

INTERNATIONAL

TEST

RESULTS

CELEBRATE

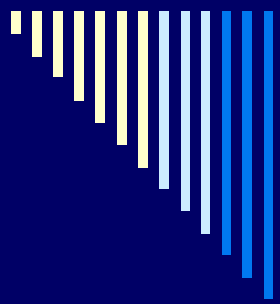
GIFTEDNESS



Kathleen Stone, Ph.D.

**World Council for Gifted & Talented Children 2013 Conference –
Louisville, Kentucky USA**

August 10 – 14, 2013



WCGTC 2013 LOUISVILLE – PROGRAM ABSTRACT

INTERNATIONAL TEST RESULTS CELEBRATE GIFTEDNESS

Kathleen Stone, Ph.D

Giftedness can be celebrated through international test results. In political discourse and the news media, worldwide test comparisons and rankings generally refer to the OECD testing program of PISA (Program of International Student Achievement), administered globally to 15 year old students. Achievement in grades 4 and 8 are documented through the testing programs of TIMSS (Trends in Mathematics and Science Study) and PIRLS (Program in Reading Language Study). There was a unique opportunity in 2011 with the alignment of the TIMSS and PIRLS testing cycles, providing concurrent transnational results in math, science and literacy. Advanced achievement scores include total mean, ranking, and sub-score data based on 90th percentile and gender distribution, as well as international benchmarks and proficiency levels. Results for TIMSS and PIRLS provide valuable data interpretation in content and cognitive sub-scores, which can become a curriculum resource for promoting content balance which would best align with international standards.

This presentation provides an overview of the 2011 TIMSS and PIRLS and PISA 2009 test results across countries, with emphasis on sub-scores related to advanced achievement and gender disparity. High achievement in TIMSS and PIRLS can suggest the potential to predict PISA test results that generate subsequent power to support policy valuing advanced achievement. An in-depth analysis of TIMSS 2011 Math scores will be used to compare a representative sample of European and Asian countries, and illustrate the rich evidence in sub-score data available to promote discourse celebrating giftedness through advancing international achievement.



OBJECTIVES

- **Analyze and Compare PISA, TIMSS, PIRLS International Test Scores**
- **Review latest test achievement in Math, Science & Reading**
- **Compare 2011 Grade 4 TIMSS & PIRLS results**
- **Outline value of Subgroup Data in relation to Gifted**
- **Celebrate Advanced Achievement through Rank & 90th Percentile**
- **Use a transnational research sample to compare achievement across Europe and Asia**
- **Increase awareness of the value and cautions in using International Test Scores for discourse in Gifted Education Policy**

PISA

Program for International Student Assessment

2000 Reading 2009

2003 Math 2012

2006 Science 2015

2009 – 65 Countries/

Jurisdictions

34 OECD & 31 Non-OECD Groups

OECD - Organization for Economic
Cooperation & Development

15 Year-Olds

<http://www.pisa.oecd.org>

Functional Skills At **End** of
Mandatory Schooling

APPLICATION of
PROBLEM-SOLVING
to real-life context.

Scores: Combined
& **SUB-SCALES**

90th Percentile Scores

PROFICIENCY LEVELS 1 – 6

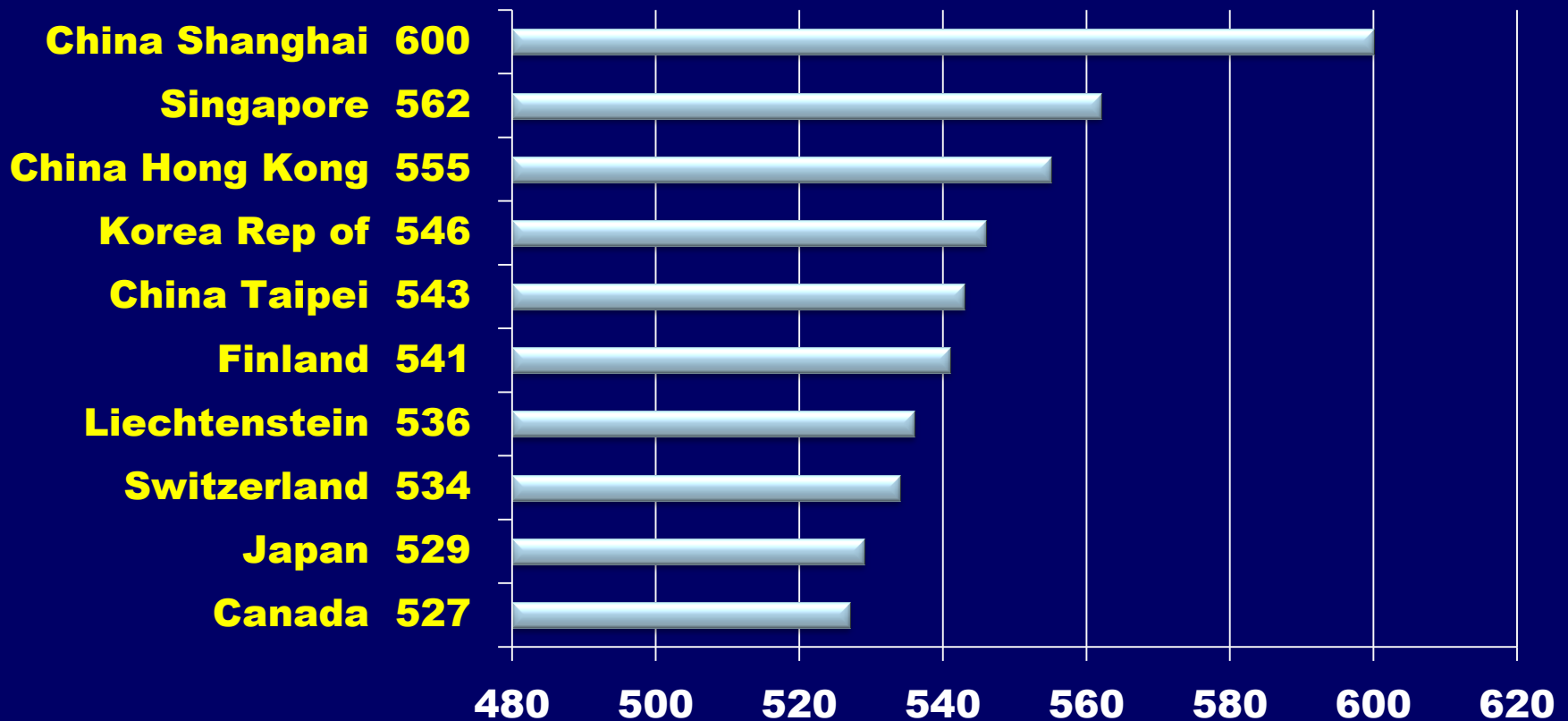
GENDER Differences

Race/Ethnicity

PISA “Effect” Indirect but
Influential Tool of Education

MATH - PISA Rank 1 - 10

PISA 2009 MATH – Age 15



SCIENCE - PISA Rank 1-10

PISA 2009 SCIENCE – Age 15



READING - PISA Rank 1-10

PISA 2009 READING – Age 15

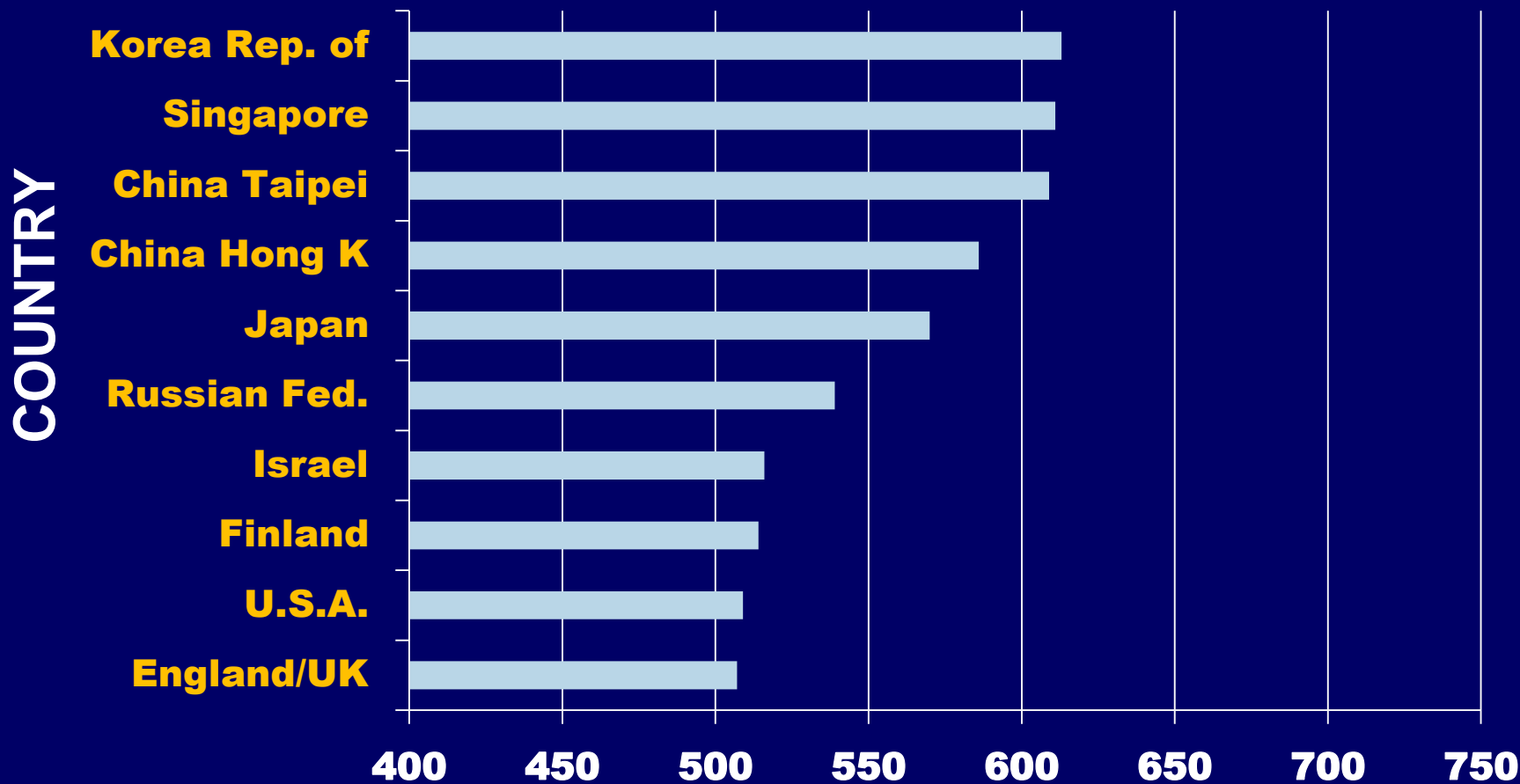




TIMSS/11 Trends in International TM4-8 TS4-8 Math & Science Study

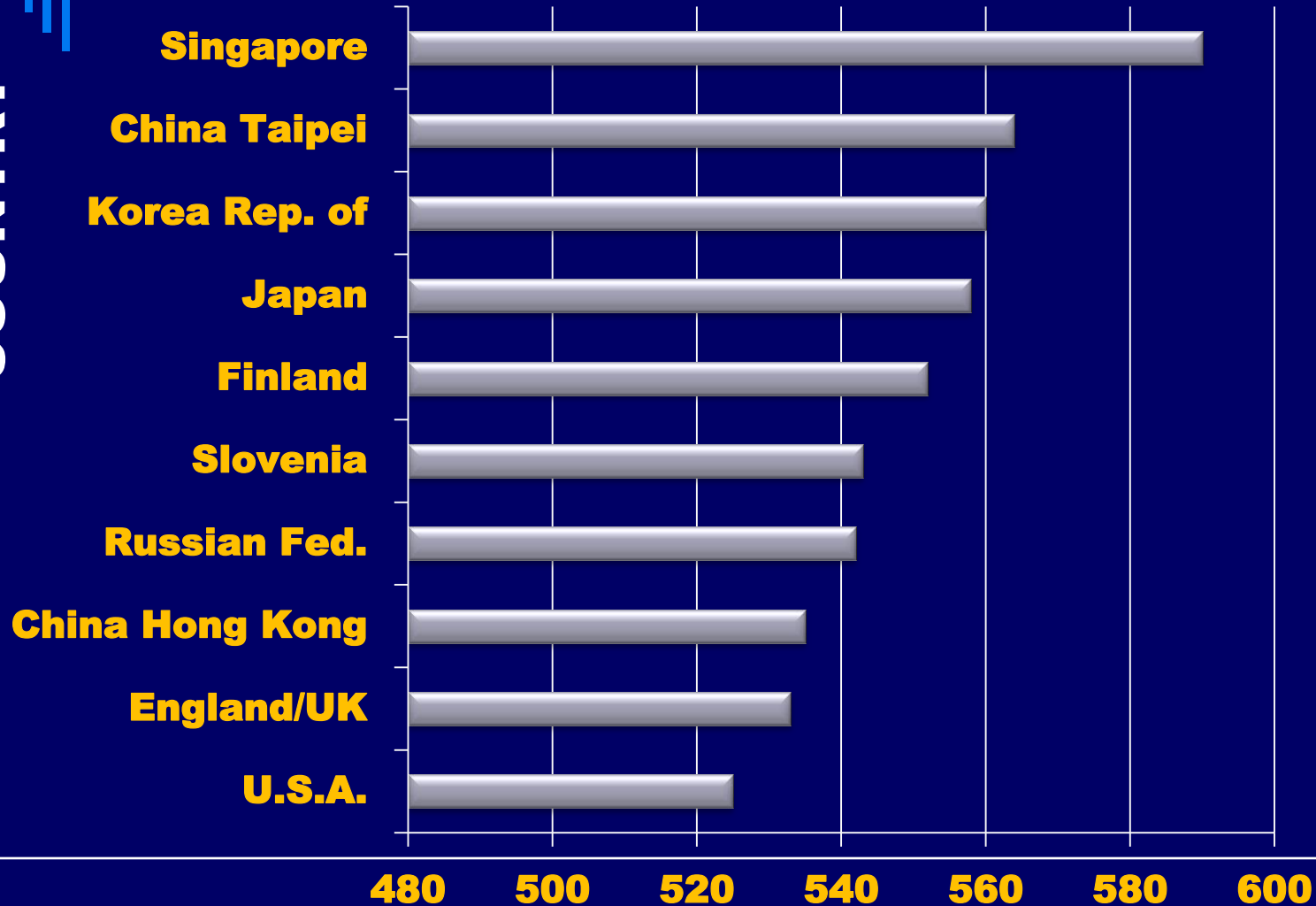
- 1995 1999 2003 2007
2011 (Pub. Dec. 2012)
- Every 4 Years
- Gr. 4 - 52 Countries
- Gr. 8 - 45 Countries
- 150-200 Schools
- 600,000 Students
- Approx. 4,000 Per Country
- **MATH & SCIENCE**
- **90+% Percentile Score**
- International **Benchmarks %**
Advanced (625) High (550)
- Multiple Choice 50-51%
- Constructed Response 49-50%
- **CONTENT & COGNITIVE** Domains
- Grade 8 – Math (Includes **Algebra**)
- **GENDER** Comparison
- Race/Ethnicity
Asian, White, Hispanic, Black
- School **POVERTY** Level
Related to Achievement
- **TRENDS** (Cohort 2007 Gr. 4, 2011 Gr. 8)
- **TIMSS & PIRLS International Study Center**
Lynch School of Educ. Boston College
http://timss.bc.edu/TIMSS2007/intl_reports.html
- IEA Intl. Assn. for Evaluation of Educational Achievement

TIMSS 2011 MATH – Grade 8

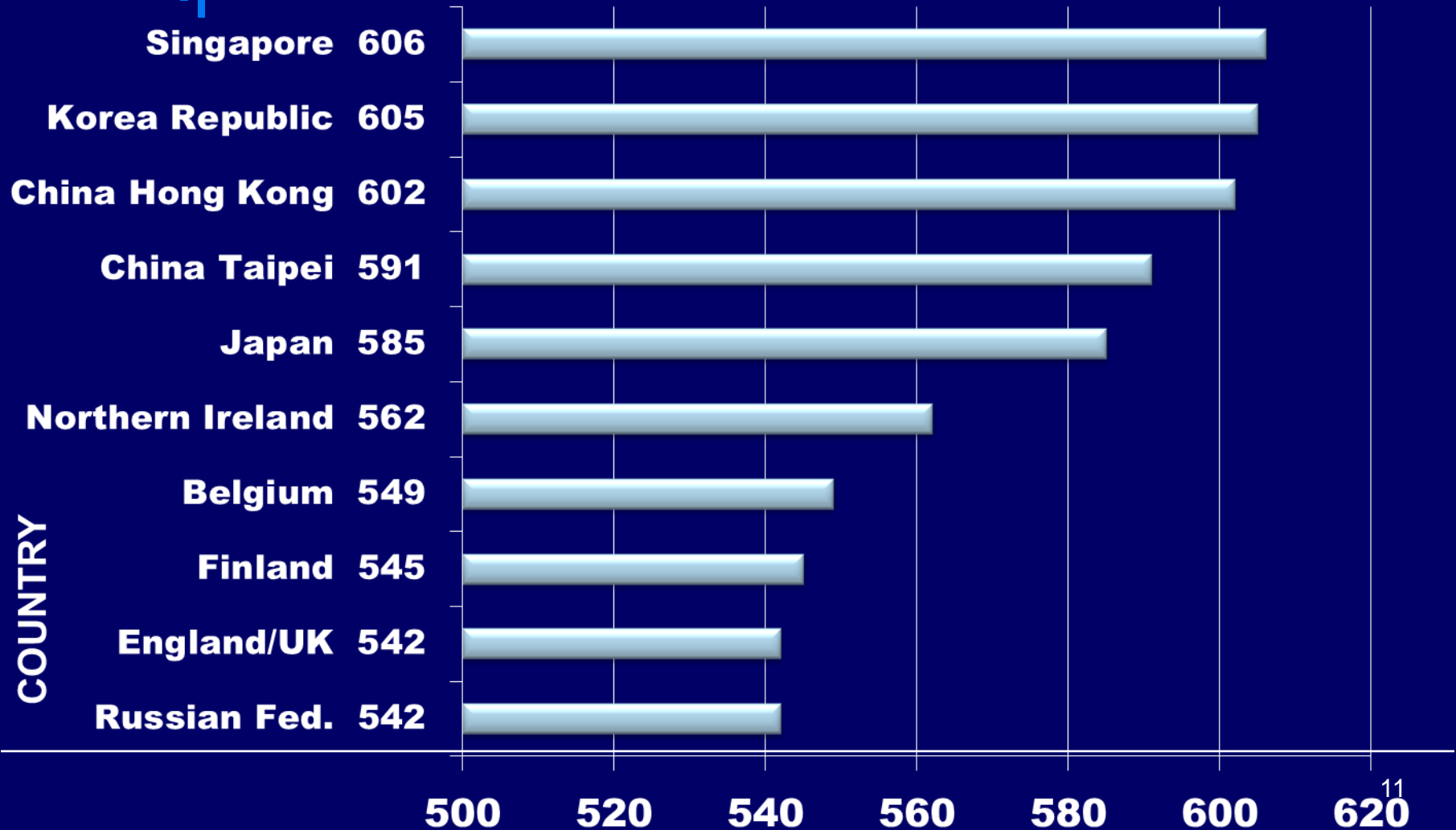


TIMSS 2011 SCIENCE – Grade 8

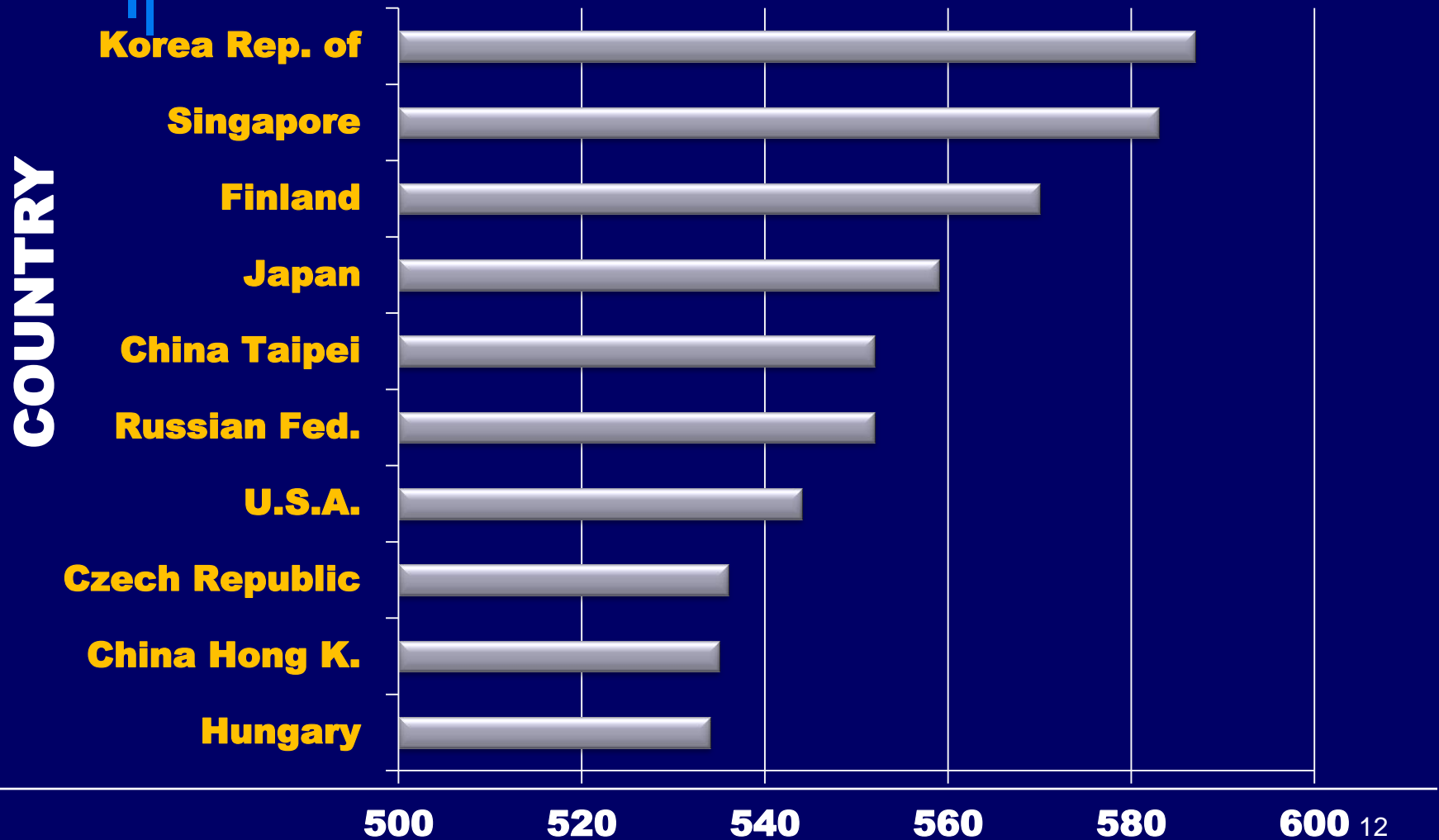
COUNTRY



TIMSS 2011 MATH – Grade 4



TIMSS 2011 SCIENCE – Gr. 4





PIRLS Progress in International Reading Literacy Study

2001

2006

2011

GRADE 4

Every 5 Years

2011 – 45 Countries

+9 Benchmarking Regions

Pre-PIRLS (End Primary) 3 Countries

COMBINED READING

SUB-SCALES:

Literary

Informational

4,000 Students - 150-200 Schools

Total Students – 325,000

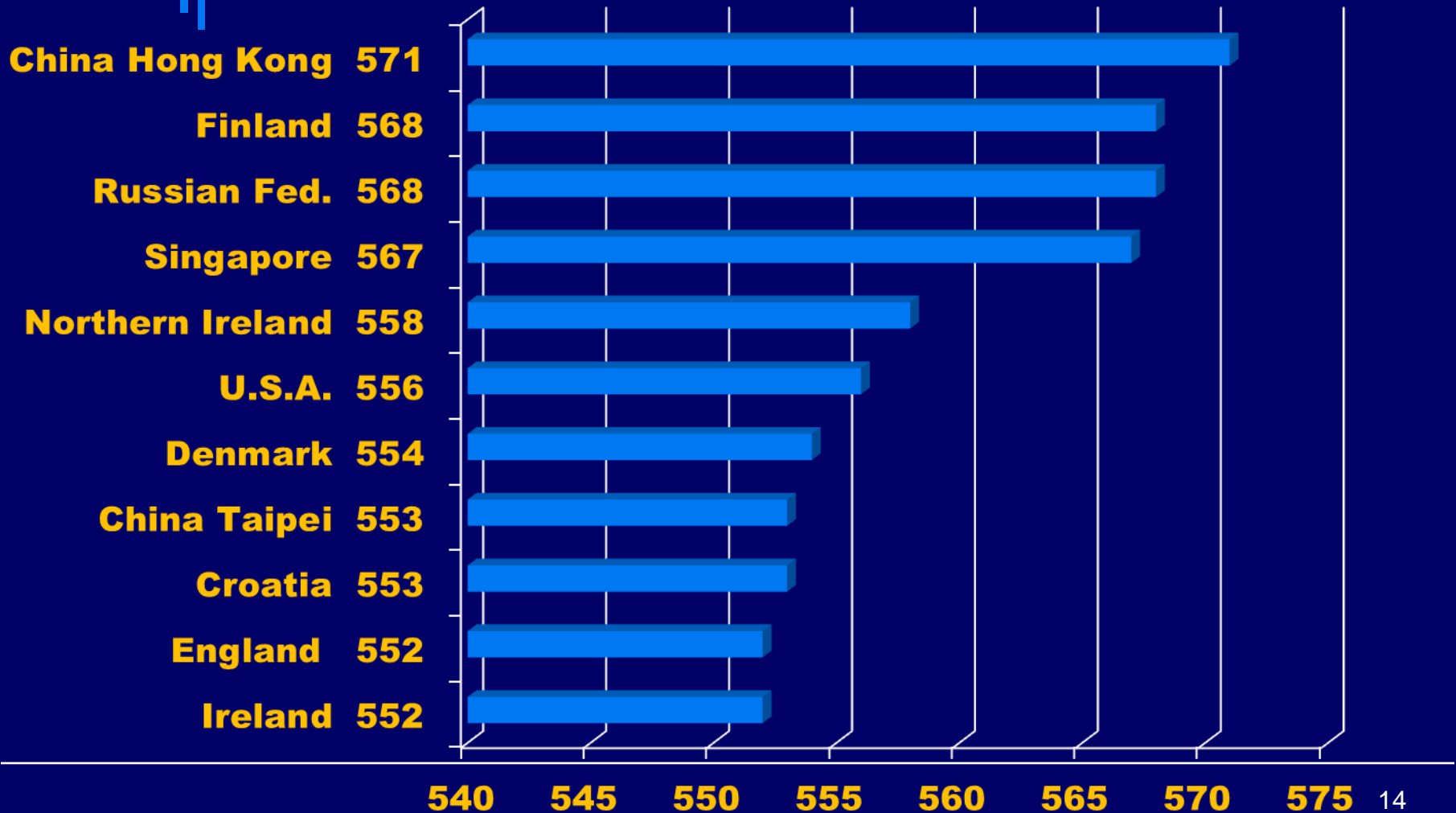
INTERNATIONAL BENCHMARKS:

ADVANCED (625)

HIGH (550)

- GENDER - Female Higher (Gap higher for Literacy)**
- RACE/ETHNICITY**
- Reading Literacy Survey**
- School Characteristics**
- Instructional Practice**
- Teacher Preparation**
- Home Survey**

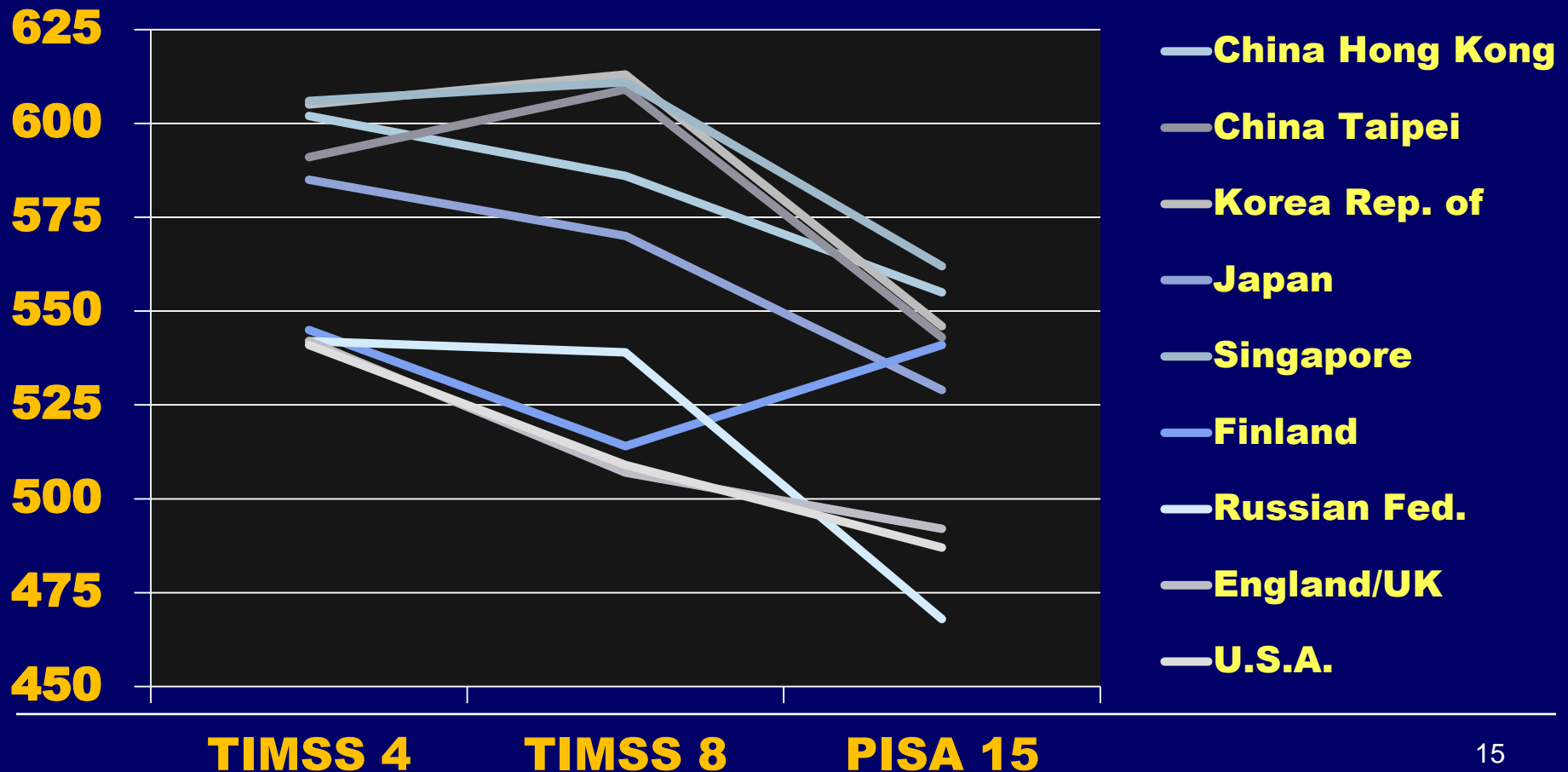
PIRLS 2011 READING – Gr. 4



MATH – High Score Pattern

TIMSS Higher Than PISA

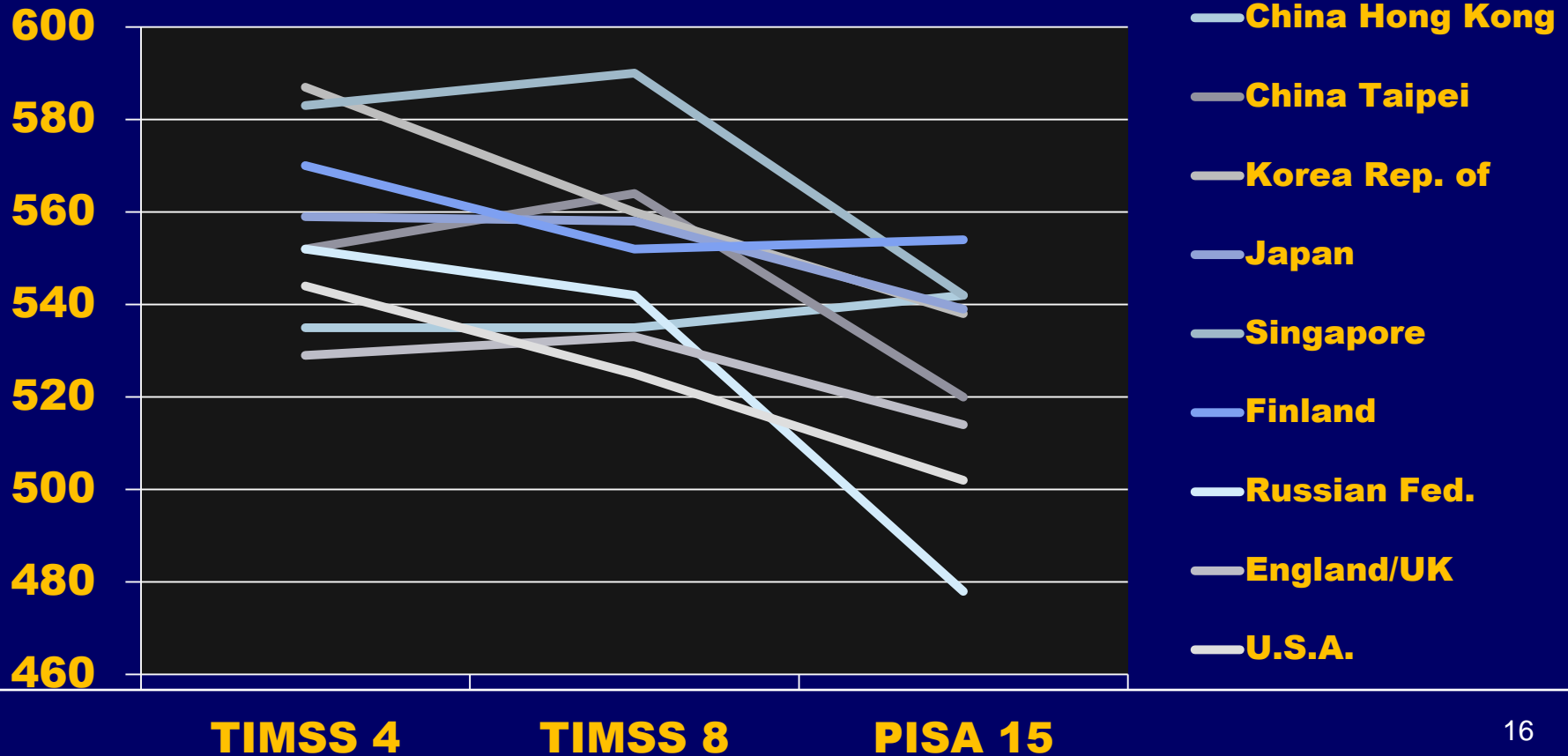
MATH HIGH SCORING COUNTRIES



SCIENCE - High Score Pattern

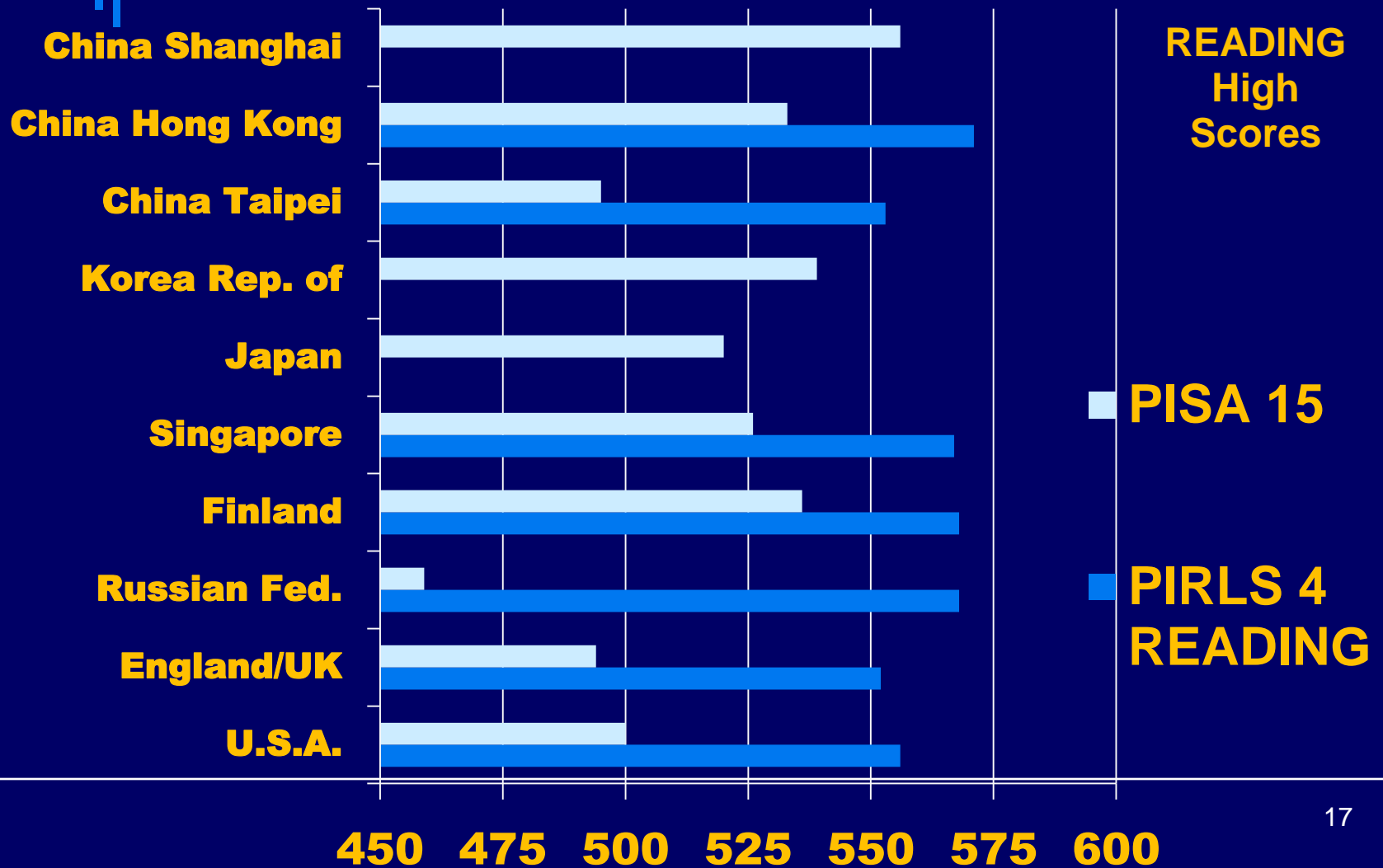
TIMSS Higher Than PISA

SCIENCE - HIGH SCORING COUNTRIES

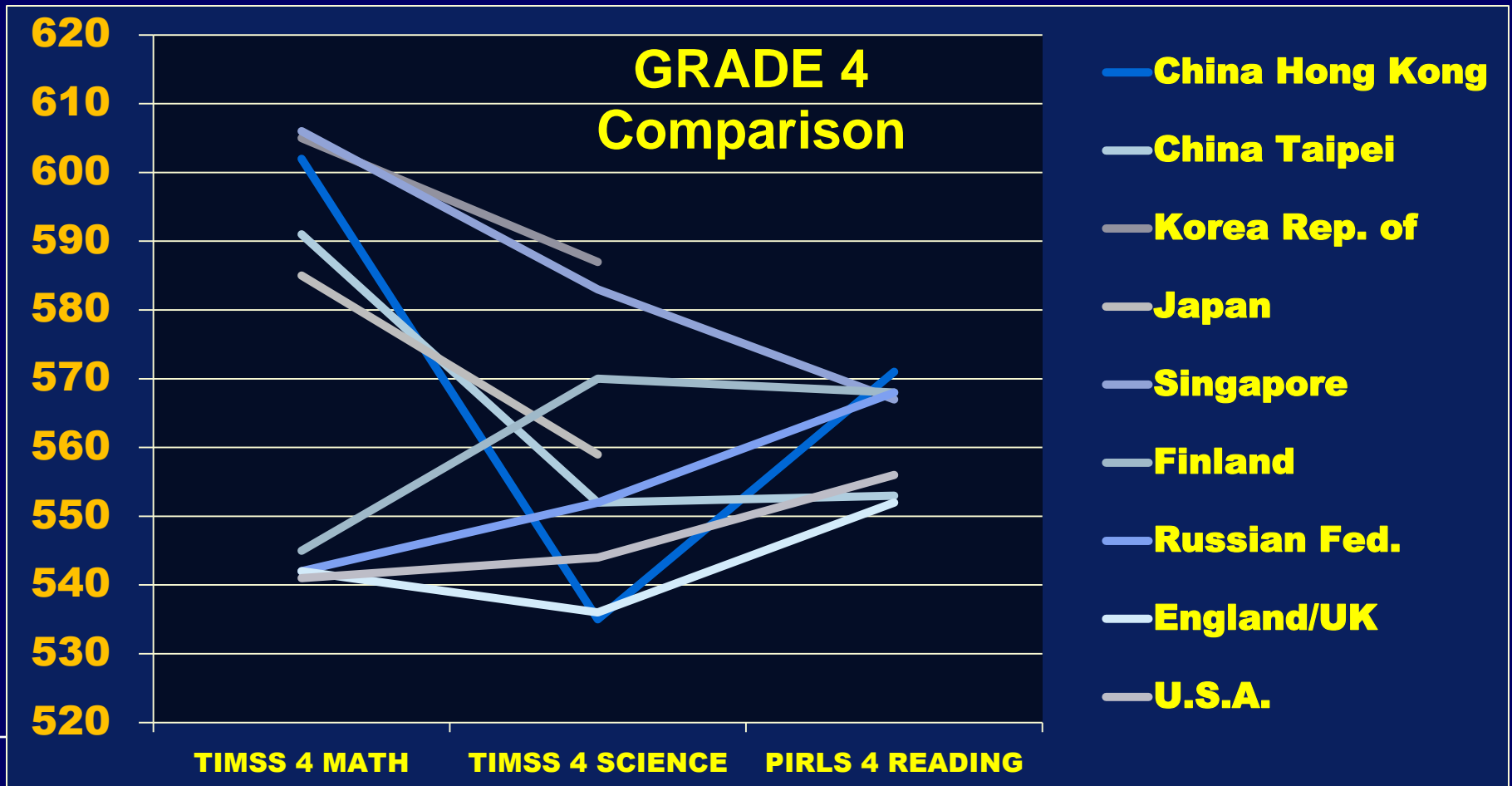


READING - High Score Pattern

PIRLS Higher Than PISA



2011 - GRADE 4 TIMSS & PIRLS Unique Comparison Year





TIMSS MATH SURVEY

HOME ENVIRONMENT

- Home Resources
- Books in Home
- Own Room / Internet
- Parent Educ/Occupation
- Speak Language of Test
- Parent Expectations
- Student Expectations
- Early Numeracy



SCHOOL RESOURCES

- Location 100,000+
- SES 25% Affluent
- Sch. Test Lang. 90+%
- Teacher Conditions
- Math Vacancies Filled
- Size School Library
- Computers Available





TIMSS MATH Survey

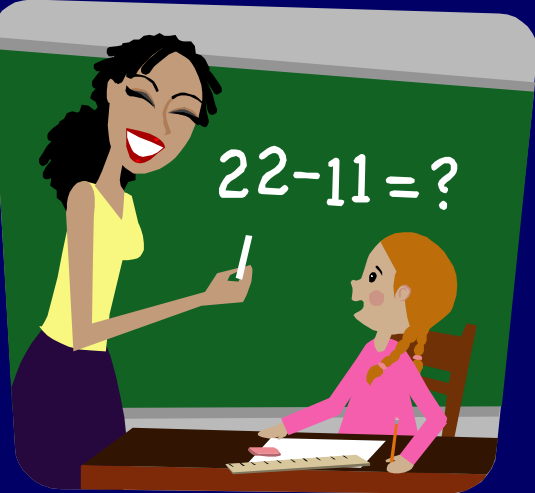
SCHOOL CLIMATE

- Emphasis **Academic** Principal & Teacher
- Safe/Orderly** School
- School **Discipline**
- School **Safety**
- Less **Bullying**

TEACHER MATH ED

- Postgrad/BA** Degree
- Major Math/Math Ed.**
- 10+ Years** Experience
- Prof Dev. **Math Content**
- Teacher **Well-Prepared**
- Teacher **Confident Math**
- Capable to **Challenge**
- Teacher **Career Satisfy**





TIMSS MATH Survey

CLASS INSTRUCTION

- Like & Value Math
- Stud. Confident Math
- Math Time Hrs/Year
- Taught TIMSS Topic
- Teacher Collaborate
- Instruction Engages
- Math to Daily Life
- Students Engage in Math
- Math Prerequisite Skills
- Lack Nutrition / Sleep
- Disruptive Students
- Uninterested Student
- Math Texts/Workbooks
- Math Concrete Objects
- Computer Software
- Whole Class/Guidance
- Hours of Homework

TIMSS 2011 MATH Survey

TIMSS INCLUDES SIGNIFICANT MATH DATA & INSIGHTS

□ East Asia

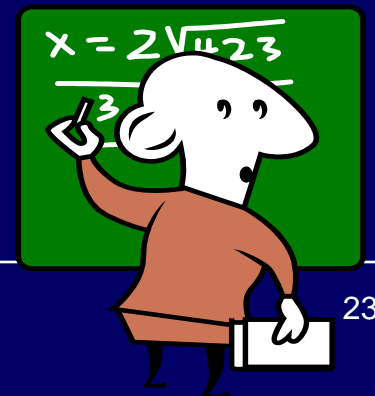
Top-Performers in
TIMSS Math

- 4th Grade More Improved
- 8th Grade More Declined
- Very High % East Asia reach Math International Benchmarks
- More Strength in Knowing Math than Applying and Reasoning
- **Early Start Crucial in Developing Math Achievement**
- Home Resources Strongly Relate to Math Achievement



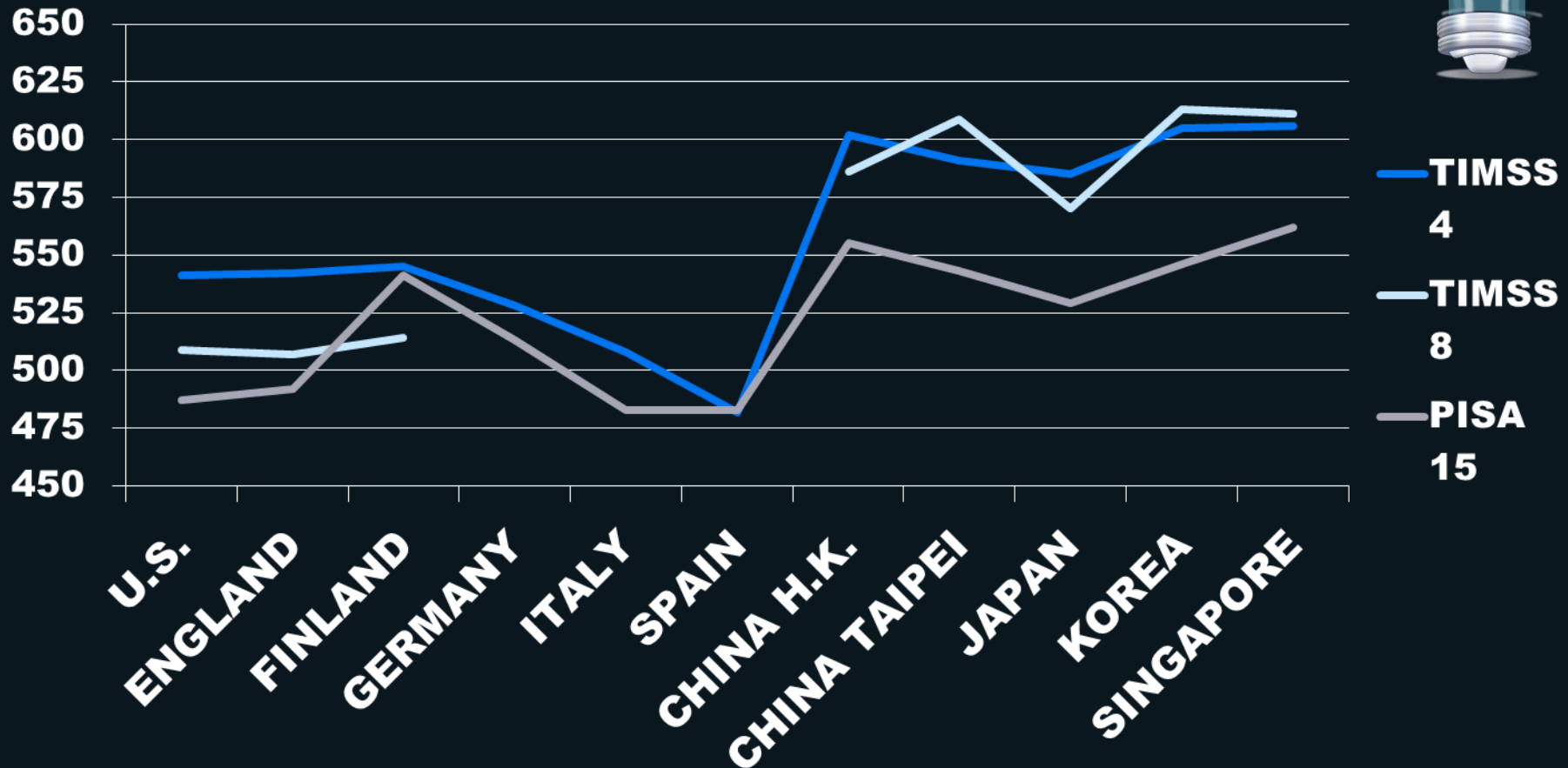
TIMSS 2011 MATH Survey

- ❑ Instruction Affected by Students Lacking in Basic **Nutrition & Sleep**
- ❑ Successful Schools: **Well-resourced**
Stress **Academic Success**
Safe & Orderly Environment
- ❑ **Teacher Preparation/Career Satisfaction** relate to Higher Mathematics Achievement
- ❑ Students with **Positive Attitudes Toward Math** have Higher Achievement
- ❑ Less Positive at Grade 8
- ❑ More **Time for Math** Instruction Teaching Math as Separate Subject
- ❑ **Engaging Instruction** Related to Higher Math Achievement



MATH - TIMSS & PISA

ASIA Consistently High





ADVANCED ACHIEVEMENT FACTORS - MATHEMATICS

- **Number of Tests** – TIMSS, PISA (Some Only PISA)
- **Years of Participation** in Testing
- **Country Comparisons** – Europe 50 – EU 27
- **CONTENT Domain** - Number, Algebra, Geometry, Data
- **COGNITIVE Domain**: Knowing, Applying, Reasoning
- **Grade 4, Grade 8, Age 15** (Application)
- **Gender, 90+ Percentile, Advanced Benchmarks**
- **Levels of Proficiency (1 – 6)**
- **Trends** over Multiple Years of Testing

□ RANK 1-20	TIMSS 4 2011	TIMSS 8 2011	PISA 15 2009
MATH Mean Range	515- 606	475- 613	501-600

VALUABLE SUBGROUP DATA

TIMSS 2011

PISA 2012

- **INTERNATIONAL BENCHMARKS**
- **PERCENTILE DISTRIBUTION**
- **CONTENT DOMAIN**
- **COGNITIVE DOMAIN**
- **GENDER**
- **TRENDS**
- **SURVEYS**



- **PROFICIENCY LEVELS 1 - 6**
- **PERCENTILE DISTRIBUTION**
- **PROBLEM-SOLVING**
- **GENDER**
- **TRENDS**
- **SURVEYS**



TIMSS 2011

INTERNATIONAL BENCHMARKS

MATH 4

NUMBER, GEOMETRY, DATA

- **LOW (400)** “DEMONSTRATE”
- **INTERMEDIATE (475)** “EXTEND”
- **HIGH (550)** “SOLVE, INTERPRET, USE”

APPLY knowledge and understanding to **solve** problems.

- **ADVANCED (625)** “ORGANIZE”
- APPLY** understanding & knowledge in variety of relatively **complex** situations & **explain reasoning**.

MATH 8



NUMBER, ALGEBRA, GEOMETRY, DATA

- **LOW (400)** “SOME KNOWLEDGE”
- **INTERMEDIATE (475)** “DEMONSTRATE”
- **HIGH (550)** “APPLY, WORK, USE, SOLVE”

APPLY understanding & knowledge in variety of relatively **complex** situations.

- **ADVANCED (625)** “APPLY, SOLVE”
- Organize & **draw conclusions** from information, make **generalizations**, & **SOLVE** non-routine problems

POSSIBLE TRANSNATIONAL RESEARCH SAMPLES

EAST ASIA FIVE DRAGONS	G8 COUNTRIES	SCANDINAVIA	P.I.I.G.S.	OTHER GROUPS?
CHINA - Shanghai	JAPAN	FINLAND	PORTUGAL	WESTERN
SINGAPORE	CANADA	ICELAND	ITALY	EUROPE
CHINA Hong Kong	GERMANY	DENMARK	IRELAND	EASTERN
KOREA Rep. of	FRANCE	NORWAY	GREECE	EUROPE
CHINA - TAIPEI	ENGLAND/ UK	SWEDEN	SPAIN	MID-EAST
JAPAN	USA			S. AMER.
	ITALY			C. AMER.
	RUSSIAN FED			AFRICA

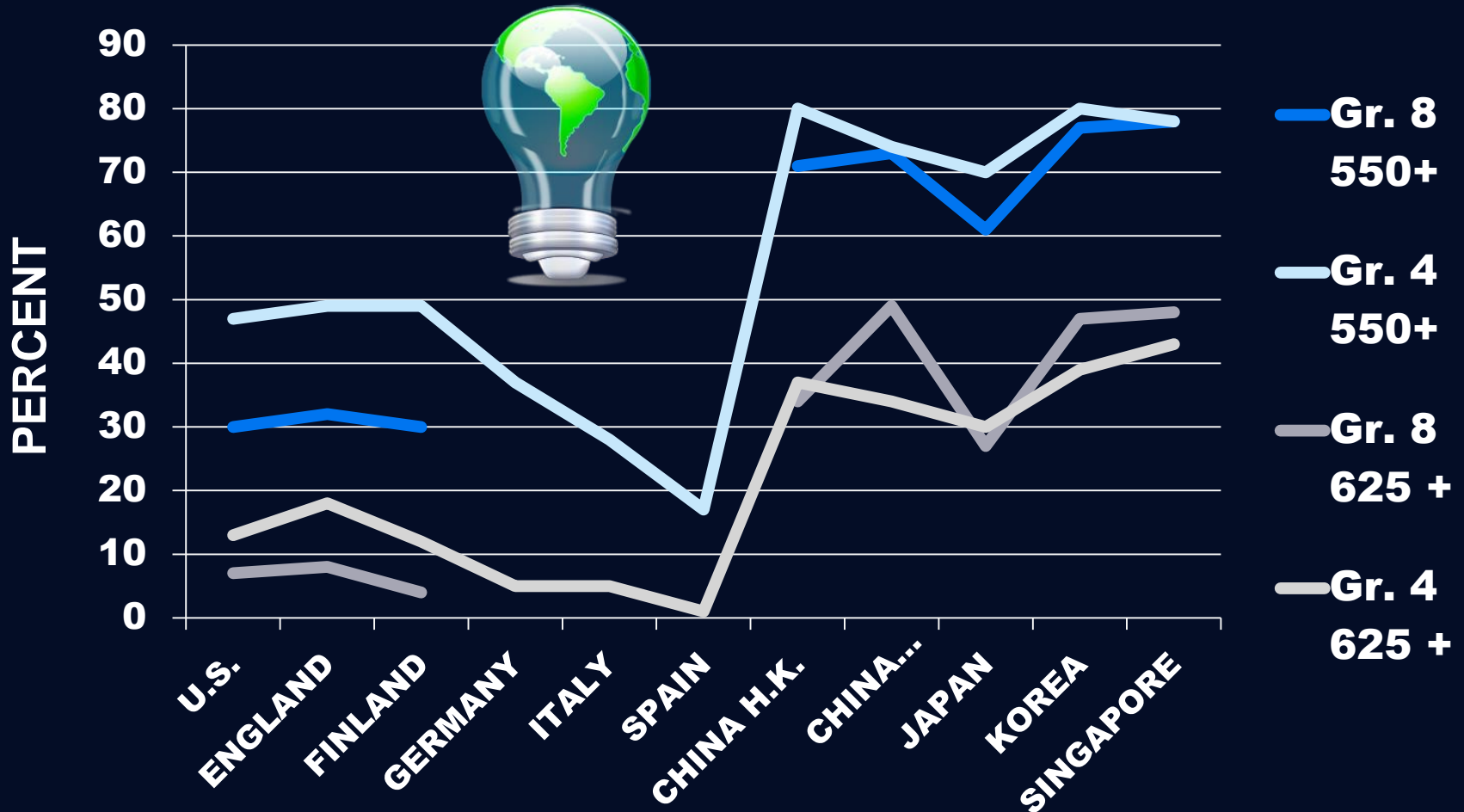


PISA – MATH – 3 TEST Sample G8 COUNTRY COMPARISON

Country	2003	Rank	2006	Rank	2009	Rank
Canada	533	7	527	7	527	10
France	511	16	495	23	497	22
Germany	503	19	504	19	513	16
Italy	466	30	462	36	483	34
Japan	534	6	523	10	529	9
Russ. Fed.	468	29	476	33	468	38
U.K.	-	-	495	23	492	28
U.S.A.	483	27	474	35	487	31

TIMSS 2011 MATH Gr. 4 & 8

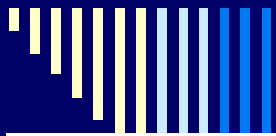
% International Benchmarks



PISA - MATH PROFICIENCY LEVELS

PRO LEV	SCORE RANGE	TASK DESCRIPTIONS
1	358 – 419	□ Answers questions involving familiar contexts where all relevant information is present & questions are clearly defined. Uses routine procedures with direct instruction.
2	420 – 481	□ Interpret & recognize situations in contexts that require no more than direct inference. Can employ basic algorithms, formula, procedures or conventions, with direct reasoning
3	482 – 544	□ Executes clearly described procedures, including sequential decisions. Select, apply simple problem-solving strategies. Interpret & use representations & reason from them.
4	545 – 606	□ Works with explicit models for complex concrete situations. Selects & integrates symbolic representations, linking to real-world. Utilize well-developed skills & reasoning
5	607 – 668	□ Develop & work with models for complex situations. Select, compare, evaluate using problem-solving strategies for complex problems. Well-developed thinking & reasoning skills, appropriate representations, symbolic & formal characterizations, with insight.
6	669+	□ Conceptualize, generalize, and utilize information based on investigations & modeling of complex problem situations. Link different sources & flexibly translate between them. □ Capable of advanced mathematical thinking & reasoning. Apply insight & understanding along with mastery of symbolic & formal math operations/relationships.





PISA Proficiency Levels 5 & 6

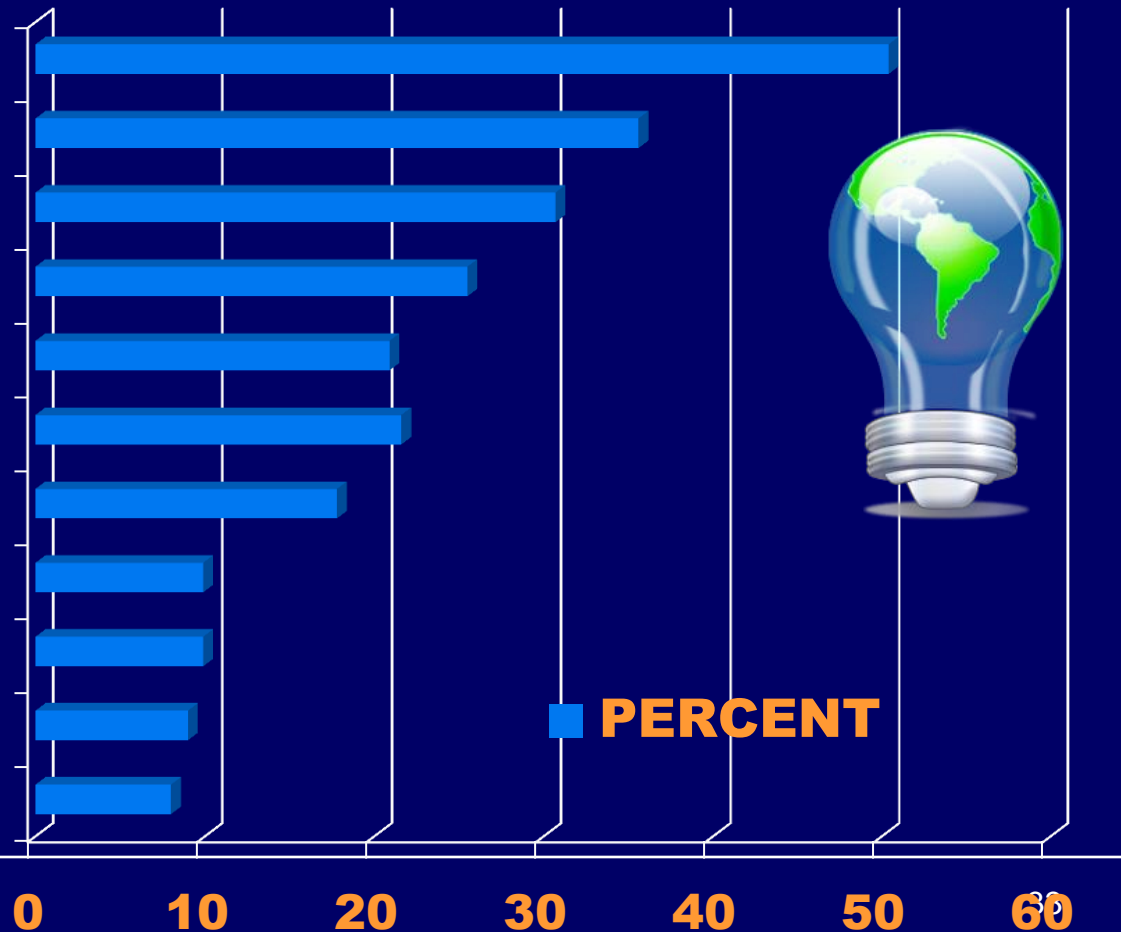
NON-EUROPE	%	WESTERN EUROPE	%	EASTERN EUROPE	%
China Hong Kong	30.7	Austria	12.9	Czech Rep. *	11.7
China Macao	17.1	Belgium	20.4	Hungary *	10.1
China Shanghai	50.4	Finland	21.6	Kazakhstan	1.2
China Taipei	28.5	France G8	13.7	Latvia	5.7
JAPAN G8 *	20.9	Germany G8	17.8	Lithuania	7.0
Korea, Rep.*	25.5	Ireland	6.7	Poland	10.4
Singapore	35.6	Italy G8	9.0	Russian Fed. G8	5.3
 OTHER		Liechtenstein	18.0	OTHER	
		Netherlands	19.8		
Australia	16.4	Portugal	9.6	Greece	5.7
Canada	18.3	Spain	8.0	Israel	5.9
New Zealand	18.9	Switzerland	24.1	Serbia	3.5
U.S.A.	9.9	United Kingdom	9.9	Turkey	5.7

PISA 2009 - MATH

Proficiency Levels 5 & 6 - %

**PISA PROFICIENCY
LEVELS 5 & 6**

CHINA SHANGHAI	50.4
SINGAPORE	35.6
CHINA HONG KONG	30.7
KOREA REP. OF	25.5
JAPAN	20.9
FINLAND	21.6
GERMANY	17.8
ENGLAND	9.9
U.S.	9.9
ITALY	9
SPAIN	8



CONTENT DOMAINS

MATH Sub-Score Data

TIMSS4

- NUMBER 50%
- ALGEBRA 30%
- GEOMETRY/MEAS. 35%
- DATA/PROB. 15%

TIMSS8

- 30%
- 20%
- 20%

PISA

- Number 38%
- Algebra 8% (Lower)
- Measurement 9%
- Geometry 14%
- Data 31% (Higher)

(Wu 2009)

□ CONTENT DOMAIN %

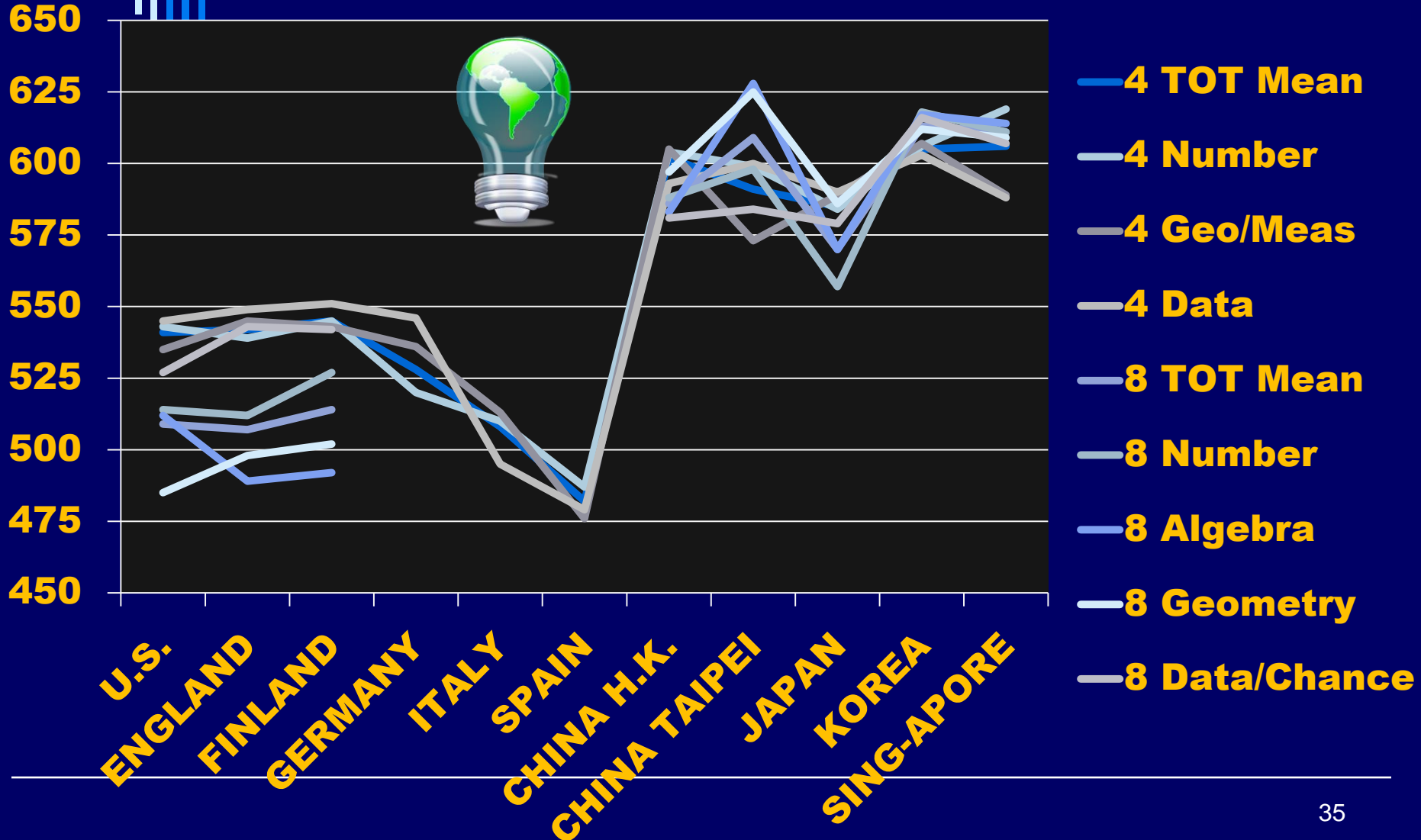
on test items can be a resource to **BALANCE** distribution in Standards.



□ CONTENT BALANCE %

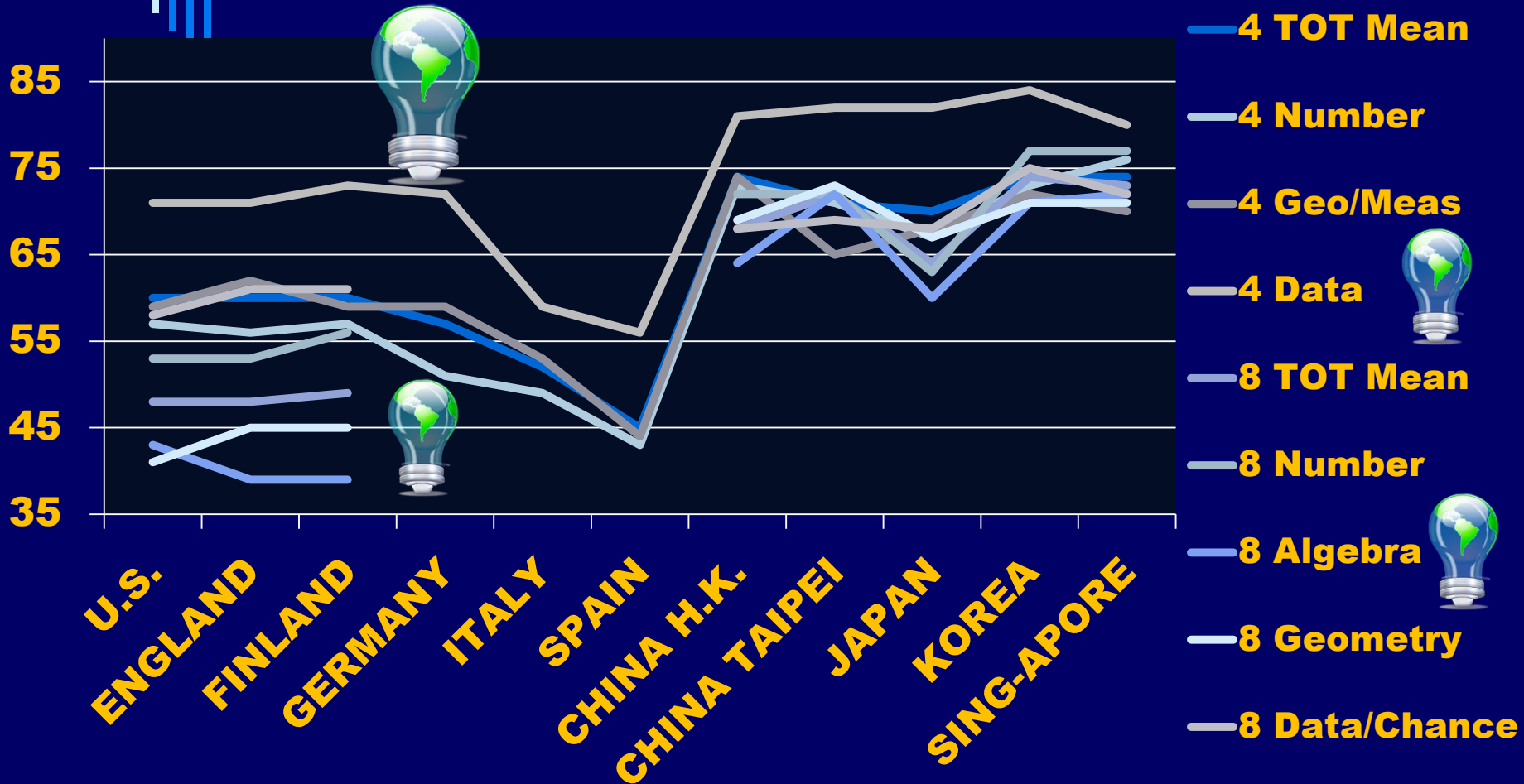
outlined in a Country's Curriculum Standards in Grades 4 and 8 may not correlate with % of Content used in test items.

TIMSS 2011 MATH CONTENT Domain



TIMSS 2011 MATH

CONTENT Domain % Correct



TIMSS 2011 MATH

GRADE 4 GRADE 8

COGNITIVE DOMAIN

- Knowing 40%
- Applying 40%
- Reasoning 20%

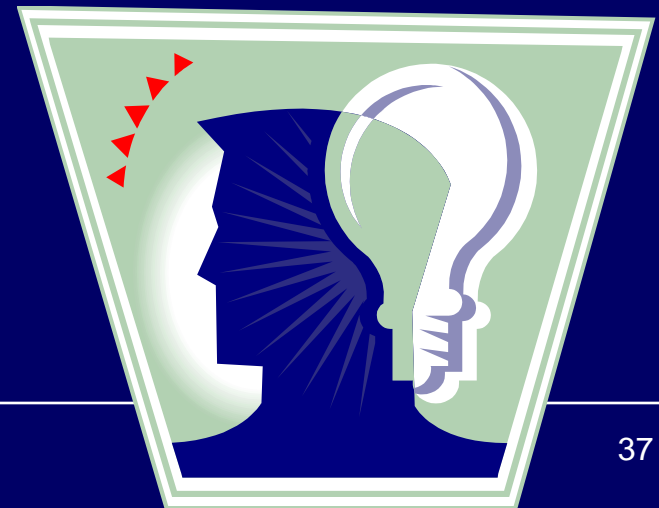
COGNITIVE DOMAIN

- Knowing 35%
- Applying 40%
- Reasoning 25%

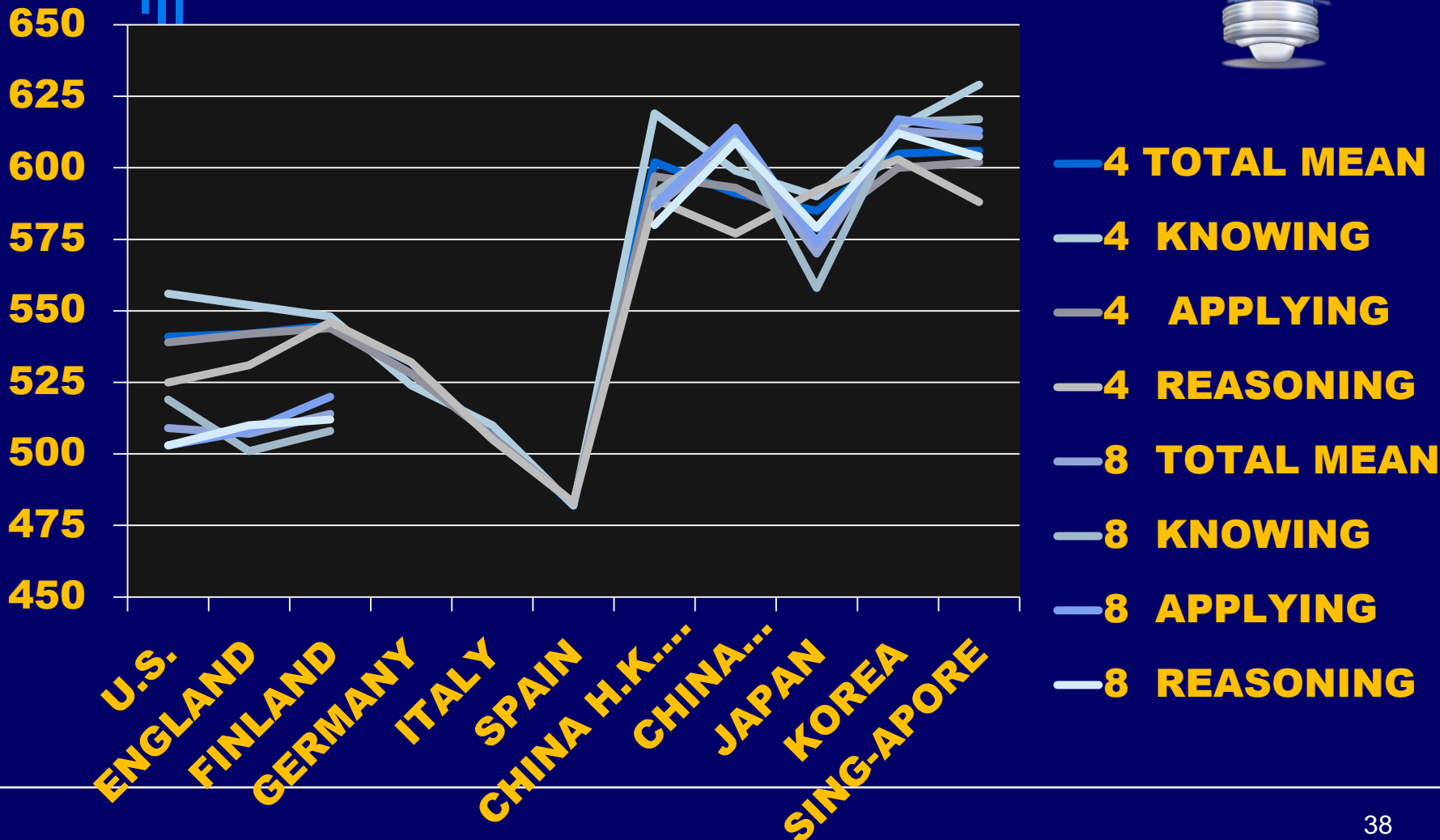


□ Higher Order Thinking Skills!!!

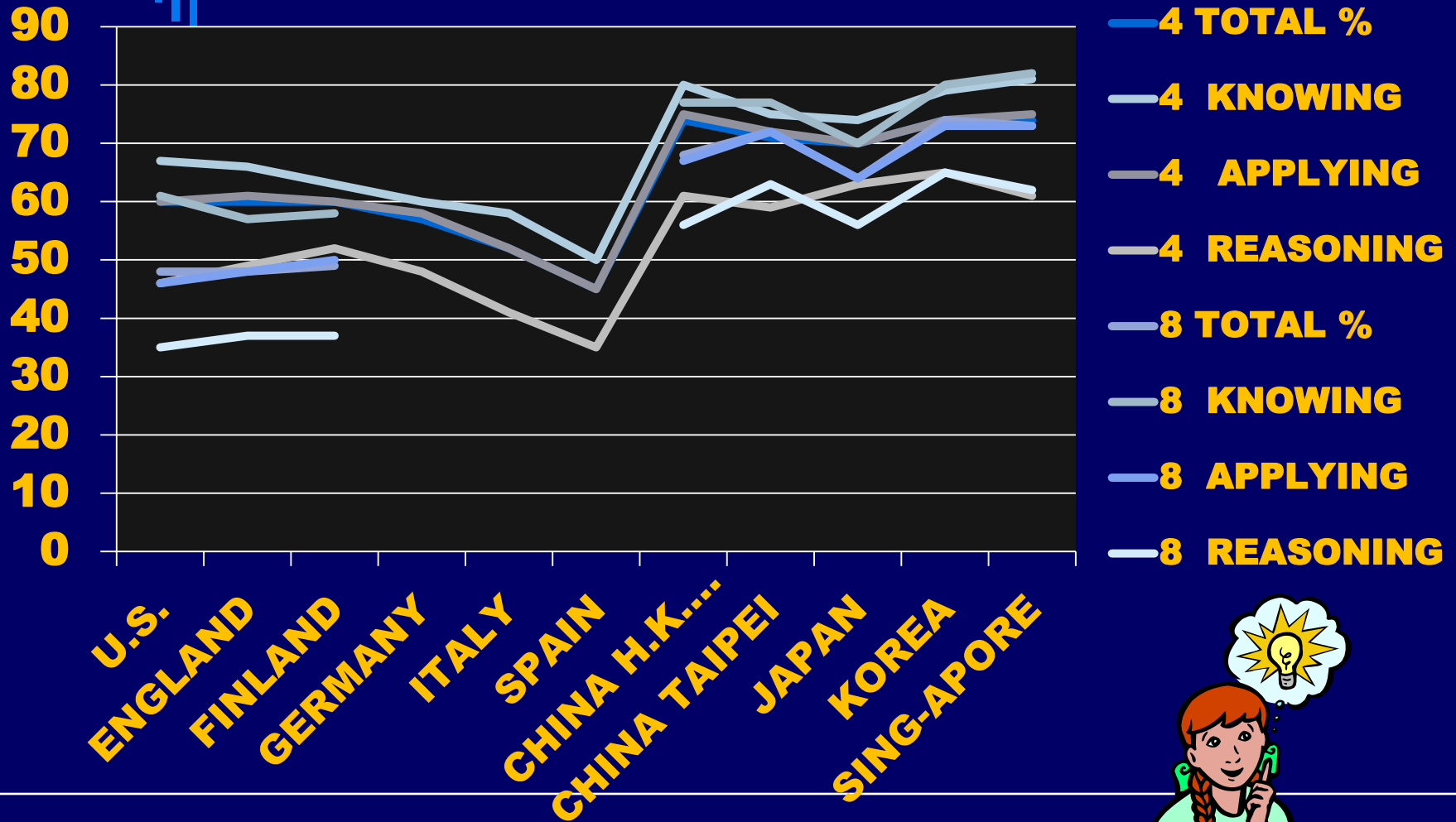
□ Bloom's Taxonomy



TIMSS 2011 MATH COGNITIVE Domain



TIMSS 2011 MATH COGNITIVE %





GENDER - TIMSS MATH 2011

TREND: Few Decreases in Existing Gender Gaps

GRADE 4 – 50 COUNTRIES

**LITTLE ACHIEVEMENT
DIFFERENCE BETWEEN
GIRLS (490) & BOYS (491)**

26 NO SIGNIFICANT DIFFERENCE

20 SMALL DIFFERENCE BOYS+

**4 RELATIVELY LARGER
DIFFERENCE FAVORING GIRLS
Qatar, Thailand, Oman, Kuwait,
United Arab Emirates**

GRADE 8 – 42 COUNTRIES

**LARGER GENDER
DIFFERENCES FAVOR
GIRLS (469) – BOYS (465)**

22 NO SIGNIFICANT DIFFERENCE

7 SMALL DIFFERENCE BOYS+

**13 DIFFERENCES FAVOR GIRLS
(Middle East Arabic-Speaking)
Qatar, Oman, Kuwait, Abu Dhabi,
UAE, Palestinian National
Authority, Jordan, Bahrain, Oman**



MATH - GENDER Variance

PISA 2009

How do girls compare to boys in mathematics skills?

- In 35 out of 65 countries, boys score significantly higher in math than girls.
- Boys have substantial score advantage of 20-33 Points:
 - Belgium, Chile, Switzerland, U.K.
 - USA, Colombia, Liechtenstein.
- 4 out of 6 Highest Countries - Little or no gender difference in math.
- Girls – Level 6 At least 10%
Chinese Taipei, Singapore, China Shanghai

POLICY RELEVANCE

- Increase Motivation & Accelerated **MATH** Opportunities for **FEMALES**
- Decrease in **GENDER** variance may increase **MATH** test scores.
- **FEMALE** or **MALE MATH** score differences support evidence for realistic goal of **GENDER EQUITY**.
- Evidence that Females have Math ability equal to math achievement of **Males**.



90TH PERCENTILE - PISA MATH 2009

90% = Significant G/T Policy Evidence

ASIA

- CHINA-SHANGHAI 726
- SINGAPORE 693
- JAPAN 648

WESTERN EUROPE/U.S.

- SWITZERLAND 658
- BELGIUM 646
- FINLAND 644
- U.K. 606
- U.S. 607

EASTERN EUROPE

- CZECH REP. 615
- POLAND 609

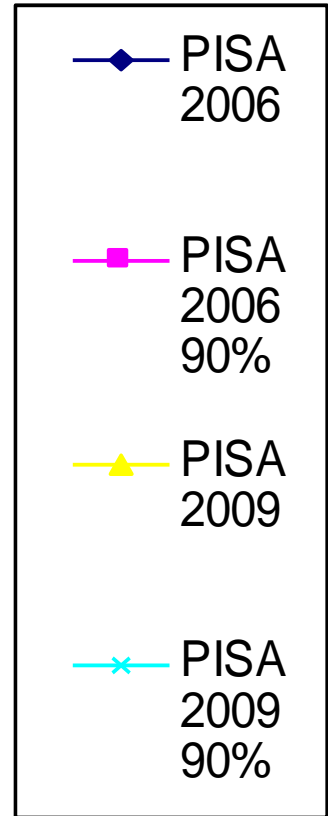
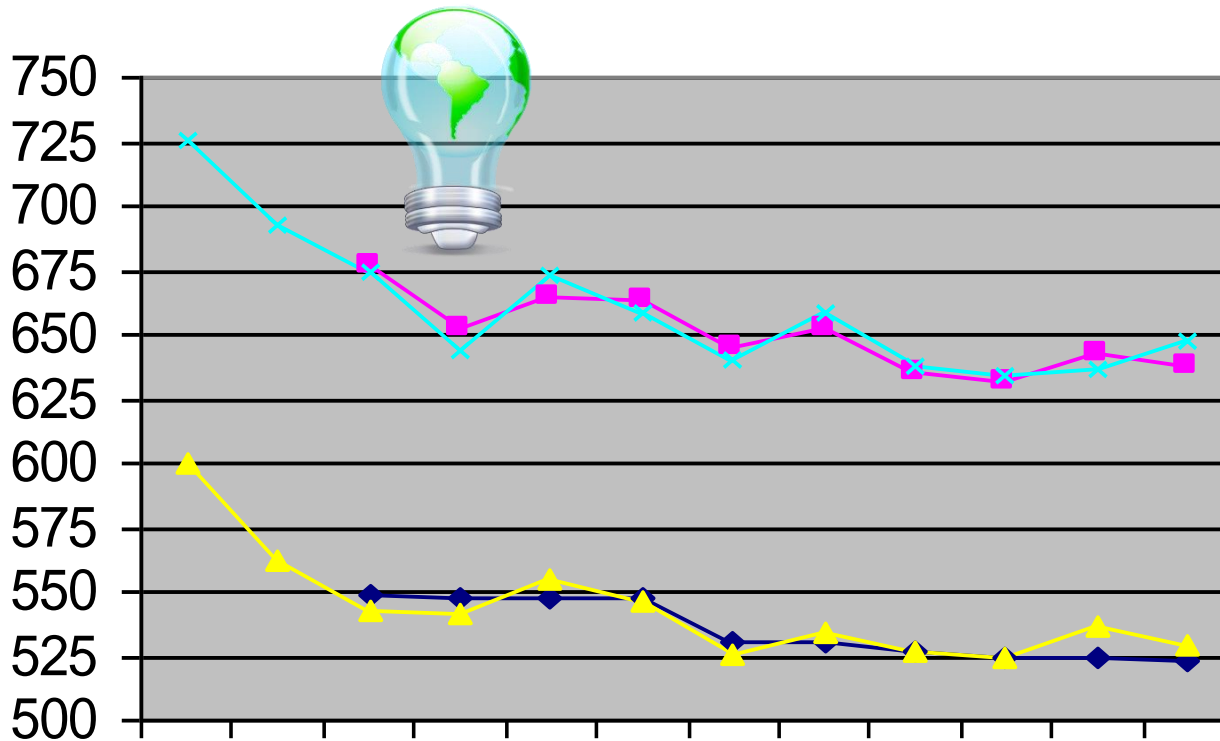
- 90% Score can be used as **DATA** to support G/T Programming and Advanced MATH Curriculum.

- Increase in 90% MATH Score can be factor in raising the mean score for the country.

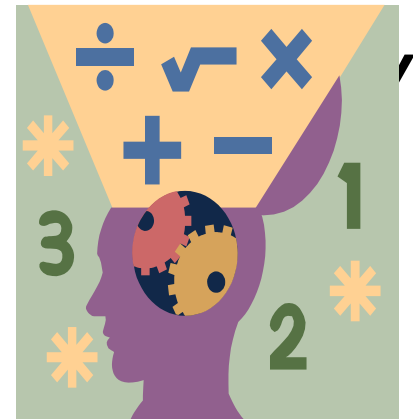
- 90% MATH Score comparisons can be used as support for policy for Advanced MATH and **CONTENT BALANCE** in curriculum development.



PISA MATH TOP SCORE PROFILES

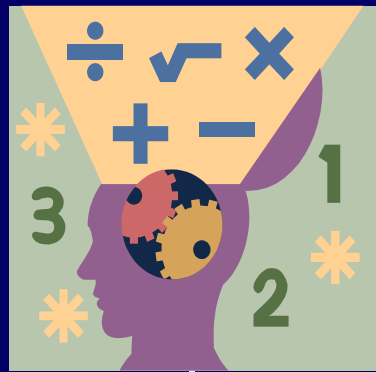


China Shanghai
 Singapore
 Chinese Taipei
 Finland
 China Hong Kong
 Korea
 Netherlands
 Switzerland
 Canada
 China Macao
 Liechtenstein
 Japan



PISA MATH 2009 FINDINGS

(OECD 2010)



How Countries Perform in Mathematics Overall

- China Shanghai and Singapore much higher
- OECD Average: $\frac{1}{2} - 1$ Proficiency Level above:
 - Canada, Finland, Japan, Korea, Netherlands, Switzerland, Hong Kong
 - Chinese Taipei, Macao
 - China, Liechtenstein
- Wider range of scores in math than reading.
- East Asian show largest advantage over others.

What Students Can Do in Mathematics? *OECD

Proficiency Levels 5 & 6

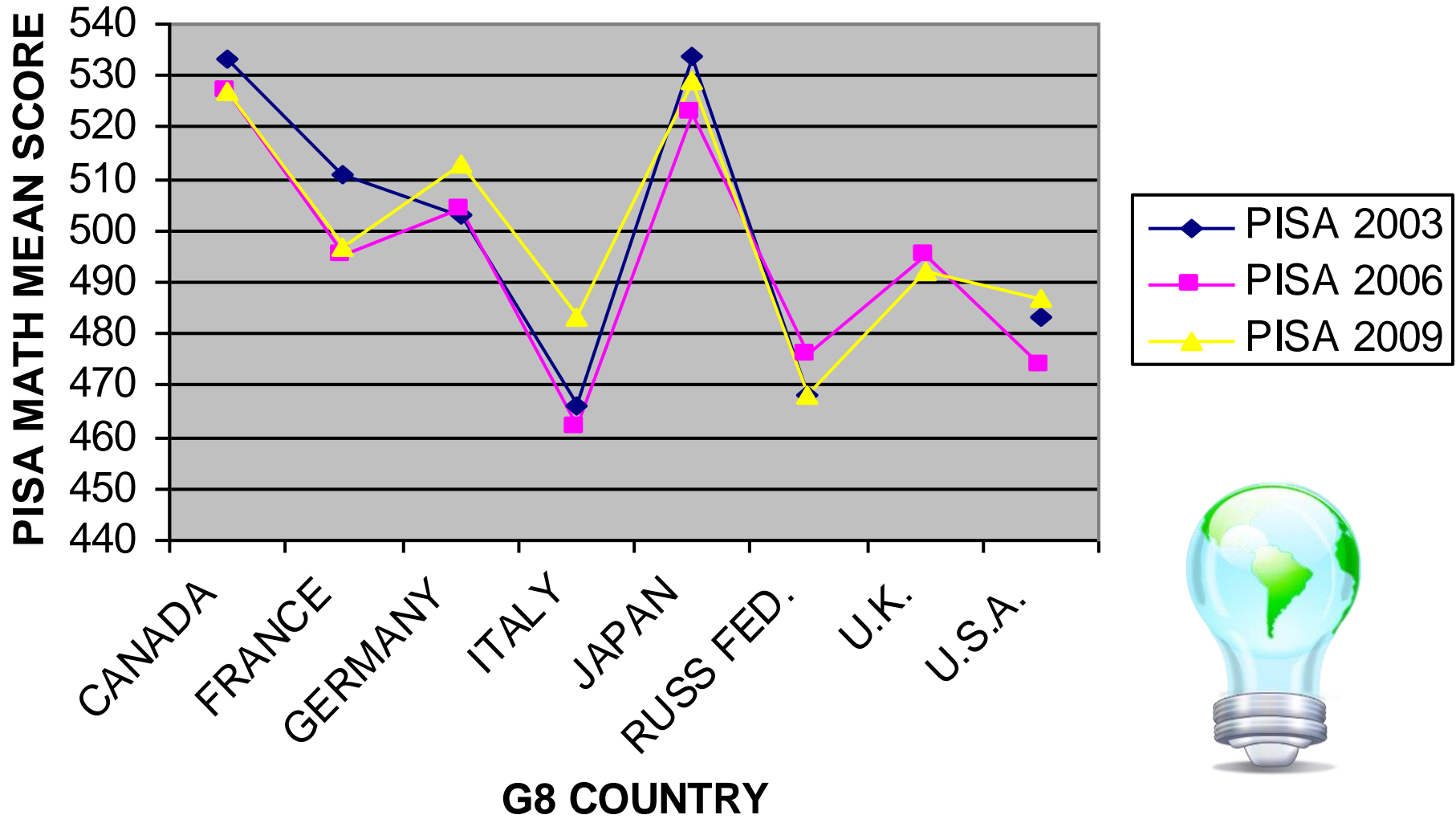
- OECD Avg. 1 in 8 13%
- Korea* (OECD High) 26%
- Chinese Taipei 29%
- Hong Kong 31%
- Singapore 36%

Proficiency Level 6

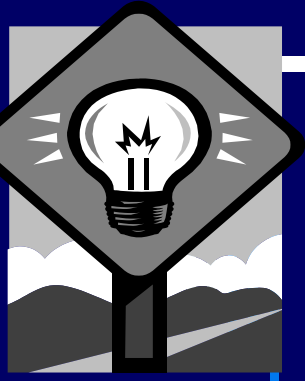
- OECD Avg. 3%
- Korea* 8%
- Switzerland* 8%
- Singapore 16%
- Shanghai China 27%



PISA MATH TREND - 3 TEST CYCLES



SAMPLE G8 TREND COMPARISON



PISA MATH TRENDS 2003 – 2009

(OECD 2010)

IMPROVED

8 Countries

- Improved in 8
- 7 of 8 countries showing better performance still well below OECD Average

Italy, Portugal, Greece

Mexico, Turkey, Brazil, Tunisia

- Mexico (+33), Brazil (+30) largest improvement
- Significant improvement among lowest-performing students: Mexico, Turkey
- **Germany** improved to above-average levels.

UNCHANGED

22 Countries

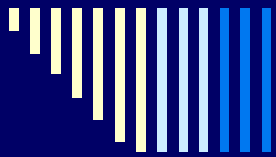
- Mean remained unchanged across 28 OECD countries.

NOTE: PISA 2003 provides results in MATH that were measured with more precision than PISA 2006 and PISA 2009, since the PISA 2003 MATH focus devoted more testing time to Mathematics. Changes are reported where they are statistically significant.

DECLINED

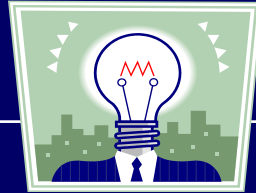
9 OECD Countries

- 8 of 9 who declined had been at or above 2003 OECD average
- **Netherlands**: Drop of 12 points but remains among highest-scoring countries.
- Drop in score but still above OECD average: **Australia, Belgium, Denmark, Iceland**
- Drop from above-average to OECD average: **Czech Rep., France, Sweden**
- **Ireland**: Drop from OECD Average to below average.



MATH G/T POLICY - Data Evidence

TIMSS



PISA

TIMSS

1995 1999 2003 2007 2011

- Results of **TIMSS 2011** Testing Released Dec. 2012
- 90th PERCENTILE Data
- ADVANCED INTERNATIONAL BENCHMARKS Data
- CONTENT Domains
- COGNITIVE Domains
- GENDER – Sub-Scales in each test cycle provide data as evidence for MATH differences.

PISA 2000R 2003M 2006S 2009R 2012M

- **MATH** Subgroup Data
- PISA **2003** and **2012** are test cycles with special focus & in-depth analyses in **MATH**.
- Results of **PISA 2012** testing will provide extensive analyses in **MATH**.
- GENDER – PISA Math Sub-Scales provide data supporting MATH differences.
- **PROFICIENCY LEVELS 1-6** can be reviewed in future MATH curriculum development for high achievement.



TIMSS 2011 SCIENCE DOMAINS

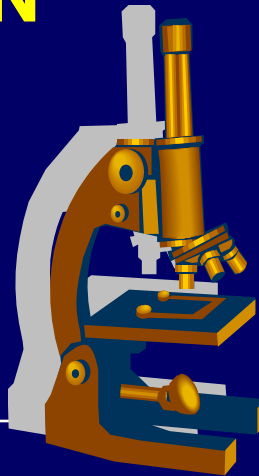
GRADE 4 GRADE 8

CONTENT DOMAIN

- Life Science 45%
- Physical Science 35%
- Earth Science 20%

COGNITIVE DOMAIN

- Knowing 40%
- Applying 40%
- Reasoning 20%



CONTENT DOMAIN

- Biology 35%
- Chemistry 20%
- Physics 25%
- Earth Science 20%

COGNITIVE DOMAIN

- Knowing 35%
- Applying 35%
- Reasoning 30%

SCIENCE SURVEY

MATH ITEMS - REPEATED in SCIENCE

TIMSS 2011 International Results in Science (2012)

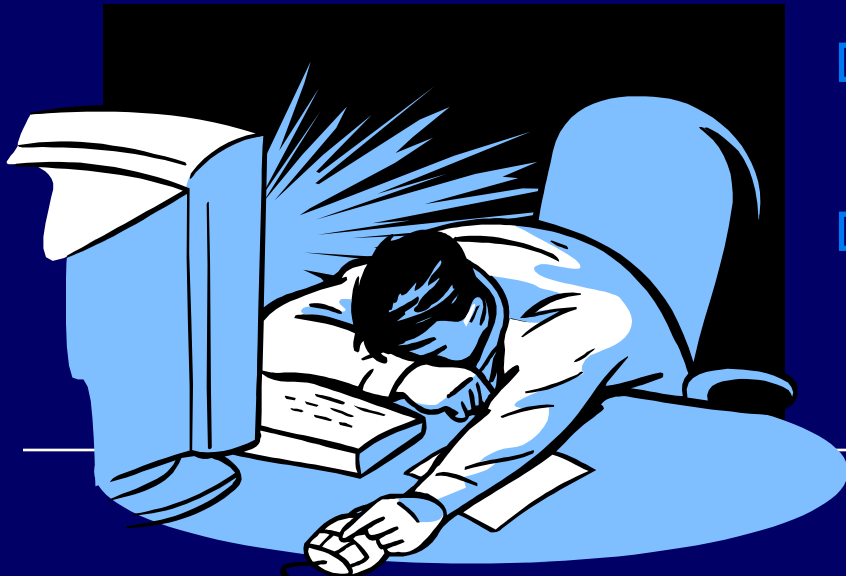
- Chapter 4 - Home Environment Support for Science Achievement
- Chapter 5 - School Resources for Teaching Science
- Chapter 6 - School Climate
- Chapter 7 – Teacher Preparation
- Chapter 8 – Classroom Instruction



TIMSS 2011 SCIENCE SURVEY

TIMSS
INCLUDES
SIGNIFICANT
SCIENCE DATA

- High Percentages East Asian Students Reach TIMSS **International Benchmarks**
- More Strength in **Knowing** than Applying Scientific Knowledge and Reasoning
- **Home Resources** Strongly Relate to Science Achievement
- Instruction Affected by Students Lacking in **Basic Nutrition & Sleep**



TIMSS 2011 SCIENCE SURVEY



- Schools **Well- resourced**
- **Academic Success Orientation**
- Emphasize Safe & Order
- **Teacher Prep & Career Satisfaction** relate to Higher Science Achievement
- Students with **Positive Attitudes** Toward Science have Higher Achievement -
(Less Positive - Grade 8)
- **More Time** for Science Instruction Teaching Science as Separate Subjects
- **Engaging Instruction** Related to Higher Science Achievement
- Science Teachers **Emphasize Science Investigations**

PIRLS 2011 - GRADE 4

READING

SUB-SCORES

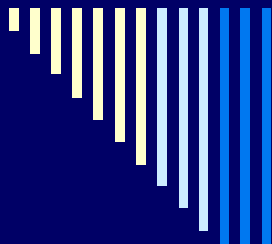
READING PURPOSES

- LITERARY
- INFORMATIONAL
- GENDER
- DIFFERENCES

READING COMPREHENSION PROCESSES

- RETRIEVING
- INTERPRETING
- GENDER DIFFERENCES





PIRLS

Progress in International Reading Literacy Study

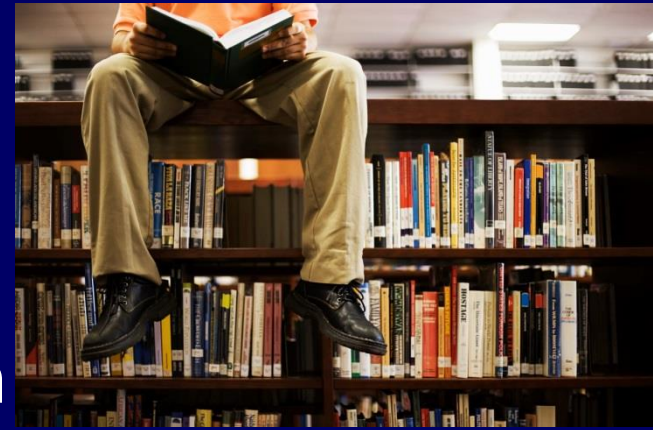
	ASSESSMENT ITEMS	Multiple Choice	Constructed Response	TOTAL	%
READING PURPOSE	Literary Experience	40	32	72	52%
	Acquire & Use Info	34	29	63	48%
	TOTAL (% OF SCORE)	74 (43%)	61 (57%)	135	100%
READING PROCESS	Focus On & Retrieve Explicitly Stated Info	21	12	33	22%
	Make Straightforward Inferences	33	13	46	28%
	Interpret & Integrate Ideas & Information	10	28	38	37%
	Examine & Evaluate Content, Language, & Textual Elements	10	8	18	13%
	TOTAL (% OF SCORE)	74 (43%)	61 (57%)	135	100%

PIRLS READING SURVEY

READING ITEMS PARALLEL TO MATH

PIRLS 2011 International Results in Reading (2012)

- Chapter 4 - Home Environment Support for **READING** Achievement
- Chapter 5 - School Resources for Teaching **READING**
- Chapter 6 - School Climate
- Chapter 7 – Teacher Preparation
- Chapter 8 – Classroom Instruction



PIRLS 2011 READING RESULTS

PIRLS INCLUDES SIGNIFICANT READING DATA



- Top-Performing: Hong Kong, Russian Fed., Finland, Singapore, N. Ireland, U.S.A.
- More Increase than Decrease Over Past Decade
- Little Reduction in Gender Gap Average:
Girls (520) Boys (504)
- High Percentage Reach PIRLS International Benchmarks
- More Economic Affluence
- Speak Language of Instruction

PIRLS 2011 READING SURVEY

Higher READING Achievement

- Top Countries Relative Strength **Interpreting, Integrating, Evaluating Comprehension Skills**
- **PURPOSE & PROCESS!!**
- **Supportive Home Environment & Early Start Crucial in Development**
- Schools Are Well-resourced
- Successful Schools **Emphasize Academic Success** and Have **Safe & Ordering Environments**
- **Teacher Education/Career Satisfaction** Related to Higher Reading Achievement
- Positive **Reading Attitudes**
- **Engaging** Reading Instruction
- Basic **Nutrition and Sleep**





PISA 2009 REPORTING (OECD 2011)

STRONG PERFORMERS

FINLAND

- ❑ Slow and Steady Reform for Consistently High Results
- ❑ Exceptional Teacher Quality

- ### **GERMANY**
- ❑ Once Weak International Standing Prompts Strong Nationwide Reforms for Rapid Improvement
 - ❑ Reduce influence of socio-economic background on student achievement

SUCCESSFUL REFORMERS

VIGNETTES ON EDUCATION REFORMS

- ### **ENGLAND**
- ❑ Tackling Teacher Shortages
 - ❑ Encouraging Science & Math Teachers

- ### **POLAND**
- ❑ Secondary Education Reform
 - ❑ Structural reforms of late 90's
- Remarkable Turnaround



CHINA-SHANGHAI - PISA 2009

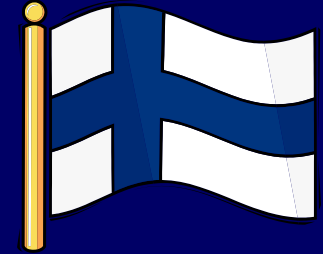
Noteworthy Achievement (Dillon 2010)

- **Math 600** **Singapore 562**
- **Reading 556** **Korea 539**
- **Science 575** **Finland 554**
- Industrial Powerhouse
- China's Rapid Modernization
- **20 Million** Residents
- "Chinese relentless at accomplishing goals."
- "Accuracy of results unassailable."
- Modern Universities
- **Magnet for best students.**
- Shanghai huge migration hub.
- Stellar students stay in city.
- Taking Education very seriously
- Important **Curricular Reforms**
- **Work Ethic** "amazingly strong"
- Chinese History competitive exams.
- **Value of Exams** in Core Subjects
- Teacher Training Emphasis
- **Teaching – Preferred Occupation**
- Teachers Salaries Have Risen
- Educators Freedom to Experiment
- Students Able to **Extrapolate & Apply**
- **More time** spent on **studying**
- School **hours long** every day
- Work extends into weekends
- **Less time on extracurricular** activities like music, athletics.



FINLAND Phenomenon

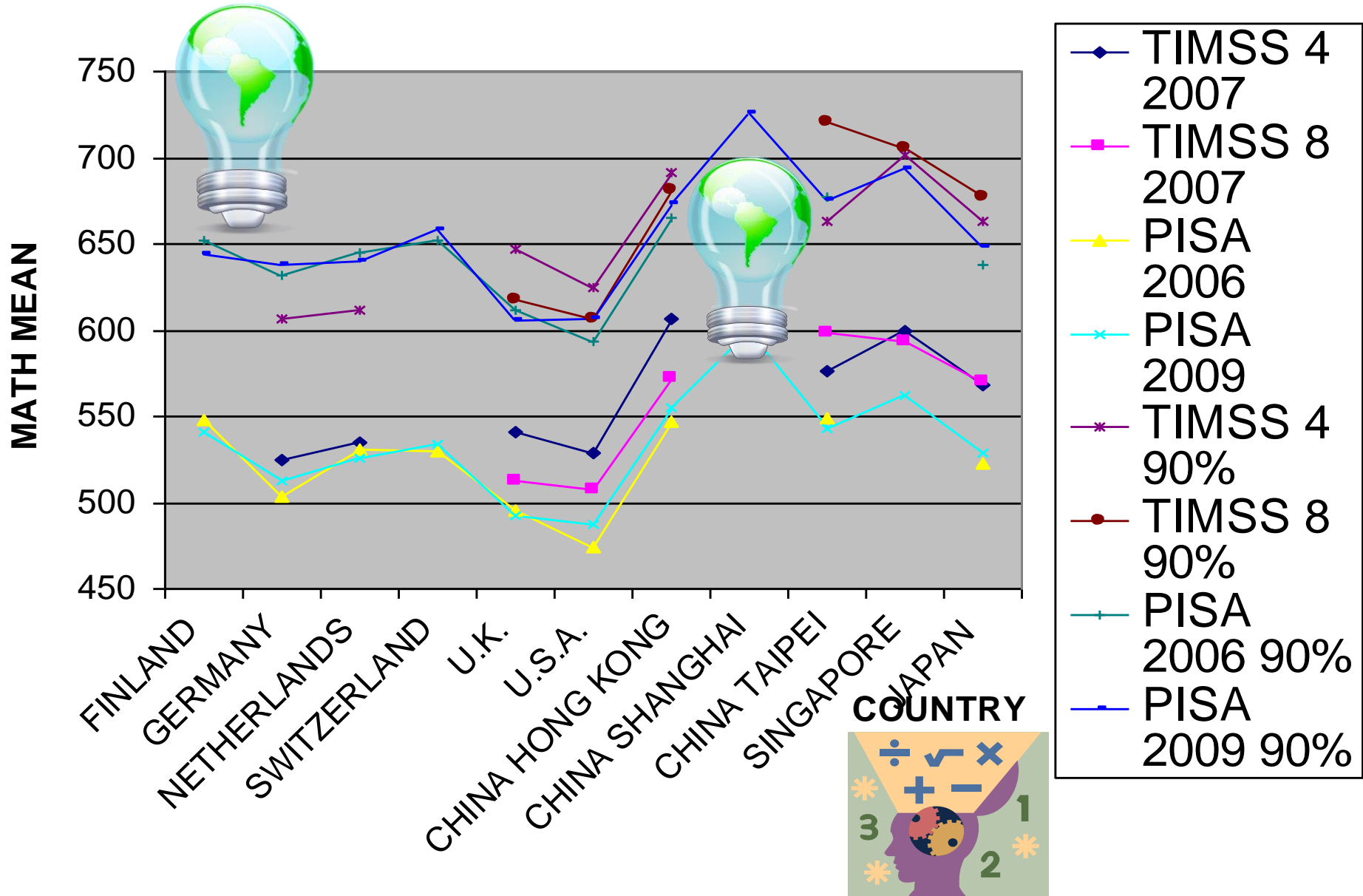
(Takayama 2010)

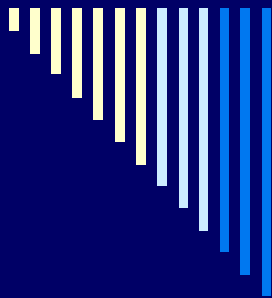


- High Quality Teacher Education Programs
- High Social Status of Teachers
- High Certification Requirements
- Extensive Library System
- High Cultural Value on Reading
- Start School at Age 7
- Systematic Effort to Avoid leaving any children behind
- Egalitarian principles & measures
- Elimination of Ability Grouping
- Free Provision of Education
- Constructivist Pedagogical Approach aligns with PISA curricular logic
- Local Control over Curriculum & Administration.
- Less is More Core Standards

NOTE: Higher Engagement Supports Cognitive Neuroscience Research (Abadzi 2006)

FINLAND - SHANGHAI COMPARISONS





PISA 2009 *Survey*

PISA 2009 – READING Focus

PISA 2012 – MATH FOCUS



OVERCOMING SOCIAL BACKGROUND

- Socio-economic Background
- Can Disadvantaged student defy odds?
- Single-Parent Family
- Immigrant Background
- Where Student Lives
- Equitable School

Resources

(OECD 2010)

LEARNING TO LEARN

- Enjoyment of Reading
- Kinds of Reading
- Reading Habit by Gender
- Learning Strategies that help students perform better

WHAT MAKES A SCHOOL SUCCESSFUL?

- Selecting & Grouping Students
- How systems select and group students
- Effect of School Governance
- School Governance in Different Countries
- Allocation of Educational Resources
- Performance in more disciplined schools.
- Learning Climate

U.S. COMMON CORE STANDARD DEVELOPMENT

(Carmichael, et al 2009) (Ravitch 2009)



	Common Core	NAEP National Assessment of Educational Progress	TIMSS	PISA
Content & Rigor 0 - 7	5 10 Content Areas Simple, clearly understood	5 Excessive Number of Standards (300) All equal status.	6 Measurable, very little jargon. Covers all content	4 Problem Solving. Does not cover grade level content.
Clarity & Specificity 0 - 3	3 Not explicit enough. Do not set priorities. All equal status.	1 Unnecessary verbiage, poor focus No clear guidance on importance.	3 Clear, coherent, well organized. Little ambiguity.	0 Unbalanced, overemphasis on data display. Poor in standards use.
GRADE	8 B	6 C	9 A	4 D



COMPARING TIMSS & PISA

Results not always consistent.

(Wu, 2009)

Identify factors contributing to discrepancies in results.

Differing Aims & Difference in Survey Designs.

PREDICTORS: Years of Schooling & Content Balance of 2 Tests - 2 Factors = 93% of Variation

Two Rankings can be reconciled to reasonable degree of accuracy.

TIMSS 4 & TIMSS 8

- Aim to improve teaching and learning of mathematics
- Provide data about achievement in relation to different types of curricula, instructional practices, school environments.
- **GRADE-BASED** – better aligned in years of schooling.
- Different ages due to when students started school.
- **MATH CONTENT** close to school

PISA – Age 15

- Aim to assess how well 15-year-olds are prepared for life's challenges. – More application.
- Ability to use knowledge and skills to meet real-life challenges rather than specific school curriculum.
- **AGE-BASED** – Similar in Age
- Can be in different grades due to when students started school.
- **CONTENT BALANCE** differs from TIMSS (Particularly Algebra, Data)



RECOMMENDATIONS

Comparing TIMSS & PISA



- Look beyond simple **ranks of countries**.
- Examine performances by **sub-domains** in context of population being tested.
- Realize how test **content** & population definition have significant impact on results.
- Trends over **test cycles** - Check whether **curriculum contents** have shifted.
- If **math topic** is not **emphasized** in curriculum, not likely students will perform as well as if emphasized.
- Test that is inclusive of wide range of **content domains** and items is more likely to produce stable and reliable results.
- **Matrix sampling** design of items in PISA & TIMSS allows inclusion of items from **different content domains**.
- Student achievements closely related to **what students are actually taught**.
- Students with **more years of schooling** do better.
- Designers need to pay close attention to **sub-content weights and population definition**.
- Test results can be useful and relevant in review of **curriculum and pedagogy**

(Wu 2009)



Interpreting International Comparisons Some Essential “Cautions” (Koretz, 2009)

- ❑ Comparisons with a “slippery **international average**” are nearly meaningless.
- ❑ Compare with performance of **other countries** that provide an informative contrast (**Sample**)
- ❑ International assessments measure very broad domains of achievement using a relatively **small number of test items to estimate mastery of domain.**
- ❑ Rankings could be **modified by changing emphasis on content.**
- ❑ **Inconsistencies Do Exist -**
No reason to put international comparisons aside.
Be careful in interpreting results.
- ❑ **Ignore small differences** even when they are statistically significant.
- ❑ Finding in **more than one assessment - more confidence** result is not due to test.
- ❑ Performance of students at **end of high school is difficult to compare -** portion of cohort leaving school early varies.



PISA UNDER EXAMINATION

Changing Knowledge, Changing Tests, & Changing Schools
Pereya, Kothoff, Cowen (Eds.) 2011

THE CONTEXT FOR INTERPRETING PISA RESULTS IN THE USA

*Negativism, Chauvinism,
Misunderstanding, and the
Potential to Distort the
Educational Systems of Nations*

Test skills are necessary
but not sufficient to predict
21st Century success either
for individuals or nations.

- Interpretive Context
- Receptive Environment
- Test Result Fear
- Not Reported - Talent
- **Social Class**
- Rest of Curriculum
- **What Curricula do
Americans Want?**



CELEBRATE Sub-groups!!



- There are a number of **VARIABLES** that can be used in analysis of International Test Scores
- Most comparisons of international test scores relate to **AVERAGE** scores of the country's test sample. Analysis of **Subgroups** provides excellent data relating to **ADVANCED** achievement.
- **GENDER** comparisons can provide support for policy and equal opportunity for advanced curriculum for males and females.
- PISA **PROFICIENCY LEVELS 5-6** are useful guides in development of curriculum for advanced students.
- **90+ PERCENTILE** – Important data for analyzing achievement of top 10%.
- **CONTENT DOMAIN** sub-scores support **CONTENT BALANCE** as significant variable related to high achievement in Mathematics.
- **COGNITIVE DOMAIN** Sub-Scores provide valuable data related to higher order **REASONING**.
- **ADVANCED INTERNATIONAL BENCHMARKS** are an excellent resource for curriculum development for high ability.
- **YEARS OF SCHOOLING & PRE- PRIMARY EDUCATION** are variables related to achievement that support early advanced opportunities
- “Shadow Education” provides undocumented additional instruction.



I.N.S.T.E.A.D. International

International Network Supporting Transnational
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Kathleen Stone, Ph.D.
International Researcher

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G Genuine
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T To
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B Belonging

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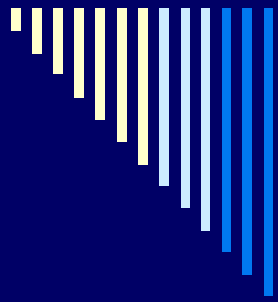
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**ADDITIONAL
SLIDES WITH
REFERENCE
DATA
AVAILABLE
on INSTEAD
International
Web-site**

www.insteadinternational.com



PISA 2009 – MATH

TOP 10

OTHER

RANK	COUNTRY	TOTAL	RANK	COUNTRY	TOTAL	NOTE
1	China Shanghai	600	16	Germany	513	G8
2	Singapore	562	22	France	497	G8
3	China Hong K	555	28	England/UK	492	G8
4	Korea Rep of	546	31 T	U.S.A.	487	G8
5	China Taipei	543	31 T	Ireland	487	PIIGS
6	Finland	541	31 T	Portugal	487	PIIGS
7	Liechtenstein	536	34 T	Italy	483	G8/PIIGS
8	Switzerland	534	34 T	Spain	483	PIIGS
9	Japan	529	38	Russian Fed.	468	G8
10	Canada	527	39	Greece	466	PIIGS ⁷⁴

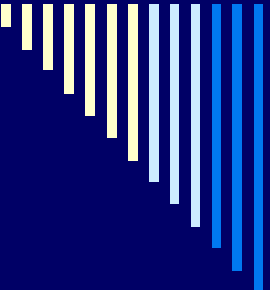


PISA 2009 – SCIENCE

TOP 10

OTHER

RANK	COUNTRY	TOTAL	RANK	COUNTRY	TOTAL	NOTE
1	China Shanghai	575	11	Netherlands	522	Small Area
2	Finland	554	12 T	China Taipei	520 T	East Asia
3 T	China Hong K	542 T	12 T	Germany	520 T	G8
3 T	Singapore	542 T	12 T	Liechtenstein	520 T	Small Area
5	Japan	539	15	Switzerland	517	Small Area
6	Korea Rep. of	538	16	England/UK	514	G8
7	New Zealand	532	17	Slovenia	512	E. Europe
8	Canada	529	19 T	Ireland	508 T	P.I.I.G.S.
9	Estonia	528	19 T	Poland	508 T	E. Europe
10	Australia	527	23	U.S.A.	502	G8 <small>75G8</small>



PISA 2009 – READING

TOP 10

OTHER

RANK	COUNTRY	TOTAL	RANK	COUNTRY	TOTAL	NOTE
1	China Shanghai	556	11	Belgium	506	Benelux
2	Korea Rep. of	539	12	Norway	503	Scandinavia
3	Finland	536	13 T	Estonia	501 T	E. Europe
4	China Hong Kong	533	13 T	Switzerland	501 T	3 Languages
5	Singapore	526	15 T	Iceland	500 T	Scandinavia
6	Canada	524	15 T	Poland	500 T	E. Europe
7	New Zealand	521	15 T	U.S.A.	500 T	G8
8	Japan	520	19 T	Germany	497 T	G8
9	Australia	515	19 T	Sweden	497 T	Scandinavia
10	Netherlands	508	23 T	China Taipei	495	East Asia

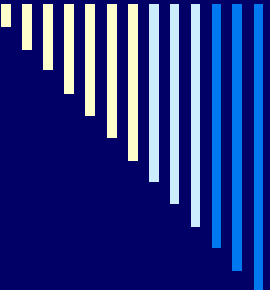


TIMSS 2011 – MATH Gr. 8

TOP 10

OTHER

RANK	COUNTRY	TOTAL	RANK	COUNTRY	TOTAL	NOTE
1	Korea Rep. of	613	11 T	Australia	505	English
2	Singapore	611	11 T	Slovenia	505	E. Europe
3	China Taipei	609	11 T	Hungary	505	E. Europe
4	China Hong K	586	14	Lithuania	502	E. Europe
5	Japan	570	15	Italy	498	G8 P.I.I.G.S.
6	Russian Fed.	539	16	New Zealand	488	English
7	Israel	516	17	Kazakhstan	487	E. Europe
8	Finland	514	18	Sweden	484	Scandinavia
9	U.S.A.	509	19	Ukraine	479	E. Europe
10	England/UK	507	20	Norway	475	Scandinavia



TIMSS 2011 – SCIENCE Gr. 8

TOP 10 OTHER

RANK	COUNTRY	TOTAL	RANK	COUNTRY	TOTAL	NOTE
1	Singapore	590	11	Hungary	522	E. Europe
2	China Taipei	564	12	Australia	519	English
3	Korea Rep. of	560	13	Israel	516	Middle East
4	Japan	558	14	Lithuania	514	E. Europe
5	Finland	552	15	New Zealand	512	English
6	Slovenia	543	16	Sweden	509	Scandinavia
7	Russian Fed.	542	17 T	Italy	501 T	P.I.I.G.S.
8	China Hong K	535	17 T	Ukraine	501 T	E. Europe
9	England/UK	533	19	Norway	494	Scandinavia
10	U.S.A.	525	20	Kazakhstan	490	E. Europe ₃

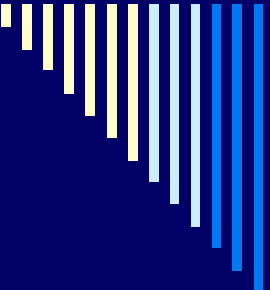


TIMSS 2011 – MATH Gr. 4

TOP 10

OTHER

RANK	COUNTRY	TOTAL	RANK	COUNTRY	TOTAL	NOTE
1	Singapore	606	11	U.S.A.	541	11 th in 2007
2	Korea Rep.	605	12	Netherlands	540	9 th in 2007
3	China H. Kong	602	13	Denmark	537	Scandinavia
4	China Taipei	591	1	Lithuania	534	E. Europe
5	Japan	585	15	Portugal	532	P.I.I.G.S.
6	Northern Ireland	562	16	Germany	528	G8
7	Belgium (Flem.)	549	17	Ireland	527	English
8	Finland	545	18 T	Australia	516 T	English
9 T	England/UK	542 T	18 T	Serbia	516 T	E. Europe ₉
9 T	Russian Fed.	542 T	20	Hungary	515	E. Europe



TIMSS 2011 – SCIENCE Gr. 4

TOP 10 OTHER

RANK	COUNTRY	TOTAL	RANK	COUNTRY	TOTAL	NOTE
1	Korea Rep. of	587	11	Sweden	533	Near Top 10
2	Singapore	583	12	Slovak Rep.	532 T	Near Top 10
3	Finland	570	13 T	Austria	532 T	Near Top 10
4	Japan	559	13 T	Netherlands	531	Near Top 10
5 T	China Taipei	552 T	15	England/UK	529	G8
5 T	Russian Fed.	552 T	16 T	Germany	528 T	G8
7	U.S.A.	544	16 T	Denmark	528 T	
8	Czech Republic	536	18	Italy	524	G8 P.I.I.G.S.
9	China Hong K.	535	19	Portugal	522	P.I.I.G.S.
10	Hungary	534	20	Slovenia	520	80

PIRLS 2011 – READING Gr. 4

TOP 10

OTHER

RANK	COUNTRY	TOTAL	RANK	COUNTRY	TOTAL	NOTE
1	China Hong Kong	571	10 T	Ireland	552 T	P.I.I.G.S.
2 T	Finland	568 T	12	Canada	548	G8
2 T	Russian Fed.	568 T	13	Netherlands	546	Benelux
4	Singapore	567	14	Czech Rep.	545	E. Europe
5	Northern Ireland	558	15	Sweden	542	Scandinavia
6	U.S.A.	556	16 T	Germany	541 T	G8
7	Denmark	554	16 T	Israel	541 T	Middle East
8 T	China Taipei	553 T	16 T	Italy	541 T	P.I.I.G.S.
8 T	Croatia	553 T	16 T	Portugal	541 T	P.I.I.G.S.
10 T	England/UK	552 T	20	Hungary	539	E. Europe



TEST OVERVIEW

TOP 10 MATH

Rank	PISA 2009	SCORE	TIMSS 8 2011	Score	TIMSS 4 2011	Score
1	China Shanghai	600	Korea Rep. of	613	Singapore	606
2	Singapore	562	Singapore	611	Korea Rep. of	605
3	China Hong Kong	555	China Taipei	609	China Hong K.	602
4	Korea Republic of	546	China Hong K	586	China Taipei	591
5	China Taipei	543	Japan	570	Japan	585
6	Finland	541	Russian Fed.	539	Northern Ireland	562
7	Liechtenstein	536	Israel	516	Belgium (Flem)	549
8	Switzerland	534	Finland	514	Finland	545
9	Japan	529	U.S.A.	509	9T England/UK	542
10	Canada	527	England/UK	507	9T Russian Fed	542



TEST OVERVIEW

TOP 10 SCIENCE

RANK	PISA 2009	Score	TIMSS 8 2011	Score	TIMSS 4 2011	Score
1	China Shanghai	575	Singapore	590	Korea Rep.	587
2	Finland	554	China Taipei	564	Singapore	583
3 T	China Hong K	542 T	Korea Rep.	560	Finland	570
3 T	Singapore	542 T	Japan	558	Japan	559
5	Japan	539	Finland	552	China Taipei	552
6	Korea Rep. of	538	Slovenia	543	Russian Fed.	552
7	New Zealand	532	Russian Fed	542	U.S.A.	544
8	Canada	529	China Hong K	535	Czech Rep.	536
9	Estonia	528	England/UK	533	China Hong K	535
10	Australia	527	U.S.A.	525	Hungary	534



Grade 4 Comparison

2011 – A Unique Opportunity

Rank	TIMSS 4 MATH	Score	TIMSS 4 SCIENCE	Score	PIRLS 4 READING	Score
1	Singapore	606	Korea Rep.	587	China Hong Kong	571
2	Korea Rep. of	605	Singapore	583	Finland	568 T
3	China Hong K.	602	Finland	570	Russian Fed.	568 T
4	China Taipei	591	Japan	559	Singapore	567
5	Japan	585	China Taipei	552	Northern Ireland	558
6	Northern Ireland	562	Russian Fed.	552	U.S.A.	556
7	Belgium (Flem)	549	U.S.A.	544	Denmark	554
8	Finland	545	Czech Republic	536	China Taipei	553 T
9	9T England/UK	542	China Hong K	535	Croatia	553 T
10	9T Russian Fed	542	Hungary	534	England & Ireland	552 T



TEST OVERVIEW

TOP 10 READING

RANK	PISA 2009	Score		RANK	PIRLS 4 2011	Score
1	China Shanghai	556		1	China Hong Kong	571
2	Korea Rep. of	539		2 T	Finland	568 T
3	Finland	536		2 T	Russian Fed.	568 T
4	China Hong Kong	533		4	Singapore	567
5	Singapore	526		5	Northern Ireland	558
6	Canada	524		6	U.S.A.	556
7	New Zealand	521		7	Denmark	554
8	Japan	520		8 T	China Taipei	553 T
9	Australia	515		8 T	Croatia	553 T
10	Netherlands	508		10 T	England & Ireland	552 T

Sample Transnational Study...

TIMSS 2011 – MATH – GR. 4

GR. 4	U.S.	ENG- LAND	FIN- LAND	GER- MANY	ITALY	SPAIN	CHINA H.K.	CHINA TAIPEI	JAPAN	KOREA	SING- APORE
TOT MEAN 2011	541	542	545	528	508	482	602	591	585	605	606
RANK 2011	11	9	8	6	23	32	3	4	5	2	1
TOT MEAN 2007	529	541		525	507		607	576	568		599
RANK 2007	11	7		12	16		1	3	4		2
TOT MEAN 2003	518	531			503		575	564	565		594
TOT MEAN 1995	518	484					557		567	581	⁸⁶ 590



TIMSS 2011 – MATH – GR. 8

GR. 4	U.S.	ENG- LAND	FIN- LAND	GER- MANY	ITALY	SPAIN	CHINA H.K.	CHINA TAIPEI	JAPAN	KOREA	SING- APORE
TOT MEAN 2011	509	507	514		498		586	609	570	613	611
RANK 2011	9	10	8		15		4	3	5	1	2
TOT MEAN 2007	508	513			480		572	598	570	597	593
RANK 2007	9	7			19		4	1	5	2	3
TOT MEAN 2003	504	498			484		586	585	570	589	605
TOT MEAN 1999	502	496	520		479		582	585	579	587	604
TOT MEAN 1995	492	498					569		581	581	609



PISA 2009 – MATH - Age 15

Age 15	U.S.	ENG- LAND	FIN- LAND	GER- MANY	ITALY	SPAIN	CHINA H.K.	CHINA TAIPEI	JAPAN	KOREA	SING- APORE
TOT MEAN 2009	487	492	541	513	483	483	555	543	529	546	562
RANK 2009	31	28	6	16	34	34	3	5	9	4	2
TOT MEAN 2006	474	495	548	504	462	480	547	549	523	547	
RANK 2006	35	23	2	19	38	32	3	1	10	3	
TOT MEAN 2003	483		544	503	466	485			534	542	
RANK 2003	24		1	16	25	23			4	2	88



TIMSS - Grades 4 & 8 MATH

International Benchmarks %

GRADE 4	U.S.	ENG- LAND	FIN- LAND	GER- MANY	ITALY	SPAIN	CHINA H.K.	CHINA TAIPEI	JAPAN	KOREA	SING- APORE
ADVANCED 625	13	18	12	5	5	1	37	34	30	39	43
HIGH 550	47	49	49	37	28	17	80	74	70	80	78
INTERMEDIATE 475	81	78	85	81	69	56	96	93	93	97	94
LOW 400	96	93	98	97	93	87	99	99	99	100	99
GRADE 8	U.S.	ENG- LAND	FIN- LND	GER- MANY	ITALY	SPAIN	CHINA H.K.	CHINA TAIPEI	JAPAN	KOREA	SING- APORE
ADVANCED 625	7	8	4		3		34	49	27	47	48
HIGH 550	30	32	30		24		71	73	61	77	78
INTERMEDIATE 475	68	65	73		64		89	88	87	93	92
LOW 400	92	88	96		90		97	96	97	99	99



TIMSS – MATH – GR. 4

Score At PERCENTILE

Percent -ile	U.S.	ENG- LAND	FIN- LAND	GER- MANY	ITALY	SPAIN	CHINA H.K.	CHINA TAIPEI	JAPAN	KOREA	SING- APORE
95	660	677	654	626	622	593	702	704	700	714	723
90	635	652	631	606	598	572	681	681	675	691	701
75	593	605	592	570	557	532	645	642	635	651	661
50	544	549	549	530	510	486	606	596	588	607	612
25	492	483	501	488	461	435	563	546	540	561	559
10	440	423	456	446	414	388	519	495	492	517	502
5	410	385	430	420	386	362	488	459	460	489	464



TIMSS – MATH – GR. 8

Score At PERCENTILE

Percent -ile	U.S.	ENG- LAND	FIN- LAND	GER- MANY	ITALY	SPAIN	CHINA H.K.	CHINA TAIPEI	JAPAN	KOREA	SING- APORE
95	635	640	617		615		706	765	701	750	734
90	607	616	596		590		684	734	674	724	713
75	562	567	559		549		644	683	630	676	672
50	511	510	516		502		595	623	574	619	620
25	457	448	470		450		537	543	515	555	559
10	409	393	430		400		470	459	458	492	494
5	381	361	405		372		428	413	425	455	453

TIMSS MATH - CONTENT DOMAIN

GR. 4	U.S.	ENG- LAND	FIN- LAND	GER- MANY	ITALY	SPAIN	CHINA H.K.	CHINA TAIPEI	JAPAN	KOREA	SING- APORE
TOTAL	541	542	545	528	508	482	602	591	585	605	606
NUMBER 50%	543	539	545	520	510	487	604	599	584	606	619
GEO/MEAS. 35%	535	545	543	536	513	476	605	573	589	607	589
DATA DISPLAY 15%	545	549	551	546	495	479	593	600	590	603	588
GR. 8	U.S.	ENG- LAND	FIN- LAND	GER- MANY	ITALY	SPAIN	CHINA H.K.	CHINA TAIPEI	JAPAN	KOREA	SING- APORE
TOTAL	509	507	514		498		586	609	570	613	611
NUMBER 30%	514	512	527		496		588	598	557	618	611
ALGEBRA 30%	512	489	492		491		583	628	570	617	614
GEOMETRY 20%	485	498	502		512		597	625	586	612	609
DATA/CHANCE 20%	527	543	542		499		581	584	579	616	⁹² 607

TIMSS MATH - CONTENT DOMAIN %

GR. 4	U.S.	ENG- LAND	FIN- LAND	GER- MANY	ITALY	SPAIN	CHINA H.K.	CHINA TAIPEI	JAPAN	KOREA	SING- APORE
TOTAL	60	60	60	57	52	45	74	71	70	74	74
NUMBER 50%	57	56	57	51	49	43	73	71	67	73	76
GEO/MEAS. 35%	59	62	59	59	53	44	74	65	68	72	70
DATA DISPLAY 15%	71	71	73	72	59	56	81	82	82	84	80
GR. 8	U.S.	ENG- LAND	FIN- LAND	GER- MANY	ITALY	SPAIN	CHINA H.K.	CHINA TAIPEI	JAPAN	KOREA	SING- APORE
TOTAL	48	48	49		46		68	72	64	74	73
NUMBER 30%	53	53	56		49		72	72	63	77	77
ALGEBRA 30%	43	39	39		39		64	72	60	71	72
GEOMETRY 20%	41	45	45		48		69	73	67	71	71
DATA/CHANCE 20%	58	61	61		52		68	69	68	75	72

TIMSS MATH COGNITIVE Domain

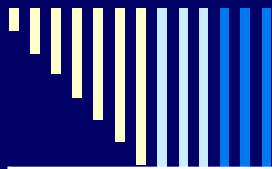
GR. 4	U.S.	ENG- LAND	FIN- LAND	GER- MANY	ITALY	SPAIN	CHINA H.K.	CHINA TAIPEI	JAPAN	KOREA	SING- APORE
TOTAL MEAN	541	542	545	528	508	482	602	591	585	605	606
KNOWING 40%	556	552	548	524	510	482	619	599	590	614	629
APPLYING 40%	539	542	544	528	506	483	597	593	579	600	602
REASONING 20%	525	531	546	532	505	483	589	577	592	603	588
GR. 8	U.S.	ENG- LAND	FIN- LAND	GER- MANY	ITALY	SPAIN	CHINA H.K.	CHINA TAIPEI	JAPAN	KOREA	SING- APORE
TOTAL MEAN	509	507	514		498		586	609	570	613	611
KNOWING 35%	519	501	508		494		591	611	558	616	617
APPLYING 40%	503	508	520		503		587	614	574	617	613
REASONING 25%	503	510	512		496		580	609	579	612	604

TIMSS MATH COGNITIVE DOMAIN %

GR. 4	U.S.	ENG- LAND	FIN- LAND	GER- MANY	ITALY	SPAIN	CHINA H.K.	CHINA TAIPEI	JAPAN	KOREA	SING- APORE
TOTAL MEAN	60	60	60	57	52	45	74	71	70	74	74
KNOWING 40%	67	66	63	60	58	50	80	75	74	79	81
APPLYING 40%	60	61	60	58	52	45	75	72	70	74	75
REASONING 20%	46	49	52	48	41	35	61	59	63	65	61
GR. 8	U.S.	ENG- LAND	FIN- LAND	GER- MANY	ITALY	SPAIN	CHINA H.K.	CHINA TAIPEI	JAPAN	KOREA	SING- APORE
TOTAL MEAN	48	48	49		46		68	72	64	74	73
KNOWING 35%	61	57	58		55		77	77	70	80	82
APPLYING 40%	46	48	50		45		67	72	64	73	73
REASONING 25%	35	37	37		34		56	63	56	65	95 62

TIMSS 2011 – SCIENCE – GR. 4

GR. 4	U.S.	ENG- LAND	FIN- LAND	GER- MANY	ITALY	SPAIN	CHINA H.K.	CHINA TAIPEI	JAPAN	KOREA	SING- APORE
TOT MEAN 2011	544	529	570	528	524	505	535	552	559	587	583
RANK 2011	7	15	3	16	18	28	9	5	4	1	2
TOT MEAN 2007	539	542		528	535		554	557	548		587
RANK 2007	7	6		11	9		3	2	4		1
TOT MEAN 2003	536	540			516		542	551	543		565
TOT MEAN 1995	542	528					508		553	576	523 ⁹⁶



TIMSS 2011 – SCIENCE – GR. 8

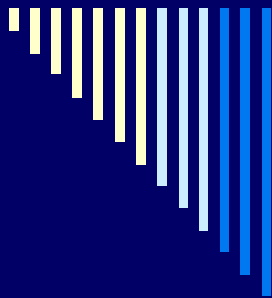
GR. 4	U.S.	ENG- LAND	FIN- LAND	GER- MANY	ITALY	SPAIN	CHINA H.K.	CHINA TAIPEI	JAPAN	KOREA	SING- APORE
TOT MEAN 2011	525	533	552		501		535	564	558	560	590
RANK 2011	10	9	5		17		8	2	4	3	1
TOT MEAN 2007	520	542			495		530	561	554	553	567
RANK 2007	9	5			14		8	2	3	4	1
TOT MEAN 2003	527	544			491		556	571	552	558	528
TOT MEAN 1999	515	538	535		493		530	569	550	549	568
TOT MEAN 1995	513	533					510		554	546	580

PISA 2009 – SCIENCE - Age 15

Age 15	U.S.	ENG- LAND	FIN- LAND	GER- MANY	ITALY	SPAIN	CHINA H.K.	CHINA TAIPEI	JAPAN	KOREA	SING- APORE
TOT MEAN 2009	502	514	554	527	489	488	542	520	539	538	542
RANK 2009	23	16	2	10	35	36	3	12	5	6	3
TOT MEAN 2006	489	515	563	516	475	488	535	532	531	522	
RANK 2006	26	12	1	11	31	27	8	4	5	9	
TOT MEAN 2003	491		548	502	487	487	540		548	538	
TOT MEAN 2000	500	532	538	487	478	491			550	552	

PIRLS 2011 – READING – GR. 4

GR. 4	U.S.	ENG- LAND	FIN- LAND	GER- MANY	ITALY	SPAIN	CHINA H.K.	CHINA TAIPEI	JAPAN	KOREA	SING- APORE
TOT MEAN 2011	556	552	568	541T	541T	513	571	553			567
RANK 2011	6	10	2	16 T	16 T	30	1	8			4
TOT MEAN 2006	540	539		548	551	513	564	535			558
RANK 2006	12	13		8	6	22	2	16			4
TOT MEAN 2001	542	553		539	541		528				528



PISA MATH - Age 15 2009 Rank 1-20

Asia (7) – English Lang. (3) - W. Europe (8) - E. Europe (2)

Rank 1-20: RANGE: TOT (501 - 600)

Rank	COUNTRY	TOT	90%	Differ- -ence	Rank	COUNTRY	TOT	90%	Differ- -ence
1	China-Shanghai	600	726	126	11	Netherlands	526	640	114
2	Singapore	562	693	131	12	China-Macao	525	634	109
3	China-Hong Kong	555	673	118	13	New Zealand	519	642	123
4	Korea, Republic	546	659	113	14	Belgium	515	646	131
5	China-Taipei	543	675	132	15	Australia	514	634	120
6	Finland	541	644	103	16	Germany G8	513	638	125
7	Liechtenstein	536	637	101	17	Estonia	512	616	104
8	Switzerland	534	658	124	18	Iceland	507	623	116
9	Japan G8	529	648	119	19	Denmark	503	614	111
10	Canada G8	527	638	111	20	Slovenia	501	628	127

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CONTINENT	COUNTRY	OECD/PART/TM	TIMSS GR 4 MATH 2007	RANK	TIMSS GR 8 MATH 2007	RANK	PISA MATH 2006	RANK	PISA MATH 2009	RANK	TIMSS 4 MATH 90%	RANK	TIMSS 8 MATH 90%	RANK	PISA MATH 2006 90%	RANK	PISA MATH 2009 90%	RANK
AS	China Shanghai	P							600	1							726	1
AS	Singapore	P	599	2	593	3			562	2	702	1	706	3			693	2
AS	China HongKong	P	607	1	572	4	547	3	555	3	691	2	681	4	665	2	673	4
AS	Korea, Rep.	O			597	2	547	3	546	4			711	2	664	3	659	5
AS	Chinese Taipei	P	576	3	598	1	549	1	543	5	663	3	721	1	677	1	675	3
WE	Finland	O					548	2	541	6					652	4	644	9
WE	Liechtenstein	P					525	8	536	7					643	9	637	14
WE	Switzerland	O					530	6	534	8					652	5	658	6
AS	Japan G8	O	568	4	570	5	523	10	529	9	663	3	677	5	638	11	648	7
NA	Canada G8	O					527	7	527	10					635	12	638	12
WE	Netherlands	O	535	9			531	5	526	11	612	14			645	7	640	11
AS	China Macao	P					525	8	525	12					632	14	634	15
OC	New Zealand	O	492	23			522	11	519	13	598	18			643	9	642	10
WE	Belgium	O					520	12	515	14					650	6	646	8
OC	Australia	O	516	14	496	14	520	12	514	15	620	11	600	12	633	13	634	15
WE	Germany G8	O	525	12			504	19	513	16	607	16			632	14	638	12
EE	Estonia	O					515	14	512	17					618	19	616	22
WE	Iceland	O					506	17	507	18					618	19	623	18
WE	Denmark	O	523	13			513	15	503	19	611	15			621	18	614	24
EE	Slovenia	O	502	19	501	12	504	19	501	20	589	22	594	15	623	17	628	17
WE	Norway	O	473	25	469	21	490	28	498	21	566	26	552	29	609	28	608	28
EE	Slovak Rep.	O	496	21			492	26	497	22	597	19			611	24	621	20
WE	France G8	O					495	23	497	22					617	21	622	19
WE	Austria	O	505	17			505	18	496	24	590	21			630	16	620	21
EE	Poland	O					495	23	495	25					610	26	609	27
WE	Sweden	O	503	18	491	15	502	21	494	26	586	23	582	21	617	21	613	25
EE	Czech Rep.	O	486	24	504	11	510	16	493	27	578	24	599	13	644	8	615	23
WE	U.K./England G8	O	541	7	513	7	495	23	492	28	647	6	618	7	612	23	606	31
EE	Hungary	O	510	15	517	6	491	27	490	29	620	11	624	6	609	28	608	28
WE	Luxembourg	O					490	28	489	30					610	26	613	25
NA	U.S.A. G8	O	529	11	508	9	474	35	487	31	625	9	607	10	593	32	607	30

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CONTINENT	COUNTRY	OECD/PART/TM	TIMSS GR 4 MATH 2007	RANK	TIMSS GR 8 MATH 2007	RANK	PISA MATH 2006	RANK	PISA MATH 2009	RANK	TIMSS 4 MATH 90%	RANK	TIMSS 8 MATH 90%	RANK	PISA MATH 2006 90%	RANK	PISA MATH 2009 90%	RANK	
WE	Portugal	O					466	37	487	31					611	24	605	32	
WE	Ireland	O					501	22	487	31					608	30	591	35	
WE	Italy	O	507	16	480	19	462	38	483	34	601	17	574	25	584	36	602	33	
WE	Spain	O					480	32	483	34					593	32	597	34	
EE	Latvia	P	537	8			486	30	482	36	628	8			590	35	584	37	
EE	Lithuania	P	530	10	506	10	486	30	477	37	624	10	609	9	602	31	590	36	
EE	Russian Fed.	P	544	6	512	8	476	33	468	38	647	6	617	8	592	34	576	41	
EE	Greece	O					459	39	466	39					575	38	580	40	
EE	Croatia	P					467	36	460	40							574	42	
ME	Dubai (UAE)	P							453	41								584	37
ME	Israel	O			463	24	442	40	447	42			584	20	581	37	581	39	
EE	Turkey	O			432	31	424	43	445	43			581	22	550	40	574	42	
EE	Serbia	P			486	18	435	41	442	43			587	17	553	39	560	44	
EE	Azerbaijan	P					476	33	431	45							512	53	
EE	Bulgaria	P			464	23	413	46	428	46			586	19	543	41	555	45	
EE	Romania	P			461	27	415	45	427	47			587	17			530	48	
LA	Uruguay	P					427	42	427	47							546	46	
LA	Chile	O					411	47	421	49							527	49	
AS	Thailand	P			441	30	417	44	419	50			562	27	524	42	522	50	
LA	Mexico	O							419	50							520	51	
LA	Trinidad/Tobago	P							414	52							546	46	
EE	Kazakhstan	P	549	5					405	53	653	5					514	52	
EE	Montenegro	P					399	48	403	54							509	54	
LA	Argentina	P					381	51	388	55							509	54	
ME	Jordan	P			427	32	384	50	387	56			556	28	489	43	490	59	
LA	Brazil	P					370	52	386	57							493	57	
LA	Colombia	P	355	31	380	41	370	52	381	58	470	30	477	41			479	61	
EE	Albania	P							377	59							493	57	
AF	Tunisia	P	327	34	420	33	365	54	371	60	469	31	508	36			471	62	
AS	Indonesia	P			397	37	391	49	371	60			509	35			462	64	
ME	Qatar	P	296	36	307	49	318	55	368	62	413	35	427	48			506	56	

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(Stone 2012)

CONTINENT	COUNTRY	OECD/PART/TM	TIMSS GR 4 MATH 2007	RANK	TIMSS GR 8 MATH 2007	RANK	PISA MATH 2006	RANK	PISA MATH 2009	RANK	TIMSS 4 MATH 90%	RANK	TIMSS 8 MATH 90%	RANK	PISA MATH 2006 90%	RANK	PISA MATH 2009 90%	RANK
LA	Peru	P							365	63							480	60
LA	Panama	P							360	64							466	63
EE	Kyrgyzstan	P					311	56	331	65							436	65
AF	Egypt	T			391	39							521	33				
AF	Algeria	T	378	30	387	40					493	29	465	42				
AF	Botswana	T			364	44							460	43				
AF	Ghana	T			309	48							428	47				
AF	Morocco	T	341	32							466	32						
AS	Malaysia	P			474	20							578	23				
EE	Armenia	P	500	20	499	13					617	13	601	11				
EE	Malta	P			488	16							597	14				
EE	Ukraine	P	469	26	462	25					573	25	572	26				
EE	Bosnia/Herzegov	T			456	28							552	29				
EE	Georgia	T	438	28	410	34					549	27	532	32				
LA	El Salvador	T	330	33	340	46					448	33	433	45				
ME	Cyprus	T			465	22							575	24				
ME	Lebanon	T			449	29							549	31				
ME	Iran, Islamic Rep	T	402	29	403	35					508	28	516	34				
ME	Bahrain	T			398	36							505	37				
ME	Syrian Arab Rep	T			395	38							502	38				
ME	Oman	T			372	42							492	40				
ME	Palestinian Natl.	T			367	43							498	39				
ME	Kuwait	T	316	35	354	45					443	34	455	44				
ME	Saudia Arabia	T			329	47							429	46				
ME	Yemen	T	224	37							371	36						
WE	U.K./Scotland	O	494	22	487	17					592	20	590	16				