Seminar on PISA and TIMSS

PISA- Insights for learning and teaching

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Hong Kong

Outline

Overview of PISA

- What is PISA?
- Students' performance
- Overview of PISA assessment frameworks
- Analysis PISA item
- Insights for teaching and learning

Concluding remarks

- School Participation and Your support
- Our appreciation to your support
- Use of PISA results for educators

What is PISA?

- Age-based target population *(15-year-olds)*
- National samples of 150 schools with 5,000 students
- Two hours of testing time for each student
- Context questionnaires for the students, parents, teachers and schools
- Sample (2012)
  - 475,000 students
  - 65 participating countries

Content of Assessment

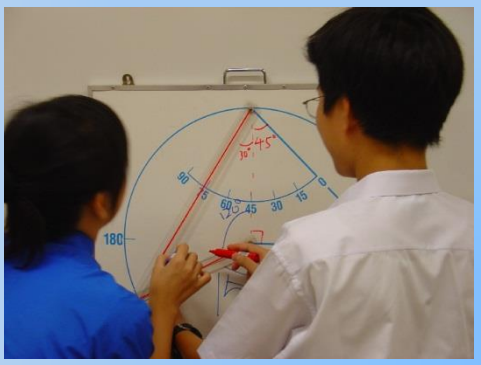
- 3 Literacy Domains
- Rotating major domains

Reading Literacy

2000

2009

Mathematical Literacy



2003

2012

Scientific Literacy

2006

2015

Instruments

- Test booklets
- Questionnaires

65 Participating countries/economies
(PISA 2012 – Asia Pacific regions)

OECD Countries			**Partner Countries (Non-OECD Countries / Regions)**		
Australia	Hungary	Poland	Albania	Kazakhstan	Shanghai-China
Austria	Iceland	Portugal	Argentina	Latvia	Singapore
Belgium	Ireland	Slovak Republic	Brazil	Liechtenstein	Thailand
Canada	Israel	Slovenia	Bulgaria	Lithuania	Tunisia
Chile	Italy	Spain	Chinese Taipei	Macao-China	United Arab Emirates
Czech Republic	Japan	Sweden	Colombia	Malaysia	Uruguay
Denmark	Korea	Switzerland	Costa Rica	Montenegro	Vietnam
Estonia	Luxembourg	Turkey	Croatia	Peru	
Finland	Mexico	United Kingdom	Cyprus	Qatar	
France	Netherlands	United States	Hong Kong-China	Romania	
Germany	New Zealand		Indonesia	Russian Federation	
Greece	Norway		Jordan	Serbia	

DeSeCo (OECD, 2001)

Definition and Selection of Competencies

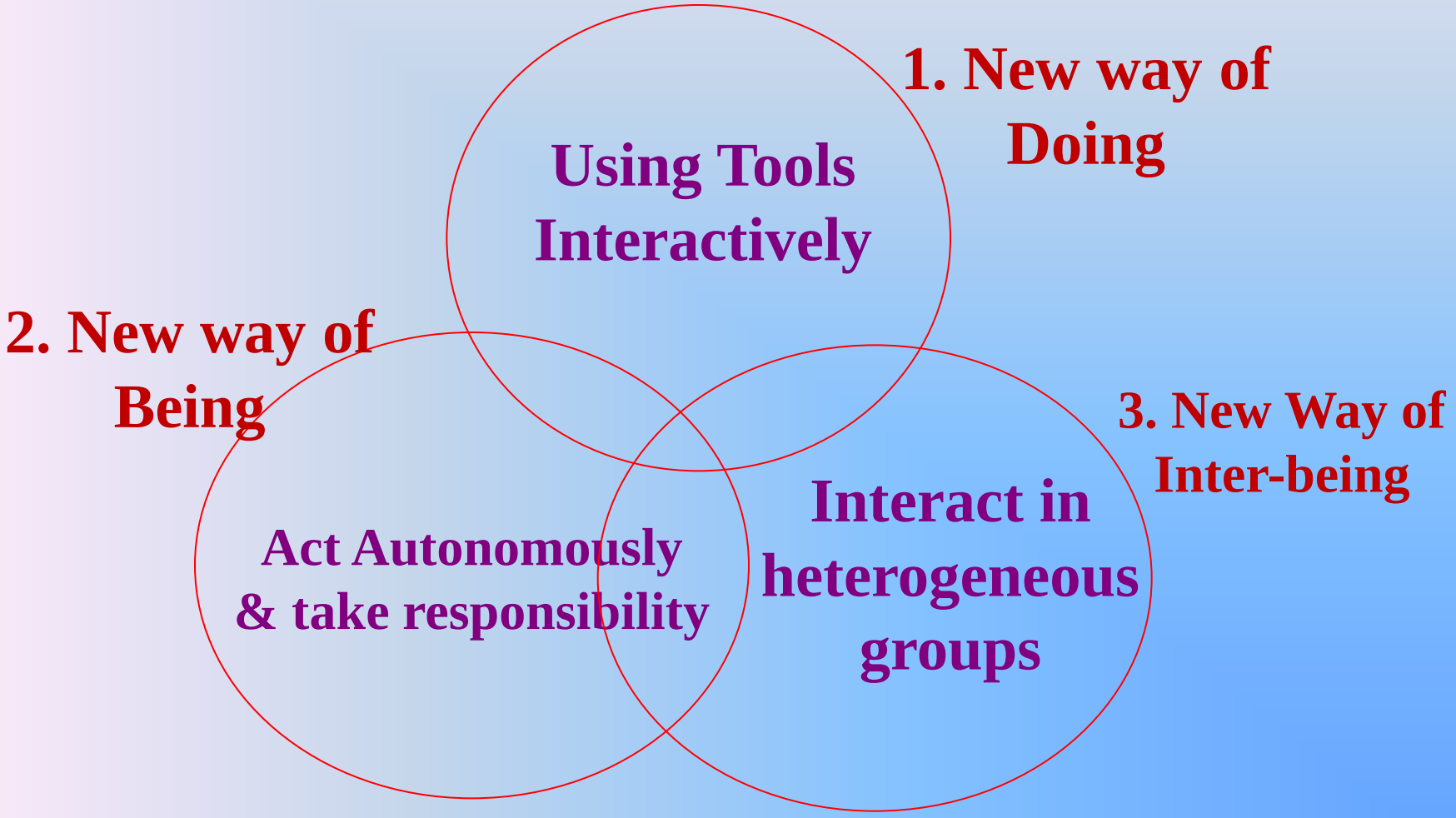
Three broad categories of key competencies

1. Using "tools" interactively: Using language, math, science, problem solving symbols, and text, technology…

2. Interacting in socially heterogeneous groups: Acting within the larger context; forming and conducting life plans; and defending and asserting one's rights, interests, limits, and needs.

3. Acting autonomously: Relating well to others; Cooperating; and Managing and resolving conflict

Key competencies for successful life and sustainable society (Adopted by HO based on Sen and Zen, 2014)



HKPISA 2012 Sampling

Explicit Strata	Implicit Strata	Total Number of Schools	Number of Participating Schools
Government	High Ability	15	6
	Medium Ability	8	2
	Low Ability	7	2
	N/A	1	0
Aided	High Ability	120	46
	Medium Ability	117	40
	Low Ability	126	33
	N/A	1	0
Independent#	Local (DSS*)	55	16
	International	32	3
Total		482	148

#There is no implicit stratification for independent schools.

*DSS refers to schools under the Direct Subsidy Scheme.

Student Background (HKPISA 2012)

	Number of participating students	Proportion (%)
Grade/Form		
7 / S1	51	1.1
8 / S2	300	6.4
9 / S3	1205	25.8
10 / S4	3088	66.1
11 / S5	26	0.6
Total	*4670*	*100*

PISA 2012 Top 10 countries/regions

(Paper based assessment, PBA)

Mathematics			Science			Reading		
Countries/Regions	**Mean**	**S.E.**	**Countries/Regions**	**Mean**	**S.E.**	**Countries/Regions**	**Mean**	**S.E.**
Shanghai-China	613	(3.3)	Shanghai-China	580	(3.0)	Shanghai-China	570	(2.9)
Singapore	573	(1.3)	**Hong Kong-China**	**555**	**(2.6)**	**Hong Kong-China**	**545**	**(2.8)**
Hong Kong-China	**561**	**(3.2)**	Singapore	551	(1.5)	Singapore	542	(1.4)
Chinese Taipei	560	(3.3)	Japan	547	(3.6)	Japan	538	(3.7)
Korea	554	(4.6)	Finland	545	(2.2)	Korea	536	(3.9)
Macao-China	538	(1.0)	Estonia	541	(1.9)	Finland	524	(2.4)
Japan	536	(3.6)	Korea	538	(3.7)	Ireland	523	(2.6)
Liechtenstein	535	(4.0)	Vietnam	528	(4.3)	Chinese Taipei	523	(3.0)
Switzerland	531	(3.0)	Poland	526	(3.1)	Canada	523	(1.9)
Netherlands	523	(3.5)	Canada	525	(1.9)	Poland	518	(3.1)

Top ranking countries/regions

Trend in Mathematics Mean Scores (2003-2012)

Country/ Region	PISA 2012 Rank (mean score)	PISA 2009 Rank (mean score)	PISA 2006 Rank (mean score)	PISA 2003 Rank (mean score)
Shanghai-China	1(613)	1(600)	/	/
Singapore	2(573)	2(562)	/	/
Hong Kong-China	3(561)	3(555)	3(547)	1(550)
Chinese Taipei	4(560)	5(543)	1(549)	/
Korea	5(554)	4(546)	4(547)	3(542)
Macao-China	6(538)	12(525)	8(525)	9(527)
Japan	7(536)	9(529)	10(523)	6(534)
Liechtenstein	8(535)	7(536)	9(525)	5(536)
Switzerland	9(531)	8(534)	6(530)	10(527)
Netherlands	10(523)	11(526)	5(531)	4(538)

PISA 2012 Top 10 countries/regions

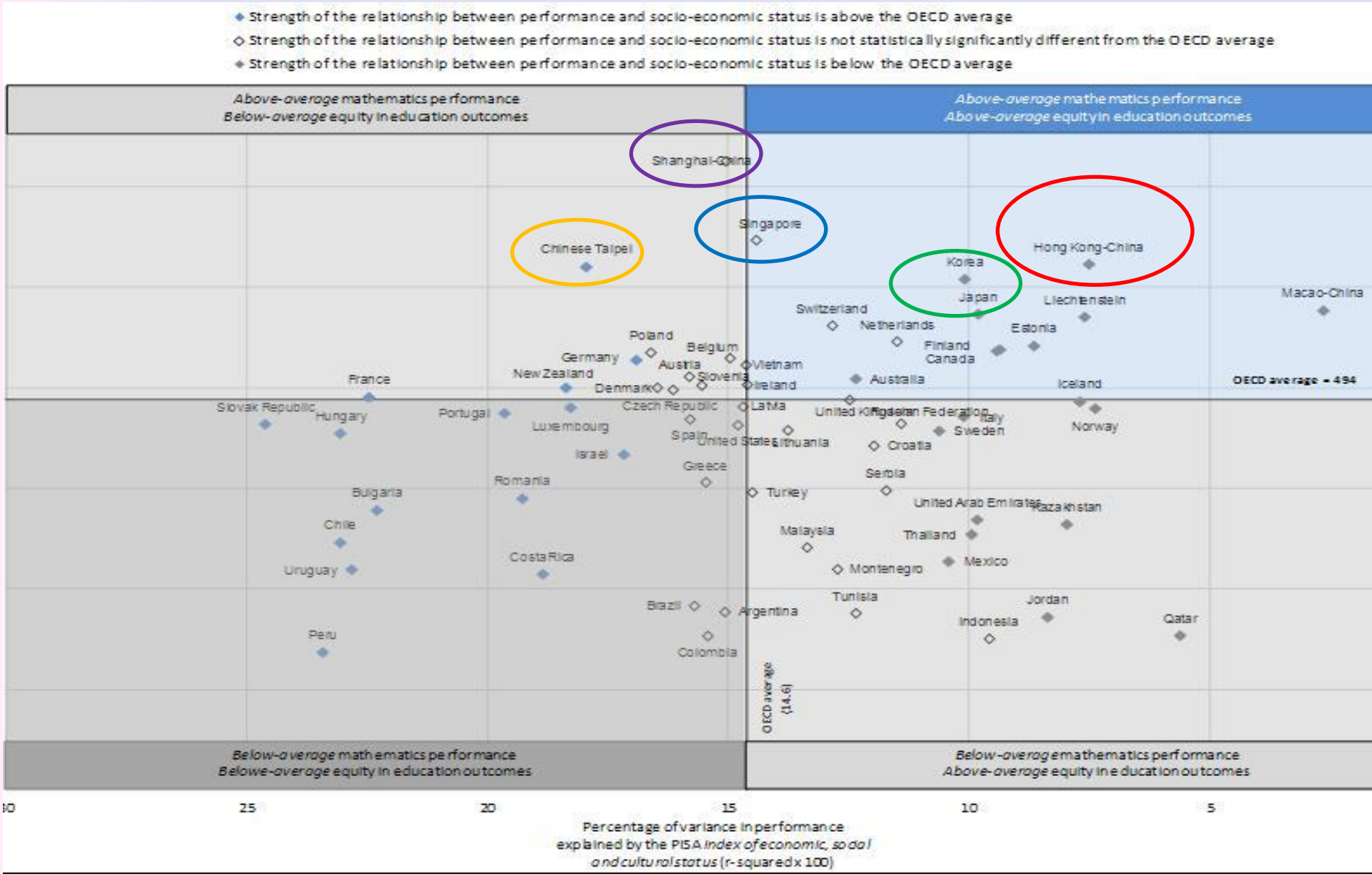
(Computer based assessment, CBA)

CBA Problem Solving			CBA Mathematics			Digital Reading		
Countries/Regions	**Mean**	**S.E.**	**Countries/Regions**	**Mean**	**S.E.**	**Countries/Regions**	**Mean**	**S.E.**
Singapore	562	(1.2)	Singapore	566	(1.3)	Singapore	567	(1.2)
Korea	561	(4.3)	Shanghai-China	562	(3.4)	Korea	555	(3.6)
Japan	552	(3.1)	Korea	553	(4.5)	**Hong Kong-China**	**550**	**(3.6)**
Macao-China	540	(1.0)	**Hong Kong-China**	**550**	**(3.4)**	Japan	545	(3.3)
Hong Kong-China	**540**	**(3.9)**	Macao-China	543	(1.1)	Canada	532	(2.3)
Shanghai-China	536	(3.3)	Japan	539	(3.3)	Shanghai-China	531	(3.7)
Chinese Taipei	534	(2.9)	Chinese Taipei	537	(2.8)	Estonia	523	(2.8)
Canada	526	(2.4)	Canada	523	(2.2)	Australia	521	(1.7)
Australia	523	(1.9)	Estonia	516	(2.2)	Ireland	520	(3.0)
Finland	523	(2.3)	Belgium	512	(2.5)	Chinese Taipei	519	(3.0)

PISA 2009 vs 2012
Top 10 countries/regions
(Digital Reading)

Digital Reading (2012)			Digital Reading (2009)		
Countries/Regions	**Mean**	**S.E.**	**Countries/Regions**	**Mean**	**S.E.**
Singapore	567	(1.2)	Korea	568	(3.0)
Korea	555	(3.6)	New Zealand	537	(2.3)
Hong Kong-China	**550**	**(3.6)**	Australia	537	(2.8)
Japan	545	(3.3)	Japan	519	(2.4)
Canada	532	(2.3)	**Hong Kong-China**	**515**	**(2.6)**
Shanghai-China	531	(3.7)	Iceland	512	(1.4)
Estonia	523	(2.8)	Sweden	510	(3.3)
Australia	521	(1.7)	Ireland	509	(2.8)
Ireland	520	(3.0)	Belgium	507	(2.1)
Chinese Taipei	519	(3.0)	Norway	500	(2.8)

Quality and Equality (PISA 2012)



Use of PISA results
For
Teaching and Learning

Teachers Professional Development

Seminar (over 200 teachers)

- How PISA measures reading/mathematical/scientific literacy of students
- An analysis of Hong Kong students' performance in the relevant literacy domains

Workshop (about 40 teachers)

- An examination of the released assessment items

Pedagogical Practice Guide

PISA Assessment Framework

Table 1: Summary of the assessment areas in PISA 2012

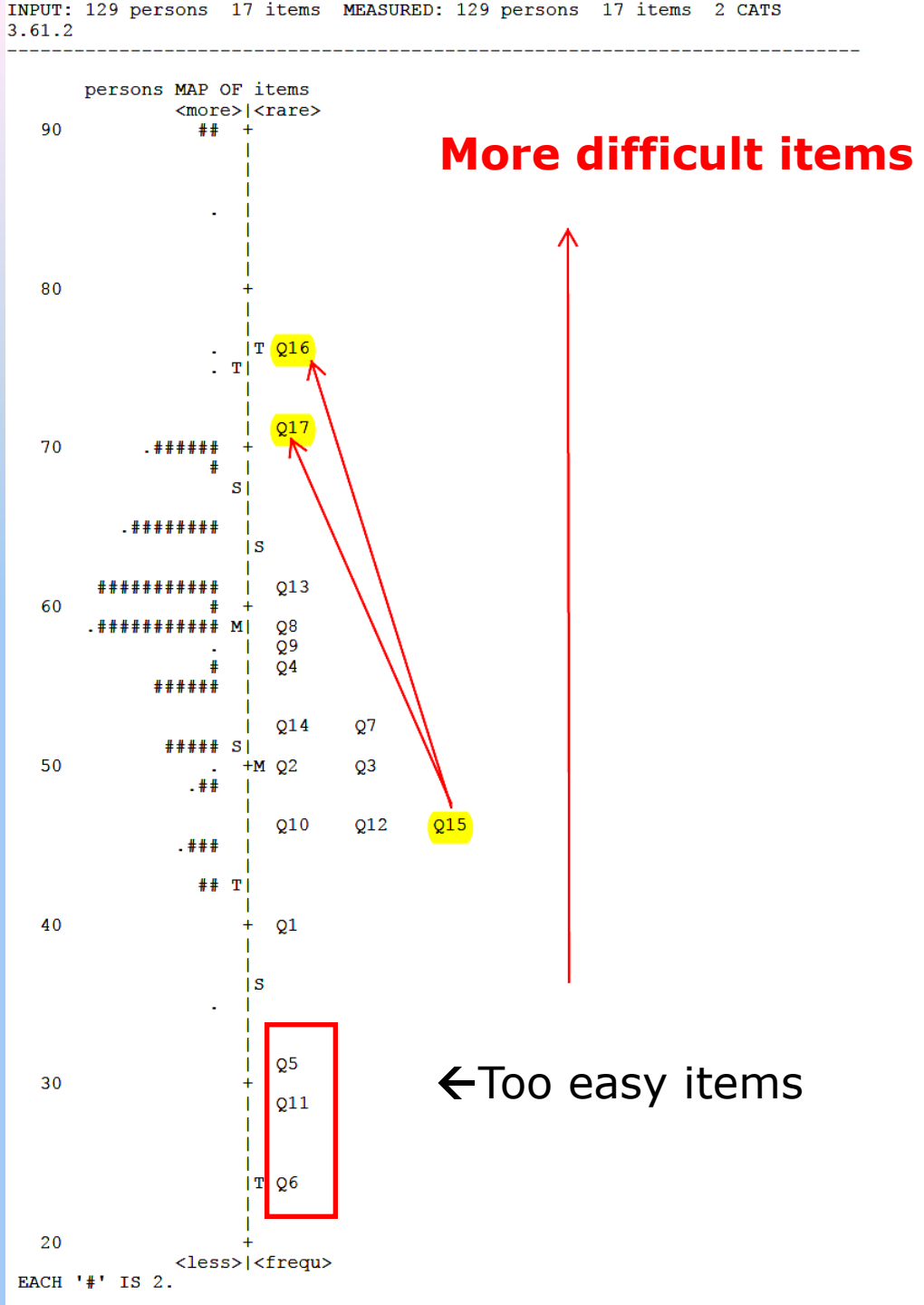
	Reading Literacy	Mathematics Literacy	Science Literacy
Definition	The capacity of an individual to understand, use, reflect on and engage with written texts in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society.	Mathematical literacy is an individual's capacity to formulate, employ and interpret mathematics in a variety of contexts. It includes reasoning mathematically and using mathematical concepts, procedures, facts and tools to describe, explain and predict phenomena. It assists individual to recognize the role that mathematics plays in the world and to make well-founded judgments and decisions needed by a constructive, engaged and reflective citizen.	The extent to which an individual: • Possesses scientific knowledge and uses that knowledge • Understands the characteristic features of science as a form of human knowledge and enquiry. • Shows awareness of how science and technology shape our material, intellectual and cultural environments. • Engages in science-related issues and with the ideas of science, as a reflective citizen.
Knowledge Domain	The form of reading materials: • *Continuous texts* including different kinds of prose such as narration, exposition, argumentation • *Non-continuous texts* • *Mixed texts* • *Multiple texts*	Clusters of relevant mathematical areas and concepts: • *Quantity* • *Space and shape* • *Change and relationships* • *Uncertainty and data*	*Knowledge of science*, such as: • "Physical systems" • "Living systems" • "Earth and space systems" • "Technology systems" *Knowledge about science*, such as: • "Scientific enquiry" • "Scientific explanations"
Competencies involved	Types of reading task or process: • Access and retrieve • Integrate and interpret • Reflect and evaluate • Complex - e.g. finding, evaluating and integrating information from multiple electronic texts	Types of mathematical task or process: • *Formulate* (formulating situations mathematically) • *Employ* (employing mathematical concepts, facts, procedures, and reasoning) • *Interpret* (Interpreting, applying and evaluating mathematical outcome)	Types of scientific task or process • *Identifying scientific issues* • *Explaining scientific phenomena* • *Using scientific evidence*
Context and situation	The use for which the text is constructed: *Personal, Educational, Occupational, Public*	The area of application of mathematics, focusing on uses in relation to personal, social and global settings such as: *Personal, Occupational, Societal, Scientific*	The area of application of science, focusing on uses in relation to personal, social and global settings such as: "Health", "Natural resources", "Environment", "Hazard", "Frontiers of science and technology"

Adapted from *PISA 2012 Assessment and Analytical Framework: Mathematics, Reading, Science, Problem Solving and Financial Literacy* (OECD 2013)

Analysis of Item

More capable students

- What does this figure represents?
- Which item is the most difficult one?
- Which item is the most easiest one?
- Overall, the test paper fits well with students' abilities?
- What are the pros and cons of the test paper?



Using PISA framework for teaching and learning

- Understand subjects of reading, math and science from an international perspective
- Don’t focus only on content but also on process skills
- Classification of assessment items
- Understand the item difficulty
- Understand student ability
- Assessment of, for, as Learning

“Robot cleaner”

http://www.fed.cuhk.edu.hk/~hkpisa/sample/sample.htm

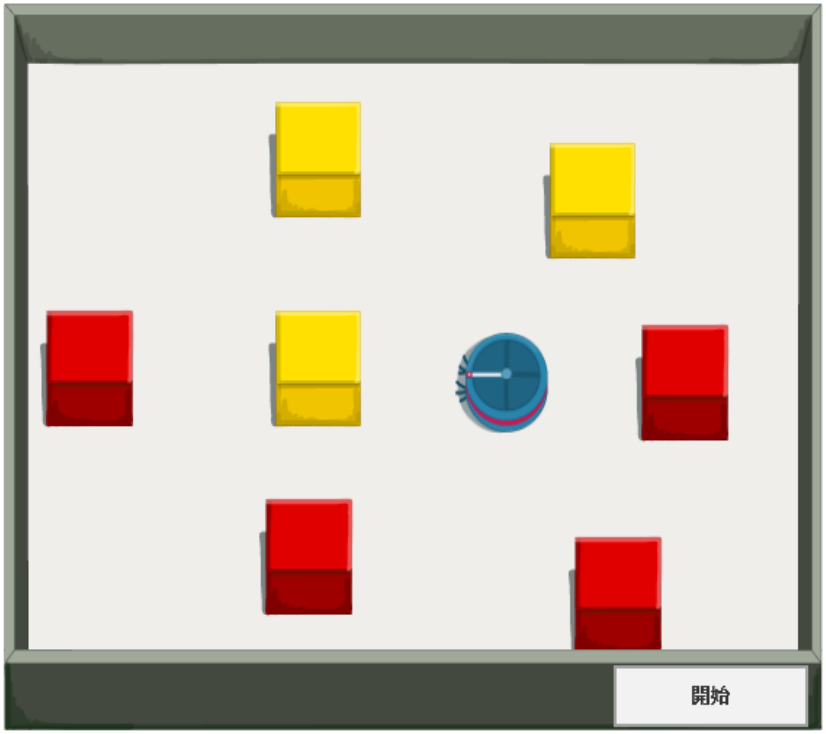
zh-HK Programme for International Student Assessment 2012

機械吸塵機

動畫顯示了新式機械吸塵機的移動情況。吸塵機正在測試中。

點擊「開始」按鈕，看看吸塵機碰到不同類型的物體時有甚麼反應。

你可以隨時點擊「重設」按鈕，使吸塵機回到起點。



問題 1: 機械吸塵機 *CP002Q08*

吸塵機碰到紅積木時有甚麼反應？

- 它立即移到另一塊紅積木。
- 它轉彎，移到最接近的黃積木。
- 它轉四分之一圈（90度）並向前移動，直至碰到其他物件。
- 它轉半圈（180度）並向前移動，直至碰到其他物件。

問題 2: 機械吸塵機 *CP002Q07*

動畫開始時，吸塵機面向左邊牆。動畫結束時，它推動了兩塊黃積木。

動畫開始時，如果吸塵機不是面向左邊牆，而是面向右邊牆，到動畫結束時，它會推動了多少塊黃積木？

- 0
- 1
- 2
- 3

問題 3: 機械吸塵機 *CP002Q06*

吸塵機遵循一套規則運作。請根據動畫，寫出一條規則，描述吸塵機碰到黃積木時的反應。

Released Material - samples test items

“Language Learning 學習語言”

http://www.fed.cuhk.edu.hk/~hkpisa/sample/sample.htm

學習語言：題目1 *[CR017Q01]*

網站language-learning.com為學習者提供甚麼服務？

- 它提供免費語言課程，由合資格導師執教。
- 它協助他們連繫其他想線上學習的人。
- 它提供學習語言的軟件。
- 它協助他們準確評估自己的語言熟練程度。

學習語言：題目2 [CR017Q04]

點擊「我的簡介」。哪一種語言拉斐爾・馬丁說得最好？

- 西班牙語。
- 英語。
- 法語。
- 德語。

Language Learning.com

首頁 | 我的簡介 | 我的朋友 | 我的訊息 | 尋找夥伴 | 連結 | 新會員

我的訊息 (2)

麥克莉寄出的訊息 (這使用者在你的「朋友」名單上)
2011年8月18日
拉斐爾你好，我只想提醒你有關使用者「艾芳仙娜」。
表面上，她的評分很高，但似乎都是她自己給自己的評分，她利用了開立的多個戶口，唯一目的就是給自己高的評分。
小心她！如果你想學習西班牙語，我會推薦杜麗莎。
祝好！
麥克莉

「推銷員」寄出的訊息 (這使用者不在你的「朋友」名單上)
2011年8月21日
你好！你想學習外語嗎？我有至醒貼士給你 . . . 試試嶄新的「詞彙訓練員」！
.. 要一個有趣、輕鬆及有效的途徑學習英語、法語、漢語、西班牙語，以及其他50種語言詞彙，現在就點擊這連結開始了吧！

www.vocabtrainer-online.com

學習語言：題目3 *[CR017Q07]*

查看「我的訊息」。你認為拉斐爾是否應該接納「詞彙訓練員」的建議？回答是或否並提出一個理由來支持你的答案。

School Participation and Your support

- **Test administration will be conducted by trained external personnel that will be hired and trained by the HKPISA center – not by school staff.**
- **School coordinators help to coordinate the day and place of assessment and IT staffs help for the checking of computers**
- **Students test and questionnaire (3 hours)**
- **Parent survey, teacher survey and school survey**

Our appreciation to your support

Participating schools:

- School report
- Certificate of Appreciation
- SDES (School Data Enquiry System)
- Pedagogical Practical Guide for teachers (PBA + CBA)
- USB + Writing pad
- Professional development workshops: Teachers from participating schools have the higher priority to attend


香港中文大學
學生能力國際評估計劃－香港中心
THE CHINESE UNIVERSITY OF HONG KONG
Hong Kong Centre for International Student Assessment

Certificate of Participation

Presented to

Chan Tai Man

for participating in the

HONG KONG PROGRAMME FOR INTERNATIONAL STUDENT ASSESSMENT

in April – May 2012

Professor Leslie N. K. Lo
Director, Hong Kong Institute of Educational Research

Professor Esther S. C. Ho
Director, HKPISA Centre

The Hong Kong Programme for International Student Assessment is an international study organized by the Organisation for Economic Co-operation and Development, supported by Education Bureau, HKSAR

OECD

Participating students :

- Certificate of Appreciation
- A well-designed bookmark as souvenir

To inform schools

學校報告

HKPISA 2012 主測試

數學、科學和閱讀的基礎能力

學校報告

甲乙丙中學

香港中文大學

香港教育研究所

學生能力國際評估計劃 — 香港中心

經濟合作與發展組織　香港中文大學　香港教育研究所

表二：學生在各測試範疇和指數的平均表現

測試日期：二〇一二年五月二十五日

	貴校 平均成績[2]	同類別學校[3] 平均成績	全港參加學校[4] 平均成績
測試範疇			
數學	72% (13%) n^5 = 24	73% (15%) n = 1807	59% (22%) n = 4517
科學	77% (11%) n = 15	75% (14%) n = 1252	65% (19%) n = 3131
閱讀	75% (12%) n = 16	79% (13%) n = 1256	69% (20%) n = 3115
自我認知能力 Self Related Cognition			
數學自我效能感 Mathematics Self-Efficacy	3.26 (0.45)	3.37 (0.50)	3.15 (0.61)
數學自我觀 Mathematics Self-Concept	2.24 (0.60)	2.43 (0.71)	2.33 (0.72)
學習數學焦慮感 Mathematics Anxiety	2.48 (0.56)	2.37 (0.67)	2.47 (0.67)
學習動機 Drive and Motivation			
學習數學的內在動機 Intrinsic Motivation	2.40* (0.83)	2.58 (0.74)	2.51 (0.76)
學習數學的工具性動機 Instrumental Motivation	2.80 (0.68)	2.80 (0.69)	2.74 (0.71)
投入學校的程度與學校風氣 Engagement with and at School and School Climate			
學校歸屬感 Sense of Belonging	2.84 (0.42)	3.02 (0.42)	2.97 (0.45)
學生對學校的觀感 Attitudes Towards School	2.82 (0.43)	2.84 (0.45)	2.82 (0.47)
紀律氣氛 Disciplinary Climate	3.16 (0.78)	3.19 (0.68)	3.14 (0.70)

[2]平均成績有*者代表該數值與同類別學校的成績有統計上的顯著差異。但如參加測試人數在 10 人以下，將不會進行顯著性檢驗。（括號內數字為標準差。）

[3]同類別學校指收生質素相近的學校。

[4]全港參加學校共有 168 間。

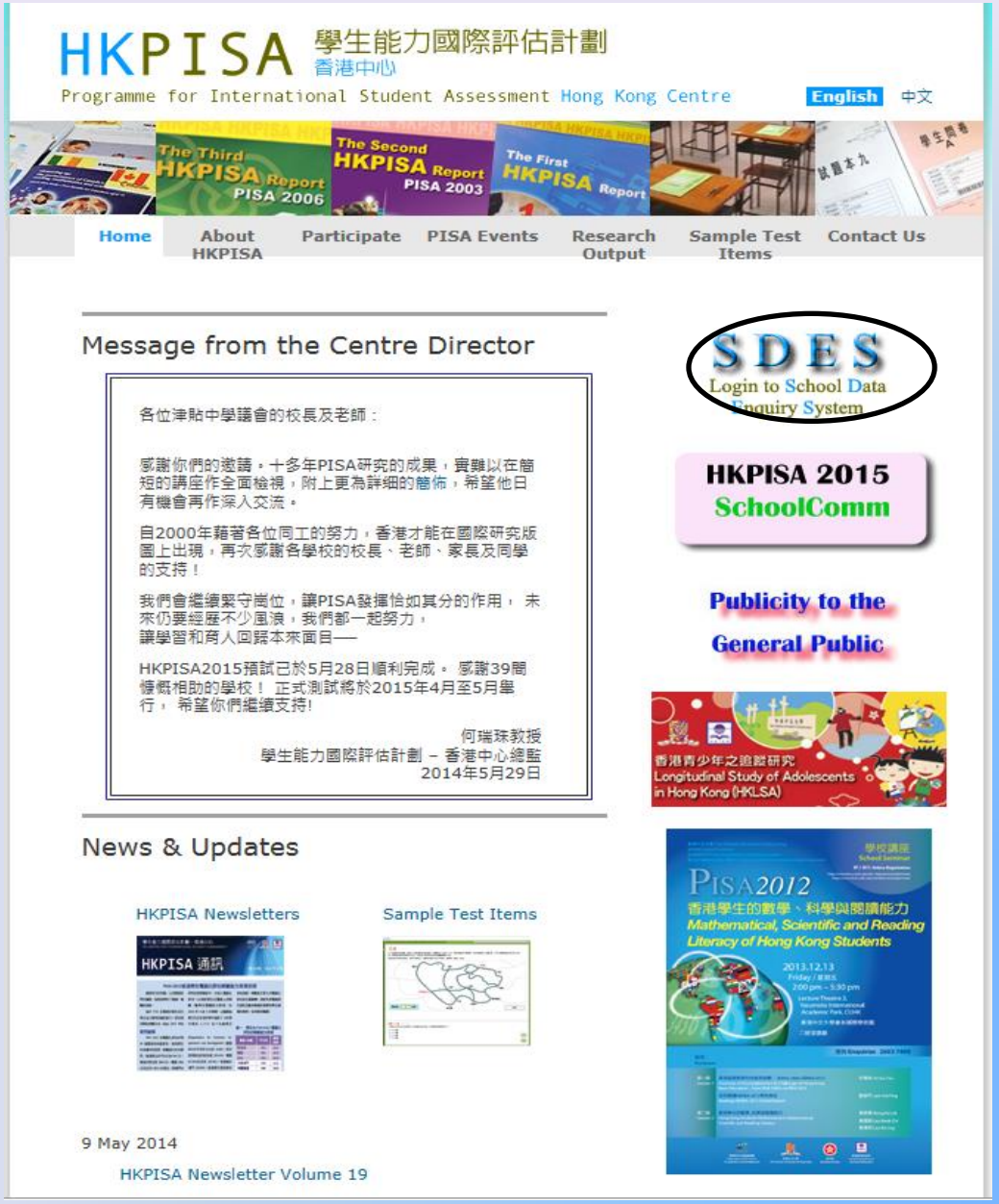
[5]n代表參加測試人數。人數會因測試範疇不同而異。

HKPISA School Data Enquiry System

Content

- **Student factors**
  - Self-related Cognitions (e.g. self concepts, …)
  - Personal Values & Attitudes
- **Parent factors**
  - Involvement at home in the child's education
  - Participation in the school
- **Literacy Performance** in Reading, Math, and Science
- Data from 2012, 2009, 2006, 2003, 2000+

http://www.fed.cuhk.edu.hk/~hkpisa



Theme: Environmental Issues
Index: Awareness of Environmental Issues
Index: Environmental Optimism
Index: Perception of Environmental Issues
Index: Responsibility for Sustainable Development
Theme: Literacy Performance
Index: Percentage Correct for Math
Index: Percentage Correct for Reading
Index: Percentage Correct for Science
Theme: Parental Factors
Index: Cultural Possession
Index: Economic, Social and Cultural Status
Index: Home Educational Resources
Index: Home Based Involvement
Index: Material Resources
Index: Parental Satisfaction
Index: Parental Arrangement of Science Activities
Index: School Based Involvement
Theme: Science Teaching & Learning
Index: Focus on Model or Application
Index: Hands-On Activities
Index: Interaction
Index: Student Investigations
Theme: Science Values & Activities
Index: General Value of Science
Index: Personal Value of Science
Index: Science Activities
Theme: Self-Related Cognitions
Index: Instrumental Motivation in Science
Index: General Interest in Learning Science
Index: Enjoyment of Science
Index: Science Self-Efficacy
Index: Future-Oriented Science Motivation
Index: Science Self-Concept

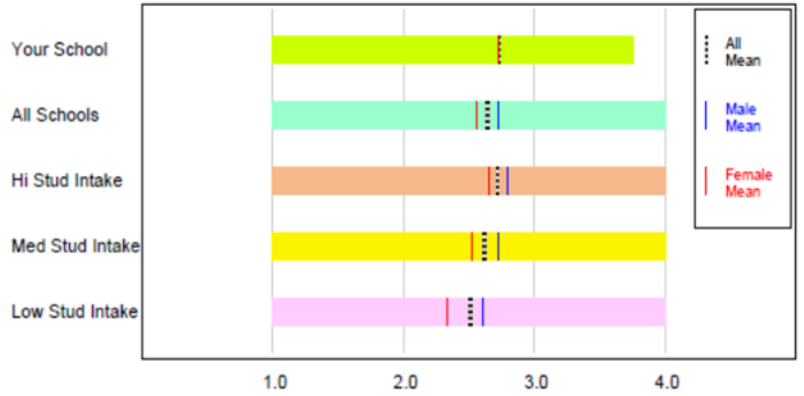
香港中文大學 The Chinese University of Hong Kong

HKPISA SCHOOL DATA
香港學生能力國際評估計劃 學校數據

Hong Kong Institute of Educational Research 香港教育研究所

GENERIC SECONDARY SCHOOL

TEST CYCLE:	HKPISA 2006 Main Study
TEST PERIOD:	May - June 2006
THEME:	Self Related Cognitions
INDEX:	General Interest in Learning Science

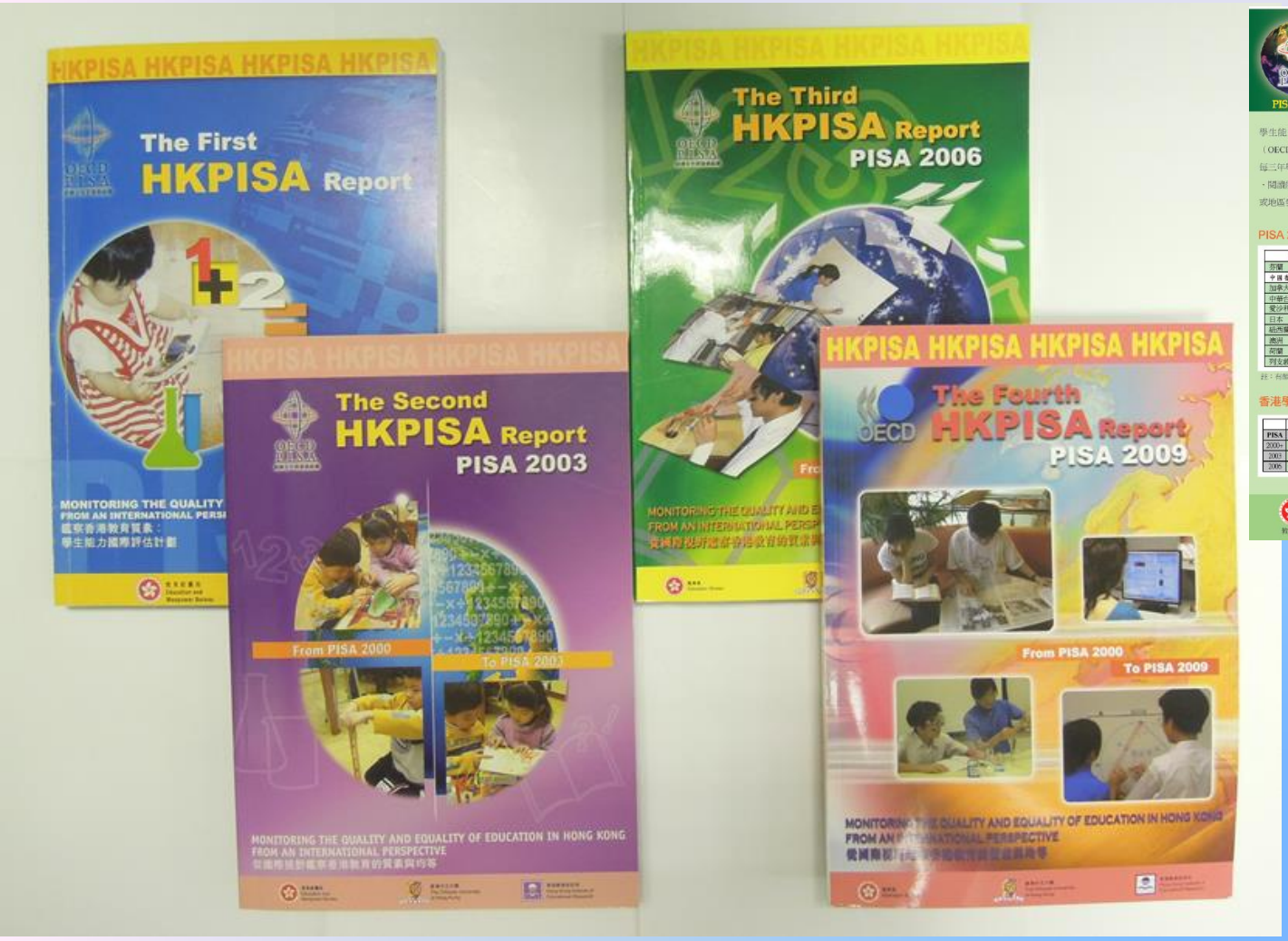


Level of General Interest in Learning Science					No. of Students	Index (Weighted Mean)		
	Very Low[1]	Low[2]	High[3]	Very High[4]		All	Male	Female
Your School	4 (6.2%)	18 (27.7%)	35 (53.8%)	8 (12.3%)	65	2.72	0	2.72
All Schools	616 (10.7%)	1840 (31.9%)	2553 (44.3%)	751 (13%)	5760	2.63	2.72*	2.56*
Hi Stud Intake	230 (8.1%)	823 (29.1%)	1376 (48.7%)	399 (14.1%)	2828	2.71	2.79*	2.65*
Med Stud Intake	182 (11%)	553 (33.5%)	702 (42.5%)	214 (13%)	1651	2.61	2.72*	2.52*
Low Stud Intake	202 (16.1%)	456 (36.3%)	464 (36.9%)	135 (10.7%)	1257	2.5	2.61*	2.33*

Weighted mean: (1) 1.0 - 1.75 / (2) 1.76 - 2.5 / (3) 2.51 - 3.25 / (4) 3.26 - 4.0

* Statistically significant in gender difference.

Regional Reports & Result leaflets



Leaflet for general public (HK PISA 2012)

OECD PISA 2012

How Well Does Hong Kong's Education Work?

The Programme for International Student Assessment (PISA) is a project led by the Organisation for Economic Co-operation and Development (OECD). PISA takes place every three years starting from 2000, assessing the knowledge and skills of 15-year-olds in reading, mathematical and scientific literacy. In addition to the conventional paper-based tests, computer-based assessments (CBA) were administered to assess students' digital problem-solving, mathematical and reading literacy. About 510,000 students from 65 countries/regions participated in PISA 2012.

Top 10 Countries/Regions in PISA 2012

Reading		Mathematics		Science	
Countries / Regions	Mean score	Countries / Regions	Mean score	Countries / Regions	Mean score
Shanghai-China	570	Shanghai-China	613	Shanghai-China	580
Hong Kong-China	**545**	Singapore	573	**Hong Kong-China**	**555**
Singapore	542	**Hong Kong-China**	**561**	Singapore	551
Japan	538	Chinese Taipei	560	Japan	547
Korea	536	Korea	554	Finland	545
Finland	524	Macao-China	538	Estonia	541
Ireland	523	Japan	536	Korea	538
Chinese Taipei	523	Liechtenstein	535	Vietnam	528
Canada	523	Switzerland	531	Poland	526
Poland	518	Netherlands	523	Canada	525

Note: Shaded area indicates scores significantly different from those of Hong Kong.

Top 10 Countries/Regions in CBA in PISA 2012

CBA Problem Solving		CBA Mathematics		Digital Reading	
Countries / Regions	Mean score	Countries / Regions	Mean score	Countries / Regions	Mean score
Singapore	562	Singapore	566	Singapore	567
Korea	561	Shanghai-China	562	Korea	555
Japan	552	Korea	553	**Hong Kong-China**	550
Macao-China	540	**Hong Kong-China**	550	Japan	545
Hong Kong-China	540	Macao-China	543	Canada	532
Shanghai-China	536	Japan	539	Shanghai-China	531
Chinese Taipei	534	Chinese Taipei	537	Estonia	523
Canada	526	Canada	523	Australia	521
Australia	523	Estonia	516	Ireland	520
Finland	523	Belgium	512	Chinese Taipei	519

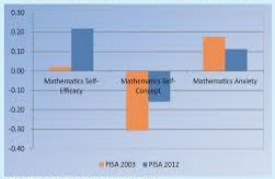
Student Performance in PISA 2012

- Mathematical Literacy
  When compared with their overall mathematics proficiency, Hong Kong students perform the best in formulating, score the highest on the space and shape sub-scale, but perform relatively less well in interpreting mathematics and handling uncertainty and data. They have made a significant improvement in mathematics when compared with PISA 2006.
- Scientific Literacy
  Hong Kong students perform consistently well and outperform most of the other countries/regions. They have made a significant improvement in science when compared with PISA 2000+, 2003 and 2006.
- Reading Literacy
  Hong Kong students perform consistently well and outperform most of the other countries/regions. Compared with the previous four PISA cycles, Hong Kong students perform the best in PISA 2012.
- CBA Problem Solving
  Hong Kong students perform well and rank fourth in CBA problem solving. As for the problem solving process, they have a stronger-than-expected performance in exploring and understanding but a weaker-than-expected performance in planning and executing.
- CBA Mathematics
  Hong Kong students perform well and rank fourth in CBA mathematics.
- Digital Reading
  Hong Kong ranks third in digital reading in PISA 2012. A remarkable improvement has been made in PISA 2012 when compared with PISA 2009.

Non-cognitive Performance

Hong Kong students' self-efficacy and self-concept in mathematics have improved from 2003 to 2012. Yet, their self-concept in mathematics is still lower than the OECD average, while their anxiety towards learning mathematics is still higher than the OECD average.

Indices of Self-related Cognition of Hong Kong Students in PISA 2012

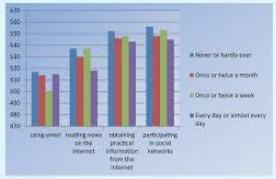


Note: OECD averages of the indices are set at 0.00.

Online activities and CBA performance

Activities found to be positively correlated with students' performance include using email, reading news on the Internet, obtaining practical information from the Internet, and participating in social networks.

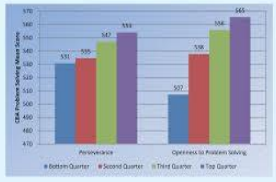
Relationship between Online Activities and CBA Problem Solving Performance of Hong Kong Students



Relationship between Attitudes towards Problem Solving and CBA Problem Solving Performance

As for the attitudes towards problem solving, the level of perseverance of Hong Kong students is higher than the OECD average, while their openness is far below the OECD average. These two kinds of attitudes are found to be significantly positively correlated with students' performance in CBA problem solving.

Relationship between Perseverance and Openness towards Problem Solving and CBA Problem Solving Performance of Hong Kong Students



Hints for Educators

- Given the generally outstanding mathematics performance of Hong Kong students, mathematics teachers may have sufficient room for attempting to bring our mathematics teaching in line with a broader conception of mathematics for the information age by making a liberal move to de-emphasise the current demands for skills in fast, complicated, symbolic and other routine mathematical manipulations such as formulae, but instead, to give students more opportunities to analyse, to conceptualise, to reason, to argue and to reflect in working out mathematics in the classroom.
- The survey of students' self-related cognition and learning motivation indicates that a wide array of students' non-cognitive (affective) factors, such as mathematics self-efficacy, mathematics self-concept, and intrinsic and instrumental motivation, are positively associated with mathematics performance. It can be contended that the cognitive and the non-cognitive (affective) domains are inter-related and interacting with each other; both are important elements in nurturing future citizens.
- Stronger focus should be put on classroom pedagogy to support curriculum innovation and improvement of using computers to better effect. Educators can examine the circumstances under which ICT activities can enhance students' learning, problem solving skills and overall competencies to promote their autonomous and lifelong learning in a digital world.
- Despite their satisfactory digital performance, there is room for improvement in the attitudes towards problem solving (perseverance and openness) among Hong Kong students.
- In the new digital age, schools and teachers may explore different ways to proactively guide students to make good use of information technology. Students should be encouraged to persist in in-depth learning with an open mind, to exercise their creativity, and to broaden their horizons by using computers, rather than to merely browse and copy information, chat with friends or even be addicted to computer games.

Hints for Parents

Regardless of parents' socio-economic status, home-based parental involvement in children's education is a promising avenue by which children's performance can be enhanced. Enhancing communication among family members, discussing school life with the children and spending time just chatting with them are important measures that parents may take to support their children's learning. Besides, the proper and positive role of home-school communication should be promoted in order to facilitate partnership between school and parents. This partnership will lead to a more thorough understanding of the children, which is essential for providing the children with appropriate guidance and support.

Things you can do to promote your child's learning:

- ☐ Discuss school life with your child
- ☐ Have dinner with your child
- ☐ Spend time chatting with your child
- ☐ Invest on educational resources for your child
- ☐ Purchase books and classical literature for your child

Things you can do to promote your child's learning in the information age:

- ☐ Allow your child to use computer and Internet at home for learning and guide them
- ☐ Encourage your child to read online news and search for practical information
- ☐ Understand the need of your child regarding using email and participating in social network
- ☐ Encourage your child to communicate with his/her teachers and classmates for learning purpose via the Internet.

Organiser of PISA in Hong Kong:
Hong Kong Centre for International Student Assessment
(Programme commissioned by Education Bureau)

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Shatin, Hong Kong

For more information about OECD/PISA, please visit the website:
http://www.oecd.org/pisa

Education Bureau

The Chinese University of Hong Kong

Hong Kong Institute of Educational Research

Mr. Andreas Schleicher, Head of Indicator and Analysis Division of the OECD's Directorate of Education

"PISA inspires national efforts to help students to learn better, teachers to teach better, and school systems to work better."

Prof. Wong Hin Wah

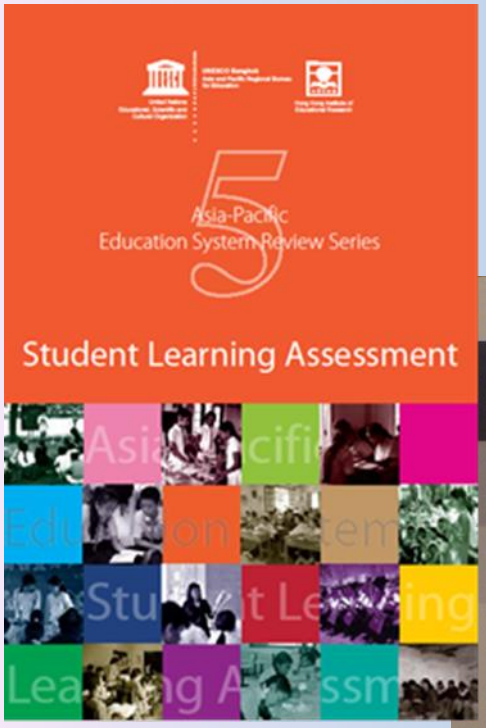
"We have to work together to improve the unenthusiasm for learning among Hong Kong students as reflected by their low academic self-concept and high anxiety."

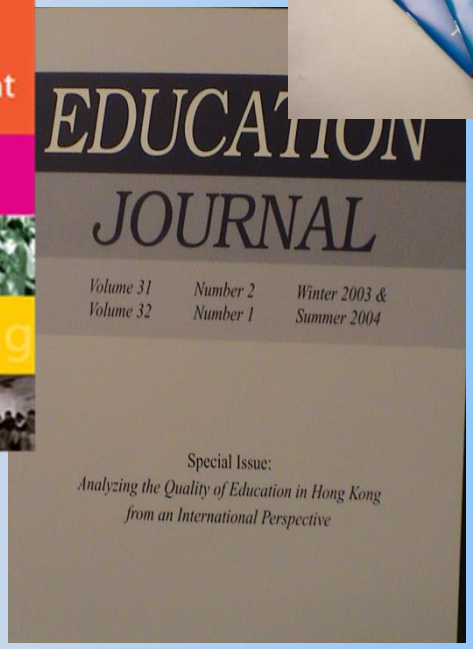
Prof. Esther Ho

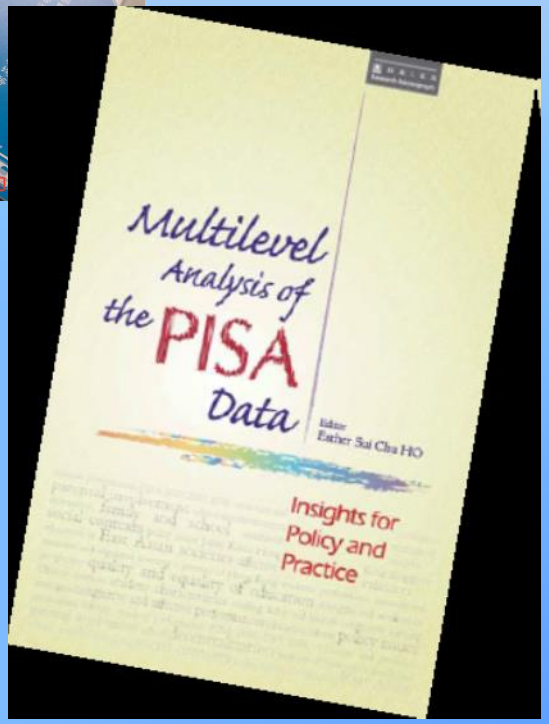
"In face of the digital age, it is essential for students to be able to take advantage of but not be lost in the digital world so that they may develop their independent and critical thinking skills."

For Educators and Academics

- Books, Papers and Special Issue in Educational Journal, Thematic Reports







HKPISA 2015
香港學生能力國際評估計劃

72 Participating countries/economies
(Updated it for **PISA 2015** – Asia Pacific regions)

OECD Countries			**Partner Countries (Non-OECD Countries / Regions)**		
Australia	Hungary	Poland	Albania	Kazakhstan	Sha
Austria	Iceland	Portugal	Argentina	Latvia	Singap
Belgium	Ireland	Slovak Republic	Brazil	Liechtenstein	Thailand
Canada	Israel	Slovenia	Bulgaria	Lithuania	Tunisia
Chile	Italy	Spain	Chinese Taipei	Macao-China	United Arab Emirates
Czech Republic	Japan	Sweden	Colombia	Malaysia	Uruguay
Denmark	Korea	Switzerland	Costa Rica	Montenegro	Vietnam
Estonia	Luxembourg	Turkey	Croatia	Peru	
Finland	Mexico	United Kingdom	Cyprus	Qatar	
France	Netherlands	United States	Hong Kong-China	Romania	
Germany	New Zealand		Indonesia	Russian Federation	
Greece	Norway		Jordan	Serbia	

The provinces of Beijing, Jiangsu and Guangdong will take part in the 2015 survey, in addition to Shanghai.

Thank you !

Further information

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HKPISA

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