

Overview of PISA

1. The Organization for Economic Co-operation and Development (OECD) initiated and organized the first Programme for International Student Assessment (PISA) in 2000. This international study compares and evaluates the effectiveness of the education system in each participating region or country. OECD collects data every three years, and develops educational indicators to help governments and policy makers evaluate and monitor the effectiveness of their educational systems at the national level. Specifically, the study assesses how well 15-year-olds approaching the end of compulsory education have acquired the knowledge and skills essential for participation in society. In particular, PISA addresses the following issues: How well are young adults prepared to meet the challenges of the future? Can they analyse, reason and communicate their ideas effectively? Can they continue learning throughout their lives?

2. The 1st cycle of PISA, called PISA 2000, was conducted in 2000. Thirty-two countries participated. Another 11 countries and regions joined PISA+ in 2002. PISA 2000 and PISA+ focused on reading literacy. Hong Kong joined PISA+ and collected the data in February 2002.

Table 1 Countries / Regions Participating in PISA 2000 & PISA+

PISA 2000		PISA+	
Australia	Hungary	New Zealand	Albania
Austria	Iceland	Norway	Argentina
Belgium	Ireland	Poland	Bulgaria
Brazil	Italy	Portugal	Chile
Canada	Japan	Russian Federation	Hong Kong, China
Czech Republic	Korea	Spain	Indonesia
Denmark	Latvia	Sweden	Israel
Finland	Liechtenstein	Switzerland	Macedonia
France	Luxembourg	United Kingdom	Peru
Germany	Mexico	United States	Romania*
Greece	Netherlands		Thailand

*Note: OECD did not have the data from Romania when this report was prepared.

3. The knowledge and skills assessed in PISA are defined not in terms of a common denominator of national school curricula but in terms of what skills are deemed to be essential for future life. PISA measures student literacy in terms of broad concepts and skills and their application. The PISA Consortium has developed a framework describing the scope and dimensions of assessment in three domains: reading, mathematics and science. Each domain has three dimensions: the content or structure of knowledge that students should acquire; a range of processes to be performed; and, the situation or context in which knowledge and skills are applied or drawn. PISA assesses students across a range of skills required for a variety of tasks that they may encounter.

Overview of HKPISA

4. The HKPISA main study was conducted in January to February 2002. A two-stage stratified sampling design was used. In the first stage, a random sample of schools from each stratum was selected with probability proportional to size. For Hong Kong, schools were classified into three strata: government, aided and independent. The distribution of schools is shown in Table 2. The weighted school participation rate before replacement was 66.6%. After replacement, the weighted school participation rate was 92.6%. Hong Kong followed the OECD sampling procedures closely and the main study met the criteria for acceptable response rate.

Table 2 Participating schools for each sampling stratum.

Explicit Strata	Implicit Strata	Total Number of Schools	Number of Schools participated
Government	High Ability	18	7
	Medium Ability	8	2
	Low Ability	10	4
Aided	High Ability	127	46
	Medium Ability	130	44
	Low Ability	101	29
Independent*	Local (DSS*)	23	6
	International	23	2
	Total	440	140

*Note: There is no intake classification for independent schools.

*DSS refers to schools under the Direct Subsidy Scheme.

5. In the second stage, thirty-five 15-year-old students were randomly selected from each school that agreed to participate. Within these schools, all 15-year-olds were eligible for the assessment. Only students who were functionally or intellectually disabled or had limited proficiency in the test language were excluded. Less than 2% of students were excluded. In other words, the sample covered 98% of the enrolled population of 15-year-olds. A total of 4405 students from 140 schools were accepted for international comparison. The sample represents the target population well.
6. The HKPISA Center trained 49 test administrators to administer the assessment in schools according to the OECD stipulated assessment procedures. After data collection, 16 markers for reading and 8 markers for mathematics and science were recruited. They were teachers or student-teachers in the relevant domains. Markers were trained to apply the marking criteria faithfully. Open-constructed response questions in 480 booklets were selected for multiple marking to ascertain the inter-marker reliability. The reliabilities of 85-98% obtained suggest that our marking in mathematics, science, and reading was very reliable and consistent.

Major Findings

Quality and Equality

7. Overall, Hong Kong students performed well compared with students in most other countries, ranking first in mathematics, third in science, and sixth in reading among the participating countries. Hong Kong got 560 on the mathematical literacy scale¹, outperforming all the other participating countries significantly except Japan (557) and Korea (547). Hong Kong scored 541 on the scientific literacy scale. Only Korea (552) and Japan (550) performed better than Hong Kong among all the participating countries, but the differences were not statistically significant. On the combined reading scale, Hong Kong obtained a score of 525. Only one country, Finland (546), performed significantly better than Hong Kong. In reading, Canada, New Zealand, Australia and Ireland also performed better than Hong Kong, but the differences were not statistically significant.
8. As far as equality in education is concerned, Hong Kong's high scores were not gained at the expense of higher inequality in schooling. The disparities between high (95th percentile) and low achievers (5th percentile) are relatively small. The disparities for combined reading, mathematical and scientific literacy are 277, 309 and 280 respectively. The corresponding OECD averages are 328, 329, 325 respectively. The relatively small disparities suggest that most students in Hong Kong have similar access to, and benefit from, the Hong Kong educational system.
9. Hong Kong's 15-year-olds scored higher than those students with similar socio-economic backgrounds (SES) in many other countries (see Appendix 2). The achievement gap of students from different socio-economic backgrounds in Hong Kong is relatively small compared with other countries. One reason could be that Hong Kong educators and parents are doing well in helping the disadvantaged students. On the other hand, we do not have many students who have attained outstanding scores on the reading proficiency scales. About 10 % of Hong Kong's 15-year-old students are at Level 5² (the highest level) in reading proficiency, which is lower than other outstanding countries.
10. Socio-economic background has only a relatively small impact on the literacy performance of Hong Kong students. SES's impacts on academic achievement are often

¹ The mean performances in the three domains for the 41 participating countries with valid database are shown in Appendix 1. The OECD average was set to 500 points with a standard deviation of 100.

² OECD divides students' proficiency into five levels. Students able to complete many of the most difficult PISA tasks are classified at Level 5. Level 5: above 625 points; Level 4: 553-625; Level 3: 481-552; Level 2: 408-480; Level 1: 335-407

expressed as socio-economic gradients³(OECD, 2000). The gradient is an indication of the extent of inequality attributable to SES. The shallow social gradients of Hong Kong suggest that Hong Kong students perform equally well regardless of their different socio-economic cultural backgrounds (see Appendix 2).

11. However, a strong effect of student intake on reading, mathematical and scientific literacy can be identified. The results suggest that the Hong Kong secondary educational system is highly segregated academically. Despite this segregation, Hong Kong's low achievers performed better when compared with those students with similar backgrounds. It can be posited tentatively that schools and teachers in Hong Kong are catering quite effectively for the needs of low achievers.

Reading Literacy

12. Hong Kong's 15-year-olds performed quite well in reading. Their scores on the three sub-scales of reading literacy, Retrieving Information, Interpreting, and Reflecting and Evaluating, were 522, 522 and 538 respectively. The corresponding OECD averages were 498, 501 and 502 respectively. The proportions of students in Hong Kong who performed at Level 3 or above on the Retrieving Information, Interpreting, and Reflecting and Evaluating sub-scales were 70%, 72% and 76% respectively whereas the corresponding OECD averages were only 59%, 60% and 62%.
13. Hong Kong students performed particularly well on the Reflecting and Evaluating sub-scale. However, in terms of text types, Hong Kong's 15-year-olds did not handle narratives and descriptives as effectively as they did with argumentative and informative texts which involve higher-level language processing.
14. Girls significantly outperformed boys on the combined reading scale by 16 points. Girls also performed better on the three reading literacy subscales. The differences were 8, 11 and 31 for the Retrieving Information, Interpreting, and Reflecting and Evaluating sub-scales respectively. On the combined reading literacy scale, the 95th percentiles for boys and girls were 618 and 624 respectively. The difference was 6 points. The 5th percentiles for boys and girls were 326 and 368 respectively. The difference was 42 points. These results indicate that high-achieving boys and girls perform similarly well; however, low-achieving boys lag severely behind low-achieving girls.

³ Steeper gradients indicate a greater relationship between SES and student performance; and shallower gradients indicate a smaller relationship between socio-economic background and student performance, or less inequality.

15. Analysis of reading habit indicates that students who spend time on reading for enjoyment and engage more in reading have higher scores. These two variables have the strongest effect on reading literacy (ranging from 7 to 15 points) though other variables such as reading diversity also have positive effect (ranging from 3 to 5 points).
16. It is worth noting that Hong Kong's 15-year-olds have a rather high level of interest in reading, which is comparable to the OECD average. However, they have a lower verbal self-concept compared with their counterparts in other countries. This level of verbal self-concept of Hong Kong's 15-year-olds is not commensurate with their high performance on the reading literacy scale.

Mathematical and Scientific Literacy

17. Hong Kong got 560 on the mathematical literacy scale, ranking first among the participating countries. At each percentile level, Hong Kong consistently performed better than the OECD average. The lead decreased from 63 to 44 from the 5th percentile to 95th percentile. Hong Kong's 15-year-old students performed substantially better than the students from other participating countries in different strands of mathematics. The performance lead was exceptionally large in algebra but only marginal in geometry.
18. Similar to their performance in other literacy areas, the performance of boys was poorer than that of girls at the 5th percentile by 10 points in mathematical literacy. However, boys outperformed girls at other percentile levels. Between 75th and 95th percentile, the gap ranged from 27 to 29 points. These performance gaps widened at higher percentile levels.
19. Hong Kong got 541 on the scientific literacy scale, ranking third among the participating countries. When compared with the OECD average, Hong Kong students performed consistently better than the OECD average at each percentile point. At the 5th and 10th percentile points, Hong Kong students got about 58 more than the OECD average. This suggests that low achievers in Hong Kong are less disadvantaged than the OECD low achievers.
20. Boys generally performed better on the scientific literacy scale than girls did, but the difference of 9 was not significant statistically. At the 5th and 10th percentile points, girls performed better than boys by 6 to 8 points, which was not significant. At higher percentile points, boys performed better and better than girls did. At 75th percentile and beyond, boys got 15 to 21 points more than girls did, which were statistically significant.

Processes of Learning

21. Compared with students of other participating countries, Hong Kong students reported that they employed most of the learning strategies less frequently than the OECD average. Six out of nine self-regulated learning indices were negative: Control Strategies (-0.28), Effort & Perseverance (-0.25), Self-efficacy (-0.37), Control Expectation (-0.37), Elaboration (-0.21) and Instrumental Motivation (-0.18). Most of these indices were extremely low compared with other participating countries. Three indices were positive: Memorization (0.07), Competitive Learning (0.67) and Co-operative Learning (0.05). The Competitive Learning index was the highest among the participating countries in PISA while the other two were about the OECD average. Competitive learning and memorization strategies were the two strategies most frequently used by Hong Kong's 15-year-old students.
22. The nine indices had significant effect on reading, mathematical and scientific literacy even after student background and school contextual factors had been taken into account. Among them, Control Strategies, Self-efficacy and Competitive Learning were the strongest predictors of literacy performance across the three domains. Instrumental motivation and Memorization had a small negative effect on literacy performance across the three domains. The effects of other indices on literacy performance were somewhat domain dependent.

Parental Involvement and Parental Investment

23. Parental involvement is also important to students' literacy performance. Students whose parents spent more time on communication with them performed better. Students who communicated with their parents more often about daily "social" topics (e.g. discussing schoolwork, spending time talking, and eating the evening meal together) tended to perform better in reading, mathematics and science.
24. Both cultural communication (e.g. discussing books, films and television programs and political and social issues) and cultural activities (e.g. visiting museums, going to concerts and watching live theatre) had moderately positive effects on literacy performance in Hong Kong and many countries. Family homework supervision was negatively associated with literacy performance. In other words, low achievers obtained more family support in homework supervision. This indicates that lower achievers may need more help from family members than higher achievers.

25. Parental investment contributes to student literacy performance even after student background and school contextual factors have been taken into account. Students whose parents invested more on educational resources such as a desk, a calculator, a dictionary and a quiet place to study performed better than others in Hong Kong. In particular, the number of books at home has a strong positive association with the three domains of literacy performance. The number of books can be seen as important cultural capital for developing a student's interest and engagement in reading, which are found to have strong positive effect on literacy performance. However, material resources such as cellular phones, TV sets, computers, motorcars, and so on were found to have negative effects on achievement in Hong Kong. This result is inconsistent with those results identified in many other countries, i.e., family possessions usually have a small positive effect on achievement (OECD, 2000).
26. Material resources measured in this study appeared to be distractors of learning for the Hong Kong 15-year-olds. Cultural possessions also had negative effects on achievement in Hong Kong. It appears that in Hong Kong, works of art or classical literature in the home may function merely as material resources. Students and parents must actually engage with such cultural products if such resources are to benefit student learning.

Profile of High and Low Achievers

27. About 74% of Hong Kong's 15-year-old students managed to achieve Level 3 or above on the combined reading literacy scale. This places Hong Kong third among the 41 countries. It indicates that Hong Kong is remarkably successful in boosting students' reading literacy as a whole. Moreover, the achievement gap between the low and high achievers is relatively small in Hong Kong. These results suggest that educators in Hong Kong as a whole are doing well in supporting low achievers.
28. However, at the bottom end, the proportions of boys and girls were drastically different. Among the bottom 15% performers on the combined reading literacy scale, more than sixty percent were boys. In other words, 2 out of 3 low achievers in reading were boys. There is a need for developing pedagogy that addresses boys' low achievement in reading.
29. Hong Kong high achievers' performance in reading was about the OECD overall average though Hong Kong ranked sixth among the participating countries. Moreover, the percentage of students achieving Level 5 in the top five countries, Finland, Canada, New Zealand, Australia and Ireland was 18%, 17%, 19%, 18% and 14% respectively. Hong Kong has only 10% of students achieving this level of proficiency. It seems that Hong Kong

is not doing as well as its western counterparts in boosting excellence at the top end of the reading scale.

30. Regarding the use of learning strategies, both high and low achievers in Hong Kong indicated a limited access to strategies for self-regulation on learning though most of the strategies were found to have a positive effect on learning. Our students reported perceiving learning as highly competitive activities regardless of their academic background.

Implications and Recommendations

For Policy Makers

31. While this was the first time that the PISA assessment was administered in Hong Kong, this was not the first international study that Hong Kong participated in. Results of previous international studies are not directly comparable to the results of the present one because of differences in assessment frameworks, age of sampled students or participating countries. It is difficult to say that Hong Kong has been improving over time. However, the present study has provided an initial baseline of the quality of our educational system at the secondary level in 2002.
32. Overall, Hong Kong students performed quite well in the three domains. It can be posited tentatively that our education system is effective in developing students' literacy without sacrificing equality. Students, regardless of their socio-economic background, can benefit from the education system. However, the academic segregation between schools in Hong Kong is high. Education policy should aim to alleviate the burden of structural constraints in the educational system such as providing extra teaching force for disadvantaged schools and designing relevant teaching and learning strategies to cater for the diverse needs of students.
33. The government can play a more proactive role in promoting a reading climate. The government can make a larger variety of reading materials available and accessible to all students; support the local production of high quality reading materials; promote reading as a hobby; improve the quality and quantity of community libraries; and form more reading clubs for sharing enjoyment of reading.

For Educators

34. At the school level, results of the study point to the importance of developing a reading culture in the school. In order to foster both “learning to read” and “reading to learn”, innovations in designing reading curriculum and assessment are urged. Specifically, teachers play an important role in teaching students skills and knowledge in reading as well as developing their interest in reading. Teachers should understand that it is not only the language teacher’s responsibility to help students read. All teachers should be readers themselves and have a role to play in helping students enjoy reading and read effectively.
35. At the classroom level, we found that Hong Kong students rely heavily on Competitions and have limited access to other learning strategies. Among the nine indexes of self-regulated learning, Control Strategies, Self-efficacy and Competitive Learning have the strongest positive association with reading, mathematical and scientific literacy performance. The implication is that learning strategies should permeate daily instruction in each of the domains so that students acquire and use various learning strategies within context. In other words, learning strategies need to be an integral part of instruction in each school subject. Instruction should include both subject knowledge and learning skills required for acquiring that knowledge.
36. Regarding scientific literacy, the results reveal that Hong Kong students are weaker in ‘recognizing questions’, ‘drawing conclusions’ and ‘communicating conclusions’ than in ‘demonstrating understanding’ and ‘identifying evidence’. Teacher development programmes should be organised to help teachers develop skills and knowledge for implementing the investigative approach. Such an approach provides more opportunities for students to develop their basic skills in evaluating evidence and making informed judgements in everyday life situations.
37. Regarding mathematical literacy, Hong Kong’s 15-year-old students performed substantially better than the OECD students in different strands of mathematics. However, boys outperformed girls significantly. Educators and teachers need to pay attention and put effort to alleviate gender differences in mathematics performance. More research in local mathematics education should be conducted for the investigation of this issue.

For Students and Parents

38. Hong Kong has only a small proportion of students who have managed to attain Level 5 on the reading proficiency scale. How to nurture children to be good readers should be one of our parents' major concerns. There are many more boys than girls in the low achievement group (62.2% as compared to 37.8%). How to help boys do better in reading, and how to nurture children, especially boys, to enjoy the process of reading, should be addressed.
39. Regarding the home environment, parents should create a cultural environment conducive to reading at home. Educators should show parents how they can help in nurturing a reading habit in their children. Parent education can also support the promotion of parents' positive attitude to and skills in reading. Parents should be readers themselves and be a role model for students at home. Parent volunteers at the school library can also benefit all students by supporting varieties of reading activities or by collecting a great variety of text types and texts written for a wide range of contexts from current reading materials.

For Future Research

40. In future studies, we should seek further collegial collaboration among professional associations of teachers, HKPISA Center of the Chinese University of Hong Kong, and the government. This kind of collaboration is essential for utilizing the framework and results of the international assessment(s) to inform the current education reform. Seeing the implementation of international assessments as part of professional development of teachers can also help in understanding the strengths and weaknesses of our students, and in reflecting on the curriculum, pedagogy and evaluation. This will benefit our future curriculum reform.
41. This summary report focuses on the student background, family processes (parental involvement and investment), and learning processes (self-regulated learning) of students. We found that these factors work alone as well as in combination to influence the success of students. The PISA 2000 and PISA+ also provide a lot of useful information about schooling processes such as decentralization, school climate, and many other teaching processes, and these issues are worthy of further study.

42. Moreover, the following themes are essential for further investigation: Quality and equality in learning outcomes; causes and consequences of achievement gaps; social segregation and academic segregation; the role schools can play to moderate educational inequalities; the at-risk and excellent students; the role of self-regulated learning as precursors for life-long learning.

43. All in all, the performance of Hong Kong's 15-year-old students in the first cycle of PISA indicates that the educational system has built a promising foundation for their future development. In the three domains of reading, mathematics and science, Hong Kong's 15-year-old students have obtained higher scores than their counterparts in other participating countries. However, in terms of self-regulated learning, parental involvement and investment, and reading habit, there is still room for improvement for Hong Kong.

PISA 概述

1. 經濟合作及發展組織(Organization for Economic Co-operation and Development, 以下簡稱 OECD)於 2000 年策劃了第一次學生能力國際評估計劃(Programme for International Student Assessment, 以下簡稱 PISA), 此計劃旨在評估及比較各參與地區或國家的教育成效。OECD 每三年進行一次數據搜集, 並於分析後提出一些教育指標, 從而協助政府及政策制定者評估及監察國家整體教育成效。PISA 的測試對象為即將完成強制教育的十五歲學生, 目的在評估他們是否能夠掌握社會所需的知識與技能。PISA 集中研究以下課題: 年青人為迎接未來挑戰作了多少準備? 他們能否有效地分析、思考及表達其想法? 他們能否終生學習?
2. PISA 的第一次評核週期(名為 PISA 2000)於 2000 年進行, 當中有三十二個國家參與。2002 年, 十一個國家及地區加入(稱為 PISA+ 計劃)。PISA 2000 與 PISA+ 以閱讀能力為主要評估領域。香港參與了 PISA+, 並於 2002 年搜集數據。

表一、PISA 2000 及 PISA+的參與國家/地區

PISA 2000		PISA+	
澳洲	匈牙利	紐西蘭	阿爾巴尼亞
奧地利	冰島	挪威	阿根廷
比利時	愛爾蘭	波蘭	保加利亞
巴西	意大利	葡萄牙	智利
加拿大	日本	俄羅斯聯邦	中國-香港
捷克共和國	韓國	西班牙	印度尼西亞
丹麥	拉脫維亞	瑞典	以色列
芬蘭	列支登士坦	瑞士	馬其頓
法國	盧森堡	英國	秘魯
德國	墨西哥	美國	羅馬尼亞*
希臘	荷蘭		泰國

*註: 我們撰寫此報告時, OECD 尚未有羅馬尼亞的資料。

3. PISA 測試學生的一般概念、技能及其應用。PISA 專業協作組織(PISA Consortium)發展了一個架構, 描述了評估三個領域(包括閱讀、數學及科學)的範圍, 每個領域分為三個層面: 學生所需的知識內容及結構、其中所涉及的運用過程, 以及知識及技能運用的處境。PISA 所測試的不同技能, 大都是學生在日常生活所需要面對的。

HKPISA 概述

4. HKPISA 的正式測試於 2002 年 1 月至 2 月進行，所採用的是二段分層隨機抽樣設計。第一階段，將香港中學分為三層：官校、資助學校及私立學校。學校分佈見表二，並以隨機抽樣方式在每層抽出學校，各層之抽取率與各層學校多少及學校內的學生數量成比例。第一期的學校參與率為 66.6%，再根據 OECD 標準邀請補充學校後，學校參與率則為 92.6%。香港嚴格遵守 OECD 的抽樣程序，正式測試的回應率亦符合要求。

表二、 每層抽取的參與學校樣本

顯層	隱層	學校數目	參與學校數目
官校	高能力	18	7
	中等能力	8	2
	低能力	10	4
資助學校	高能力	127	46
	中等能力	130	44
	低能力	101	29
獨立學校*	本地（直資*）	23	6
	國際學校	23	2
	總數	440	140

*註：獨立學校沒有收生分類。

*直資：直接資助計劃

5. 第二階段，在同意參與的學校裏，經隨機抽樣抽出 35 位十五歲學生。這些學校裏，除了殘疾、智障或有語言能力障礙的學生外，所有十五歲學生均合符測試資格。不能接受測試的學生低於 2%，換言之，樣本涵蓋十五歲註冊學生的 98%。可以作國際比較的香港學生共 4405 人，來自 140 間學校，樣本能準確代表目標母群體。
6. 根據 OECD 所認可的測試程序，HKPISA 中心培訓了 49 位測試主任，執行各校的測試。搜集數據後，我們招募了 16 位閱讀科閱卷員，以及 8 位數學科及科學科閱卷員，他們都是有關領域的在職教師或準教師，並且接受了評卷訓練，以了解評卷準則。為評估各評卷員的評卷信度，我們挑選了 480 份試卷，以當中那些答案可自由發揮的題目，作共同評分。評卷信度達 85-98%，顯示我們在數學、科學及閱讀試卷的評分非常可靠及評卷員的評卷標準相當一致。

研究結果要點

質素與均等

7. 總的來說，與大部份國家比較，香港學生表現出色。在參與國家當中，香港在數學科排名首位，科學科排名第三，閱讀科則排名第六⁴（見附錄一）。在數學方面，香港得分 560，除了日本（557）和韓國（547）的成績跟香港並無統計上的顯著分別之外，香港十五歲學生的表現遠比其他 38 個國家出色。在科學方面，香港得分 541，在 41 個參與國家當中只有韓國（552）和日本（550）的成績比香港優異，但在統計數字上並沒有顯著差異。在綜合閱讀能力方面，香港得分 525，只有芬蘭（546）的表現顯著比香港出色，加拿大、紐西蘭、澳洲及愛爾蘭的成績雖比香港為高，但在統計數字上並沒有重大差異。
8. 以教育均等而言，香港的優良成績並不意味其學校教育偏向不平等。高分數者（第 95 個百分位）與低分數者（第 5 個百分位）之間的差異相對地小，綜合閱讀能力的差異值是 277，數學能力的差異值是 309，科學能力的差異值則是 280，比 OECD 相對的有關平均數字：328、329 及 325 為低。香港成績的差異值相對地小，意味著香港絕大部份學生所接受的教育得益相當平均，可說是較接近教育成效均等的理想。
9. 與許多其他國家裏社經背景（簡稱 SES）相似的學生比較，香港的十五歲學生得分較高（見附錄二）。在香港，來自不同社會經濟背景的學生，他們之間的成績差距，較其他國家為小。其中一個原因可能是香港的教育系統及教育工作者能有效地協助弱勢學生。然而，在閱讀成績突出的香港學生不多，香港的十五歲學生只有大約 10% 在閱讀能力方面達到第五級水平⁵，這比率低於其他在閱讀上成績優異的國家。
10. 以香港的學生來說，他們的社經背景對其在測試中的表現只有相對較小的影響。SES 對學業成績的影響常以「社經坡度」（social gradient）⁶表示（OECD, 2000）。「社經坡度」顯示學習成果的不均等情況有多大程度可歸因於 SES。整體而言香港的「社經坡度」小，意味著不同的社會經濟文化背景，對香港

⁴ 41 個具完整數據的參與國家在每個領域的平均表現見附錄一。OECD 所設定的平均值是 500，標準偏差是 100。

⁵ OECD 評估學生的閱讀水平分為五級：達第五級者能完成 PISA 閱讀測試內最困難的題目，分數達 626 或以上，達第四級者分數達 553-625，達第三級者分數達 481-552，達第二級者分數達 408-480，達第一級者分數為 335-407。

⁶ 坡度愈大，表示 SES 與學生表現的關係愈大。坡度愈小，則表示 SES 與學生表現的關係愈小，亦即較少不平等情況。

學生的表現影響很小。

11. 然而，我們發現學校收生水平對閱讀、數學和科學能力的影響相當大。研究結果顯示香港中學教育有明顯的成績等級分隔現象，雖然如此，與其他社經背景相約國家的學生比較，香港低分數者還是表現較佳。我們可暫且推論，為入學水平低的學生提供教育服務的香港學校和教師相當努力和稱職。

閱讀能力

12. 香港十五歲學生在閱讀方面表現不俗，他們在提取資料、解釋及反思三個範疇所得分數分別是 522、522 及 538，比 OECD 相關的平均值 498、501 及 502 為高。香港學生當中，能在這三個範疇取得第三級水平的比例分別是 70%、72% 及 76%，亦比 OECD 相關的平均值 59%、60% 及 62% 為高。
13. 香港學生在「反思」方面的表現尤佳。然而，以文章體裁來說，香港學生在處理敘述文及描寫文方面較弱。他們比較擅於處理議論文及資料性的文章，這類文體一般需要較高層次的語言處理能力。
14. 在綜合閱讀能力方面，女孩的表現遠超男孩 16 分，她們在閱讀能力的三個範疇也是表現較佳。在三個理解水平上，男孩與女孩的差異分別是 8、11 及 31。在綜合閱讀能力上，男孩及女孩的第 95 個百分位分別是 618 及 624，兩者相差 6 分；男孩及女孩的第 5 個百分位分別是 326 及 368，兩者相差 42 分。這些數字顯示；高分組的男孩和女孩表現相近，但低分組男孩的表現卻遠遠不及低分組女孩。
15. 閱讀習慣的分析顯示，為興趣花較多時間閱讀、閱讀得較投入的學生，他們所得分數也較高，以上兩個因素對閱讀能力有最強的影響（7 分至 15 分），而其他因素（例如閱讀範疇的多元化）也有正面影響（3 分至 5 分）。
16. 值得注意的是，與 OECD 的平均值比較，香港十五歲學生對閱讀的興趣相當高。然而，從他們的自述來看，香港學生在閱讀方面的自我觀卻比其他國家為低。香港學生偏低的閱讀自我觀與他們在閱讀能力的高水準表現不大相對應。

數學與科學能力

17. 香港在數學能力得到 560 分，在參與國家當中排名第一。在每個百分位水平，香港的表現都勝過 OECD 的平均值。由第 5 個百分位至第 95 個百分位，香港所高出的分數由 63 分降至 44 分。香港的十五歲學生在各個數學範疇的表現都比其他國家的學生為佳，在代數方面所領先的分數尤其顯著，而在幾何學方面則只有些微領先。
18. 在數學能力的第 5 個百分位，男生比女生的表現遜色 10 分，這與他們在其他能力領域的表現相似。然而，在其他百分位水平，男生的表現卻勝過女生。在第 75 與第 95 個百分位之間，男生高出女生 27 分至 29 分。百分位愈高，男生表現和女生表現的差異也愈大。
19. 香港在科學能力得到 541 分，在參與國家當中排名第三。在每個百分位水平，香港的表現也勝過 OECD 的平均值。在第 5 與第 10 個百分位，香港學生的分數比 OECD 的平均值高出大約 58 分，這顯示香港的低分組學生的表現較其他 OECD 低分數者為佳。
20. 男生在科學能力的表現也比女生為佳，但 9 分的差距在統計上並不顯著。在第 5 和第 10 個百分位，女生勝過男生 6 分至 8 分，而這亦非重大差異。在愈高的百分位，男生的表現愈勝過女生。在第 75 及更高的百分位，男生的分數比女生高出 15 至 21 分，在統計上這是顯著的差距。

學習策略

21. 與其他參與國家比較，香港學生運用不同的學習策略，較 OECD 的平均值為小。根據問卷上的回答，九個自主學習指數當中有六個是負數，包括：控制策略 (-0.28)、用功與毅力 (-0.25)、自我效能/自我勝任感 (-0.37)、控制期望 (-0.37)、連繫學習 (-0.21) 及工具性動機 (-0.18)，與其他參與國家比較，這些指數大部份可謂極小。餘下的三個指數則是正數，包括：記憶 (0.07)、競爭學習 (0.67) 及合作學習 (0.05)，其中競爭學習指數是 PISA 的參與國家當中最高的，而另外兩個指數則與 OECD 的平均值差不多。由此可見，競爭學習是香港十五歲學生最常用的學習策略。
22. 在考慮學生背景和學校的處境因素下，九個自主學習策略指數仍對閱讀、數學和科學能力有重要的影響，當中以控制策略、自我效能/自我勝任感及競爭學習最能預測學生在三個領域上的表現，而工具性動機和記憶對他們在三個領域上的表現卻有細微的負面影響，其他指數的影響則因不同領域而異。

家長參與及家長資源投入

23. 家長的參與對學生的能力表現也重要。當家長花較多時間與學生溝通，他們的表現也較佳。當學生較多與家長就一些日常「社會性」的事情溝通，例如討論功課、聊天及一起吃晚餐，他們在閱讀、數學及科學的表現也較佳。
24. 對香港和很多國家來說，文化溝通（例如討論書籍、電影、電影節目、以及政治和社會課題）與文化活動（例如參觀博物館、聽演奏會、看舞台劇）兩者都對學生的能力表現有中等的正面影響。家庭功課輔導與學生的能力表現呈負相關，意即學生能力高時則家庭功課輔導較低，這顯示低分數者或許比高分數者較需要家人的協助。
25. 即使把學生背景和學校的處境因素也考慮在內，家長資源投入還是對學生的能力表現有影響。以香港的情況來說，當家長較多投資在教育資源上（例如書桌、計算機、字典、寧靜的溫習環境），其子女的表現則會比其他學生為佳。學生家中的藏書量更是與他們在三個領域當中的表現有密切的關係，藏書量可視為一種重要的文化財產，有助發展學生對閱讀的興趣與投入感，而閱讀的興趣與投入感則對學生的能力表現有重大的正面影響。然而，研究顯示物質資源（例如手提電話、電視機、電腦、汽車等）卻對香港的成績有負面影響。這個結果與許多其他國家的結果並不一致，在其他國家，家庭財產通常對學生的成績有些微的正面影響（OECD, 2000）。
26. 這次研究所量度的物質資源，可能會令香港十五歲學生在學習時分心。文化財產對香港學生的成績也有負面影響，港人家中的藝術品或經典文學作品似乎只是一種物質資源。學生與家長必須真正認識和欣賞這些文化物品，才會對學生的學習有益。

高分數者與低分數者的簡況

27. 香港十五歲學生大約有 74% 在綜合閱讀能力取得第三級或以上的成績。這顯示香港在提高整體閱讀能力方面相當成功。此外，香港高分數者與低分數者之間的成績差異相對地小。這些結果顯示，整體來說，香港的教育系統及教育工作者能有效地支援學習能力稍遜的學生。
28. 然而，在成績分佈的最低層，男女比例的差異很大。以綜合閱讀能力來說，分數最低的 15% 學生當中，男生佔六成以上。因此，香港需要發展有關的教學法，以協助男生克服他們在閱讀方面的障礙。

29. 就閱讀能力而言，雖然香港在參與國家當中排名第六，但香港較高分數者的表現卻低於 OECD 的整體平均值。此外，五個成績最佳國家的學生所能達到第五級水平的百分率分別為 18%（芬蘭）、17%（加拿大）、19%（紐西蘭）、18%（澳洲）及 14%（愛爾蘭），而香港只有 10% 學生達到這個水平。以閱讀標準來說，在進一步提升優異成績方面，香港的教育系統似乎不及一些成績優異的西方國家。
30. 在運用學習策略這方面，儘管大部份的自主學習策略都對學習有正面影響，但香港十五歲學生無論高能力或低能力的學生，都只是有限地應用這些策略。研究結果顯示香港所有學生均非常偏向競爭學習。

啓示及建議

給政策制定者

31. 這是香港第一次進行 PISA 評估，卻不是香港第一次參與國際研究。但以往的國際研究結果不能與這次研究直接比較，因為它們在理念架構、學生年齡、參與國家方面均有差異，我們不能判斷香港這些年來在教育成效方面是否有所進步。因此，這次研究可視為 2002 年香港中學教育質素的基準線。
32. 整體來說，香港學生在三個領域上的表現均相當理想。我們可暫且推論，香港的教育系統能提供優質而均等的教育機會，在有效地發展整體學生的能力時，並不會犧牲了弱勢群體的學習機會，無論學生的社經背景如何，他們都能在教育系統中有所獲益。然而，香港中學的收生有明顯的成績分隔現象，教育政策應著眼於減輕結構性限制為教育系統所帶來的負擔，例如為弱勢學校提供額外的教學人手、設計適切的教學與學習策略，以切合學生不同的需要。
33. 香港在提倡閱讀風氣方面，政府可扮演更主動的角色，例如為所有學生提供更多不同種類的讀物、支持本地出版高質素讀物、提倡閱讀的嗜好、從質及量兩方面改善社區圖書館、組織更多讀書會讓人們分享閱讀的樂趣等。

給教育工作者

34. 在學校的層面上，累積下來的數據指出了在學校培養閱讀文化的重要性。為提高「學習如何閱讀」和「透過閱讀學習」的風氣，閱讀課程和閱讀評估方面的設計均需要革新。在教導學生閱讀的技巧和知識，以及培養學生對閱讀的興趣這兩方面，老師所擔當的角色尤其重要。老師應該明白，培育學生

閱讀能力並非單只是語文老師的責任，所有老師本身也應該以身作則地閱讀，並且給予學生協助，讓他們享受閱讀的過程並有效地閱讀。

35. 在課堂的層面上，我們發覺香港學生非常偏重「競爭」，而甚少應用其他學習策略。另一方面，相對於其他國家，香港學生的控制策略、用功與毅力、自我效能/自我勝任感、控制期望、連繫學習及工具性動機的指數都甚低。在這些自主學習的元素當中，與閱讀、數學及科學能力表現有最強正面關係的元素分別是：控制策略、自我效能/自我勝任感及競爭學習。這給我們的啓示是，日常授課時，學習策略應滲透於每個領域，從而讓學生在不同的處境當中掌握及運用各種學習策略。換言之，學習策略應該融入各科目的授課中，而授課應兼顧科目知識和掌握知識所需的學習技巧。
36. 科學能力方面，結果顯示香港學生在辨識問題、下結論和表達結論比較弱，而在說明理解和辨認證據兩方面則稍佳。我們建議推行教師發展計劃，讓科學教師作好準備，實施探究式教法。教師發展計劃有助老師發展有關探究式教法的技巧及知識，而探究式教法能為學生提供更多學習機會，讓他們發展辨識問題、下結論和表達結論方面的技巧。
37. 數學能力方面，香港十五歲學生在數學各個範疇的表現都遠勝參與 PISA 的其他地區及國家的學生。然而，男生的表現比女生出色。教育工作者應該關注這點，並且努力減低數學表現中的性別差異。關於本地數學課堂的研究亦應多點探討這個課題。

給學生及家長

38. 香港只有小部份學生在閱讀能力上取得第五級水平，怎樣培養孩子成為好的閱讀者應該是家長最需要關注的問題之一。在低分數者當中，男生人數遠高於女生人數（男生佔 62.2%，女生佔 37.8%）。「如何讓男生在閱讀方面有所改進？如何培養孩子（尤其男生）享受閱讀的過程？」這兩個問題應受到重視。
39. 家庭環境方面，家長應在家中盡力營造一個有利閱讀的文化環境，教育者應指導家長培養孩子的閱讀習慣。家長教育也有助提升家長對閱讀的態度和技巧，家長本身亦應閱讀，並且在家庭中作子女的榜樣。家長主動協助學校圖書館的工作，例如協助進行不同的閱讀活動，或者搜集各種文類，以及在現時的閱讀材料中選取有關不同處境的文章，這些對學生均有裨益。

將來研究的啓示

40. 未來研究方面，政府、香港中文大學 HKPISA 中心與教師專業機構之間，應該尋求更進一步的合作。爲了好好運用國際評估的理念和結果，以求爲現行教育的改革提供資料，各單位的通力合作是必須的。進行國際評估可作爲老師專業發展的一部份，也有助了解香港學生的強項和弱點，這均有助我們反思課程、教學法以及構思日後的課程改革。
41. 這份報告的分析重點在於學生背景、家庭因素（家長參與及資源投入）以及學生的學習策略（自主學習）對學習成效的影響。我們發現這些因素或個別或整體地影響學生的成績。PISA 2000 與 PISA+亦提供了許多關於學校教育過程的實用資料，例如有關權力下放、學校風氣以及許多其他教育過程，這些都值得我們在將來繼續研究。
42. 此外，以下都是我們將來主要的研究課題：學習成果的質素和均等；成績差距的原因和結果；社會的分隔與學術的分隔；爲減低教育成效的不均等，學校可擔當甚麼角色；邊緣學生與傑出學生；自主學習在學生表現及終生學習方面有何角色。
43. 總體來說，根據香港十五歲學生在第一屆 PISA 評估的表現看，香港教育系統有穩固的基礎培育學生面對未來。在三個領域中，香港十五歲學生所得分數比其他參與國家爲高。然而，在自主學習、家長參與及閱讀習慣這幾方面，香港仍有改善的空間。

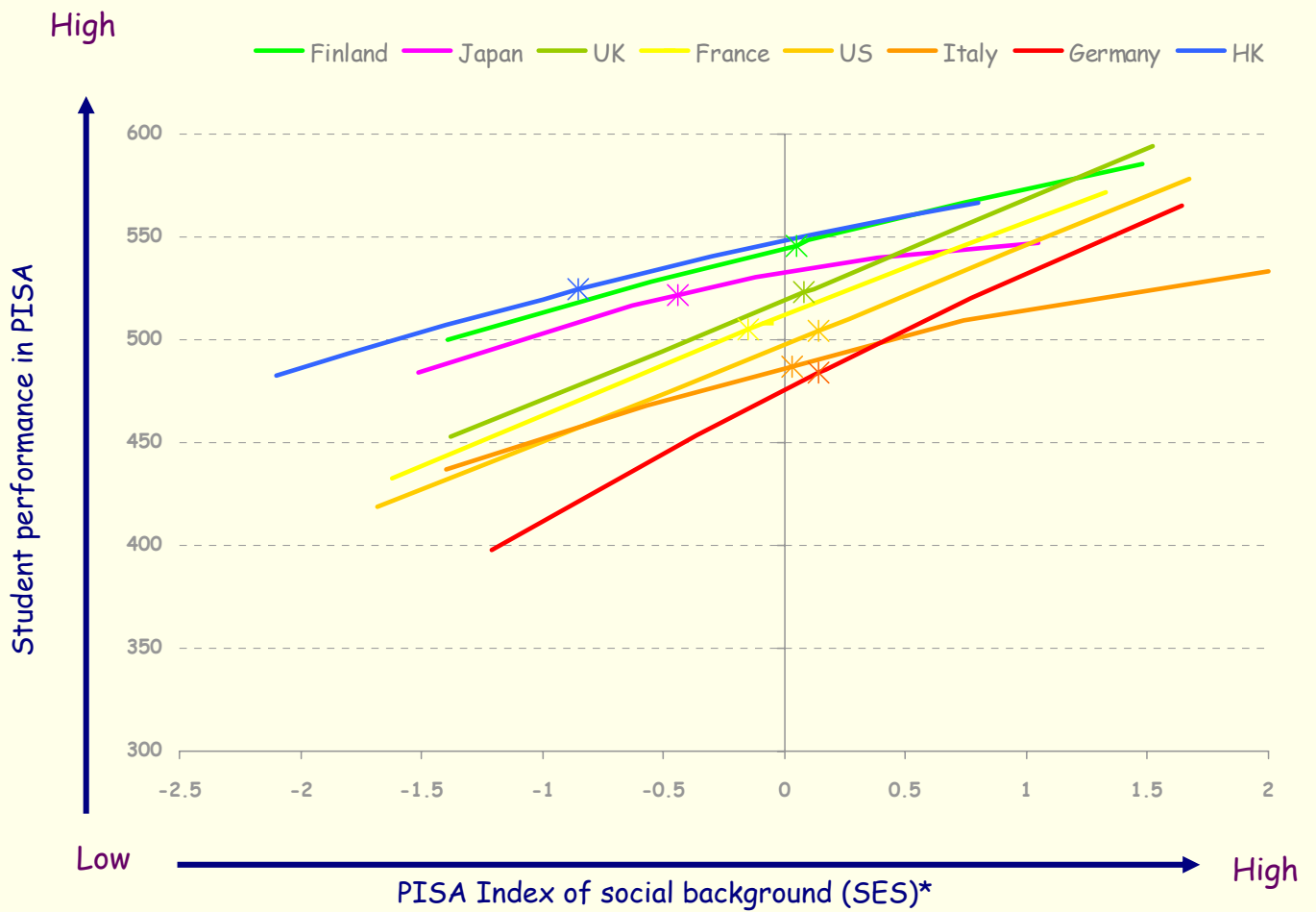
Appendix

Appendix 1 Literacy Performance of 15-year-olds.

Reading Literacy			Mathematics Literacy			Science Literacy		
Country	Mean	S.E.	Country	Mean	S.E.	Country	Mean	S.E.
Finland	546	(2.6)	Hong Kong, China	560	(3.3)	Korea	552	(2.7)
Canada	534	(1.6)	Japan	557	(5.5)	Japan	550	(5.5)
New Zealand	529	(2.8)	Korea	547	(2.8)	Hong Kong, China	541	(3.0)
Australia	528	(3.5)	New Zealand	537	(3.1)	Finland	538	(2.5)
Ireland	527	(3.2)	Finland	536	(2.2)	United Kingdom	532	(2.7)
Hong Kong, China	525	(2.9)	Australia	533	(3.5)	Canada	529	(1.6)
Korea	525	(2.4)	Canada	533	(1.4)	New Zealand	528	(2.4)
United Kingdom	523	(2.6)	Switzerland	529	(4.4)	Australia	528	(3.5)
Japan	522	(5.2)	United Kingdom	529	(2.5)	Austria	519	(2.6)
Sweden	516	(2.2)	Belgium	520	(3.9)	Ireland	513	(3.2)
Austria	507	(2.4)	France	517	(2.7)	Sweden	512	(2.5)
Belgium	507	(3.6)	Austria	515	(2.5)	Czech Republic	511	(2.4)
Iceland	507	(1.5)	Denmark	514	(2.4)	France	500	(3.2)
Norway	505	(2.8)	Iceland	514	(2.3)	Norway	500	(2.8)
France	505	(2.7)	Liechtenstein	514	(7.0)	United States	499	(7.3)
United States	504	(7.1)	Sweden	510	(2.5)	Hungary	496	(4.2)
Denmark	497	(2.4)	Ireland	503	(2.7)	Iceland	496	(2.2)
Switzerland	494	(4.3)	Norway	499	(2.8)	Belgium	496	(4.3)
Spain	493	(2.7)	Czech Republic	498	(2.8)	Switzerland	496	(4.4)
Czech Republic	492	(2.4)	United States	493	(7.6)	Spain	491	(3.0)
Italy	487	(2.9)	Germany	490	(2.5)	Germany	487	(2.4)
Germany	484	(2.5)	Hungary	488	(4.0)	Poland	483	(5.1)
Liechtenstein	483	(4.1)	Russian Federation	478	(5.5)	Denmark	481	(2.8)
Hungary	480	(4.0)	Spain	476	(3.1)	Italy	478	(3.1)
Poland	479	(4.5)	Poland	470	(5.5)	Liechtenstein	476	(7.1)
Greece	474	(5.0)	Latvia	463	(4.5)	Greece	461	(4.9)
Portugal	470	(4.5)	Italy	457	(2.9)	Russian Federation	460	(4.7)
Russian Federation	462	(4.2)	Portugal	454	(4.1)	Latvia	460	(5.6)
Latvia	458	(5.3)	Greece	447	(5.6)	Portugal	459	(4.0)
Israel	452	(8.5)	Luxembourg	446	(2.0)	Bulgaria	448	(4.6)
Luxembourg	441	(1.6)	Israel	433	(9.3)	Luxembourg	443	(2.3)
Thailand	431	(3.2)	Thailand	432	(3.6)	Thailand	436	(3.1)
Bulgaria	430	(4.9)	Bulgaria	430	(5.7)	Israel	434	(9.0)
Mexico	422	(3.3)	Argentina	388	(9.4)	Mexico	422	(3.2)
Argentina	418	(9.9)	Mexico	387	(3.4)	Chile	415	(3.4)
Chile	410	(3.6)	Chile	384	(3.7)	Macedonia	401	(2.1)
Brazil	396	(3.1)	Albania	381	(3.1)	Argentina	396	(8.6)
Macedonia	373	(1.9)	Macedonia	381	(2.7)	Indonesia	393	(3.9)
Indonesia	371	(4.0)	Indonesia	367	(4.5)	Albania	376	(2.9)
Albania	349	(3.3)	Brazil	334	(3.7)	Brazil	375	(3.3)
Peru	327	(4.4)	Peru	292	(4.4)	Peru	333	(4.0)

Note: Shaded area indicates score significantly different from that of Hong Kong.

Appendix 2 Relationship between Social Background and Reading Literacy in eight countries



*Note: the social background index based on the index of parents occupational status and years of schoolings that the parents completed as well as the indices of family wealth, educational resources and cultural possessions. The index is standardized on all the OECD countries to have a mean of zero and a standard deviation of one.