【Education Policy Studies Series】

Can Basic Education System in Hong Kong Be Equal and Excellent: Results from PISA2000+

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Education Policy Studies Series

Education embraces aspirations of individuals and society. It is a means of strengthening human resources, sustaining competitiveness of society, enhancing mobility of the underprivileged, and assimilating newcomers to the mainstream of society. It is also a means of creating a free, prosperous, and harmonious environment for the populace.

Education is an endeavor that has far-reaching influences, for it embodies development and justness. Its development needs enormous support from society as well as the guidance of policies that serve the imperatives of economic development and social justice. Policy-makers in education, as those in other public sectors, can neither rely on their own visions nor depend on the simple tabulation of financial cost and benefit to arrive at decisions that will affect the pursuit of the common good. Democratization warrants public discourse on vital matters that affect all of us. Democratization also dictates transparency in the policy-making process. Administrative orders disguised as policies have a very small audience indeed. The public expects well-informed policy decisions, which are based on in-depth analyses and careful deliberation. Like the policy-makers, the public and professionals in education require a wealth of easily accessible facts and views so that they can contribute constructively to the public discourse.

To facilitate rational discourse on important educational matters, the Hong Kong Institute of Educational Research of The Chinese University of Hong Kong organizes from time to time "Education Policy Seminars" to address critical issues in educational development of Hong Kong and other Chinese societies. These academic gatherings have been attended by stakeholders,

practitioners, researchers and parents. The bulk of this series of occasional papers are the fruit of labor of some of the speakers at the seminars. Others are written specifically as contributions to the series.

The aim of this Education Policy Studies Series is to present the views of selected persons who have new ideas to share and to engage all stakeholders in education in an on-going discussion on educational matters that will shape the future of our society.

International Assessment of Education Quality Series

Entering the era of globalization, Hong Kong is getting more and more related to other parts of the world. It is important for us to examine the quality of education and the effectiveness of educational reforms in Hong Kong from an international as well as a comparative perspective. How do the various reforms impact on students' cognitive ability, attitude, and style of learning? Have students acquire the knowledge and skills essential for meeting the challenges of the twenty-first century? Are students able to make rational decision and communicate their idea effectively? Are students prepared for life-long learning? Also, how will the family's cultural, social and economic resources impact on students' learning? At the organizational level, how do education policies and the various aspects of school life (e.g., school decentralization, school climate, teacher autonomy, and parental involvement, etc.) impact on the quality of education and school effectiveness? All these are important questions worthy of investigation.

International Assessment of Education Quality Series aims at extending our understanding of the quality and equality of educational systems from an international comparative perspective. This series will be of value to various stakeholders in the field of education: researchers can examine the current state of affair of education and the outcome of educational reforms; policy makers can formulate local policies that is responsive to global development; teachers and parents can regard education from a broader perspective to understand education in the context of Hong Kong, of the Chinese communities, or further in the international context. In sum, the series, by providing stakeholders of the education community with "reason" and "data," attempts to support them in their decision and action for a better future of our students.

International Assessment of Education Quality Series

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By Andreas Schleicher

Can Basic Education System in Hong Kong Be Equal and Excellent: Results from PISA2000+

Abstract

Education is seen as transformational force for social equity when the education system is equal and excellent in its outcome. "Can schools simultaneously achieve high academic standard and foster equal educational opportunity?" It is obvious that these are two major goals for basic education. Are the two goals in conflict? Can basic education be excellent and equal at the same time? This article attempts to address this issue by investigating the performance of 15-year-old secondary school students in Hong Kong. The primary database examined in this article is from PISA (Programme for International Student Assessment) organized by OECD (Organisation for Economic Co-operation and Development). The major objective of this study is to investigate whether Hong Kong's basic education is a system that provides both high quality and equal opportunity in terms of educational provision for 15-year-old students. First, I will review the quality of secondary school system by assessing the overall performance on reading, mathematical, and scientific literacy scales in PISA. Then I will assess the equality of educational outcomes by examining the achievement gap between students from different social backgrounds in terms of gender, immigration status, family structure, parent occupation, parent education, and family's economic, social

and cultural status. The results suggest that Hong Kong's education system has achieved both excellence and equality of opportunity when compared with other participating countries. However, policy makers should be aware that Hong Kong has the highest percentage of immigrant students among the participating countries/regions, and the achievement gap between the non-native students and local students is substantial. The serious academic and social segregation among schools are also important issues that need to be addressed through social and educational policies and practices.

Introduction

In Hong Kong and in many other countries, a fundamental question that has been posed for basic education is: "Can schools simultaneously achieve high quality of achievement and foster more equality of educational opportunity?" It is obvious that these are two major goals for basic education. Are these goals in conflict? Can basic education be both excellent and equal?

The concept of "equality" has several references in education. There was a time when people believed schools were "equalizers," if their definition of equality was simply that everyone was provided with a free public school education. Coleman (1968) traced the evolution of the concept of equality in education and noted that it has gone through at least five stages of development: (1) equal access of inputs such as school finances and expenditures; (2) common curriculum whereby schools provided a common curriculum for all

children, regardless of their backgrounds; (3) differential curriculum where schools did offer a differential curriculum (college, general, and vocational) that allowed students, regardless of their backgrounds, to choose a curriculum best suited to their occupational goals or academic interests; (4) desegregated schooling with the understanding that equality of education outcomes cannot be achieved via separate schools for different races; and finally (5) equality of results concerning the extent to which schools are able to provide equality of educational results given different students inputs (pp. 16–17). According to Coleman (1968), the first stage of definition of equality is concerned with "input"; the second and third stages are associated with "processes" from different points of view; the fourth and fifth stages of the equality are related mainly with "outputs." In this article, equality of education is defined mainly as the academic outputs for students with different individual characteristics and family and social backgrounds.

A large body of research examines the role of schooling in influencing social equality. Status attainment research examines the relationship between background characteristics and social stratification through the schooling process. Earlier studies in this tradition demonstrate that schools can indeed mitigate the negative effects of social origins on status attainment by increasing educational and occupational aspirations, academic achievement, and income (e.g., Campbell, 1983). Critics of status attainment research question the ability of schools to facilitate the attainment of social equality. They argue that schools ensure the continuation of the social stratification found in society through specific educational processes, practices,

and policies that characterize contemporary schools (e.g., Bowles & Gintis, 1976). In particular, researchers point out the disadvantages faced by the working class, female, and ethnic minority groups in schooling outcomes and life chances.

This article attempts to examine the overall quality and equality of opportunity in basic education in Hong Kong. The major research question is whether Hong Kong's basic education is an education system of high quality as well as equality of opportunity for 15-year-old students. First, I will review the quality of secondary school systems by assessing the overall performance on the reading, mathematical, and scientific literacy scales from an international perspective. Then I will assess the equality of educational outcomes by examining the achievement gaps of students from different social backgrounds in terms of gender, immigration status, family structure, parent occupation, parent education, and family's economic, social and cultural status.

Database and Methodology

PISA

The primary database used in this article is from OECD's (Organisation for Economic Co-operation and Development) Programme for International Student Assessment (PISA). PISA is a collaborative effort under the direction of the OECD Secretariat, through an international consortium led by the Australian Council for Educational Research (ACER) and governments of participating countries (OECD, 2001). PISA constitutes one of the most comprehensive and rigorous

international assessments of student performances at present. The broad goal of this international survey is to assess whether young people can analyze, reason, and communicate their ideas effectively, and whether they are prepared to engage in life-long learning. Specifically, PISA covers the assessment of three domains: reading literacy, mathematical literacy, and scientific literacy. The population being studied is 15-year-old students. The "PISA 2000" survey was conducted in 2000 in 32 countries. The "PISA+" survey was conducted in 2002 in 11 countries/regions (OECD & UNESCO, 2003). Table 1 listed the countries that participated in PISA 2000 and PISA+.

Table 1. Countries/regions Participating in PISA 2000 and 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

* The response rate of the Netherlands was too low for appropriate comparison.
\# Data for Romania were not available when this article was prepared.

HKPISA

In Hong Kong, PISA is organized by the Hong Kong Centre for International Student Assessment in The Chinese University of Hong Kong. According to the information provided by the

Education and Manpower Bureau of the Hong Kong government, in Hong Kong, schools were stratified based on its type (government, aided, or private) and its student intake (high, medium, or low ability). The stratified sampling method ensures the appropriate proportion of each type of school in the sample (see Table 2). According to OECD sampling standard, a total of 4,405 students from 140 schools were accepted for the final analysis.

Table 2. Selected and Participating Schools for Each Sampling Stratum

Explicit strata	Implicit strata	Total no. of schools	No. of schools accepted by OECD
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
		440	140

* There is no intake classification for independent schools.

\# DSS refers to schools under the Direct Subsidy Scheme.

Analysis

To understand the achievement gap between different subgroups, I will consider one variable at a time for each analysis. T-test or ANOVA will be performed to assess the achievement gap between high-performing and low-performing students; between girls and boys; between immigrant and local

students; between students from single-parent family and other types of families; between students with parents from high and low socio-economic status (as measured by parents' occupational status, level of education, and economic, social and cultural resources). This approach involves some tradeoffs. It should be noted that some factors might be correlated. Moreover, the associations between factors and performances are not necessarily causal in nature. Although questions about causal relations are pertinent to educational policy-making, the present cross-sectional study is not designed specifically to address such questions.

Results and Discussions

Overview of Quality of Hong Kong's Basic Education from an International Perspective

The mean performances in each of the three domains for the 41 participating countries are shown in Table 3. The OECD average was set to 500 with standard deviation of 100. Overall, the mean performance of Hong Kong students in all the three domains is above the OECD average.

In reading, only one country, Finland, scored significantly higher than Hong Kong.[1] Hong Kong achieved the sixth highest mean score of 525. The other top countries on the combined reading literacy scale were Canada, New Zealand, Australia, and Ireland. They did not differ significantly from Hong Kong. On the other hand, the average score of Hong Kong was higher than that of Korea, the United Kingdom (U.K.), Japan, and Sweden, but the differences were also not significant.

Table 3. Literacy Performance of 15-year-olds in PISA 2000 and PISA+

Reading literacy			Mathematical literacy			Scientific literacy		
Country/region	*M*	*SE*	Country/region	*M*	*SE*	Country/region	*M*	*SE*
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 scores significantly different from that of Hong Kong.

In Mathematics, Hong Kong got the highest mean score among the participating countries/regions. The mean score for Hong Kong was 560. Japan and Korea did not differ from Hong Kong significantly. They were also the top three performing countries/regions on the scientific literacy scale. The mean performance of Hong Kong was 541. This placed Hong Kong third among the participating countries/regions. Although Korea and Japan scored higher than Hong Kong, the differences were not significant.

Gender Equality in Academic Achievement

In many previous international studies, there were consistent gaps between males and females, with males tending to be ahead in mathematics and science (Martin et al., 2000; Mullis et al., 2000) and females universally so in reading (Johnson & Cheung, 1995). Consistent with previous study (Johnson & Cheung, 1995), females perform better in all the participating countries/regions including Hong Kong on the combined reading literacy scale of the present PISA study. Table 4 shows that the disparities between boys and girls are far from negligible. The OECD average gap in reading is 32 points in favor of females, which corresponds to almost half of a proficiency level.[2] The gender difference is significant in all but Israel and Peru. Albania has the largest gender difference, and is 58 in favor of girls. The gender gap in Japan and Korea is 30 and 14 respectively (OECD & UNESCO, 2003). In Hong Kong, girls score 16 higher than boys, which is statistically significant but still less than the OECD average of 32.

Table 4. Student Performance on the Combined Reading, Mathematical, and Scientific Literacy Scales by Gender

	Males (1)		Females (2)		Difference *
	M	*SE*	*M*	*SE*	(1) – (2)
Reading literacy					
OECD average	485	0.8	517	0.7	**–32**
Hong Kong, China	518	4.8	533	3.6	**–16**
Mathematical literacy					
OECD average	506	1.0	495	0.9	**11**
Hong Kong, China	569	5.3	551	4.3	**18**
Scientific literacy					
OECD average	501	0.9	501	0.8	0
Hong Kong, China	545	4.9	536	3.7	9

* Positive differences indicate that males perform better than females; negative differences indicate that females perform better than males. Differences that are statistically significant are indicated in bold.

In mathematical literacy, the performance of males is significantly better than that of females in 15 countries/regions including Hong Kong. Boys across OECD countries score an average of 11 points higher than girls (see Table 4). Only in Albania do females perform significantly better than males. In Hong Kong, the gender difference is 18, significantly in favor of boys, and more than the OECD average of 11.

In scientific literacy, males and females perform similarly in most countries/regions. Thirty-three countries/regions including Hong Kong show no statistically significant gender difference. Only in three countries — Korea, Austria, and Denmark — do males perform better in science than females. Better performance for girls was found in six countries including Albania, Latvia, Macedonia, New Zealand, the Russian Federation, and Thailand (OECD & UNESCO, 2003, p. 146).

In Hong Kong, boys perform better than girls by 9 points in scientific literacy, but the gender difference is not statistically significant.

To conclude, the advantage of girls in reading literacy and that of boys in mathematical literacy in Hong Kong are significant but the lead of boys in scientific literacy is no longer significant. These patterns may have resulted from the broader societal and cultural context of educational policies and practices in favor of girls in language subjects and in favor of boys in mathematics curriculum. Previous findings of the Third International Mathematics and Science Study (TIMSS), where gender differences in science performance among eighth-grade students were much larger, almost always favored boys (Martin et al., 2000). One of the possible reasons for these differences in results between PISA and TIMSS may be due to the fact that PISA had a higher proportion of open-ended and contextualized items in which girls tend to do better, rather than multiple-choice items in which boys tend to do better. This may also have contributed to the higher performance by females in science in PISA.

Equality of Immigrant and Local Students

There are two theories regarding the relationship between immigrant status and achievement. One theory argues that some immigrants are able to achieve more in spite of discrimination, because their culture places a premium on academic success, effort and persistence, deferred gratification, and social mobility (Hirschman & Falcon, 1985, p. 84). For instance, the cultural value of Chinese immigrants is believed to be the major factor

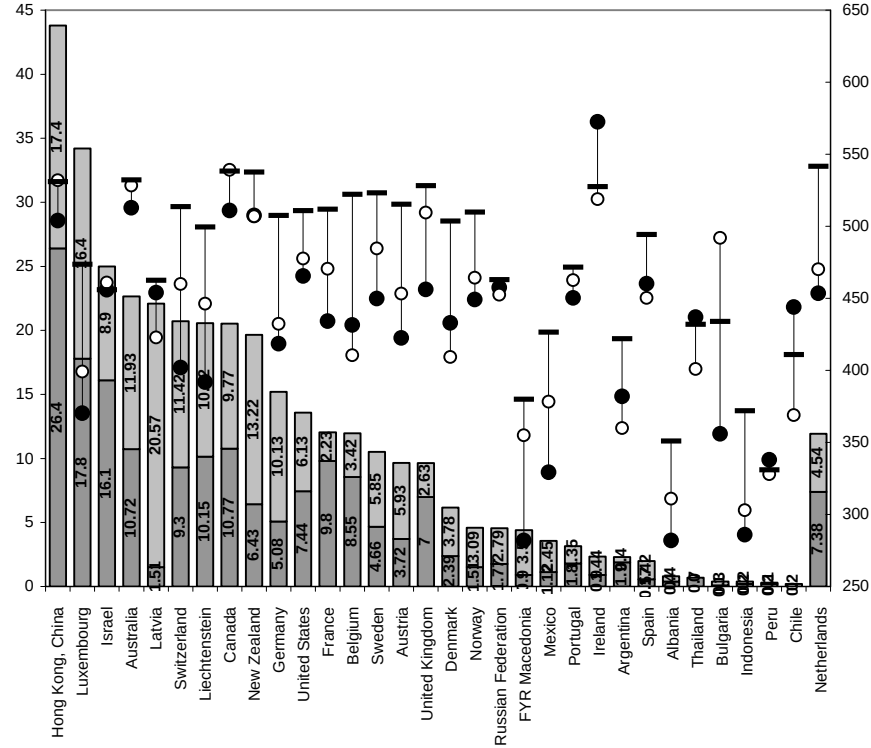
for the academic success of Asian students in the United States (U.S.) (Coleman, 1987). Another interpretation is that the differential attainments of certain immigrants are due to prior educational and occupational differences. For instance, Jewish immigrants in the U.S. had a substantial social class advantage in terms of their education and occupation relative to other immigrants from Eastern and Southern Europe (Steinberg, 1981).

In the PISA study, immigration status of a student is classified into three categories: (1) native, (2) first-generation, and (3) non-native. "Native" refers to students who were born in the country of assessment with at least one of their parents born in the same country. "First-generation" refers to students who were born in the country of assessment but both their parents were foreign-born. "Non-native" refers to those students and their parents who were all foreign-born.

In Hong Kong, the percentages of first-generation students and non-native students are 26.4% and 17.4% respectively, totaling 43.6% of the sample. In comparison with the OECD average (a total of 9%), Hong Kong has much more non-native or first-generation students in the secondary school system (see Figure 1).

A comparison of the overall performance in reading literacy of non-native students with that of native and first-generation students reveals a comparatively large difference in favor of native and first-generation students in 18 countries/regions including Hong Kong (OECD & UNESCO, 2003, p. 173).

Figure 1. Percentage of Non-native and First-generation Students (Left Scale) and Performance of Non-native, First-generation, and Native Students on the Combined Reading Literacy Scale (Right Scale)



Left scale

Percentage of students who were foreign-born and whose parents were also foreign-born ("non-native students")

Percentage of students who were born in the country of assessment but whose parents were foreign-born ("first-generation students")

Right scale

Mean performance on the combined reading literacy scale of students who were born in the country of assessment with at least one of their parents born in the same country ("native students")

Mean performance on the combined reading literacy scale of students who were born in the country of assessment but whose parents were foreign-born ("first-generation students")

Mean performance on the combined reading literacy scale of students who were foreign-born and whose parents were also foreign-born ("non-native students")

In several countries such as the U.K., the U.S., Sweden, and Finland, non-native students got much lower reading scores than native students. They are at least 71 points behind the native student in 10 out of 15 countries with more than 3% of immigrant students (OECD & UNESCO, 2003, p. 173). Yet in some countries the gap was smaller. In Hong Kong, native students and first-generation students have similar levels of literacy performance, while non-native students perform somewhat lower. A possible explanation for these interesting findings is that the majority of immigrant students in Hong Kong are from the Chinese mainland. Those non-native students who were born in the Chinese mainland and then moved to Hong Kong might have had more difficulty in overcoming their language barriers and cultural differences than those whose parents moved to Hong Kong before they were born. Another interpretation for the large achievement gap between first-generation students and non-native students is that: first-generation students have sufficient time to learn and integrate into the local primary and secondary schools. This result indicates the effectiveness of Hong Kong's education system in integrating the first-generation students, but there is still room to improve for the non-native students.

Equality of Students from Single-parent Families and Other Family Types

Large-scale research studies in the U.S. indicate that students living in single-parent families tend to perform lower than those living with both parents. One major explanation is that parental involvement of single-parent families is substantially less than that of the traditional two-parent families (e.g., Ho & Willms,

1996; Milne, Ginsbury, Myers, & Rosenthal, 1986). Empirical evidence provided by Milne et al. (1986) suggests that the amount of time devoted to monitor children's homework is more for two-parent families than for single-parent families in elementary schools, and that this difference is much greater for high-school students. The study of eighth-grade students by Ho and Willms (1996) also confirms that single-parent families tend to participate less in their children's education both at home and in school.

In the PISA study, OECD classifies family structure into four types: single family, nuclear family, mixed family, and other responses. A "single family" is defined as a family in which a student lives with any one of the following: a mother, a father, a female guardian, or a male guardian. A nuclear family is a family in which a student lives with a father and a mother. A mixed family is one in which a student lives with a mother and a female guardian, a father and a female guardian, or a female and a male guardian.

In Hong Kong, the percentage of single-parent families is about 10.4%, which is relatively smaller than the OECD average of 14.7%. In the U.K. and the U.S., the percentages of students living with only one parent are the largest, being 20.5% and 21% respectively. Across the OECD countries, students who live with one parent score lower in the combined reading literacy scale than students who live with both parents. In some countries/regions including Hong Kong, at the student level, there is no significant difference in students' reading performance between single-parent families and other family types (see Table 5).

Table 5. Performance in Reading, Mathematics, and Science in Hong Kong by Family Structure

	Single parent (1)		Other type (2)		Difference *
	M	*SE*	*M*	*SE*	(1) – (2)
Reading literacy					
OECD average	491	1.0	503	1.9	**–12**
Hong Kong, China	519	5.4	527	2.9	–8
Mathematical literacy					
OECD average	492	1.5	506	2.8	**–14**
Hong Kong, China	550	6.8	562	3.3	–12
Scientific literacy					
OECD average	488	1.4	502	2.8	**–14**
Hong Kong, China	533	6.6	543	3.1	–10

* Negative differences indicate that students from single-parent family perform worse than students from other family structure. Differences that are statistically significant are indicated in bold.

Equality of Students from Different Parent Background

Socio-economic status (SES) is a major factor affecting a student's learning outcomes. The "family resource hypothesis" (Harker, Nash, Durie, & Charters, 1993) explains the consistent association. The hypothesis suggests that SES is likely to affect parental involvement by providing different amounts of cultural, social, and economic capitals for children's education. For instance, occupation provides income, which is actually economic capital that can be directly invested to provide learning material and an appropriate environment for children's education. Parents' education can be seen as cultural capital that provides the competence and confidence for parents to interact with schoolteachers. Social networks can also be regarded as a type of social capital (Coleman, 1990), and provide parents with the appropriate obligations and expectations,

information channels, and norms, hence facilitating negotiations with schoolteachers.

Parental Occupation Status

Previous research has shown that students' learning outcomes are affected by family backgrounds in many different and complex ways (Ho & Willms, 1996). For example, the SES of families has been consistently found to be an important variable in explaining variation in student academic achievement.

To provide one of the indicators of social class of a family, PISA uses parental occupation to derive the International Socio-economic Index (ISEI). It is based on the concept of occupational prestige. In the PISA 2000 study, performance differences in reading, mathematics, and science were found to be strongly associated with ISEI. In some countries like Belgium, Germany and Switzerland, students in the bottom quarter of the occupational index were found to be more than twice as likely as other students to be in the bottom 25% of their country's students on the reading literacy scale (OECD, 2001, p. 140).

In Hong Kong, the average score derived from ISEI of 15-year-olds' families is 42.3, which is lower than the OECD average of 48.9. If we look at the top quarter of the occupational index, the average ISEI index of Hong Kong is 58.2, which is much lower than the OECD average of 70.2 (see Table 6).

The figures in Tables 7, 8 and 9 indicate that, consistent with many previous studies, the higher the parents' occupation status, the better the students perform in reading, mathematics,

Table 6. Occupation Status by National Quarters of the ISEI Index

	All Students		Bottom quarter		Second quarter		Third quarter		Top quarter	
	M	*SE*	*M*	*SE*	*M*	*SE*	*M*	*SE*	*M*	*SE*
OECD average	48.9	0.1	29.3	0.0	42.4	0.0	53.6	0.0	70.2	0.1
Hong Kong, China	42.3	0.4	28.1	0.2	37.0	0.1	45.8	0.1	58.2	0.4

Table 7. Performance on the Reading Literacy Scale by National Quarters of the ISEI Index

	Bottom quarter		Second quarter		Third quarter		Top quarter	
	M	*SE*	*M*	*SE*	*M*	*SE*	*M*	*SE*
OECD average	463	0.9	491	0.8	515	0.7	545	0.9
Hong Kong, China	508	4.0	527	3.4	533	3.6	548	4.7

Table 8. Performance on the Mathematical Literacy Scale by National Quarters of the ISEI Index

	Bottom quarter		Second quarter		Third quarter		Top quarter	
	M	*SE*	*M*	*SE*	*M*	*SE*	*M*	*SE*
OECD average	465	1.2	491	0.9	513	1.0	542	1.2
Hong Kong, China	547	4.9	562	4.1	569	5.4	580	6.2

Table 9. Performance on the Scientific Literacy Scale by National Quarters of the ISEI Index

	Bottom quarter		Second quarter		Third quarter		Top quarter	
	M	*SE*	*M*	*SE*	*M*	*SE*	*M*	*SE*
OECD average	465	0.9	490	0.9	512	0.9	543	1.1
Hong Kong, China	518	4.2	541	3.9	549	4.2	568	5.9

and science. The impact of parents' occupation on their children's reading performance appears to be more obvious than that on mathematics and science. One possible reason is that the index of parents' occupation status indicates the amount of cultural capital available to children which is essential to cultural subjects such as reading.

The gap in literacy performance associated with parental occupational status differs across countries/regions. The difference in performance between the bottom quarter and the top quarter on the combined reading literacy is 40 in Hong Kong, 46 in Thailand, 62 in Indonesia, 90 in the U.S., and 98 in the U.K. The achievement gap in reading, mathematics, and science between those students whose parents score on the top 25% and the bottom 25% occupation status in Hong Kong is 40, 33, and 50 respectively. These gaps are relatively smaller than the OECD average of 82, 77, and 78. It can be argued that the academic achievements of students from high and low status groups are quite similar in Hong Kong.

Parental Education Background

Parental education is another student background variable that is often used in the analysis of educational outcomes. Theoretically, it has been argued that parental education is a more relevant factor influencing students' learning outcomes than parental occupation. Like occupation, the collection of internationally comparable data on parental education poses significant challenges, and less work has been done in internationally comparable measures of educational outcomes than that in occupational status.

PISA 2000 used a revised International Standard Classification of Education (ISCED) for establishing indices of parental education. A large performance difference was found between students whose mothers had completed upper secondary education and those whose mother had the lowest level of attainment (OECD, 2001, p. 149). In Hong Kong, a similar pattern was found where students whose parents completed only primary or lower secondary education performed significantly lower than those whose mothers completed upper secondary or tertiary education.

The achievement gap of students with better educated mothers (completed upper secondary education) and less educated mothers (completed only primary or lower secondary education) is only 28 in reading, 24 in mathematics, and 26 in science, all of which are very small when compared to the OECD average of 44, 46, and 45 respectively (see Tables 10–12). It can be argued that student performance varies little with the mother's level of education in Hong Kong and the impact of mother's education is not as strong as in many OECD countries.

In Hong Kong, the impact of father's education is comparable to the OECD average. The achievement gap of students with better educated fathers (completed upper secondary education) and less educated fathers (completed only primary or lower secondary education) is 29 in reading, 30 in mathematics, and 34 in science, all very close to the OECD average of 35, 27, and 30 respectively (see Tables 10–12).

Table 10. Percentage of Students and Performance on the Combined Reading Scale by Level of Mother's Education and Father's Education

	Completed primary or lower secondary education			Completed upper secondary education			Completed tertiary education or above		
	% of students	*M*	*SE*	% of students	*M*	*SE*	% of students	*M*	*SE*
Mother									
OECD average	32.3	467	0.9	41.1	511	0.8	26.6	534	0.9
Hong Kong, China	72.7	518*	2.7	23.1	546	4.3	4.2	563	11.3
Father									
OECD average	30.1	473	2.1	39.7	508	2.1	30.2	537	2.4
Hong Kong, China	68.9	516	3.0	23.1	545	3.8	8.0	570	7.9

* It indicates that there is significant difference between the group whose mothers did not complete upper secondary education and the group whose mothers did.

Table 11. Percentage of Students and Performance on the Mathematical Literacy Scale by Level of Mother's Education and Father's Education

	Completed primary or lower secondary education		Completed upper secondary education		Completed tertiary education or above	
	M	*SE*	*M*	*SE*	*M*	*SE*
Mother						
OECD average	464	0.9	510	0.9	533	1.0
Hong Kong, China	554*	3.2	578	5.5	597	15.2
Father						
OECD average	467	2.4	494	1.7	538	2.9
Hong Kong, China	551	3.4	581	5.1	602	8.6

* It indicates that there is significant difference between the group whose mothers did not complete upper secondary education and the group whose mothers did.

Table 12. Percentage of Students and Performance on the Scientific Literacy Scale by Level of Mother's Education and Father's Education

	Completed primary or lower secondary education		Completed upper secondary education		Completed tertiary education or above	
	M	*SE*	*M*	*SE*	*M*	*SE*
Mother						
OECD average	465	0.9	510	0.9	532	1.1
Hong Kong, China	533	2.8	559	5.4	594	11.4
Father						
OECD average	474	2.8	504	1.6	540	2.8
Hong Kong, China	530	2.9	564	4.9	583	7.7

Equality of Performance Among Schools

In the previous sessions, Hong Kong appears to have high mean scores of literacy performance, and the gaps in literacy performance among students from different social backgrounds are relatively small. Another criterion for equality is the difference of student performance among schools.

Equality of Performance Among Schools in PISA

Two indicators of equality of performance among schools can be examined by total variation and the percentage of total variation that lies between schools for each of the participating countries. Table 13 shows these indicators of between-school equality. Total variation for each of the three domains can be "differences between schools" and "differences between students within schools." The percentages were obtained through multilevel analysis and then the between-school variation was expressed as a percentage of total variation in student performance within a country/region.

Columns 3, 6 and 9 of Table 13 show the percentages of between-school variation within each of the participating countries/regions for reading, mathematics, and science performance. These percentages can be seen as an indicator of academic segregation among schools — that is, the equality of students' learning outcomes among schools in a country/region. The range is wide: from 7.6% to 67.2% for reading literacy, from 5.4% to 52.9% for mathematical literacy, and from 7.6% to 52.8% for scientific literacy.

The total variation of reading literacy of Hong Kong students is 7,056, and 48.3% of the total variation lie between

Table 13. Between-school Variation in Student Performance on the Combined Reading Literacy, Mathematics, and Scientific Scale

Country/region	Reading		Mathematics		Science	
	Total variation	% of between-school variation	Total variation	% of between-school variation	Total variation	% of between-school variation
Iceland	8,529	7.6	7,159	5.4	7,705	7.6
Sweden	8,495	9.7	8,724	8.3	8,688	8.2
Norway	10,743	10.9	8,383	8.1	9,128	10.0
Finland	7,994	12.3	6,451	8.1	7,446	6.6
New Zealand	11,701	16.2	9,748	17.5	10,149	16.9
Canada	8,955	17.6	7,152	17.3	7,893	16.2
Ireland	8,755	17.8	6,982	11.4	8,416	14.1
Denmark	9,614	18.6	7,500	17.8	10,652	16.0
Australia	10,357	18.8	8,107	17.5	8,879	17.5
Spain	7,181	20.7	8,192	18.3	9,097	18.0
United Kingdom	10,098	21.4	8,402	22.7	9,639	24.3
United States	10,979	29.6	9,671	32.0	10,217	35.6
Luxembourg	10,088	30.8	8,566	25.3	9,281	27.6
Thailand	5,929	30.9	6,889	33.8	5,929	30.9
Latvia	10,435	31.2	10,654	26.7	9,543	28.6
Portugal	9,436	36.8	8,341	32.0	7,923	31.3
Russian Federation	8,466	37.1	10,837	36.3	9,825	30.6
Korea	4,833	37.4	7,110	38.7	6,508	38.3
Albania	9,801	40.9	11,449	30.0	8,836	29.5
Indonesia	5,184	42.7	7,225	34.1	5,625	33.5
Israel	11,881	42.9	17,161	33.7	15,625	31.7
Brazil	7,427	43.1	9,493	35.9	8,181	28.1
Switzerland	10,408	43.4	9,922	41.1	10,012	41.6
Liechtenstein *	m	43.9	9,162	m	8,896	m
Macedonia	8,836	44.9	9,604	31.3	6,889	34.0
Japan	7,358	45.4	7,559	49.7	8,185	44.4
Hong Kong, China	**7,056**	**48.3**	**8,836**	**45.1**	**7,225**	**44.9**
Greece	9,436	50.4	11,731	46.9	9,390	40.0
Argentina	11,881	51.2	14,400	44.9	11,881	41.1
Czech Republic	9,278	53.4	9,276	43.7	8,821	40.3
Mexico	7,370	53.4	6,834	51.1	5,940	40.9
Italy	8,356	54.0	8,174	42.4	9,612	42.2
Bulgaria	10,404	55.4	12,100	45.9	9,216	40.2
Chile	8,100	56.7	8,836	45.4	9,025	39.2
Peru	9,216	58.0	11,664	40.5	8,100	30.0
Germany	12,368	59.8	10,512	55.2	10,394	49.5
Belgium	11,455	59.9	11,268	54.7	12,314	55.4
Austria	8,649	60.0	8,545	52.3	8,327	55.8
Poland	9,958	63.2	10,510	54.2	9,378	51.4
Hungary	8,810	67.2	9,592	52.9	10,510	52.8
OECD average	9,277	35.2	8,631	33.3	9,019	30.6

* "m" = missing.

schools, which is higher than the OECD average of 35.2%. Similar pattern was found in mathematics and science. Between-school differences accounted for 45.1% and 44.9% of the test score differences in mathematics and science respectively. To conclude, schools in Hong Kong differed more than schools of most OECD countries (mean = 35.2%, 33.3%, and 30.6% in reading, mathematics, and science). Outstanding countries such as Sweden and Finland that perform very well in reading have very low between-school variation (9.7% and 12.3% respectively). They also are more likely to have very low between-school variation in other subjects including mathematics and science. These education systems provide students both high-quality and high-equity schooling environment. This is the ideal type of system toward which Hong Kong should strive for.

Asian countries such as Japan and Korea had between-school variations of reading of 45.4% and 37.4% respectively, whereas in the U.S. and the U.K., the between-school variations were 29.6% and 21.4%. This difference indicates the degree of school inequality or academic segregation of the school systems between the Asian and Western countries. One possible explanation for the difference is that the Asian countries have different ability tracking among schools.

Hong Kong has a "6–3–2–2" school system of which the first nine years have been free and compulsory since 1979. After six years of elementary schooling, each student attends secondary school. At the time of this study, the results of the school examination and government examination of primary school students at the end of grade 5 and the whole year of

grade 6 were used to allocate students to secondary schools. Hong Kong grouped students into five ability levels before 2000. After that year, the tracking system was reduced to three ability levels (or bands) with about 33% of students in each band. This academic segregation in school intake is expected to be a major factor for inequality of school performance in Hong Kong. Besides the academic segregation, social segregation between schools should also be considered. In the next analysis, multilevel analysis will be used to assess to what extent and how school academic intake and social intake can explain inequality among schools.

Impact of Academic and Social Segregation on Inequality of school performance in Hong Kong

Table 14 shows the results of multilevel analysis, which examines the effect of the school's academic intake and social composition on students' reading performance. School mean SES and school mean banding are used as the two major indicators of academic segregation and social segregation among schools.

Table 14. Multilevel Analysis of Effect of School Intake on Reading Performance

	Model 1		Model 2	
	Coefficient	*SE*	Coefficient	*SE*
Intercept	**523.9*****	**3.6**	**524.9*****	**2.2**
School mean SES (social intake)	96.2***	9.9	18.6*	8.9
School band (academic intake)			52.9***	4.1
Between-school variance explained	42.3%		81.3%	
Within-school variance explained	1.6%		1.6%	

* $p < .05$; *** $p < .001$

Results of model 1 indicated that social intake of the school is a significant predictor of the reading performance. With one unit increase in the mean SES, the performance increases by 96 points. The between-school variation reduces by 42%.

Model 2 extended model 1 by adding school mean academic intake, which varies from 1 (high ability) to 3 (low ability). The results indicated that both social and academic intakes have significant effect on reading performance. When school academic intake (banding) changes from high to medium or from medium to low, reading performance decreases by about 53 points. The effect of mean SES is reduced in model 2. For every one-unit increase in school mean SES, the reading performance increases by about 19 points only. The percentage of between-school variation explained by the two intake variables is 81%. In other words, a large amount of inequality of school performance can be explained by the academic and social segregation. Only about 19% of the between-school variation remained unexplained.

Conclusions and Implications

This article examined the overall literacy performance of our 15-year-old students and identified the disparity of literacy performance across students of different backgrounds and across different schools. The results indicated that Hong Kong has obtained the highest mean score in mathematics, the third highest mean score in science, and the sixth highest mean score in reading. These results suggest a high average quality of Hong Kong's basic education.

Second, there are small disparities between different subgroups including gender, family structure, parents' occupation and parents' education levels. These results suggest that Hong Kong's education system is doing quite well in providing equal access to education and is beneficial to most of the students regardless of an individual's social, cultural, or economic background. It appears that Hong Kong's education system has achieved both excellence and equality in results when compared with other participating countries.

However, there is substantial inequality of performance among schools in Hong Kong. In other words, PISA shows us that the schools that students attend are strongly predictive of their performances. Student performance in reading literacy varies according to the school they attend by 35% among OECD countries and by 48% among schools in Hong Kong. Results of multilevel analysis indicated that the between-school variation in student performance in reading literacy (81%) was largely explained by the school's social composition and academic intake in Hong Kong. Only 19% of the between-school variation remains unexplained after controlling for the social and academic intake factors.

To conclude, there is evidence of input inequality, in the sense that schools with larger proportions of student from lower SES and lower academic backgrounds are in schools in which educational conditions are relatively less favorable. From the perspectives of policy makers, changing the five-banding system to three-banding system appears to be promising policy to create a more homogenous schooling system. However,

changing the existing categorical systems into a more comprehensive one could be too drastic. Compensatory policies and special programs for disadvantaged learners might potentially counter the inequities that presently exist between schools.

Policy makers should also be aware that Hong Kong has the highest percentage of immigrant students among the 41 participating countries/regions. Of the total of 43.8% of immigrant students, 17.4% are non-native (both students and their parents were foreign born) and 26.4% are first-generation (students were born in Hong Kong but their parents were born in foreign countries). The disadvantage seen in non-native students' performances is substantial although first-generation students perform as well as local students in PISA+ study. Special adjustment programs should be designed to address the needs of these non-native immigrant students. For those families who are non-native speakers, specific parent education and involvement programs are needed to help with their language acquisitions. With growing number of immigrants in Hong Kong, the government should have specific educational and social policies to support the adaptation of this particular group of students to their new schooling and living environments in Hong Kong.

This article attempts to depict the quality and equality of Hong Kong's basic education. The goal of excellence and equality of education appeared to be incompatible in previous discourse, yet this conflict is not universal or inherent in the education system as reflected in the findings of Hong Kong.

Readers may be curious to know the criteria whereby Hong Kong can claim to excel and to provide educational equality in school performances, and under what conditions Hong Kong can bring about relatively high levels of achievement among the top and average students without leaving other disadvantaged students too far behind. Possible reasons could be core curriculum of less differentiation that is equally demanding for all students; better disciplinary climate, and academic press; greater demands for students' time in schoolwork and homework, and regular assessment with feedback to students; high parental aspiration and expectations; and so on. All these are interesting topics for future studies. Yet, the inequality of student performance among schools is problematic and a longitudinal study is needed to examine to what extent and how the comprehensive school reforms in reducing banding among schools can change this pattern over time.

Notes

1. Bonferroni adjustment was applied when multiple comparisons among the participating countries were made. With a Type I error of 0.05, the adjusted *t* value for 41 comparisons is approximately 3.234, instead of 1.960.
2. About two-thirds of 15-year-olds in the OECD countries are within 100 points of the OECD mean score of 500, and one proficiency level is equal to just over 70 points.

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