

High-stakes testing and its impact on students and schools in Hong Kong: What we have learned from the PISA studies

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Abstract

Using data from the first two cycles of the Programme for International Student Assessment, PISA 2000 and PISA 2003, this paper argues that there is no significant relationship between the use of assessments and learning outcomes in Hong Kong. On the contrary, using assessment for tracking students showed negative effect on achievement. Moreover, students use a significant amount of time on homework and tutoring after normal school hours. Since students are very anxious about their academic performances, they tend to be highly competitive and avoid collaboration in their learning, and consequently Hong Kong students suffer from low self-esteem and very high anxiety level even though they perform well in many international studies

Keywords: high-stakes assessment, school segregation, self-concept, test anxiety, learning strategies

Introduction

Chinese society has always had a very strong belief in the positive value of rigorous testing. National assessment has been in place since the Sui dynasty (606 B.C), where people believed that coveted government official positions could only be assigned to those who excelled in examinations. The Chinese term for state examinations is *Keju* (科舉), which means literally “subject – recommendation.” That is, the examination was seen as a form of recommendation of suitable candidates for official positions (Siu, 2005). Education, in conjunction with the examination system, has always been perceived as a channel for social mobility, whereby individuals can strive for higher social status.

Learning is an ordeal in the Chinese culture. Chinese parents believe that there is no shortcut in learning. Success cannot be attained for their children without effort and pain associated with examinations and testing. Most parents believe that it is fair for individuals, regardless of their family backgrounds, to climb up the social ladder by striving to get through a series of examinations. However, researchers and educators argue that obsessive concern with testing and examination in Hong Kong has had deleterious effects on students and schools (Biggs, 1998; Pong & Chow, 2002). Lewellyn et al. (1982, p. 33) report that, “the curriculum in Hong Kong is ‘examination driven’ and the examinations are structured so as to dominate style and content of learning in the classroom.”

In PISA 2003, the second cycle of the OECD/PISA study, Hong Kong students perform well in the four assessment domains. Consistent with the first cycle of the PISA2000 study (Ho, 2004), Hong Kong ranks among the top ten countries/regions in all the four domains, as can be seen in Table 1. The mean performance of Hong Kong was significantly above the OECD average with 1st in mathematics, 3rd in science, 10th in reading, and 2nd in problem solving respectively.

Can the Chinese tradition of high stakes testing be credited with Hong Kong’s comparative success internationally? In this paper, I argue that the high-stakes testing system in Hong Kong cannot be credited with Hong Kong’s high performance. Findings from the first two cycles of PISA studies in PISA2000 and PISA2003 indicate that high-stakes testing makes no significant contribution to academic performance, but instead has significant negative effect on the schooling system, students’ lives after school, students’ motivation, self-related cognition, and their learning experiences (OECD, 2003; OECD, 2004).

Table 1 Literacy performance of 15-year-olds in the four domains of literacy

Mathematical literacy			Scientific literacy			Reading literacy			Problem solving skills		
Country/Region	Mean	S.E.	Country/Region	Mean	S.E.	Country/Region	Mean	S.E.	Country/Region	Mean	S.E.
Hong Kong	550	(4.5)	Finland	548	(1.9)	Finland	543	(1.6)	Korea	550	(3.1)
Finland	544	(1.9)	Japan	548	(4.1)	Korea	534	(3.1)	Hong Kong	548	(4.2)
Korea	542	(3.2)	Hong Kong	539	(4.3)	Canada	528	(1.7)	Finland	548	(1.9)
Netherlands	538	(3.1)	Korea	538	(3.5)	Australia	525	(2.1)	Japan	547	(4.1)
Liechtenstein	536	(4.1)	Liechtenstein	525	(4.3)	Liechtenstein	525	(3.6)	New Zealand	533	(2.2)
Japan	534	(4.0)	Australia	525	(2.1)	New Zealand	522	(2.5)	Macao	532	(2.5)
Canada	532	(1.8)	Macao	525	(3.0)	Ireland	515	(2.6)	Australia	530	(2.0)
Belgium	529	(2.3)	Netherlands	524	(3.1)	Sweden	514	(2.4)	Liechtenstein	529	(3.9)
Macao	527	(2.9)	Czech Republic	523	(3.4)	Netherlands	513	(2.9)	Canada	529	(1.7)
Switzerland	527	(3.4)	New Zealand	521	(2.4)	Hong Kong	510	(3.7)	Belgium	525	(2.2)
Australia	524	(2.1)	Canada	519	(2.0)	Belgium	507	(2.6)	Switzerland	521	(3.0)
New Zealand	523	(2.3)	Switzerland	513	(3.7)	Norway	500	(2.8)	Netherlands	520	(3.0)
Czech Republic	516	(3.5)	France	511	(3.0)	Switzerland	499	(3.3)	France	519	(2.7)
Iceland	515	(1.4)	Belgium	509	(2.5)	Japan	498	(3.9)	Denmark	517	(2.5)
Denmark	514	(2.7)	Sweden	506	(2.7)	Macao	498	(2.2)	Czech Republic	516	(3.4)
France	511	(2.5)	Ireland	505	(2.7)	Poland	497	(2.9)	Germany	513	(3.2)
Sweden	509	(2.6)	Hungary	503	(2.8)	France	496	(2.7)	Sweden	509	(2.4)
Austria	506	(3.3)	Germany	502	(3.6)	United States	495	(3.2)	Austria	506	(3.2)
Germany	503	(3.3)	Poland	498	(2.9)	Denmark	492	(2.8)	Iceland	505	(1.4)
Ireland	503	(2.4)	Slovak Republic	495	(3.7)	Iceland	492	(1.6)	Hungary	501	(2.9)
Slovak Republic	498	(3.3)	Iceland	495	(1.5)	Germany	491	(3.4)	Ireland	498	(2.3)
Norway	495	(2.4)	United States	491	(3.1)	Austria	491	(3.8)	Luxembourg	494	(1.4)
Luxembourg	493	(1.0)	Austria	491	(3.4)	Latvia	491	(3.7)	Slovak Republic	492	(3.4)
Poland	490	(2.5)	Russian Federation	489	(4.1)	Czech Republic	489	(3.5)	Norway	490	(2.6)
Hungary	490	(2.8)	Latvia	489	(3.9)	Hungary	482	(2.5)	Poland	487	(2.8)
Spain	485	(2.4)	Spain	487	(2.6)	Spain	481	(2.6)	Latvia	483	(3.9)
Latvia	483	(3.7)	Italy	486	(3.1)	Luxembourg	479	(1.5)	Spain	482	(2.7)
United States	483	(2.9)	Norway	484	(2.9)	Portugal	478	(3.7)	Russian Federation	479	(4.6)
Russian Federation	468	(4.2)	Luxembourg	483	(1.5)	Italy	476	(3.0)	United States	477	(3.1)
Portugal	466	(3.4)	Greece	481	(3.8)	Greece	472	(4.1)	Portugal	470	(3.9)
Italy	466	(3.1)	Denmark	475	(3.0)	Slovak Republic	469	(3.1)	Italy	469	(3.1)
Greece	445	(3.9)	Portugal	468	(3.5)	Russian Federation	442	(3.9)	Greece	448	(4.0)
Serbia	437	(3.8)	Uruguay	438	(2.9)	Turkey	441	(5.8)	Thailand	425	(2.7)
Turkey	423	(6.7)	Serbia	436	(3.5)	Uruguay	434	(3.4)	Serbia	420	(3.3)
Uruguay	422	(3.3)	Turkey	434	(5.9)	Thailand	420	(2.8)	Uruguay	411	(3.7)
Thailand	417	(3.0)	Thailand	429	(2.7)	Serbia	412	(3.6)	Turkey	408	(6.0)
Mexico	385	(3.6)	Mexico	405	(3.5)	Brazil	403	(4.6)	Mexico	384	(4.3)
Indonesia	360	(3.9)	Indonesia	395	(3.2)	Mexico	400	(4.1)	Brazil	371	(4.8)
Tunisia	359	(2.5)	Brazil	390	(4.3)	Indonesia	382	(3.4)	Indonesia	361	(3.3)
Brazil	356	(4.8)	Tunisia	385	(2.6)	Tunisia	375	(2.8)	Tunisia	345	(2.1)

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

Testing culture in Hong Kong

Current educational reforms around the world stress high-stakes testing not only as a means to monitoring the progress of students, but also as a mechanism for improving student performance, enhancing school effectiveness and holding students, teachers, and school administrators accountable (Horn, 2003; Lewis, 2000). Ultimately, the goal of educational reform is to increase students' educational "success." But how is "success" defined in Hong Kong, an immensely competitive, materialistic, and result-oriented society? There, personal status is mostly measured by the wealth derived from one's successful career, and good education is always considered as the major means for achieving this goal. The answer to the question of who would be considered a successful student in Hong Kong is that when students score highly in many subjects in the two major public examinations in Hong Kong; namely the Hong Kong Certificate of Education Examination (HKCEE) and the Hong Kong Advanced Level Examination (HKALE). Universities publicize the number of students they admit each year with high results. Outstanding examination results also give students privileges to signify their potential. For instance, students who have achieved "A"s in more than 6 subjects on their HKCEE are eligible to apply for the Early Admissions Scheme (EAS) that gives them the chance of entering local universities by passing the HKALE. Apart from the early university admission tickets, various awards await them, which include one-year free travelling passes from bus companies, and scholarships equal to tertiary tuition fee from a local university. Their success stories are also publicized in various media. Yet, the assessment system in Hong Kong does not only produce "winners". In fact, assessment has proved to be a hurdle for the rest of the students. One of its latent purposes is not only to identify the "high-achievers," but also to sort out those who do not show potential for higher education.

Since 1979, Hong Kong has had a 6-3-2-2-school system, where education for the first nine years is free and compulsory (Morris, 1995). After six years of elementary school, all students attend secondary school. Since 2000, the results of school internal examinations and the government external examination of primary school students at the end of grade 5 and 6 have been used to allocate students to secondary schools. Under the current Secondary School Places Allocation System (SSPAS), all primary school students are streamed into three bands. To determine individual students' "band," their school examination results are adjusted by the school's overall performance in the Academic Aptitude Test (AAT). Consequently, this banding system results in highly segregated secondary schools.

When students are promoted to senior high, or Secondary Four and Five in Hong Kong, they have to prepare for the HKCEE, through which only about 30 percent of the students are likely to become eligible for matriculation edu-

cation in Secondary Six and Seven. At the end of their matriculation years, students take the Advanced Supplementary Level and Advanced Level examinations to compete for admissions in local tertiary institutes. Finally, about 25 percent of the same age group move on into post-secondary studies, where about 15 percent study toward a Bachelor's degree and the remaining 10 percent study toward an associated degree (Biggs, 1998). Therefore, the examination system in Hong Kong acts as a filtering mechanism, sorting out those that are apparently "less" capable of receiving higher education. Students' performance in these examinations plays a key role in determining whether they will end up in high-achieving careers in government, administration, business, and various professional sectors (Biggs, 1998). Biggs(1998) notes that, "...At all stages, the curriculum, teaching methods, and student study methods are focused on the next major assessment hurdles" (p.316). In other words, high-stakes tests such as the HKCEE and the HKALE are assessments that have significant consequences not only for students, but also for their schools (Lewis, 2000).

An evaluation or test should be an integral part of a curriculum, and it should normally come at the end of the teaching and learning process. In Hong Kong, however, with the advent of high-stakes public examinations, the direction seems to be reversed. Since high-stakes tests in Hong Kong appear to have paramount determining power regarding students' higher education and subsequently their career prospects, it is not difficult to imagine how the "dog" (the curriculum and pedagogy) has been wagged by its "tail" (high-stakes examinations).

Pong and Chow (2002) used a qualitative approach to examine students and teachers' experience towards examination in Hong Kong secondary schools. The study found that the examination system in Hong Kong has become a burden to both students and teachers. Teachers and students pointed out that the over-emphasis on examinations and assessments has created a backlash effect. For instance, both teachers and students have focused on getting the "main points" as the "good answers" rather than providing answers with carefully structured "arguments" in the examinations. Moreover, curriculum has become examination-oriented and has induced adverse competition among students. It has created additional stress about the future prospect of the child and has ignored his or her present life and situation. Various other studies(Biggs, 1998; Cheng, 1997; Pong and Chow, 2002) have also researched the effects of high-stakes testing on the curriculum and pedagogy in Hong Kong and have come to similar conclusions. Drawing upon the empirical evidence from two large scale international studies, PISA2000 and PISA2003 (OECD, 2003; OECD, 2004), the remainder of this paper will focus on the nature and possible consequences of high-stakes testing on six aspects of schooling in Hong Kong: 1) student performance, 2) school segregation, 3) students' life after school, 4) students' learning environment and their motivation, 5) self-concept and 6) learning anxiety.

Effect on student performance

Supporters of high-stakes testing believe that high academic performance is related to the testing system and that the quality of education can be improved by introducing a system of rewards and sanctions that may motivate students to work harder, and thereby perform better. Using the national dataset of the National Assessment of Educational Progress (NAEP) from the United States, Raymond & Hanushek (2003) argue that, in the U. S., states with high-stake and even low-stake systems for schools performed significantly better than states without such testing. However, another study finds that there is no relationship between high-stakes testing and student achievement across the different states of the United States (Nicholes, Glass & Berliner, 2006). It appears that there is no consistent evidence of the positive impact of high-stakes testing on students' performance.

Table 2 shows that on average in Hong Kong, principals reported that assessment results are used for different purposes. Nearly all principals reported that they were used for "informing parents" about their children's progress; improving curriculum; making decisions about "students' retention or promotion"; and assessing school progress. Moreover, 63 percent reported that the tests were used for assessing teachers; and for grouping students for instructional purposes. However, only about 23% of the principals reported that assessments were used for comparing for district and regional standards. Less than 20% said that they were used for comparing with other schools. The second and third columns in table 2 indicate that the percentage of reports that suggest the use of assessment for first six purposes are all higher in Hong Kong than other PISA2003 countries and regions.

Table 2 also shows that, of the eight uses of assessment reported by the principals, the use of assessment results to group students was the only one to have significant negative association with students' achievement. Therefore, it can be tentatively argued that it is difficult to relate the multiple uses of assessments to learning outcomes in Hong Kong.

High-stakes tests are those, the results of which are seen by students, teachers, administrators, and parents or the general public, and are used as a basis to make important decisions that immediately and directly affect them, such as promotion or placement of students, evaluation of teachers and schools (Madaus, 1988). It is interesting to find that all the high-stakes uses of assessment have negative association with student performance. For instance, results in table 2 indicate that schools using assessment results to make decisions about retention or promotion of students, grouping students, comparing with other schools, the district, or with the Hong Kong standards, tend to perform no better than those who do not.

In contrast, low-stake uses of assessment such as when results are reported to schools and teachers for assessing their progress, showed positive association.

Results in table 2 indicate that schools that use assessment to examine school progress, to evaluate teachers' effectiveness or to improve curriculum are more likely to perform better in mathematics than those who do not, though the relationship is not significant. To summarize, it is difficult to find positive contributions of high stakes uses of assessments to learning outcomes in Hong Kong. In fact, the use of assessment results in tracking students might even have significant negative impact on student achievement and school performance.

Table 2 Use of assessment results and student performance in mathematics (PISA2003)

Use of Assessment	% of schools use this method		Math scores of schools that use this method (A)		Math scores of schools that do not use this method (B)		Diff=A-B	
	HK	OECD	Mean	(S.E.)	Mean	(S.E.)	Diff	(S.E.)
Inform parents	99%	96%	551	(4.7)	m	m	m	m
Improve curriculum	97%	76%	551	(4.9)	525	(36.4)	25	(37.1)
Retention/promotion of students	96%	80%	550	(4.8)	559	(16.9)	-9	(18.1)
Assess schools' progress	90%	71%	552	(5.3)	533	(22.3)	19	(24.2)
Group students	63%	48%	537	(7.5)	571	(8)	-34*	(12.9)
Assess teachers' effectiveness	63%	49%	550	(7.4)	549	(8.6)	1	(13.1)
Compare to district or national standard	23%	57%	537	(16.7)	554	(4.8)	-17	(18.6)
Compare to other schools	19%	50%	545	(19.9)	551	(4.4)	-6	(21.2)

* $p < 0.05$; m= missing

Effect on school segregation

As mentioned in the previous section, all primary school students are streamed into three bands with about 33% in each. To determine their “band,” students’ school examination results are adjusted through the school’s overall performance in the Academic Aptitude Test. The PISA2003 data can be used to examine the extent to which this streaming policy affects the heterogeneity of schools in Hong Kong.

Table 3 shows the percentages of total variance that lies between schools in each of the domains for Hong Kong and the OECD average in PISA2003. The ratio of between-school variance to total variance indicates the heterogeneity of schools in a country. Among PISA2003 countries, the range of ratios of between-school variance is wide: from 4.0% to 58.2% for mathematical literacy; from 3.9 to 55.9% for reading literacy; from 4.1% to 54.7% for scientific literacy; and 3.0% to 57.6% for problem solving. Results in table 3 indicate that schools differed significantly in Hong Kong. Between-school variance accounts for 46.6% of test score differences in mathematics, which is higher than the OECD average of 32.7%. Unlike Hong Kong, Finland not only performs well in mathematics, but also has a very low between-school variance (4.8%), indicating that the country provides students with both high quality and high equity learning. In science, reading and problem solving, the ratios of between-school variations in Hong Kong, which are 45.4%, 42.2% and 39.8% respectively, are also much higher than the OECD averages for the same subjects.

The percentage of total variance that lies between schools can be seen as an indicator of school segregation. Since Hong Kong schools have higher percentage of between-school variance than the OECD average, it is easy to identify schools with particularly high or low level of achievement in Hong Kong. This high level of variance between schools indicates the inequality of schooling outcomes for 15-year-old students in Hong Kong.

Table 3 Between-school variance in performance between Hong Kong and other countries in PISA 2003

	<i>Mathematics</i>		<i>Science</i>		<i>Reading</i>		<i>Problem solving</i>	
	Total variation	Percentage of total variation within school	Total variation	Percentage of total variation within school	Total variation	Percentage of total variation within school	Total variation	Percentage of total variation within school
Hong Kong	9946	46.60%	8766	45.40%	7016	42.20%	9445	39.95%
OECD	8593	32.70%	10056	29.90%	8593	31.40%	8655	32.20%

Effect on students' life after school

The people of Hong Kong, along with those in other Confucian-heritage societies, attribute success to effort and failure to the lack thereof (Hau & Salili, 1991). Effort attributions are, in the event of failure, often more adaptive than ability attributions, in that one can believe that failure is redeemable by putting in more efforts, whereas the belief that failure is due to a lack of ability leads simply to resignation and disengagement (Pong & Chow, 2002). However, there is a downside: effort-attributing teachers and parents press students for endless studying.

It is only natural that, in the face of external examination pressure, lessons in Hong Kong schools are dominated by reviews of past examination papers. Reinforcement is believed to increase the likelihood that desirable behavior will occur. Thus, besides frequent practice tests and examinations, most schools and parents believe that homework and drill play an important part in helping students "to grind the iron bar into a needle" (Pong & Chow, 2002). Sometimes, schools also organize supplementary classes for students during weekends and public holidays.

However, when schools do not set an amount of homework that parents deem sufficient, or are not able to provide adequate exam-oriented teaching, students will be sent to after-school tutorial classes. Attending tutorial classes after school is so common that parents often feel that their children would be disadvantaged if they were not enrolled in extra tutorials (Pong & Chow, 2002). The examination year is also the time for students to take extra lessons from private "cram" schools. However, as the name suggests, rather than assisting students to pursue deep learning, a cram school aims to impart as much information to students as possible in the shortest period of time. The goal is to enable students to "parrot", or to unthinkingly repeat, information that is deemed necessary to get through specific examinations. Cram schools are so prevalent in Hong Kong that they have become a *de facto* parallel educational system, and many students spend considerable amounts of time and money to attend cram schools after regular classes.

PISA2003 provides data on students' time used on studying after school – this includes homework, remedial or enrichment classes at school, tutoring, cram classes or other study activities out of school. Table 4 shows the average number of hours per week a 15-year-old student spends in various types of after-school studying activities across countries. Hong Kong ranked 11th out of the 41 countries in after-school tutoring where about 11 hours per week were spent in after-school studying. Korea ranked 5th (with more than 17 hours per week) and Japan ranked 15th (with less than 7 hours). Similar to the PISA2003 study, the earlier TIMSS study also examined the nature of after-school tutoring in the Hong Kong school system using different measures. Baker et al. (1995) analyzed TIMSS data to determine the percentage of eight-grade stu-

dents taking extra lessons or attending a cram school in mathematics. The results of their analyses show that Hong Kong ranked 9th among the 41 countries with over half of the countries participating; Japan ranked 6th (more than 60%), and Korea came in 13th (less than 50%).

Table 4 After school tutoring among countries/regions in PISA2003

Countries	Total	Home work	Remedial class at school	Enrichment class at school	Private tutoring	Attend out of school classes	Other study
Russian Federation	20.02	12.90	1.96	1.27	0.60	1.56	3.71
Mexico	19.92	6.40	4.02	3.00	2.53	3.16	3.71
Greece	19.05	8.22	1.72	1.32	2.21	5.18	2.42
Korea	17.70	3.47	4.75	1.88	1.23	3.73	4.12
Turkey	17.26	5.85	2.82	2.18	1.74	3.83	5.76
Latvia	15.99	9.64	1.31	0.93	0.63	1.95	2.29
Hungary	13.58	9.92	0.53	0.38	0.57	0.59	2.24
Italy	12.80	9.75	1.00	0.42	0.49	0.63	1.06
Macao	12.78	7.92	1.47	0.83	0.67	0.66	1.20
Hong Kong	11.18	6.90	1.21	0.62	0.71	0.78	0.87
Spain	10.99	6.94	0.37	0.24	1.04	1.58	1.77
Thailand	10.87	7.05	0.89	0.83	0.59	1.21	0.31
Slovakia	10.45	8.42	0.54	0.45	0.60	0.36	0.71
Uruguay	10.44	6.69	0.51	0.35	1.41	0.80	2.13
Ireland	10.40	7.76	0.57	0.33	0.34	0.48	2.76
Brazil	9.76	4.88	1.05	0.82	0.61	2.17	2.15
United States	9.74	5.55	1.30	1.50	0.26	0.39	1.50
PISA average	9.51	6.21	0.97	0.78	0.51	0.89	1.65
Yugoslavia	9.03	5.17	0.30	0.30	0.84	0.32	2.91
U.K.	8.73	6.27	0.45	0.51	0.20	0.45	1.60
Luxembourg	8.70	6.07	0.34	0.37	0.48	0.84	2.49
Germany	8.41	6.27	0.14	0.61	0.49	0.13	1.35
Australia	8.33	5.66	0.67	0.58	0.29	0.33	1.37
France	8.07	6.84	0.57	0.23	0.34	0.18	0.50
Canada	8.01	4.98	1.10	0.88	0.24	0.41	1.26
Japan	7.93	3.78	1.13	0.85	0.11	0.56	1.96
Portugal	7.73	4.83	0.43	0.31	0.89	0.40	1.58
New Zealand	7.29	4.55	1.16	0.48	0.28	0.32	1.57
Belgium	7.28	6.11	0.20	0.34	0.16	0.32	0.56
Austria	7.08	4.06	0.25	0.49	0.31	0.20	2.11
Finland	6.87	3.67	0.19	1.98	0.07	0.35	0.80
Iceland	6.86	4.62	0.54	0.66	0.37	0.32	0.63
Denmark	6.47	5.32	0.23	0.12	0.12	0.32	0.75
Czech Republic	6.03	3.74	0.24	0.44	0.27	0.83	1.00
Switzerland	5.85	4.60	0.26	0.25	0.19	0.58	0.72
Norway	5.71	4.80	0.33	0.21	0.12	0.22	0.77
Liechtenstein	5.63	4.44	0.21	0.16	0.10	0.35	0.82
Sweden	4.94	3.88	0.35	0.10	0.20	0.22	0.82

Note: The data of Netherlands, Poland and Tunisia is incomplete; therefore, they are not included in the tables.

Although the two international studies used different estimates of after schooling tutoring, it is noteworthy to find that the after school tutoring in Japan appeared to have decreased since the country introduced significant educational reform in the 1990s to reduce the content of the math curriculum, and to emphasize less drilling and more mathematical thinking. The findings based on PISA2003 data can be seen as a preliminary indicator of their success in reducing students' after school study load. In fact, attending classes after school in Hong Kong and Korea is not a healthy phenomenon as students are put under the great pressure of seemingly endless studying, leaving less time for other social and cultural activities.

Effect on students' learning environment

Provided with significant determining power of the high-stakes examinations and a highly competitive education environment, students in Hong Kong tend to adhere to performance-oriented learning goal and adopt a pragmatic approach to learning. Ames and Ames (1984) point out that when competition is highlighted in high-stakes examinations, students are pressured to focus on the demonstration of their competence relative to those of other students. They are likely to be concerned with how their abilities are judged in comparison to their classmates. So they engage in ego-enhancement activities by aiming to perform better than others and proving their own superiority by trying to get higher grades than their classmates or rewards from the teachers (Ames & Archer, 1988).

Table 5 shows the indices of competitive learning and cooperative learning of students from 41 countries that participated in the PISA2000 study. Hong Kong has the highest mean Competitive Learning index of 0.67. In contrast, most of the European countries have low mean values. Hong Kong gets the average value in the Cooperative Learning index, which is 0.04, and Korea has the lowest mean value. These figures suggest that students in Hong Kong are used to competitive learning environment, but use cooperative learning strategies less frequently than the OECD average.

In short, under the competitive learning environment posed by high-stakes examinations in Hong Kong, students focus on their ability to win or outperform others. Their self-perception of ability depends on how they perform relative to others. Thus, self-evaluation of ability fluctuates with their performances.

Table 5 Competitive and co-operative learning of 15 year-olds in PISA2000+

	<i>Competitive learning index</i>		<i>Co-operative learning index</i>
Hong Kong	0.67	Portugal	0.59
Macedonia	0.60	Chili	0.54
Mexico	0.54	Denmark	0.50
Chili	0.49	Brazil	0.47
Albania	0.47	U.K.	0.39
Thailand	0.32	U.S.A.	0.35
Bulgaria	0.31	Thailand	0.32
New Zealand	0.29	New Zealand	0.29
U.S.A.	0.27	Albania	0.24
Latvia	0.22	Latvia	0.24
Denmark	0.19	Mexico	0.22
Israel	0.18	Ireland	0.22
U.K.	0.18	Italy	0.20
Ireland	0.15	Norway	0.17
Czech Republic	0.14	Netherlands	0.14
Russian Fed.	0.13	Bulgaria	0.09
Australia	0.10	Hong Kong	0.05
Hungary	0.10	Finland	0.04
Iceland	0.01	Australia	0.04
Italy	-0.00	Switzerland	- 0.01
Sweden	-0.01	Liechtenstein	- 0.02
Brazil	-0.03	Macedonia	- 0.04
Norway	-0.03	Israel	- 0.05
Germany	-0.07	Czech Republic	- 0.05
Korea	-0.14	Austria	- 0.10
Luxembourg	-0.18	Belgium	- 0.15
Austria	-0.19	Germany	- 0.21
Liechtenstein	-0.21	Sweden	- 0.21
Portugal	-0.22	Russian Fed.	- 0.23
Finland	-0.25	Iceland	- 0.29
Netherlands	-0.25	Hungary	- 0.34
Switzerland	-0.26	Luxembourg	- 0.41
Belgium	-0.38	Korea	- 0.85

Effect on self-concept and anxiety

The focus of high-stakes testing may have detrimental impact on students' self-concept and self-efficacy. When students are not under the pressure of high-stakes testing, they generally have a high degree of self-efficacy, use deep processing strategies and self-regulation in coping with the learning task, and

generally perform better than others (Pintrich et al., 2001). Therefore, performance and learning goals generate different learning behaviors and have different implications for the development of students' self-concepts. In the PISA 2000+ study, although Hong Kong ranked 6th in Reading and 1st in Mathematics achievement, its students were ranked the 2nd lowest in Reading self-concept and the 7th lowest in Mathematics self-concept among the 41 countries/regions in PISA.

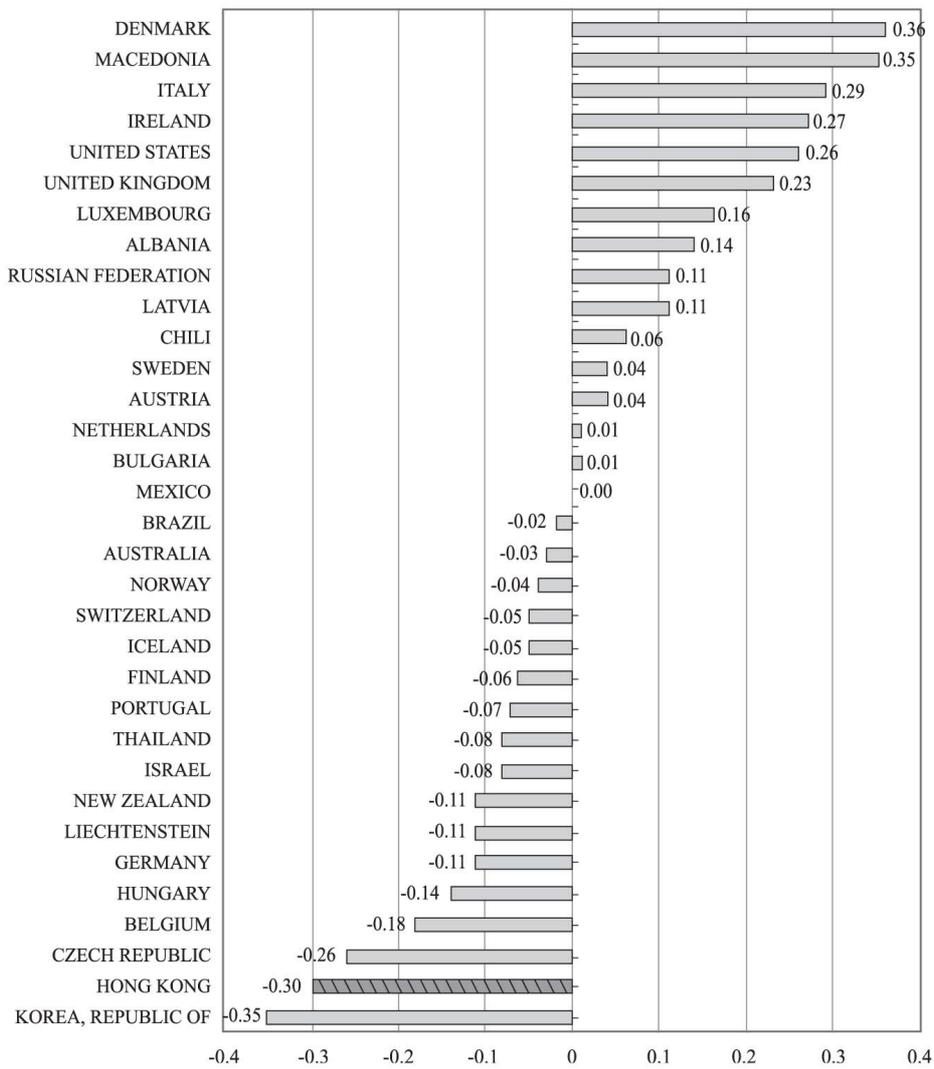


Figure 1 Reading self-concept across countries in PISA2000+

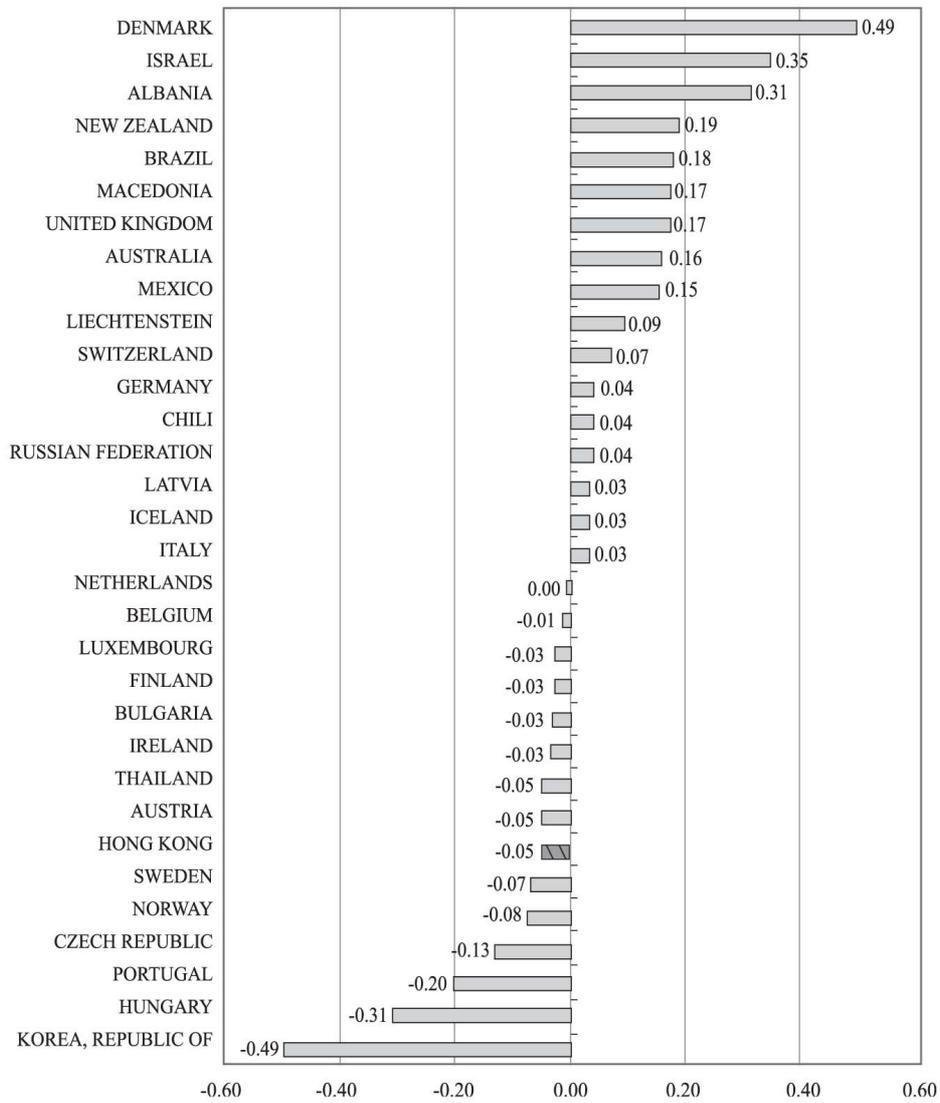


Figure 2 Mathematics self-concept across countries in PISA2000+

The focus of testing on cognitive achievement also diminishes the importance of children's self confidence and increases their anxiety level. With reference to PISA2003 (OECD, 2004), Hong Kong has an index of anxiety of 0.22, which is significantly higher than the OECD average (See figure 3). According to stu-

dents' response in the PISA 2003 survey, about 68 percent of students in Hong Kong often worry about the difficulties in mathematics learning, and 72 percent worry that they may get poor grades on the subject. As a result of the high-stakes testing, students are more likely to develop learning anxiety, and they could become anxious in the face of setbacks (Ames & Ames, 1984).

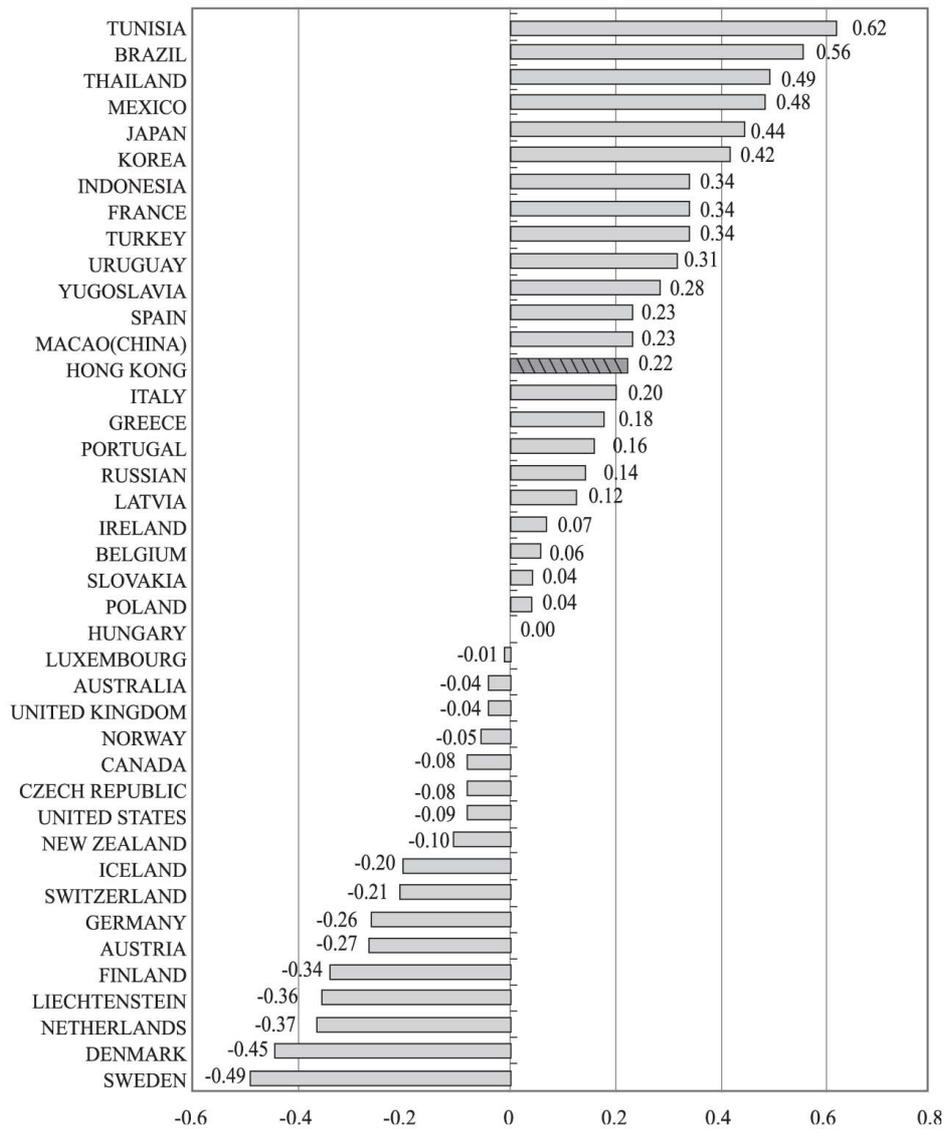


Figure 3 Mathematics anxiety across countries in PISA2003

Conclusion

In this paper, I have reviewed the testing culture in Hong Kong, arguing that high-stakes testing in Hong Kong is not related to the higher academic performance of its students. Based on the data provided in the first two cycles of the PISA study, we found no evidence that high-stakes testing has any positive impact on students' mathematics achievement. On the one hand, results from low-stakes assessment can support teaching and learning by providing information to parents and feedback to teachers and schools. Low-stakes testing can also reveal good practices and identify shared problems so as to improve curriculum and develop more supportive learning environment. This study has identified the positive effects of low-stakes testing though the effects are not statistically significant. On the other hand, high-stakes use of testing results such as streaming students showed significant negative relationship with students' academic achievement. Moreover, as a result of the streaming policy, Hong Kong schools are highly segregated academically. Since students' academic performances in examinations play a key role in determining their life chances in studying and working, they spend a lot of time on homework, private tutoring, and cram school after regular school hours. In the face of internal and external examination pressure, students are very anxious about their performances and are highly competitive. As a result, they lack collaborative capabilities in the learning process, and Hong Kong students consequently suffer from a low self-concept and high anxiety level even though they perform well in international studies.

Although we cannot attribute high-stakes testing to all of the negative characteristics reviewed here, which include school segregation, low self-concept, and highly competitive and stressful learning environment directly, there is a cyclical trend such that in the months of May, June and July are the peak suicide months among students taking such tests. In Hong Kong, these months coincide with the time when most public examinations are held and candidates' results are disclosed (Tse, 2000).

When test results are the major arbiter of future educational or life chance in a highly stratified society like Hong Kong, all internal and external tests are high-stakes and performing well on these tests become the major goal of schools. The results of the PISA analysis show no evidence that high-stakes testing could lead to improved achievement. To the contrary, there are possibly deleterious effects of high-stakes testing on students and their learning environment. For this reason, the continued use of high-stakes testing for supporting learning has become highly problematic. Future studies should explore strategies to minimize the potentially negative influences of high-stakes tests on students and schools. Lowering the stakes in testing by introducing systematic formative assessment can provide valuable descriptive information to inform students and teachers about the progress of teaching and learning. Such ap-

proaches may be promising avenues for the improvement of Hong Kong curriculum and students learning.

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