Overview of Accomplishment & Challenges of Hong Kong Basic Education:

From PISA 2000+ to PISA 2015

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- Content of Assessment in PISA
- Major Findings in PISA 2015
- Major Factors Related to Student Performance
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Content of Assessment in PISA

Research Design

- Age-based target population (15-year-olds)
- National samples of 150 schools with at least 5,400* students (Computer-based assessment)
- Two hours of computer-based assessment for each student
- Contextual questionnaires for students, parents, teachers and schools (30 mins each)
- Sample: 510,000 students from 72 participating countries/economies

Content of Assessment in PISA

- 3 Literacy Domains
- Rotating major domains

Reading Literacy

2000
2009

Mathematical Literacy

2003
2012

Scientific Literacy

2006
2015

Instruments
- Computer-based Assessment: Science, Reading, Mathematics, Problem Solving (2015)
- Questionnaires

72 Countries/Economies Participating in PISA 2015

OECD Countries			Partner Countries (Non-OECD Countries/Economies)		
Australia	Iceland	Portugal	Albania	Georgia	Peru
Austria	Ireland	Slovak Republic	Algeria	Hong Kong-China	Qatar
Belgium	Israel	Slovenia	Argentina	Indonesia	Romania
Canada	Italy	Spain	Brazil	Jordan	Russian Federation
Chile	Japan	Sweden	China (B-S-J-G)*	Kazakhstan	Singapore
Czech Republic	Korea	Switzerland	Bulgaria	Kosovo	Thailand
Denmark	Latvia	Turkey	Chinese Taipei	Lebanon	Trinidad and Tobago
Estonia	Luxembourg	United Kingdom	Colombia	Lithuania	Tunisia
Finland	Mexico	United States	Costa Rica	Macao-China	United Arab Emirates
France	Netherlands		Croatia	Malaysia	Uruguay
Germany	New Zealand		Cyprus	Malta	Vietnam
Greece	Norway		Dominican Republic	Moldova	
Hungary	Poland		Republic of Macedonia	Montenegro	

* China (B-S-J-G) refers to the four PISA participating provinces or cities in China : Beijing, Shanghai, Jiangsu and Guangdong.

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HKPISA 2015 Sampling

Explicit Strata	Implicit Strata	Total Number of Schools	Number of Participating Schools
Government	High Ability	15	6
	Medium Ability	7	2
	Low Ability	8	2
Aided	High Ability	119	45
	Medium Ability	115	37
	Low Ability	124	28
	(N/A)	1	1
Independent#	Local (DSS*)	59	17
	International	33	0
Total		481	138

#There is no implicit stratification for independent schools.
*DSS refers to schools under the Direct Subsidy Scheme.

Grade Distribution (HKPISA2015)

	Number of Participating Students	Proportion (%)
Grade/Form		
7/S1	59	1.1
8/S2	286	5.3
9/S3	1384	25.8
10/S4	3612	67.4
11/S5	18	0.3
Total	5359	100

Demographic Features of Participating Students

	Number of Participating Students	Proportion (%)
Sex		
Female	2675	49.9
Male	2684	50.1
Total	5359	100
Place of Birth		
Hong Kong	3962	73.9
Non-Hong Kong	1227	22.9
Data Missing	170	3.2
Total	5359	100
Immigrant Status		
Native	3364	62.8
Second-Generation	1103	20.6
First-Generation	705	13.2
Data Missing	187	3.5
Total	5359	100

Major Findings PISA 2015 Top 10

Science			Reading			Mathematics		
Countries/ Economies	**Mean**	**S.E.**	**Countries/ Economies**	**Mean**	**S.E.**	**Countries/ Economies**	**Mean**	**S.E.**
Singapore	556	(1.2)	Singapore	535	(1.6)	Singapore	564	(1.5)
Japan	538	(3.0)	**Hong Kong-China**	**527**	**(2.7)**	**Hong Kong-China**	**548**	**(3.0)**
Estonia	534	(2.1)	Canada	527	(2.3)	Macao-China	544	(1.1)
Chinese Taipei	532	(2.7)	Finland	526	(2.5)	Chinese Taipei	542	(3.0)
Finland	531	(2.4)	Ireland	521	(2.5)	Japan	532	(3.0)
Macao-China	529	(1.1)	Estonia	519	(2.2)	China (B-S-J-G)	531	(4.9)
Canada	528	(2.1)	Korea	517	(3.5)	Korea	524	(3.7)
Viet Nam	525	(3.9)	Japan	516	(3.2)	Switzerland	521	(2.9)
Hong Kong-China	**523**	**(2.5)**	Norway	513	(2.5)	Estonia	520	(2.0)
China (B-S-J-G)	518	(4.6)	New Zealand	509	(2.4)	Canada	516	(2.3)

Trend of Hong Kong Student Performance

	Science#		Mathematics##		Reading###	
Cycle	Mean	S.E.	Mean	S.E.	Mean	S.E.
2000+	541	3.0	560	3.3	525	2.9
2003	539	4.3	550	4.5	510	3.7
2006	542	2.5	547	2.7	536	2.4
2009	549	2.8	555	2.7	533	2.1
2012	555	2.6	561	3.2	545	2.8
2015	523	2.5	548	3.0	527	2.7

# indicates that the science performance in 2015 is significantly lower than that from 2006 to 2012.
indicates that the mathematics performance in 2015 is significantly lower than that in 2012.
indicates that the reading performance in 2015 is significantly higher than that in 2003 and lower than that in 2012.

Percentage of Students at Each Proficiency Level in Science in PISA 2015 (Hong Kong & OECD Countries)

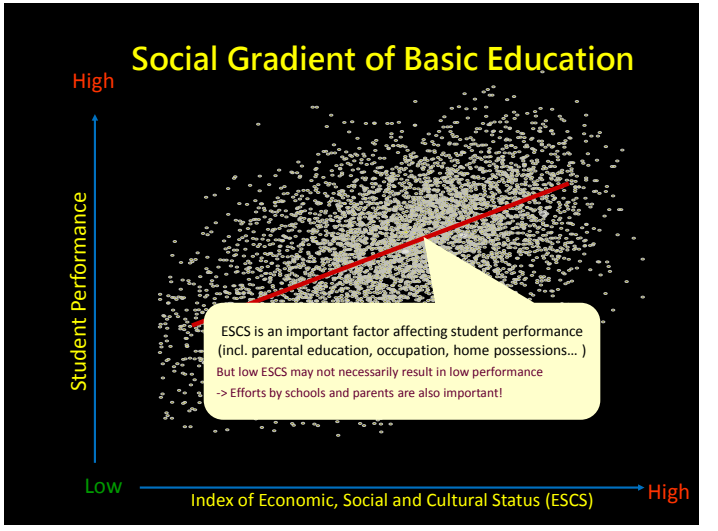
	Lower score limit	Hong Kong	OECD Average	Difference# (HK–OECD)	
Level 6	708	0.4%	1.1%	-0.6%	***
Level 5	633	6.9%	6.7%	0.3%	
Level 4	559	27.4%	19.0%	8.4%	***
Level 3	484	36.1%	27.2%	8.9%	***
Level 2	410	19.7%	24.8%	-5.1%	***
Level 1a	335	7.8%	15.7%	-8.0%	***
Level 1b	261	1.6%	4.9%	-3.4%	***
Below Level 1b		0.1%	0.6%	-0.5%	***

HK (7.4%) vs OECD (7.7%): **0.4%** less at Level 5 or above

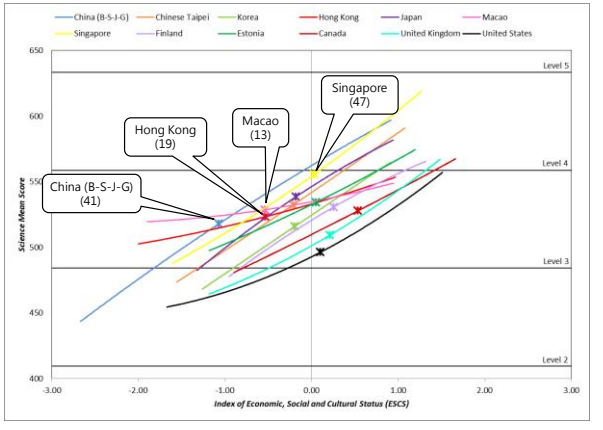
HK (90.6%) vs OECD (78.8%): **11.8%** more at Level 2 or above

*** Significant difference ($p < 0.001$)

The minor discrepancy in the difference is due to rounding of numbers.



Relationship between Student Performance in Science and Their Family Economic, Social and Cultural Status



Change in Science Score for Every Unit Increase of Individual Economic, Social and Cultural Status

	PISA 2006		PISA 2009		PISA 2012		PISA 2015	
	Social Gradient	S.E.	Social Gradient	S.E.	Social Gradient	S.E.	Social Gradient	S.E.
Science	26	(2.3)	19	(2.3)	21	(2.3)	19	(2.0)
Reading	22	(2.4)	17	(2.2)	20	(2.5)	19	(2.2)
Mathematics	26	(2.5)	24	(2.3)	27	(2.6)	22	(2.3)

	Difference		
	2015 - 2006	2015 - 2009	2015 - 2012
Science	-7 *	0	-2
Reading	-3	2	-1
Mathematics	-5	-2	-5

Effect of ESCS on Science Performance (PISA 2006 & 2015)

	Effect of Individual ESCS		Effect of School Mean ESCS	
	Change in science score for every unit increase of individual ESCS	S.E.	Change in science score for every unit increase of school mean ESCS	S.E.
2006	26	(2.3)	72	(8.3)
2015	19	(2.0)	55	(4.9)
Diff.	-7	(0.3)	-17	(3.4)

The effect of individual ESCS has decreased,

but the effect of **school mean ESCS** is still significant and substantial!

Effect of ESCS on Mathematics Performance (PISA 2003 & 2012)

	Effect of Individual ESCS		Effect of School Mean ESCS	
	Change in mathematics score for every unit increase of individual ESCS	S.E.	Change in mathematics score for every unit increase of school mean ESCS	S.E.
2003	5.8	(1.9)	90.4	(10.8)
2012	4.5	(1.5)	65.1	(7.9)
Diff.	-1.3	(2.4)	-25.3	(13.4)

The effect of individual ESCS has decreased,

but the effect of **school mean ESCS** is still significant and substantial!

Effect of ESCS on Reading Performance (PISA 2000+ & 2009)

	Effect of Individual ESCS		Effect of School Mean ESCS	
	Change in reading score for every unit increase of individual ESCS	S.E.	Change in reading score for every unit increase of school mean ESCS	S.E.
2000+	6	(1.3)	71	(11.8)
2009	3	(1.4)	32	(14.2)
Diff.	-3	(2.2)	-39	(21.1)

The effect of individual ESCS has decreased,

but the effect of **school mean ESCS** is still significant and substantial!

Equality of Basic Education

- High vs Low Achievers
- Boys vs Girls
- Local and Immigrant Students

Student Performance at 5th & 95th Percentile
(From 2006 to 2015)

Comparison of High and Low Achievers' Performance in Science, Reading and Mathematics from PISA 2006 to PISA 2015

	PISA 2006				PISA 2009				PISA 2012				PISA 2015			
Percentile	5th		95th		5th		95th		5th		95th		5th		95th	
	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.	Mean score	S.E.
Science	380	(6.2)	682	(3.1)	393	(7.3)	681	(3.3)	403	(7.1)	679	(3.4)	379	(5.5)	646	(3.2)
Reading	390	(6.2)	660	(2.7)	380	(5.5)	659	(3.1)	391	(6.4)	672	(4.1)	372	(5.6)	656	(3.5)
Mathematics	386	(6.1)	692	(4.8)	390	(5.1)	703	(4.7)	391	(5.9)	709	(4.3)	389	(5.8)	687	(4.6)

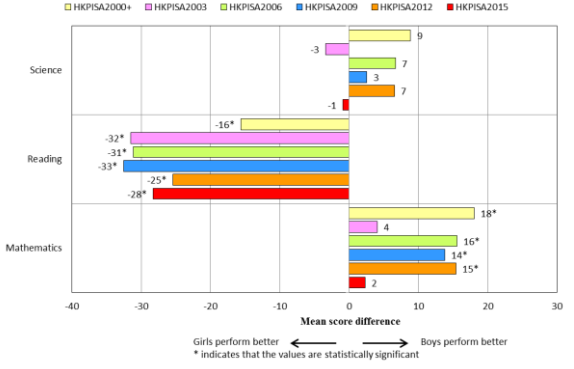
Student Performance at 5th & 95th Percentile
(From 2006 to 2015)

	Difference#					
	2015 - 2006		2015 – 2009		2015 - 2012	
Percentile	5th	95th	5th	95th	5th	95th
Science	-1	-36 ***	-14	-35 ***	-24 *	-34 ***
Reading	-18	-4	-8	-2	-19	-16 *
Mathematics	4	-5	-1	-16 *	-1	-22 **

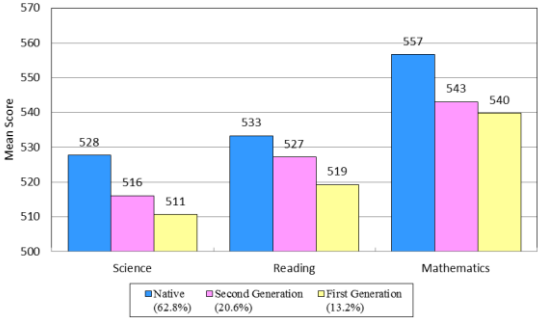
The minor discrepancy in the difference is due to rounding of numbers.

The mean scores of both high and low achievers have dropped, but the decline of high achievers is greater than that of low achievers.
The science mean score of high achievers has dropped significantly from 2006,2009,2012 to 2015; the reading mean score of high achievers has dropped significantly from 2012 to 2015 ; the mathematics mean score of high achievers has also dropped significantly from 2009, 2012 to 2015.

Gender Differences in Scientific, Reading and Mathematical Literacy of Hong Kong Students (From HKPISA 2000+ to 2015)



Literacy Performance of Local and Immigrant Students in Hong Kong (PISA 2015)



Factors Related to Student Performance

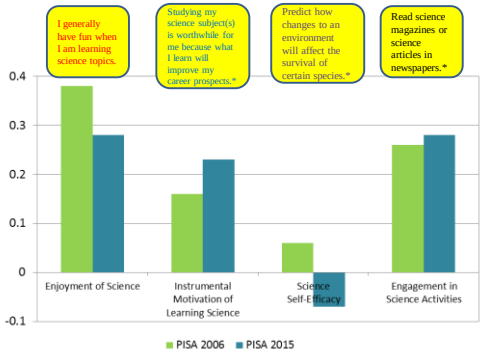
Student Level:

- **Self-related Cognition**
- **Engagement in Science Activities**

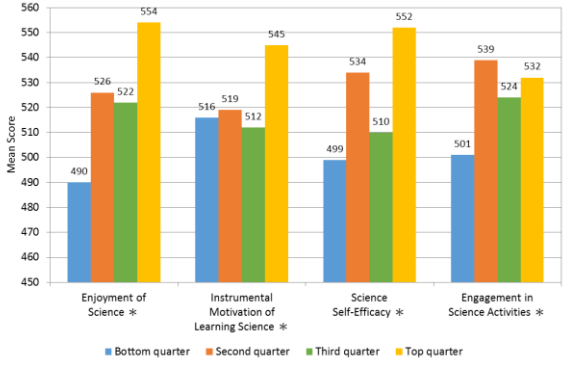
Parent Level:

- **Parental Involvement**
- **Parental Investment**

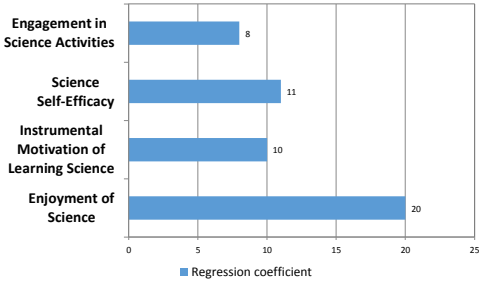
Indices of Self-related Cognition and Engagement in Science Activities of Hong Kong Students (2006 vs 2015)



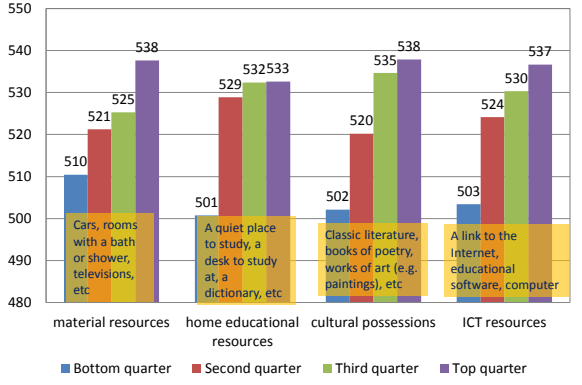
Relationship between Students' Self-related Cognition, Engagement in Science Activities and Scientific Literacy Performance (PISA 2015)



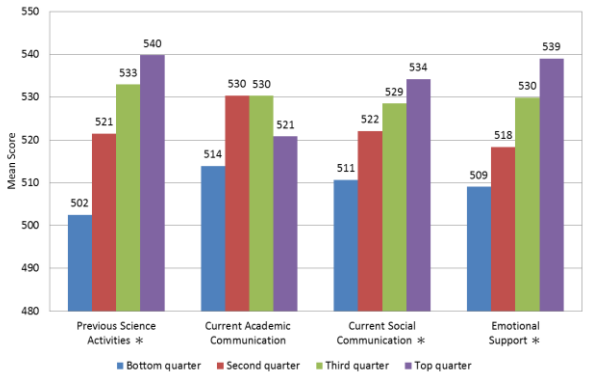
Relative Effects of Students' Self-related Cognition and Engagement in Science Activities on Scientific Literacy Performance



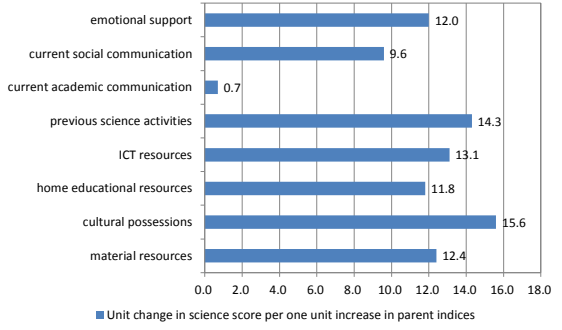
Relationship between Parental Investment and Students' Scientific Literacy Performance (PISA 2015)



Relationship between Parental Involvement and Students' Scientific Literacy Performance (PISA 2015)



*Relative Effects of Parental Factors on Students' Science Performance (PISA 2015)



Accomplishment

(From PISA 2000+ to 2015)

Accomplishment

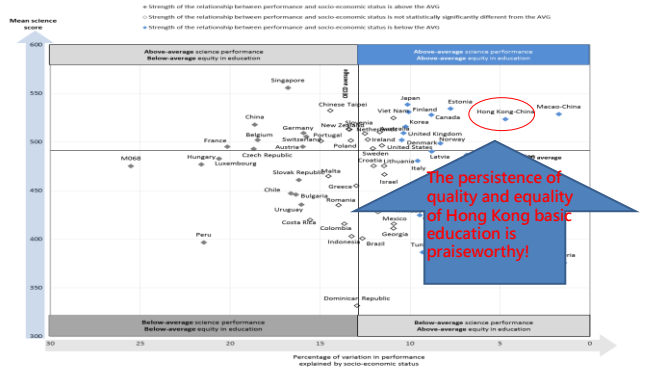
Quality:

- **Keep performing at the top 10** in science, reading and mathematics
- Self-related cognition in learning science: **Enjoyment of science and instrumental motivation of learning science** are consistently higher than the OECD average

Equality:

- Girls' performances in mathematics and science are no longer worse than boys'
- Social gradient is consistently low: Achievement gap between high and low ESCS students is not large
- Effect of school mean ESCS has decreased (but is still significant and substantial)

Praiseworthy: Quality and Equality (PISA 2015)



Challenges

(From PISA 2000+ to 2015)

Challenges

- **Science,** reading and mathematics **performances are worse than before**
- **Science self-efficacy** is lower than OECD average and **has declined**
- **Enjoyment of science has declined** (but instrumental motivation has increased)
- **Low percentage of high achievers in Hong Kong**
  - Current teaching practices may not be sufficient to help high achieving students?
  - Or the current education system cannot retain high achievers?
- **Boys continue to perform more poorly than girls in reading**
  - Need to understand why and how to adapt instructional design and materials to enhance boys' reading motivation and confidence in language learning
- **Newly arrived immigrant students have declined in performance**: Both first- and second-generation **immigrant students** perform more poorly than local born students and they require more support

*Looking Forward

- Press release: 6 Dec 2016
- School seminar: 16 Dec 2016
- HKCISA Centre will continue to analyze the various factors related to student performance
- Teacher professional development:
  - HKCISA Centre will collaborate with teacher associations to organize seminars and workshops and to further analyze student performance in this PISA cycle

Acknowledgement

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Buddhist Tai Hung College
Buddhist Wong Wan Tin College
Caritas Fanling Chan Chun Ha Secondary School
Caritas St. Joseph Secondary School
Caritas Tuen Mun Marden Foundation Secondary School
Carmel Divine Grace Foundation Secondary School
Carmel Pak U Secondary School
Chan Sui Ki (La Salle) College
Cheung Sha Wan Catholic Secondary School
China Holiness Church Living Spirit College
Chiu Lut Sau Memorial Secondary School
Choi Hung Estate Catholic Secondary School
Christ College
Christian & Missionary Alliance Sun Kei Secondary School
Christian Alliance S W Chan Memorial College
Christian Nationals' Evangelism Commission Lau Wing Sang Secondary School
Clementi Secondary School
Cognitio College (Hong Kong)
Confucian Tai Shing Ho Kwok Pui Chun College
Cotton Spinners Association Secondary School
Cumberland Presbyterian Church Yao Dao Secondary School
Daughters of Mary Help of Christians Siu Ming Catholic Secondary School
Delia Memorial School (Broadway)
ELCHK Lutheran Secondary School
Elegantia College (Sponsored by Education Convergence)
Evangel College
Fanling Kau Yan College
Fanling Lutheran Secondary School
Fukien Secondary School
Fukien Secondary School (Siu Sai Wan)
Fung Kai Liu Man Shek Tong Secondary School
Fung Kai No.1 Secondary School
Heep Yunn School
Heung To Middle School
Heung To Middle School (Tin Shui Wai)
HHCKLA Buddhist Leung Chik Wai College
HHCKLA Buddhist Ma Kam Chan Memorial English Secondary School
Ho Dao College (Sponsored by Sik Sik Yuen)
Ho Lap College (Sponsored by the Sik Sik Yuen)
Ho Ngai College (Sponsored by Sik Sik Yuen)
Ho Yu College and Primary School (Sponsored by Sik Sik Yuen)
Holy Trinity College
Homantin Government Secondary School
Hon Wah College
Hong Kong And Macau Lutheran Church Queen Maud Secondary School
Hong Kong Baptist University Affiliated School Wong Kam Fai Secondary and Primary School
Hong Kong Sheng Kung Hui Bishop Hall Secondary School
Hong Kong Taoist Association Tang Hin Memorial Secondary School
Hong Kong True Light College
Hong Kong Weaving Mills Association Chu Shek Lun Secondary School
Kau Yan College
Kiangsu-Chekiang College (Shatin)
King Ling College
King's College
Kowloon Sam Yuk Secondary School
Kowloon Tong School (Secondary Section)
Kwai Chung Methodist College
Kwun Tong Kung Lok Government Secondary School
Lee Kau Yan Memorial School
Ling Liang Church M H Lau Secondary School
Lingnan Secondary School
Lions College
Lung Kong World Federation School Limited Lau Wong Fat Secondary School
Madam Lau Kam Lung Secondary School of Miu Fat Buddhist Monastery
Maryknoll Convent School (Secondary Section)
Munsang College
Newman Catholic College
Ning Po No.2 College
Po Chiu Catholic Secondary School
Po Leung Kuk Laws Foundation College
Po Leung Kuk Lee Shing Pik College
Po Leung Kuk Lo Kit Sing (1983) College
Po Leung Kuk Mrs Ma Kam Ming-Cheung Fook Sien College
Po Leung Kuk Tong Nai Kan Junior Secondary College
Po Leung Kuk Vicwood K.T. Chong Sixth Form College
Po Leung Kuk Wu Chung College
Po Leung Kuk Yao Ling Sun College
Pok Oi Hospital Tang Pui King Memorial College
Pui Ching Middle School
Pui Shing Catholic Secondary School
Queen Elizabeth School
Queen Elizabeth School Old Students' Association Secondary School
Queen's College Old Boys' Association Secondary School
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Sacred Heart Canossian College
SALEM - Immanuel Lutheran College
Shatin Tsung Tsin Secondary School
Shau Kei Wan East Government Secondary School
Sheung Shui Government Secondary School
Shun Tak Fraternal Association Lee Shau Kee College
Shun Tak Fraternal Association Leung Kau Kui College
Shun Tak Fraternal Association Seaward Woo College
South Tuen Mun Government Sec Sch
St. Bonaventure College And High School
St. Catharine's School For Girls, Kwun Tong
St. Francis' Canossian College
St. Francis Xavier's College
St. Joseph's Anglo-Chinese School
St. Joseph's College
St. Louis School
St. Margaret's Girls' College, Hong Kong
St. Mark's School
St. Paul's Co-Educational College
St. Paul's College
St. Paul's School (Lam Tin)
St. Stephen's Church College
St. Stephen's Girls' College
St. Teresa Secondary School
Stewards Ma Kam Ming Charitable Foundation Ma Ko Pan Memorial College
Stewards Pooi Tun Secondary School
Tack Ching Girls' Secondary School
Tak Oi Secondary School
The Association of Directors & Former Directors of Pok Oi Hospital Ltd. Leung Sing Tak College
The Bishop Hall Jubilee School
The Chinese Foundation Secondary School
The Church of Christ In China Chuen Yuen College
The Church of Christ In China Kei Chi Secondary School
The Church of Christ In China Kei Long College
The Church of Christ In China Kei San Secondary School
The Church of Christ In China Kei To Secondary School
The Church of Christ In China Rotary Secondary School
The Hong Kong Chinese Christian Churches Union Logos Academy
The Jockey Club Eduyoung College
The Methodist Church Hong Kong Wesley College
The Methodist Lee Wai Lee College
The Mission Covenant Church Holm Glad College
The Pentecostal Holiness Church Wing Kwong College
The Salvation Army William Booth Secondary School
The True Light Middle School of Hong Kong
Tin Ka Ping Secondary School
Tin Shui Wai Government Secondary School
True Light Girls' College
Tsuen Wan Government Secondary School
Tsuen Wan Public Ho Chuen Yiu Memorial College
Tsung Tsin Christian Academy
Tuen Mun Catholic Secondary School
Tung Wah Group of Hospitals Li Ka Shing College
Tung Wah Group of Hospitals Lo Kon Ting Memorial College
Tung Wah Group of Hospitals S.C. Gaw Memorial College
Tung Wah Group of Hospitals Wong Fut Nam College
Tung Wah Group of Hospitals Yau Tze Tin Memorial College
United Christian College
United Christian College (Kowloon East)
Valtorta College
Workers' Children Secondary School
Yan Chai Hospital Law Chan Chor Si College
Yan Chai Hospital Lim Por Yen Secondary School
Yan Chai Hospital No. 2 Secondary School
Yan Chai Hospital Wong Wha San Secondary School
Yan Oi Tong Tin Ka Ping Secondary School
Ying Wa College

OECD

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HKCISA

Thank you !

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