Enhancing learning and teaching of mathematics and science in Hong Kong – A reflection based on the TIMSS 2019 results

Development Webinar

Event AA (Primary Science)

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IEA

Policy 21
政策二十一

Outline

- What is TIMSS?
- What does it test? And what does it measure?
- Findings in TIMSS 2019 HK study
  - I'd compare them with the results of previous rounds
- HK students performance in selected items
  - Pedagogies.

Background of TIMSS 2019

- Trends in International Mathematics and Science Study
- TIMSS is conducted under the auspices of the International Association for the Evaluation of Educational Assessment (IEA)
- Its dates back to 1964
- Among others, it measures student achievement in mathematics and science at Grade 4 (Yr 5) and Grade 8 (Yr 9)

Background of TIMSS 2019

National, social and
educational contexts

↓

Home, school, teacher,
and classroom contexts

↓

Student achievement
and attitudes

Participating Countries/Regions

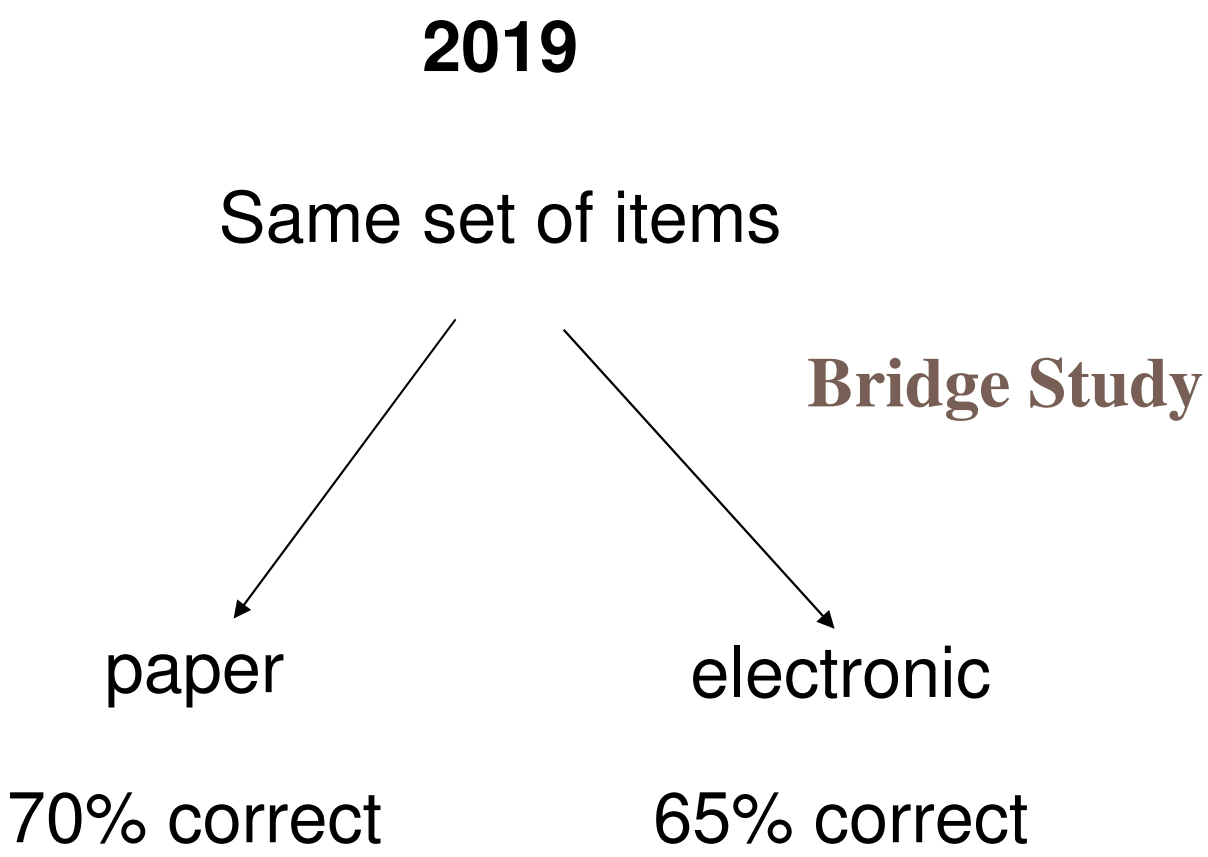
- ~70 countries/regions participated in TIMSS 2019
- ~60 countries/regions participated in the 4th grade (Year 5) assessment
- ~45 countries/regions participated in the 8th grade (Year 9) assessment
- More than 580,000 students were tested worldwide

From paperTIMSS to eTIMSS

- TIMSS 2019 is transitioning from paper-and-pencil test (paperTIMSS) to computer-based assessment (eTIMSS)
- Transitioning to eTIMSS is to:
  - reflect the growing use of digital devices in school and everyday life
  - keep pace with an increasing worldwide reliance on digital communication and assessment
  - enable participating countries to capitalize on the benefits of technology to ask students to solve mathematics problems and conduct science investigations in interactive situations

TIMSS 2015 paper	TIMSS 2019 electronic	Comparable?
70% correct	50% correct	

Bridge Study in TIMSS 2019



TIMSS 2019 in Hong Kong

- The Hong Kong samples included students from local and non-local schools
- 139 primary schools and 136 secondary schools
- 2968 Primary 4 students and 3265 Secondary 2 students were tested in eTIMSS
- 1329 Primary 4 students and 1423 Secondary 2 students were tested in the Bridge study

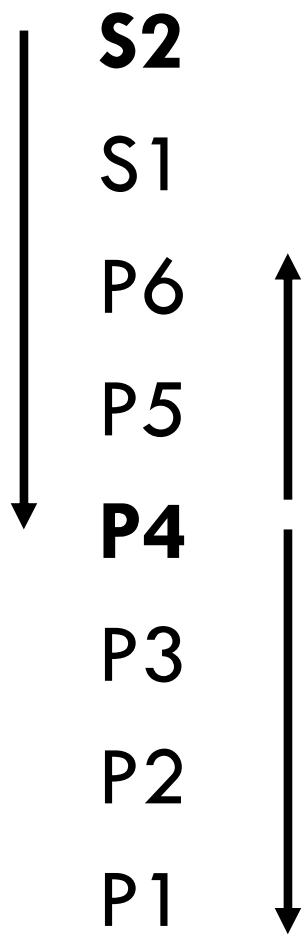
Bridge and eTIMSS

Exhibit 6: eTIMSS 2019 International Average Percent Correct on Paper Bridge and eTIMSS Invariant Items

Grade 4	Bridge	eTIMSS	Difference	z– test
Mathematics	53.42 (0.23)	50.77 (0.13)	2.65 (0.26)	B>E (0.05)
Science	51.51 (0.20)	49.69 (0.11)	1.82 (0.23)	B>E (0.05)
Grade 8	**Bridge**	**eTIMSS**	**Difference**	**z– test**
Mathematics	47.37 (0.33)	43.72 (0.18)	3.66 (0.38)	B>E (0.05)
Science	47.81 (0.27)	45.72 (0.16)	2.09 (0.31)	B>E (0.05)

B>E indicates the bridge students performed significantly higher than the eTIMSS students (α= 0.05).

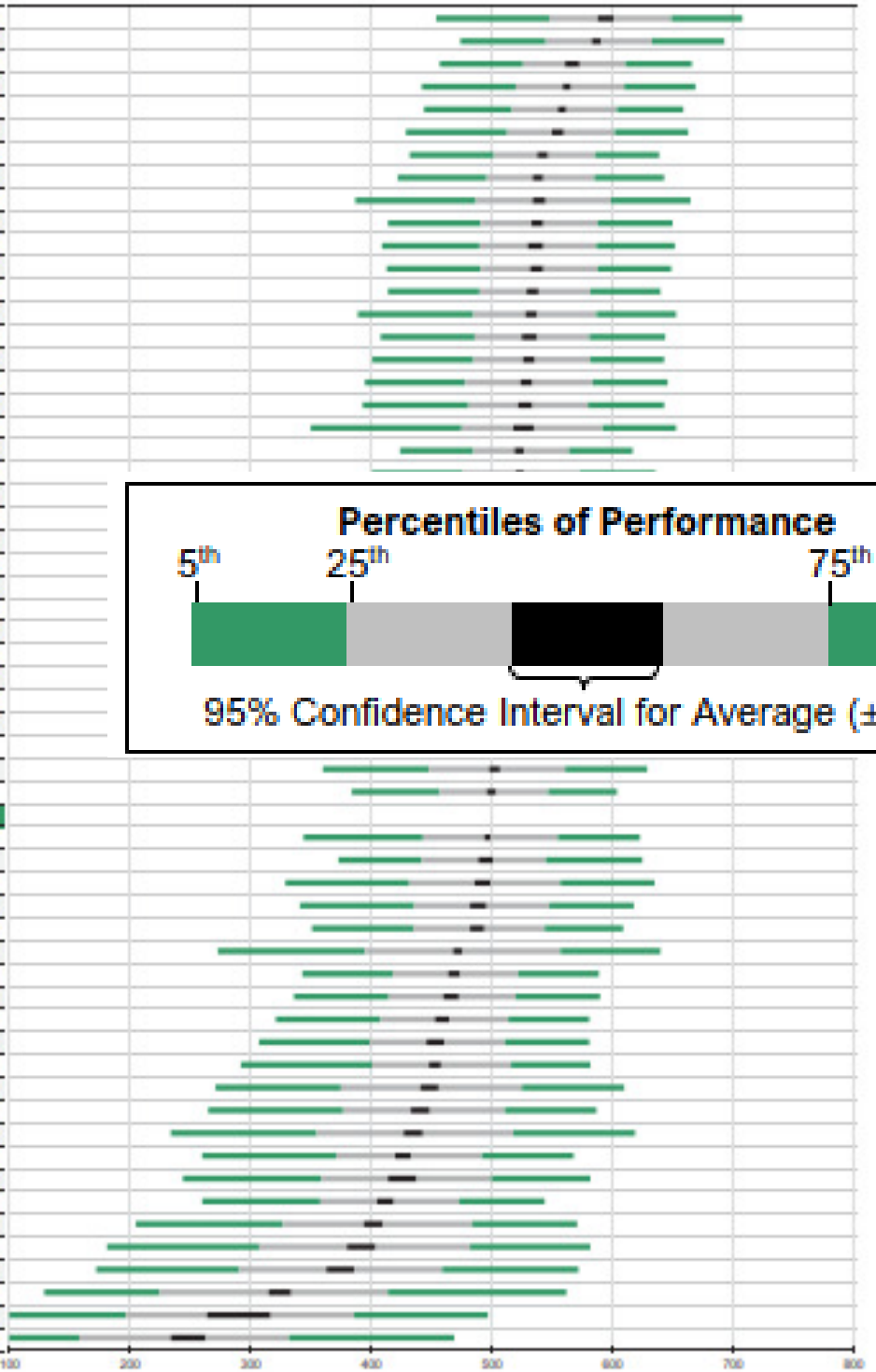
Why do I cover Grade 4 and Grade 8 results?

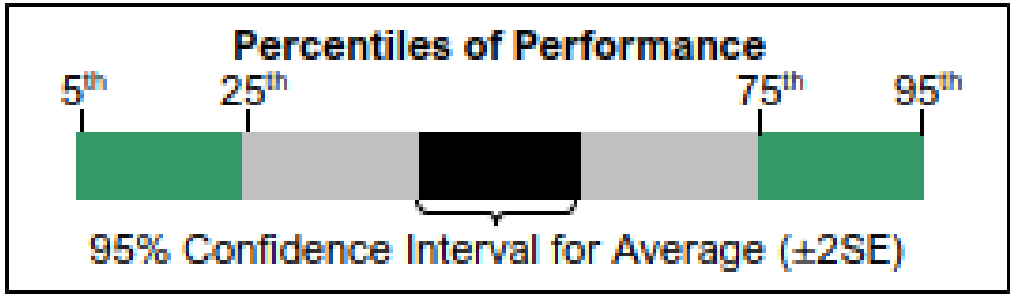


Primary 4

Country	Average Scale Score	
[3] Singapore	595 (3.4)	▲
Korea, Rep. of	588 (2.1)	▲
[2] Russian Federation	567 (3.0)	▲
Japan	562 (1.8)	▲
Chinese Taipei	558 (1.8)	▲
Finland	555 (2.6)	▲
[2] Latvia	542 (2.4)	▲
† Norway (5)	539 (2.2)	▲
[2] † United States	539 (2.7)	▲
[2] Lithuania	538 (2.5)	▲
Sweden	537 (3.3)	▲
[2] England	537 (2.7)	▲
Czech Republic	534 (2.6)	▲
Australia	531 (2.7)	▲
† Hong Kong SAR	530 (3.2)	▲
Poland	528 (2.4)	▲
Hungary	529 (2.7)	▲
Ireland	528 (3.2)	▲
[2] Turkey (5)	526 (4.2)	▲
Croatia	524 (2.2)	▲
[1 2] Canada	523 (1.9)	▲
† Denmark	522 (2.4)	▲
Austria	522 (2.6)	▲
Bulgaria	521 (4.9)	▲
[2] Slovak Republic	521 (3.7)	▲
† Northern Ireland	518 (2.3)	▲
[1] Netherlands	518 (2.9)	▲
Germany	518 (2.2)	▲
[2] Serbia	517 (3.5)	▲
Cyprus	511 (3.0)	▲
Spain	511 (2.0)	▲
Italy	510 (3.0)	▲
[2] Portugal	504 (2.6)	
[2] New Zealand	503 (2.3)	
† Belgium (Flemish)	501 (2.1)	
TIMSS Scale Centerpoint	**500**	
Malta	496 (1.3)	▽
[2] Kazakhstan	494 (3.1)	
Bahrain	493 (3.4)	▽
Albania	489 (3.5)	▽
France	488 (3.0)	▽
United Arab Emirates	473 (2.1)	▽
Chile	469 (2.6)	▽
Armenia	466 (3.4)	▽
Bosnia and Herzegovina	459 (2.9)	▽
[1] Georgia	454 (3.9)	▽
Montenegro	453 (2.5)	▽
Qatar	449 (3.9)	▽
Iran, Islamic Rep. of	441 (4.1)	▽
Oman	435 (4.1)	▽
Azerbaijan	427 (3.3)	▽
North Macedonia	426 (6.2)	▽
[2] Kosovo	413 (3.7)	▽
[2] Saudi Arabia	402 (4.1)	▽
Kuwait	392 (6.1)	▽
ψ Morocco	374 (5.8)	▽
✻ South Africa (5)	324 (4.9)	▽
[2] ✻ Pakistan	290 (13.4)	▽
[2] ✻ Philippines	249 (7.5)	▽
Benchmarking Participants		

531/ 15th





Primary 4 Science

Science • Grade 4

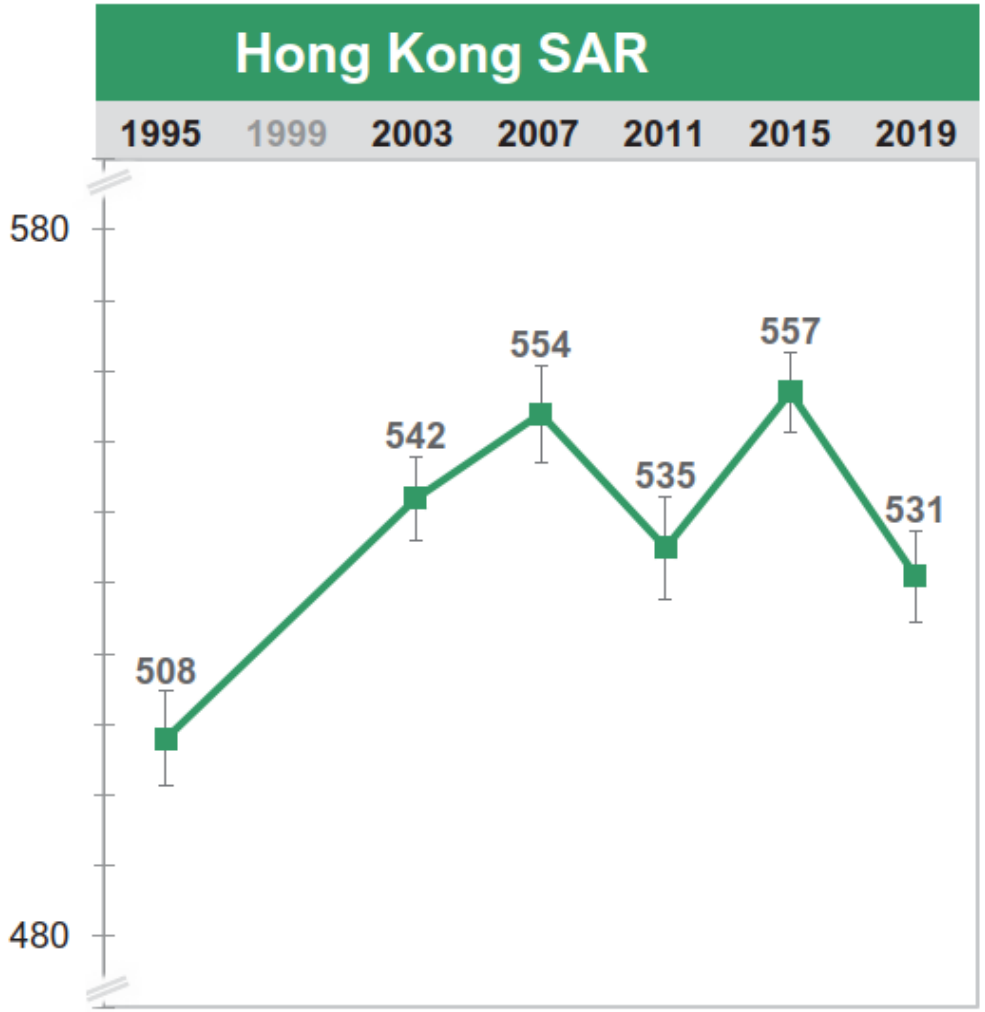
IEA TIMSS 2019

Exhibit 2.1: Average Science Achievement and Scale Score Distributions

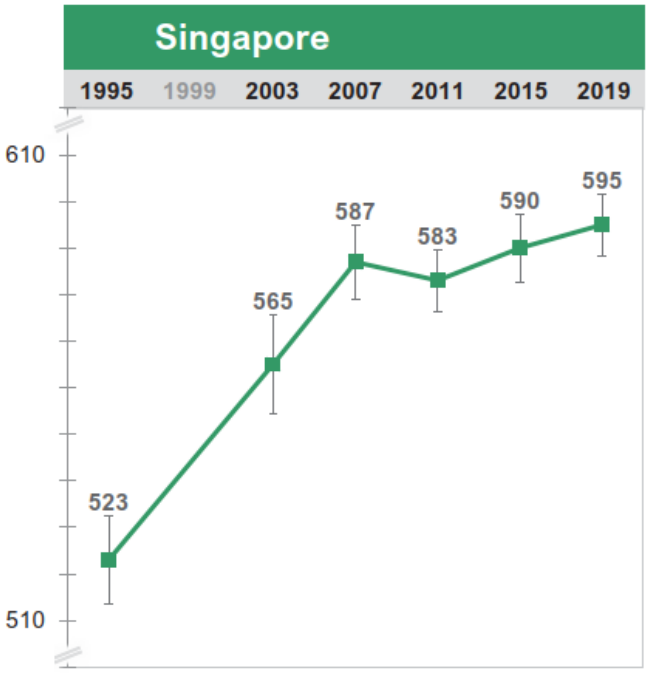
Country		Average Scale Score		Science Achievement Distribution
[3] Singapore		595 (3.4)	▲	
Korea, Rep. of		588 (2.1)	▲	
[2] Russian Federation		567 (3.0)	▲	
Japan		562 (1.8)	▲	
Chinese Taipei		558 (1.8)	▲	
Finland		555 (2.6)	▲	
[2] Latvia		542 (2.4)	▲	
† Norway (5)		539 (2.2)	▲	
[2] † United States		539 (2.7)	▲	
[2] Lithuania		538 (2.5)	▲	
Sweden		537 (3.3)	▲	
[2] England		537 (2.7)	▲	
Czech Republic		534 (2.6)	▲	
Australia		533 (2.4)	▲	
† Hong Kong SAR	15th	531 (3.3)	▲	

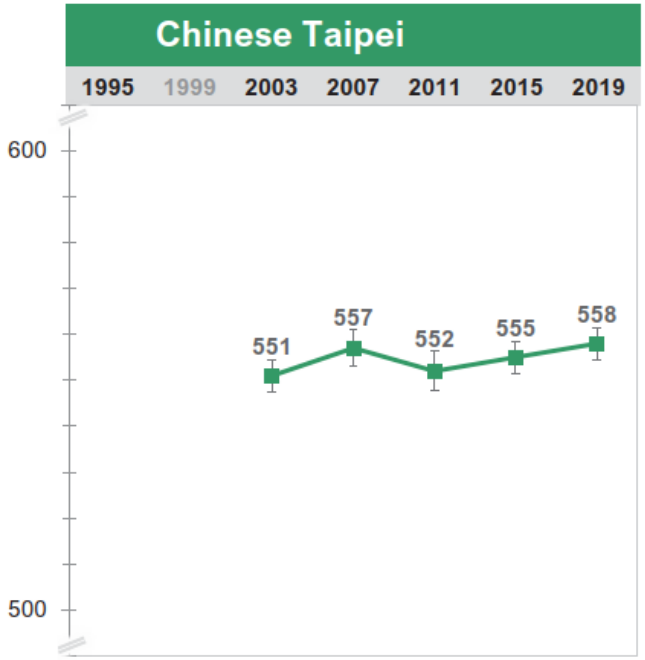
9th-20th: no stat. sign. diff.

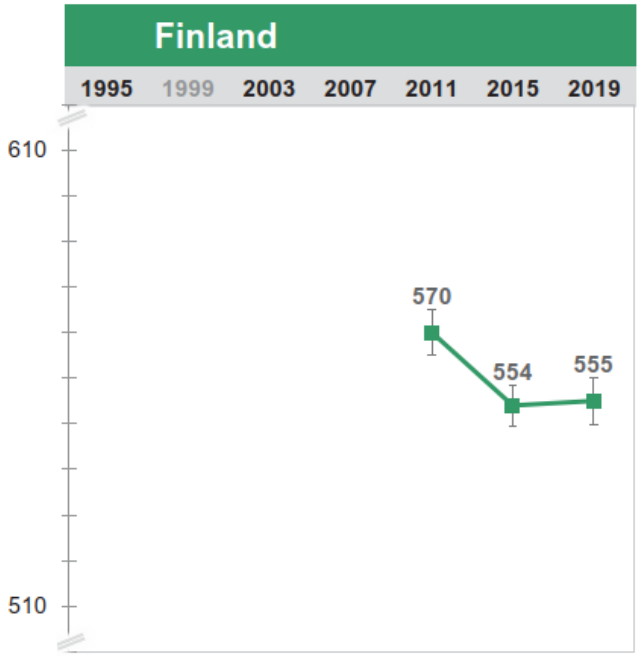
Trends in Primary 4 Science



Country	Average Scale Score	Differences Between Years 2015	2011	2007	2003	1995	Science Achievement Distribution
Hong Kong SAR							
† 2019	531 (3.3)	-25 ▽	-4	-23 ▽	-11 ▽	23 ▲	
† 2015	557 (2.9)		22 ▲	2	14 ▲	49 ▲	
[2] 2011	535 (3.7)			-19 ▽	-8	27 ▲	
2007	554 (3.5)				12 ▲	46 ▲	
† 2003	542 (3.0)					35 ▲	
1995	508 (3.4)						


Singapore
1995
1999
2003
2007
2011
2015
2019
610
510
523
565
587
583
590
595


Chinese Taipei
1995
1999
2003
2007
2011
2015
2019
600
500
551
557
552
555
558


Finland
1995
1999
2003
2007
2011
2015
2019
610
510
570
554
555

Trend: Bridge & Previous Cycles (P4)

Bridge 2019 vs. Previous TIMSS Cycles		
	Science	
	Scale scores	s.e.
2019 eTIMSS	531	3.4
2019 Bridge Study	542	7.3
2015	557	2.9
2011	535	3.7
2007	554	3.5
2003	542	3.0
1995	508^	3.4

^ TIMSS 2019 Bridge result significantly higher

Secondary 2

Secondary 2 Science

Science • Grade 8

IEA TIMSS 2019

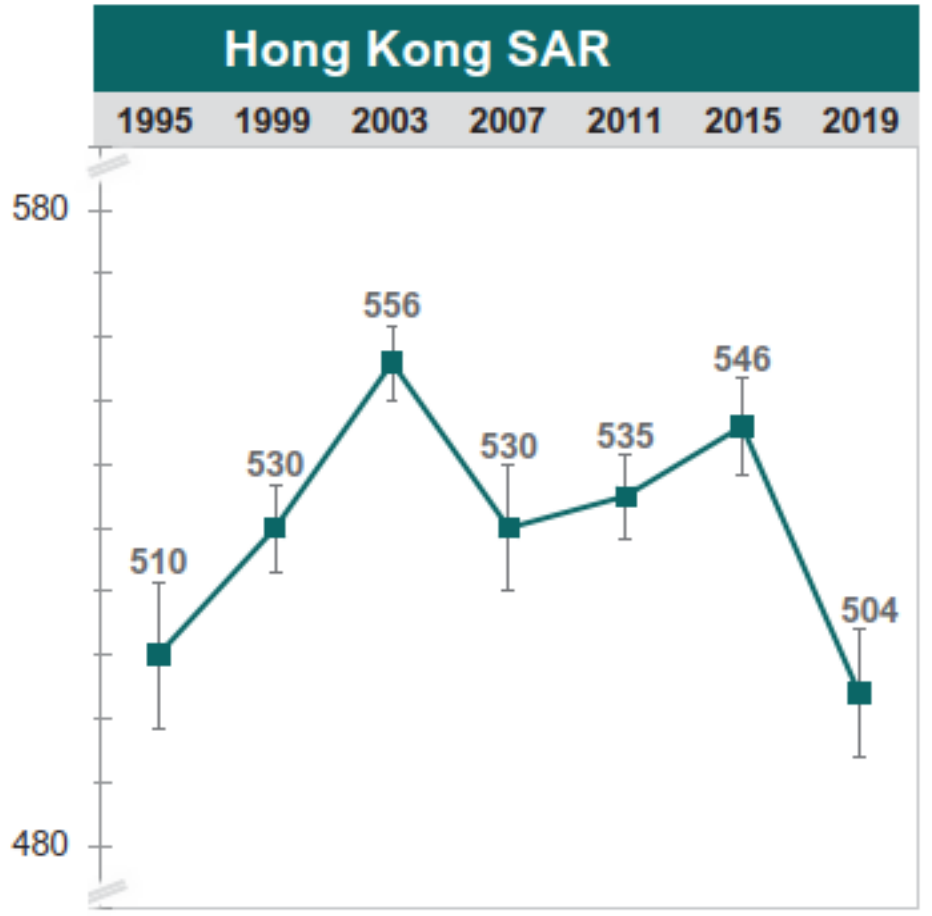
Exhibit 4.1: Average Science Achievement and Scale Score Distributions

Country	Average Scale Score	
[2] Singapore	608 (3.9)	▲
Chinese Taipei	574 (1.9)	▲
Japan	570 (2.1)	▲
Korea, Rep. of	561 (2.1)	▲
[2] Russian Federation	543 (4.2)	▲
Finland	543 (3.1)	▲
Lithuania	534 (3.0)	▲
Hungary	530 (2.6)	▲
Australia	528 (3.2)	▲
Ireland	523 (2.9)	▲
† United States	522 (4.7)	▲
[2] Sweden	521 (3.2)	▲
Portugal	519 (2.9)	▲
England	517 (4.8)	▲
Turkey	515 (3.7)	▲
[3] Israel	513 (4.2)	▲
† Hong Kong SAR 17th	504 (5.2)	
Italy	500 (2.6)	
TIMSS Scale Centerpoint	**500**	

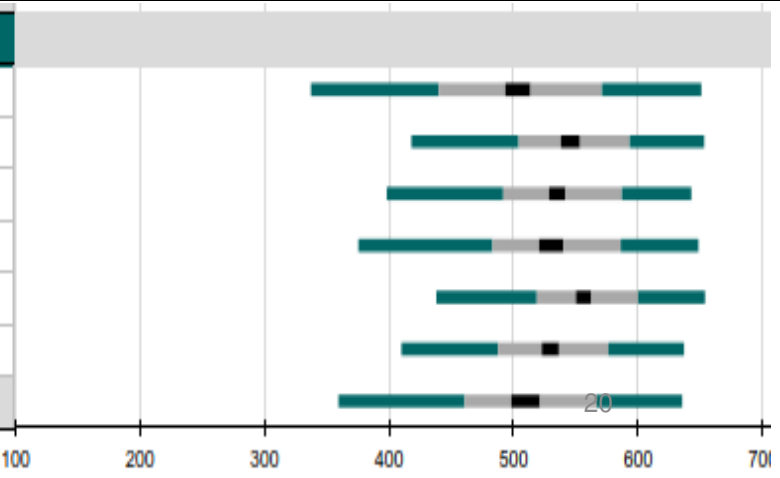
Science Achievement Distribution

14th-20th: no stat. sign. diff.

Trends in Secondary 2 Science



Country	Average Scale Score	Differences Between Years 2015	2011	2007	2003	1999	1995	Science Achievement Distribution
Hong Kong SAR								
† 2019	504 (5.2)	-42 ▽	-32 ▽	-27 ▽	-53 ▽	-26 ▽	-6	
2015	546 (3.9)		11 ▲	16 ▲	-10 ▽	16 ▲	36 ▲	
2011	535 (3.4)			5	-21 ▽	6	25 ▲	
† 2007	530 (5.0)				-26 ▽	1	20 ▲	
† 2003	556 (3.0)					27 ▲	46 ▲	
† 1999	530 (3.5)						20 ▲	
1995	510 (5.9)							



Trend: Bridge & Previous Cycles (S2)

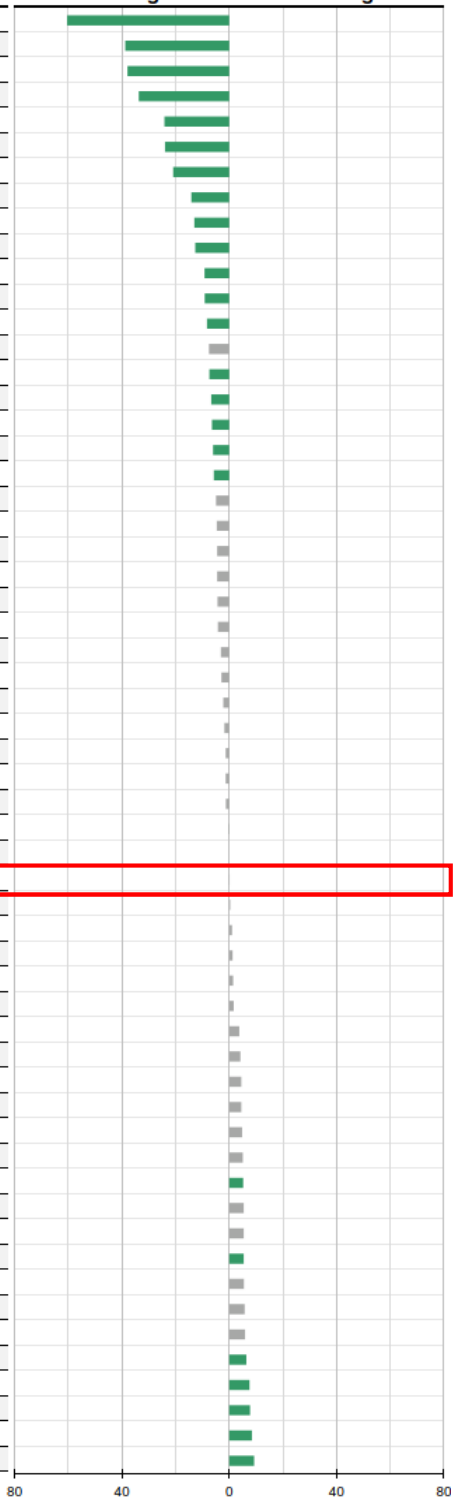
Bridge 2019 vs. Previous TIMSS Cycles (Secondary 2)		
	Science	
	Scale scores	s.e.
2019 eTIMSS	504	5.2
2019 Bridge Study	531	5.3
2015	546#	3.9
2011	535	3.4
2007	530	5.0
2003	556#	3.0
1999	530	3.5
1995	510^	5.9

^ TIMSS 2019 Bridge result significantly higher # TIMSS 2019 Bridge result significantly lower

Primary 4: Gender

TIMSS 2019
Gender & Science Achievement (Primary 4)

Country	Girls		Boys		Difference (Absolute Value)
	Percent of Students	Average Scale Score	Percent of Students	Average Scale Score	
2 Saudi Arabia	48 (0.8)	434 (4.8)	52 (0.8)	373 (6.5)	60 (8.3)
Kuwait	47 (2.6)	413 (6.9)	53 (2.6)	374 (8.7)	39 (10.3)
2 ✻ Pakistan	45 (4.7)	311 (15.4)	55 (4.7)	273 (14.5)	38 (15.8)
Bahrain	49 (1.2)	510 (3.8)	51 (1.2)	476 (5.1)	34 (6.1)
Oman	50 (0.7)	447 (3.8)	50 (0.7)	423 (5.0)	24 (3.6)
2 ✻ Philippines	48 (0.7)	261 (7.8)	52 (0.7)	238 (7.8)	24 (4.9)
✻ South Africa (5)	50 (0.6)	335 (5.4)	50 (0.6)	314 (5.2)	21 (3.9)
North Macedonia	48 (0.6)	433 (6.5)	52 (0.6)	419 (6.7)	14 (4.3)
2 Kosovo	49 (1.0)	420 (4.2)	51 (1.0)	407 (4.0)	13 (3.6)
Qatar	50 (1.5)	456 (6.0)	50 (1.5)	443 (3.7)	13 (6.1)
Armenia	48 (0.8)	471 (3.5)	52 (0.8)	462 (4.0)	9 (3.1)
Ψ Morocco	49 (0.7)	379 (6.4)	51 (0.7)	370 (5.8)	9 (3.7)
Albania	49 (0.9)	494 (3.9)	51 (0.9)	485 (3.9)	8 (3.4)
Bulgaria	48 (0.9)	525 (5.3)	52 (0.9)	518 (5.4)	7 (4.3)
2 Serbia	50 (0.9)	521 (3.5)	50 (0.9)	513 (4.3)	7 (3.5)
Bosnia and Herzegovina	49 (0.7)	462 (3.1)	51 (0.7)	455 (3.5)	7 (2.9)
2 Kazakhstan	49 (0.7)	497 (3.6)	51 (0.7)	491 (3.1)	6 (2.8)
Montenegro	47 (0.6)	457 (2.9)	53 (0.6)	451 (2.8)	6 (2.8)
Japan	48 (0.5)	565 (2.0)	52 (0.5)	559 (2.1)	6 (2.0)
Finland	49 (0.9)	557 (3.5)	51 (0.9)	552 (2.4)	5 (3.1)
2 Latvia	50 (0.9)	544 (2.6)	50 (0.9)	540 (3.0)	5 (2.9)
2 New Zealand	48 (1.3)	505 (3.2)	52 (1.3)	500 (2.8)	5 (3.9)
2 Lithuania	49 (0.9)	540 (2.8)	51 (0.9)	536 (3.3)	4 (3.4)
United Arab Emirates	50 (1.1)	475 (3.1)	50 (1.1)	471 (2.6)	4 (4.0)
Azerbaijan	47 (0.9)	429 (3.9)	53 (0.9)	425 (3.5)	4 (3.2)
† Norway (5)	48 (0.9)	541 (2.4)	52 (0.9)	538 (3.1)	3 (3.5)
Poland	49 (0.8)	532 (2.8)	51 (0.8)	529 (3.2)	3 (3.0)
Sweden	50 (1.1)	538 (3.6)	50 (1.1)	536 (3.8)	2 (3.3)
France	49 (1.0)	489 (3.2)	51 (1.0)	487 (3.4)	2 (2.8)
† Northern Ireland	50 (1.0)	519 (2.9)	50 (1.0)	518 (2.8)	1 (3.4)
† Denmark	50 (0.8)	523 (2.7)	50 (0.8)	522 (2.8)	1 (2.8)
Australia	49 (0.8)	533 (2.9)	51 (0.8)	532 (2.7)	1 (2.9)
≡ Netherlands	49 (1.0)	519 (3.1)	51 (1.0)	518 (3.3)	0 (2.8)
Croatia	50 (1.2)	524 (2.6)	50 (1.2)	524 (2.7)	0 (3.1)
† Hong Kong SAR	46 (1.3)	531 (3.1)	54 (1.3)	531 (4.3)	0 (3.6)
2 England	50 (1.0)	537 (3.6)	50 (1.0)	537 (2.7)	0 (3.5)
2 Russian Federation	51 (1.1)	567 (3.5)	49 (1.1)	568 (3.3)	1 (3.0)
Spain	47 (0.8)	511 (2.4)	53 (0.8)	512 (2.5)	1 (2.9)
Iran, Islamic Rep. of	49 (2.1)	440 (6.6)	51 (2.1)	442 (5.4)	2 (8.7)
Chinese Taipei	48 (0.6)	557 (2.0)	52 (0.6)	559 (2.2)	2 (2.3)
† Belgium (Flemish)	51 (0.8)	499 (2.3)	49 (0.8)	503 (2.8)	4 (2.9)
Cyprus	52 (0.7)	509 (2.8)	48 (0.7)	514 (4.1)	4 (3.3)
Ireland	50 (1.1)	526 (3.8)	50 (1.1)	530 (3.4)	4 (3.5)
Germany	50 (0.8)	516 (2.8)	50 (0.8)	520 (2.4)	4 (2.8)
Malta	49 (0.7)	493 (2.1)	51 (0.7)	498 (2.4)	5 (3.7)
1 Georgia	49 (0.9)	452 (4.7)	51 (0.9)	457 (4.2)	5 (4.1)
1 2 Canada	49 (0.8)	520 (2.1)	51 (0.8)	526 (2.2)	5 (2.1)
2 Turkey (5)	52 (1.4)	524 (4.4)	48 (1.4)	529 (5.2)	5 (4.6)
2 Slovak Republic	49 (1.0)	518 (3.8)	51 (1.0)	523 (4.4)	5 (3.8)
2 † United States	49 (0.8)	536 (3.0)	51 (0.8)	541 (3.2)	5 (2.7)
2 Portugal	48 (0.9)	501 (3.1)	52 (0.9)	506 (2.7)	6 (2.9)
Austria	49 (1.0)	519 (3.1)	51 (1.0)	525 (3.0)	6 (3.3)
Chile	50 (1.3)	466 (3.1)	50 (1.3)	472 (3.3)	6 (3.7)
Hungary	48 (1.0)	526 (3.2)	52 (1.0)	533 (3.1)	6 (3.3)
Italy	50 (0.8)	506 (3.3)	50 (0.8)	514 (3.3)	8 (2.8)
3 Singapore	49 (0.5)	591 (3.6)	51 (0.5)	598 (3.8)	8 (2.8)
Czech Republic	49 (0.9)	529 (3.0)	51 (0.9)	538 (3.0)	8 (3.1)
Korea, Rep. of	47 (0.7)	583 (2.4)	53 (0.7)	592 (2.5)	9 (2.5)
International Average	**49 (0.2)**	**493 (0.6)**	**51 (0.2)**	**489 (0.6)**	

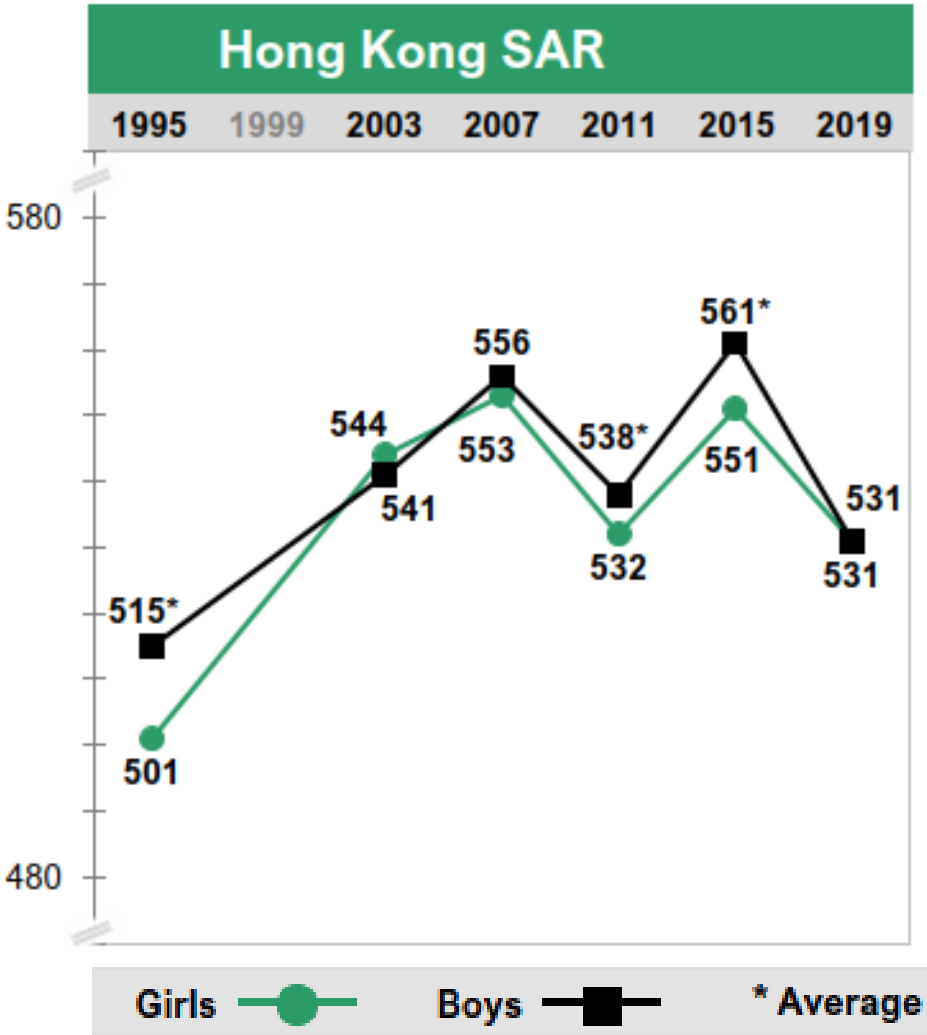


Difference statistically significant

Difference not statistically significant

Policy 21 政策二十一

Gender and Achievement (P4)

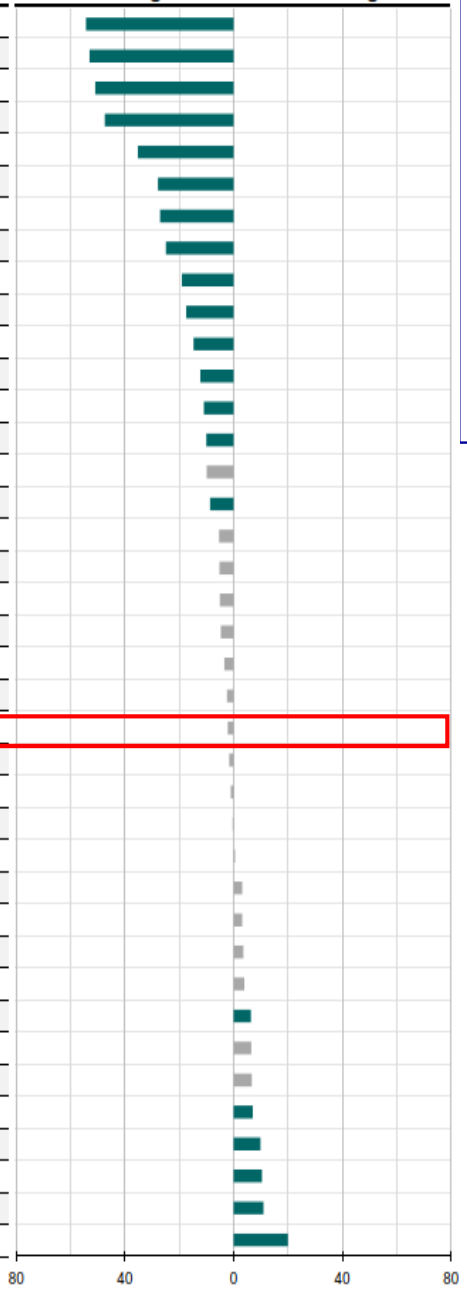


TIMSS 2019
No significant difference

Secondary 2: Gender

TIMSS 2019 Gender & Science Achievement (Secondary 2)

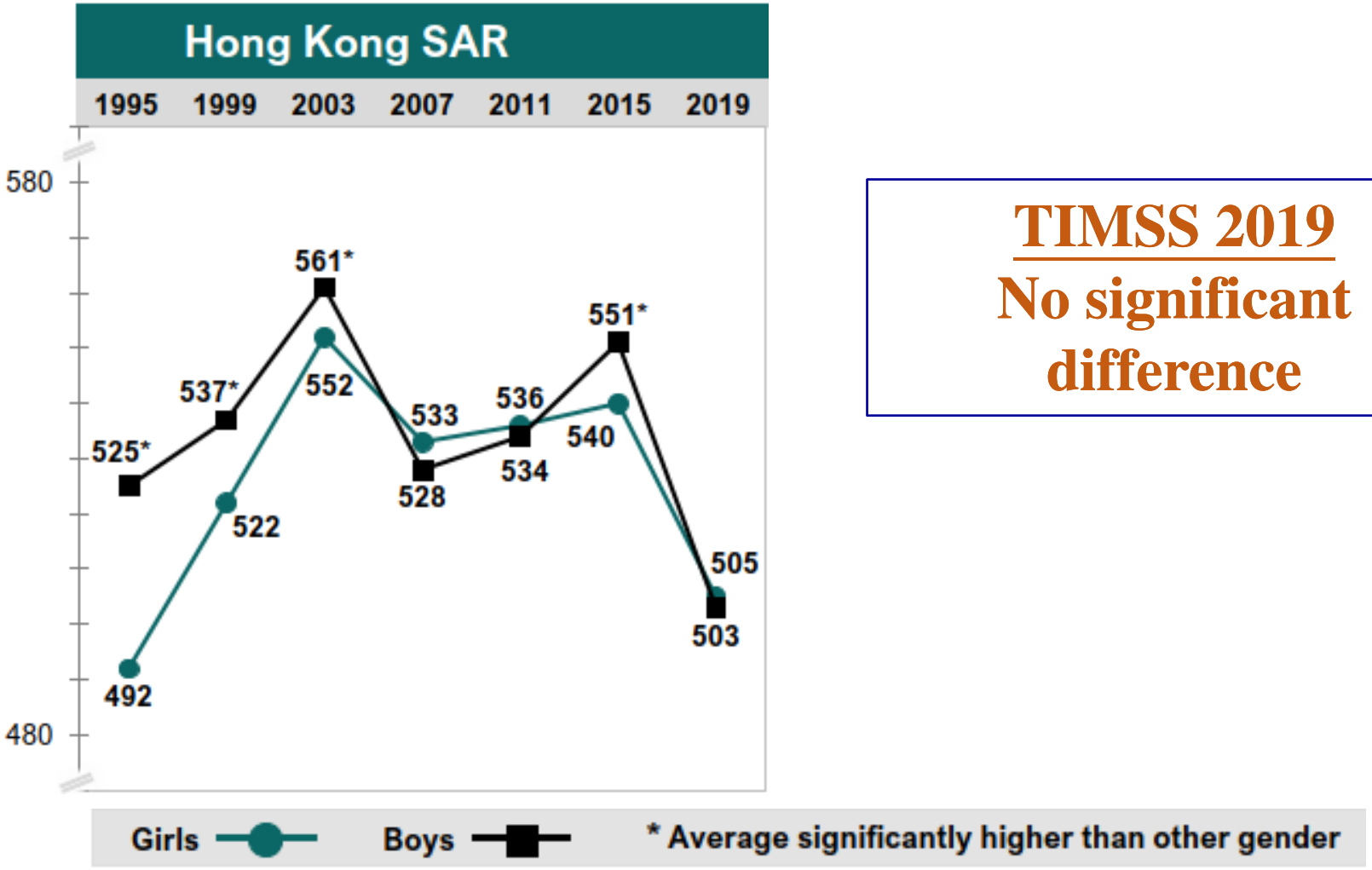
Country	Girls		Boys		Difference (Absolute Value)	Gender Difference
	Percent of Students	Average Scale Score	Percent of Students	Average Scale Score		Girls Scored Higher / Boys Scored Higher
Oman	48 (1.1)	485 (3.1)	52 (1.1)	431 (4.5)	54 (5.1)	
Jordan	48 (3.4)	480 (4.0)	52 (3.4)	427 (6.6)	53 (7.6)	
Bahrain	49 (0.9)	512 (2.6)	51 (0.9)	461 (2.8)	51 (3.7)	
2 Saudi Arabia	49 (0.9)	455 (3.3)	51 (0.9)	408 (3.9)	47 (5.0)	
Kuwait	53 (2.2)	461 (5.7)	47 (2.2)	426 (9.4)	35 (10.3)	
Qatar	50 (2.4)	488 (5.2)	50 (2.4)	461 (6.0)	28 (7.4)	
2 Egypt	55 (2.0)	402 (6.1)	45 (2.0)	374 (8.2)	27 (9.2)	
United Arab Emirates	48 (1.8)	486 (3.9)	52 (1.8)	461 (4.0)	25 (6.5)	
Finland	48 (0.8)	552 (3.1)	52 (0.8)	533 (3.9)	19 (3.5)	
Iran, Islamic Rep. of	47 (1.3)	459 (4.6)	53 (1.3)	441 (5.4)	17 (7.2)	
Cyprus	49 (0.6)	491 (2.4)	51 (0.6)	476 (2.5)	15 (3.1)	
Ψ South Africa (9)	52 (0.6)	376 (3.2)	48 (0.6)	364 (3.6)	12 (2.8)	
2 Sweden	49 (0.9)	527 (3.7)	51 (0.9)	516 (3.8)	11 (4.0)	
Romania	51 (0.9)	475 (4.3)	49 (0.9)	465 (4.9)	10 (3.9)	
Turkey	50 (1.3)	520 (3.8)	50 (1.3)	510 (5.1)	10 (5.1)	
2 Kazakhstan	49 (1.1)	483 (3.4)	51 (1.1)	474 (3.6)	9 (3.4)	
Malaysia	51 (1.1)	463 (3.5)	49 (1.1)	458 (4.3)	5 (3.7)	
Ireland	49 (1.1)	526 (3.0)	51 (1.1)	521 (3.9)	5 (3.8)	
Lebanon	49 (1.4)	379 (5.3)	51 (1.4)	374 (5.2)	5 (5.0)	
† United States	49 (0.9)	525 (3.9)	51 (0.9)	520 (6.1)	5 (4.3)	
England	53 (1.9)	518 (5.5)	47 (1.9)	515 (6.6)	3 (7.2)	
Lithuania	50 (1.0)	535 (3.0)	50 (1.0)	533 (3.6)	2 (2.9)	
† Hong Kong SAR	46 (2.1)	505 (5.9)	54 (2.1)	503 (6.3)	2 (6.5)	
Morocco	50 (0.7)	395 (2.9)	50 (0.7)	393 (2.9)	2 (2.4)	
1 Georgia	48 (1.2)	447 (4.4)	52 (1.2)	446 (4.5)	1 (4.3)	
Australia	49 (1.5)	529 (3.1)	51 (1.5)	528 (4.6)	0 (4.7)	
† Norway (9)	49 (0.7)	495 (3.5)	51 (0.7)	496 (3.8)	1 (3.9)	
† New Zealand	48 (2.1)	497 (3.6)	52 (2.1)	500 (4.9)	3 (5.0)	
3 Israel	52 (1.7)	512 (4.5)	48 (1.7)	515 (5.0)	3 (4.6)	
France	49 (0.8)	487 (2.6)	51 (0.8)	490 (3.6)	4 (3.4)	
Chinese Taipei	50 (0.9)	572 (2.4)	50 (0.9)	576 (2.5)	4 (2.9)	
Portugal	50 (1.1)	516 (3.2)	50 (1.1)	522 (3.4)	6 (3.1)	
2 Singapore	49 (0.7)	604 (4.5)	51 (0.7)	611 (4.5)	7 (4.4)	
2 Russian Federation	48 (1.0)	539 (4.5)	52 (1.0)	546 (4.6)	7 (3.5)	
Italy	50 (1.0)	497 (2.8)	50 (1.0)	504 (3.0)	7 (2.7)	
Japan	52 (1.0)	565 (2.4)	48 (1.0)	575 (2.5)	10 (2.5)	
Korea, Rep. of	48 (1.4)	555 (2.9)	52 (1.4)	566 (2.6)	10 (3.5)	
Chile	49 (1.6)	457 (3.6)	51 (1.6)	468 (3.9)	11 (4.7)	
Hungary	50 (0.9)	520 (2.9)	50 (0.9)	540 (3.2)	20 (3.1)	
International Average	**50 (0.2)**	**495 (0.6)**	**50 (0.2)**	**485 (0.8)**		



Difference statistically significant

Difference not statistically significant

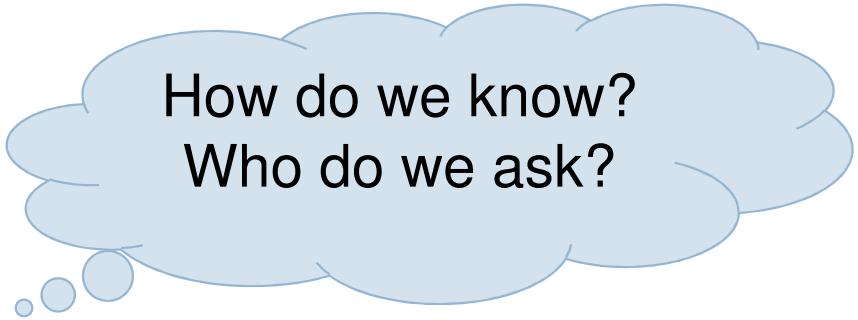
Gender and Achievement (S2)



TIMSS 2019
No significant difference

A Short Summary

- P4: There have been ups and downs over the past 25 years.
  - No evidence that ‘we have been getting worse’.
  - Nor evidence that ‘we have been getting better’.
- S2: We are at the 20 years low
- Switching to e-test negatively impacted on students’ achievement.
- There’s no gender differences overall



Primary 4: Socioeconomic status; resources

Primary 4

Number of books in the home (students):

1) 0-10
2) 11-25
3) 26-100
4) 101-200
5) More than 200

Number of children's books in the home (parents):

1) 0-10
2) 11-25
3) 26-50
4) 51-100
5) More than 100

Number of home study supports (students):

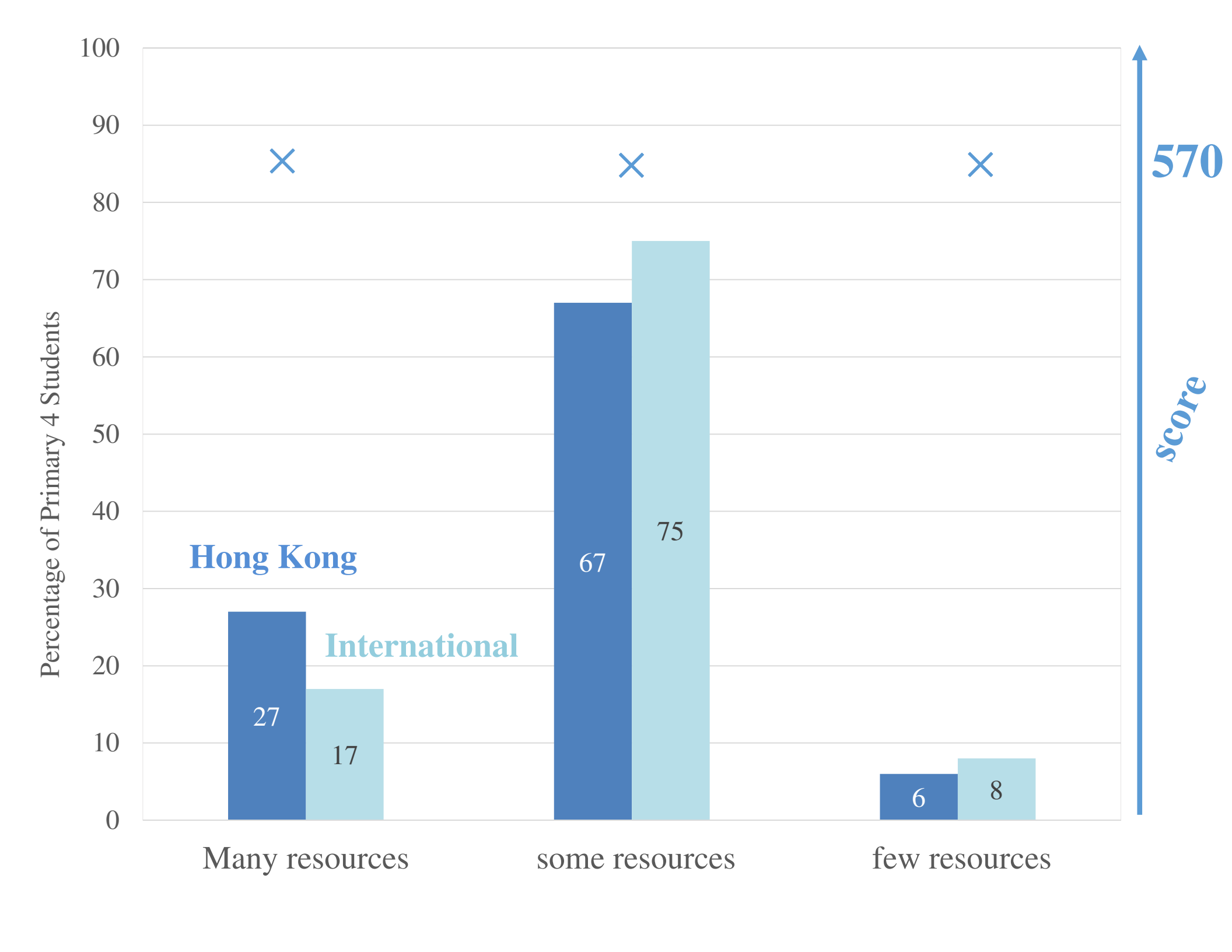
1) None
2) Internet connection or own room
3) Both internet connection and own room

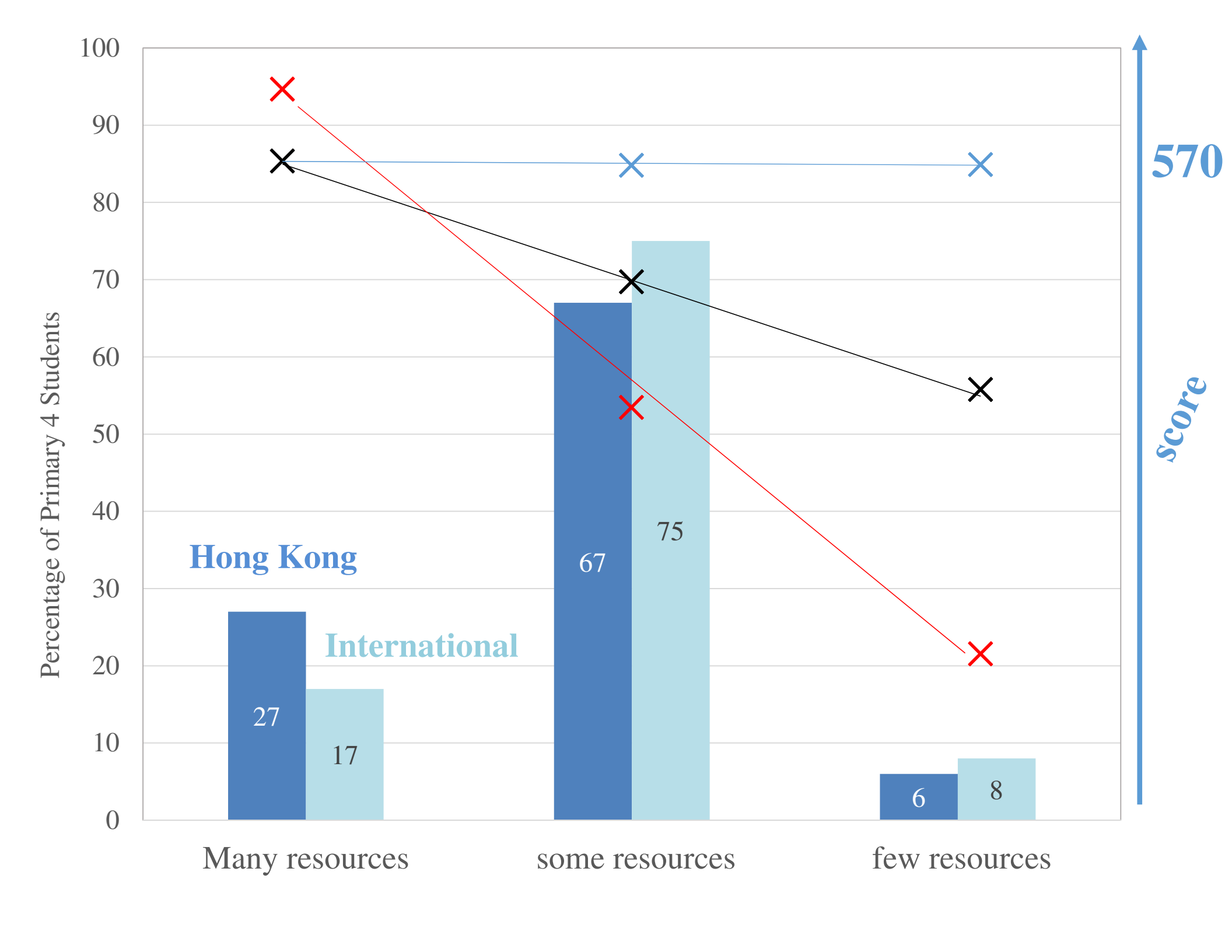
Highest level of education of either parent (parents):

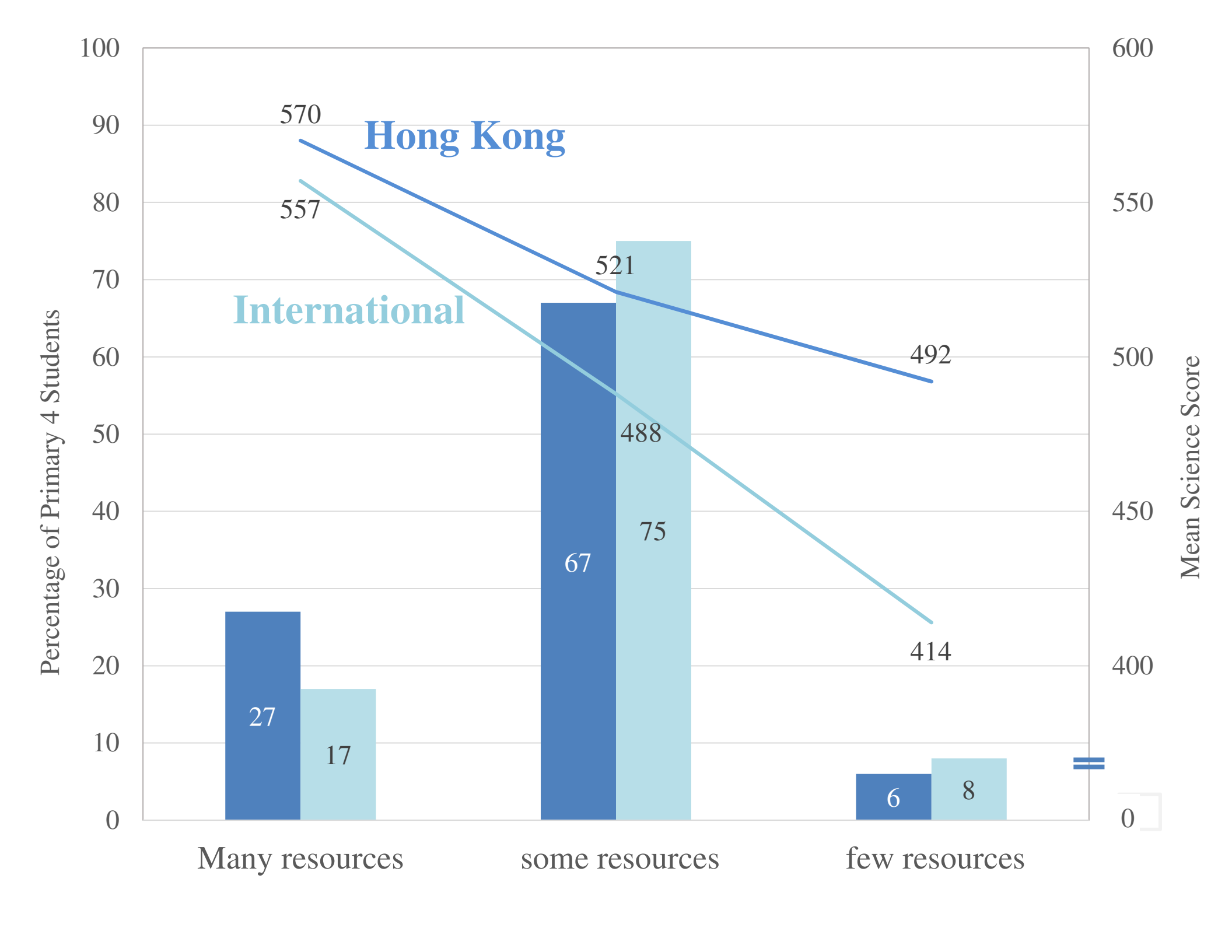
1) Finished some primary or lower secondary or did not go to school
2) Finished lower secondary
3) Finished upper secondary
4) Finished post-secondary education
5) Finished university or higher

Highest level of occupation of either parent (parents):

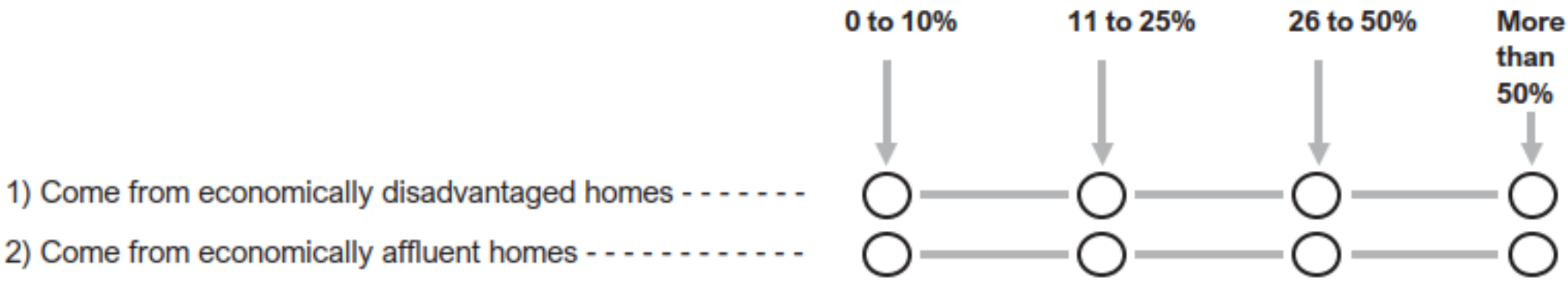
1) Has never worked outside home for pay, general laborer, or semi-professional (skilled agricultural or fishery worker, craft or trade worker, plant or machine operator)
2) Clerical (clerk or service or sales worker)
3) Small business owner
4) Professional (corporate manager or senior official, professional, or technician or associate professional)


100
90
80
70
60
50
40
30
20
10
0
Percentage of Primary 4 Students
570
score
Hong Kong
International
27
17
67
75
6
8
Many resources
some resources
few resources


100
90
80
70
60
50
40
30
20
10
0
Percentage of Primary 4 Students
570
score
Hong Kong
International
27
17
67
75
6
8
Many resources
some resources
few resources


100
90
80
70
60
50
40
30
20
10
0
600
550
500
450
400
0
Percentage of Primary 4 Students
Mean Science Score
570
557
521
492
414
Hong Kong
International
27
17
67
75
6
8
Many resources
some resources
few resources

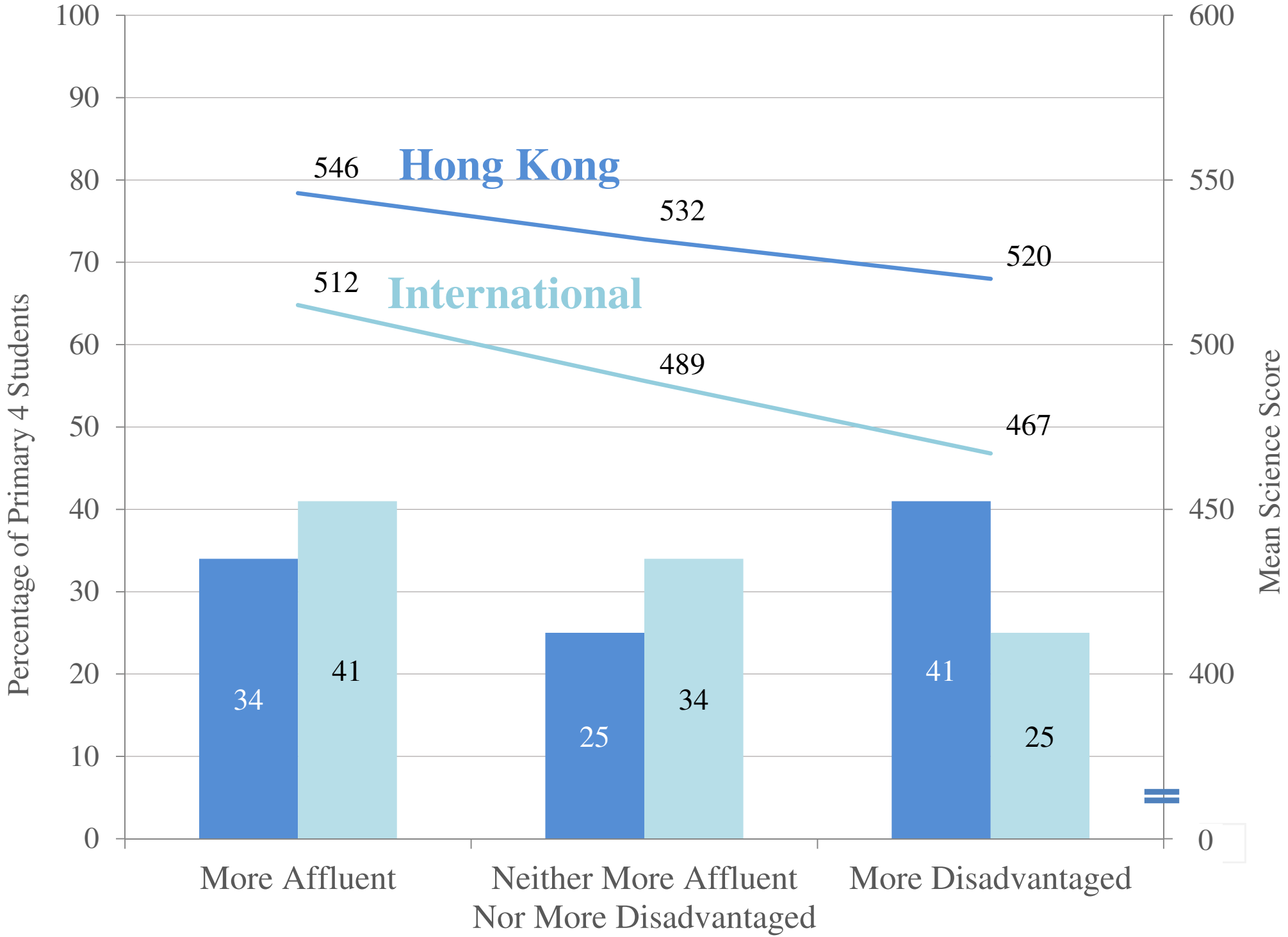
Approximately what percentage of students in your school have the following backgrounds?



More Affluent: Schools where more than 25% of the student body comes from economically affluent homes and not more than 25% from economically disadvantaged homes

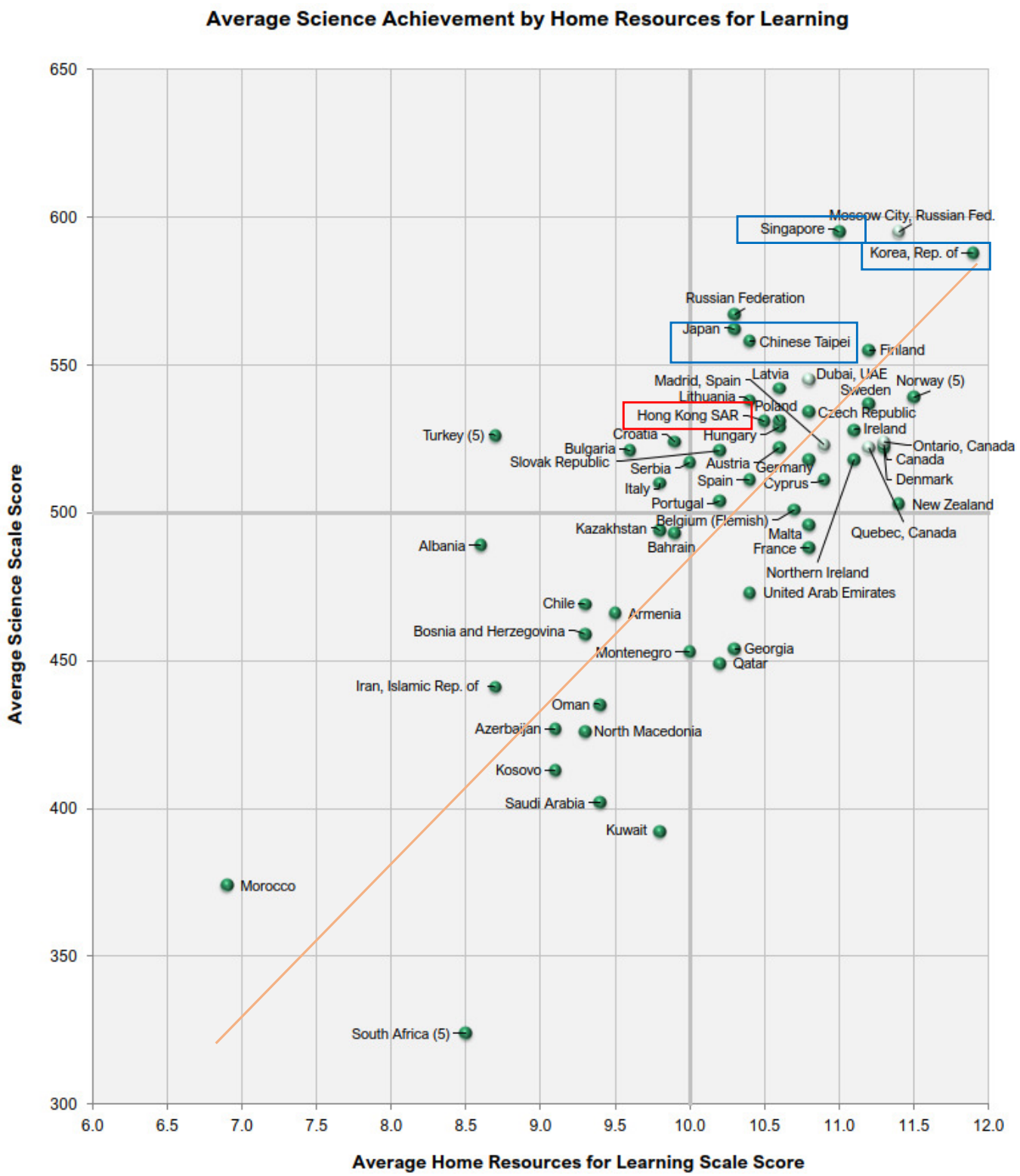
More Disadvantaged: Schools where more than 25% of the student body comes from economically disadvantaged homes and not more than 25% from economically affluent homes

Neither More Affluent Nor More Disadvantaged: All other possible response combinations


100
90
80
70
60
50
40
30
20
10
0
600
550
500
450
400
0
Percentage of Primary 4 Students
Mean Science Score
546
Hong Kong
532
520
512
International
489
467
34
41
25
34
41
25
More Affluent
Neither More Affluent Nor More Disadvantaged
More Disadvantaged

Primary 4

Home Resources for Learning



Secondary 2: Socioeconomic status; resources

Secondary 2

Number of books in the home:

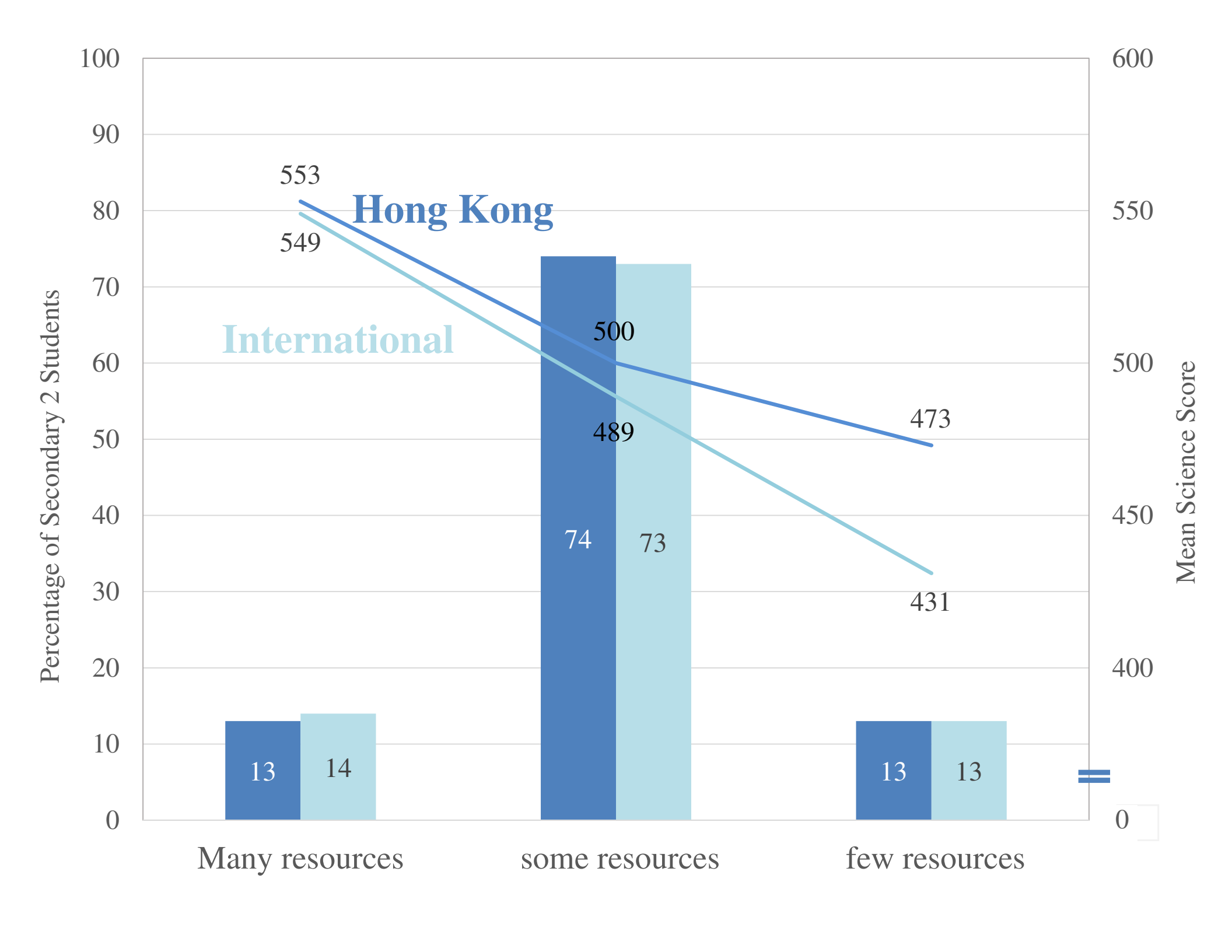
1) 0-10
2) 11-25
3) 26-100
4) 101-200
5) More than 200

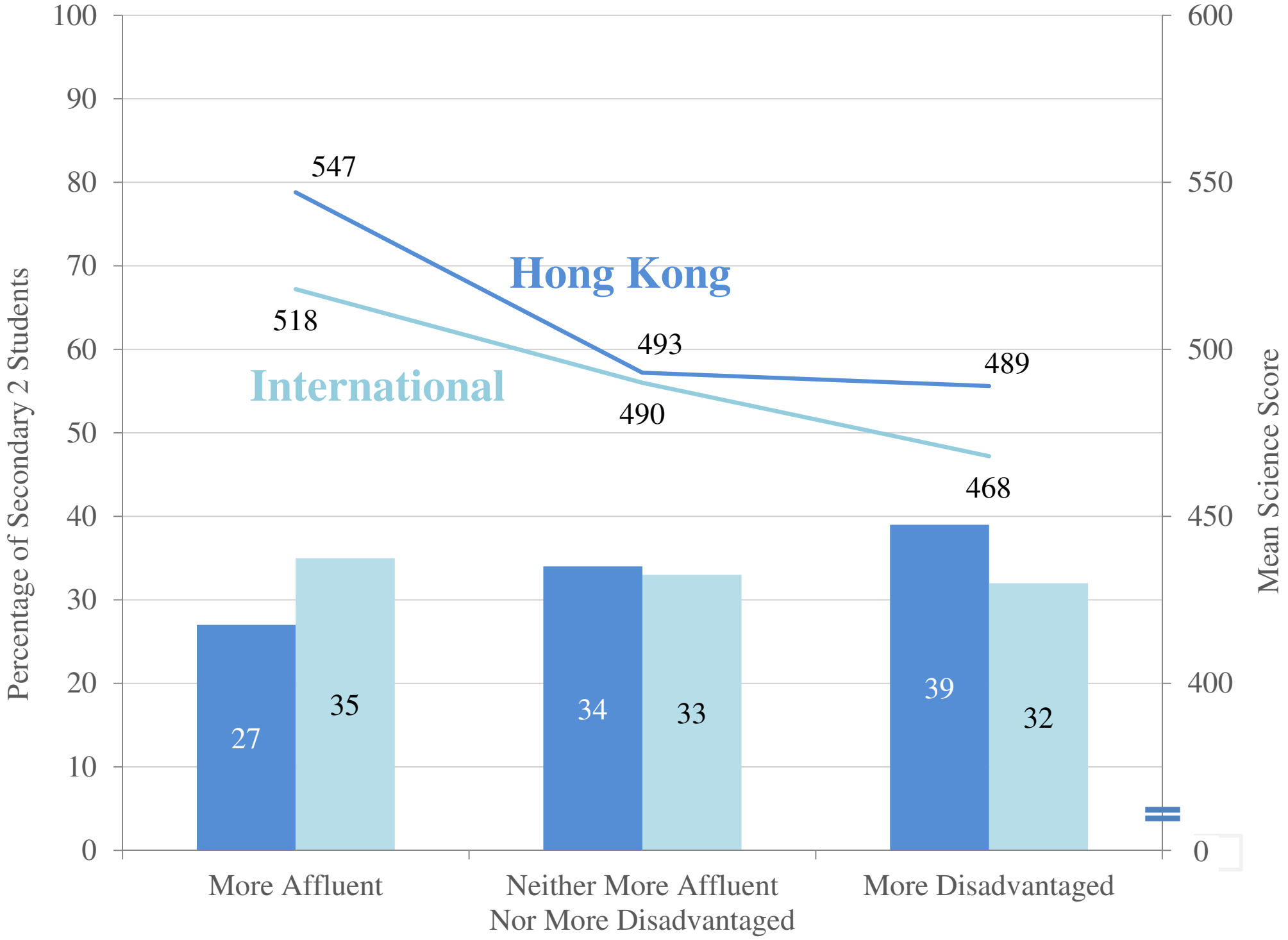
Number of home study supports:

1) None
2) Internet connection or own room
3) Both internet connection and own room

Highest level of education of either parent:

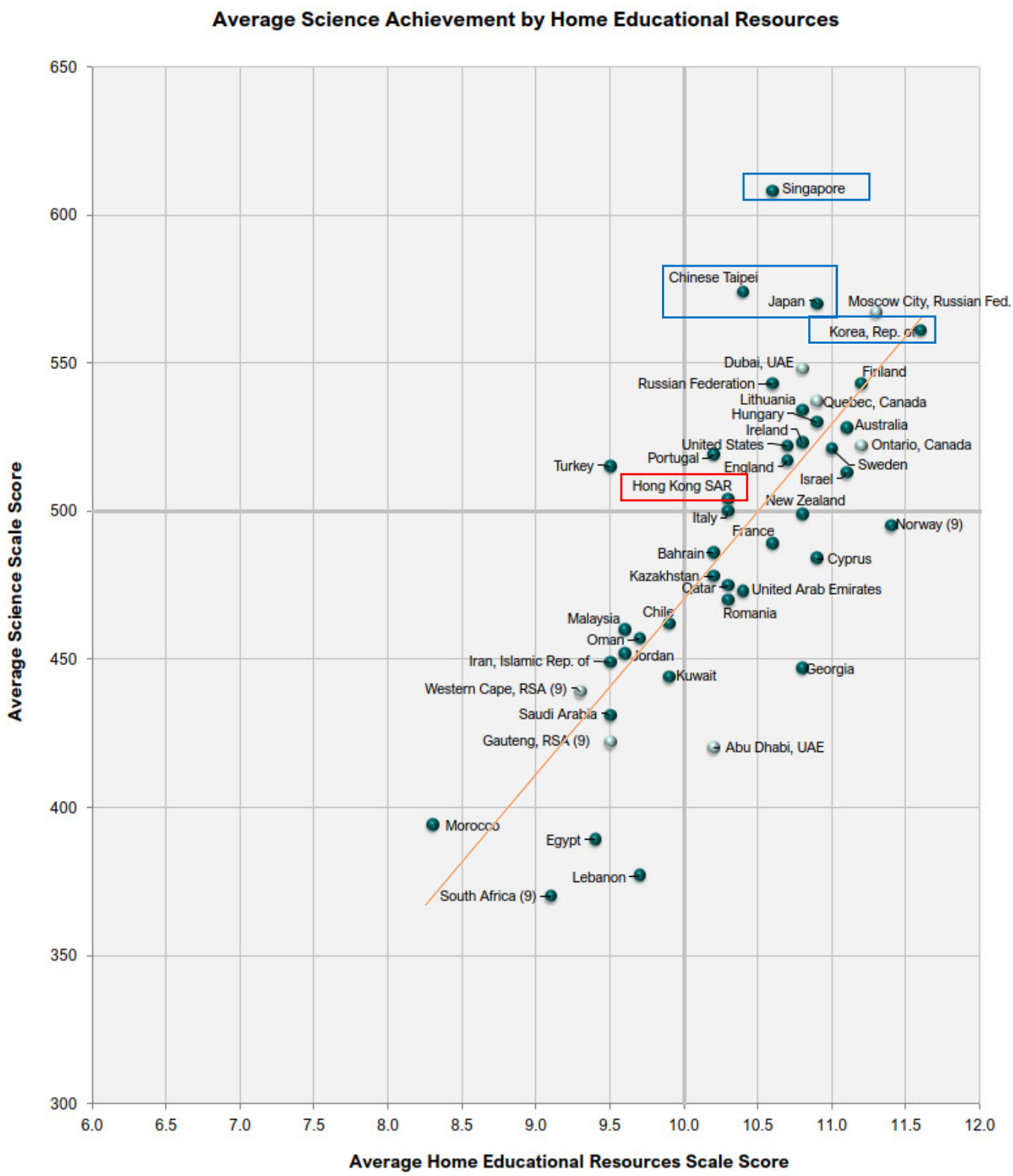
1) Finished some primary or lower secondary or did not go to school
2) Finished lower secondary
3) Finished upper secondary
4) Finished post-secondary education
5) Finished university or higher


100
90
80
70
60
50
40
30
20
10
0
Percentage of Secondary 2 Students
600
550
500
450
400
Mean Science Score
553
549
Hong Kong
International
500
489
473
74
73
431
13
14
13
13
Many resources
some resources
few resources


100
90
80
70
60
50
40
30
20
10
0
600
550
500
450
400
0
Percentage of Secondary 2 Students
Mean Science Score
547
Hong Kong
518
493
489
International
490
468
27
35
34
33
39
32
More Affluent
Neither More Affluent
Nor More Disadvantaged
More Disadvantaged

Secondary 2

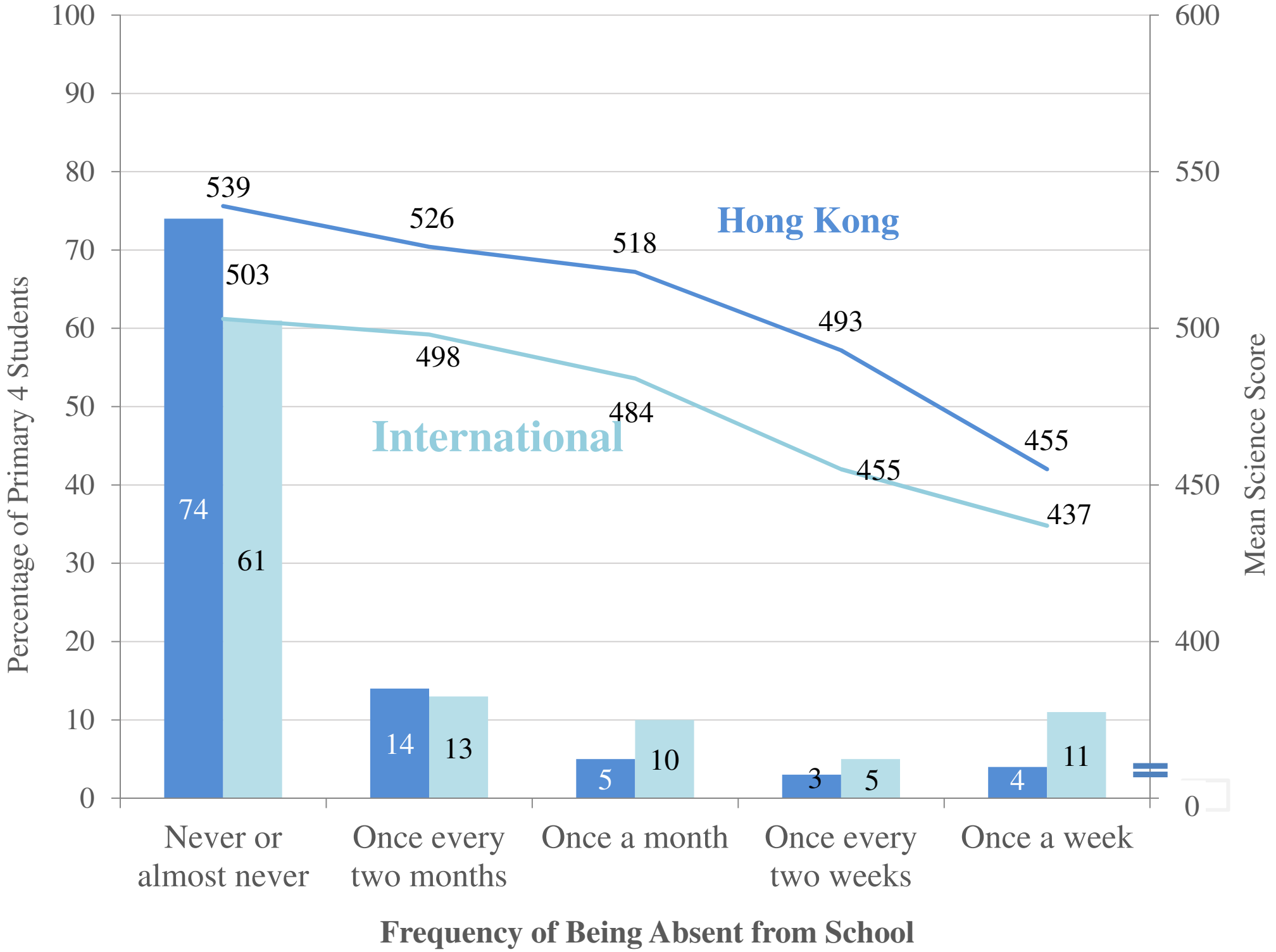
Home Educational Resources

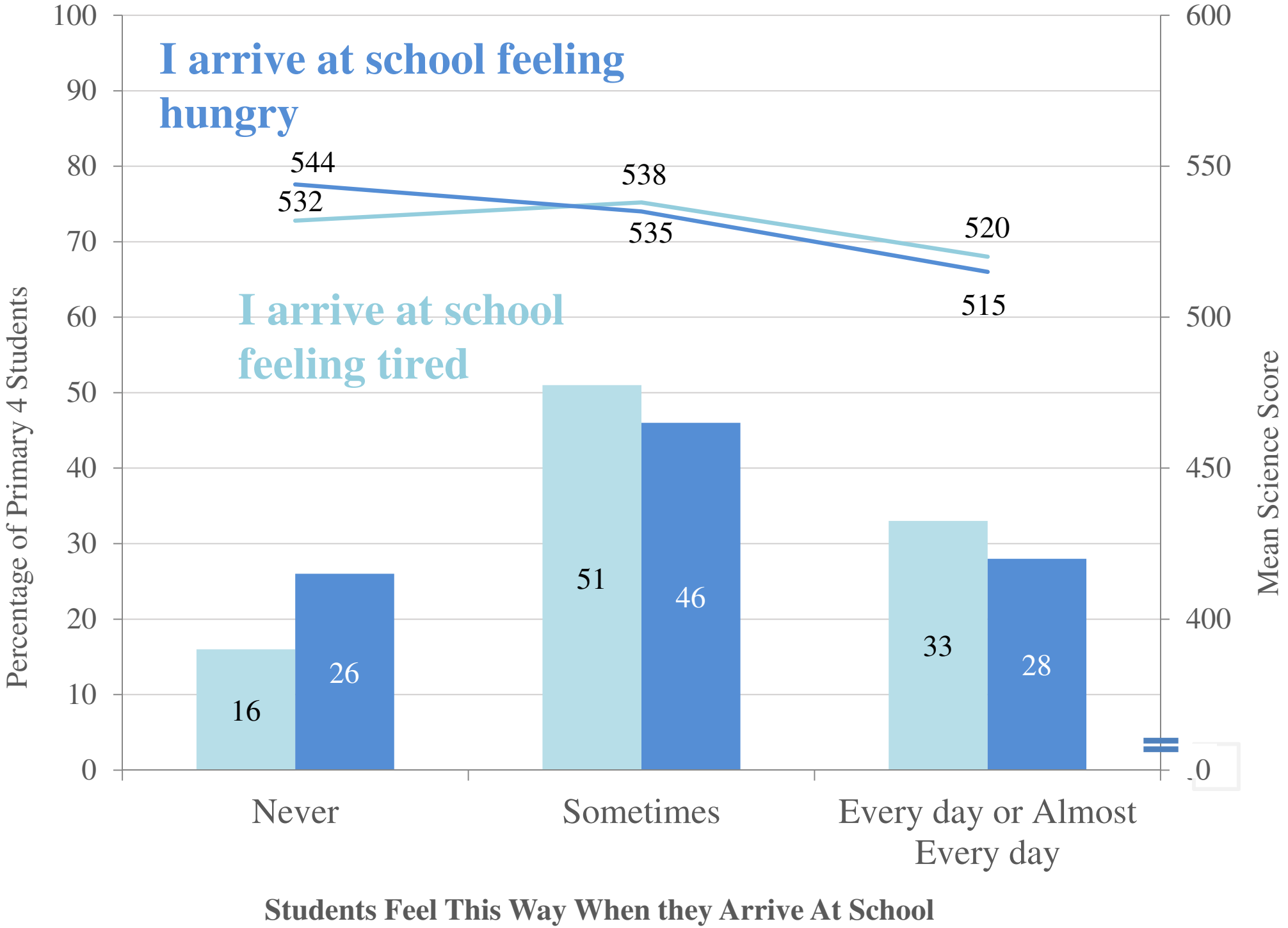


A Short Summary

- In primary school, the association between Socioeconomic status and achievement in HK is weaker than the international association.
  - In S2, it still applies for students of middle to low SES
  - High SES are privileged.

Primary 4: Students' well-being and absence


100
90
80
70
60
50
40
30
20
10
0
600
550
500
450
400
0
Percentage of Primary 4 Students
Mean Science Score
539
526
518
493
455
503
498
484
455
437
Hong Kong
International
74
61
14
13
5
10
3
5
4
11
Never or almost never
Once every two months
Once a month
Once every two weeks
Once a week
Frequency of Being Absent from School


I arrive at school feeling hungry
I arrive at school feeling tired
544
532
538
535
520
515
16
26
51
46
33
28
100
90
80
70
60
50
40
30
20
10
0
600
550
500
450
400
Percentage of Primary 4 Students
Mean Science Score
Never
Sometimes
Every day or Almost Every day
Students Feel This Way When they Arrive At School

A Short Summary – P4

- The data prompts us to support those who arrive at school feeling hungry and/or tied.
- And those who are absent regularly.
  - Absence and achievement may be chicken-and-egg issue
- These all may relate to SES – but we need to further investigate.

What do the scores mean? (Primary 4)

Four Levels of International Benchmarks

Low International Benchmark

Students show limited understanding of scientific concepts and limited knowledge of foundational science facts.

It can be considered a level of minimum proficiency internationally.
Many countries had >90% of their students reaching the Low Benchmark.

Which animal has a backbone?

A

octopus

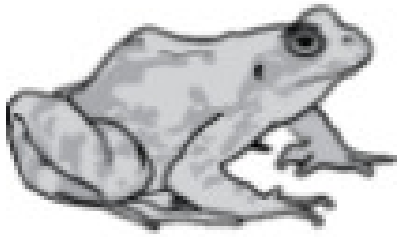
B

spider

C

butterfly

D



frog

Which animal has a backbone?

A 
octopus

B 
spider

C 
butterfly

D 
frog

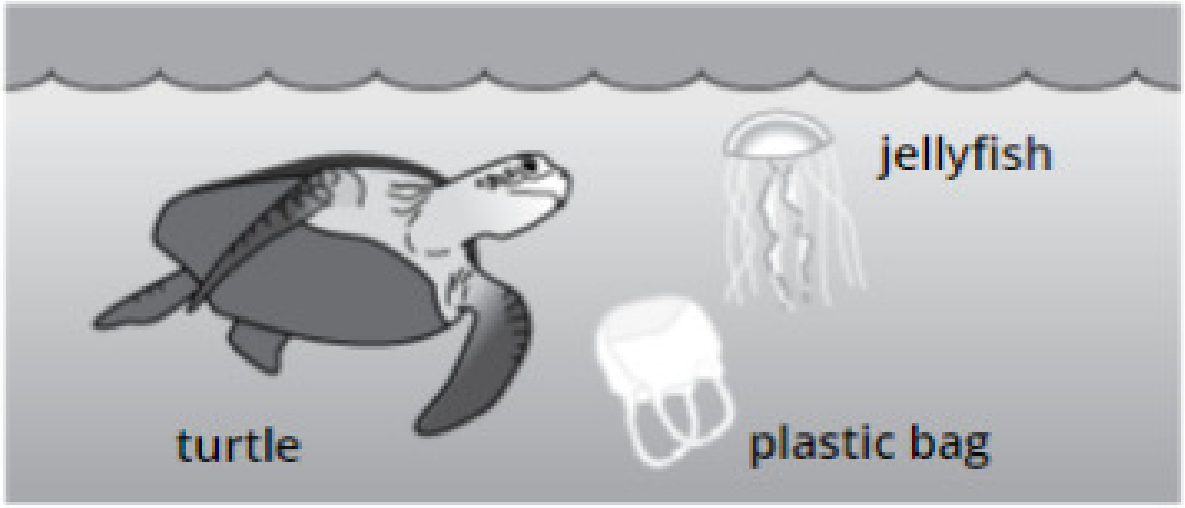
	Hungary	89 (1.6) ▲
2	Latvia	88 (1.6) ▲
	Croatia	87 (1.6) ▲
	Korea, Rep. of	87 (1.6) ▲
	Albania	86 (2.5) ▲
	Armenia	85 (1.7) ▲
	Chinese Taipei	85 (1.4) ▲
2	Slovak Republic	84 (1.7) ▲
†	Norway (5)	83 (2.0) ▲
1	Georgia	83 (1.8) ▲
	Bulgaria	83 (2.1) ▲
2†	United States	82 (1.2) ▲
2	Serbia	82 (1.9) ▲
	Poland	81 (1.6) ▲
	Bosnia and Herzegovina	81 (1.7) ▲
2	Turkey (5)	81 (1.8) ▲
	Czech Republic	81 (1.9) ▲
	North Macedonia	81 (2.1) ▲
2	Russian Federation	80 (1.9) ▲
	Japan	80 (1.5) ▲
†	Denmark	79 (2.0) ▲
	Malta	79 (1.7) ▲
	Finland	79 (1.7) ▲
	Sweden	79 (1.9) ▲
	Australia	78 (1.7) ▲
2	New Zealand	78 (1.8) ▲
1 2	Canada	78 (1.5) ▲
2	Kazakhstan	77 (1.8)
2	England	77 (2.4)
	France	76 (2.0)
	Azerbaijan	76 (2.0)
†	Northern Ireland	76 (2.0)
	Ireland	76 (2.1)
	Montenegro	75 (1.7)
	Cyprus	75 (1.8)
2	Lithuania	74 (2.0)
	International Average	**74 (0.3)**
	Morocco	74 (1.7)
2	Kosovo	74 (1.8)
†	Hong Kong SAR	74 (2.3)

Four levels of International benchmarks

Intermediate International Benchmark

Students show knowledge and understanding of some aspects of science.

The picture shows a turtle and jellyfish swimming in the ocean. A plastic bag is floating nearby.



Write down one reason why plastic objects in the ocean are dangerous for animals such as turtles.

The turtle's flippers could get tangled up in the bag and make it hard for it to swim.

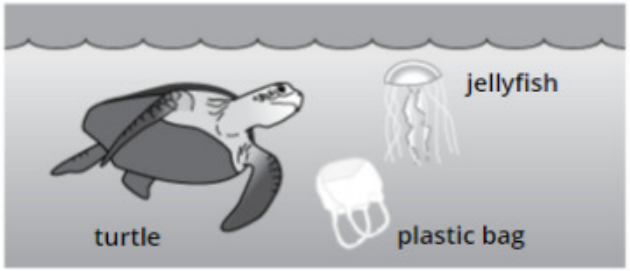
Four Levels of International Benchmarks

Intermediate International Benchmark

Students show knowledge and understanding of some aspects of science.

- Students show basic knowledge of what plants and animals need to survive as well as some knowledge of the characteristics of animals.
- Students can recognize different properties of matter, demonstrate understanding of simple electrical circuits, and apply elementary
- knowledge of forces and motion, such as the force between a magnet and different materials.
- Students show some understanding of Earth's physical characteristics.
- Students can relate information in diagrams to some basic science concepts.

The picture shows a turtle and jellyfish swimming in the ocean. A plastic bag is floating nearby.



Write down one reason why plastic objects in the ocean are dangerous for animals such as turtles.

The turtle's flippers could get tangled up in the bag and make it hard for it to swim.

	Sweden	86 (1.8) ▲
	Finland	85 (1.4) ▲
†	Norway (5)	85 (1.9) ▲
	Australia	84 (1.6) ▲
	Japan	83 (1.6) ▲
≡	Netherlands	83 (1.8) ▲
3	Singapore	83 (1.2) ▲
	Cyprus	83 (1.7) ▲
2	England	81 (2.1) ▲
	Ireland	81 (1.9) ▲
2†	United States	79 (1.2) ▲
†	Denmark	78 (2.2) ▲
†	Belgium (Flemish)	78 (2.1) ▲
†	Northern Ireland	76 (2.5) ▲
	Malta	76 (1.8) ▲
	Chinese Taipei	75 (2.2) ▲
12	Canada	75 (1.6) ▲
2	Russian Federation	74 (2.3) ▲
	Czech Republic	73 (1.9) ▲
	Germany	73 (2.1) ▲
	Korea, Rep. of	73 (2.1) ▲
2	Lithuania	71 (1.9) ▲
	Spain	70 (2.0) ▲
2	New Zealand	70 (1.7) ▲
2	Portugal	70 (2.2) ▲
	Austria	70 (2.2) ▲
	Hungary	68 (2.0) ▲
	Poland	67 (1.9) ▲
	Italy	65 (2.1) ▲
2	Slovak Republic	63 (2.4) ▲
	France	62 (2.6) ▲
†	Hong Kong SAR	62 (3.0)
	Chile	61 (2.1)
2	Latvia	60 (2.2)
2	Turkey (5)	58 (2.4)
	International Average	**57 (0.3)**
2	Serbia	54 (2.7)

Four Levels of International Benchmarks

High International Benchmark

Students communicate and apply knowledge of life, physical, and Earth sciences.

The picture below shows a desert.

What are two **living things** shown in the picture?

1. Camel
2. Cactus

What are two **non-living things** shown in the picture?

1. Rock
2. Sand

The picture below shows a desert.

What are two **living things** shown in the picture?

1. Camel
2. Cactus

What are two **non-living things** shown in the picture?

1. Rock
2. Sand

	Kuwait	46 (2.3)
	International Average	**45 (0.3)**
	Albania	39 (2.8) ▽
2	England	38 (2.6) ▽
	North Macedonia	38 (3.3) ▽
	Bosnia and Herzegovina	38 (2.4) ▽
	France	37 (2.2) ▽
	Japan	37 (2.3) ▽
	Korea, Rep. of	37 (2.4) ▽
	Iran, Islamic Rep. of	35 (2.5) ▽
	Ireland	34 (2.1) ▽
†	Denmark	34 (2.4) ▽
2	Pakistan	34 (3.6) ▽
	Azerbaijan	33 (2.0) ▽
2	New Zealand	32 (2.0) ▽
	Spain	32 (2.2) ▽
1	Georgia	31 (2.7) ▽
≡	Netherlands	30 (2.3) ▽
†	Northern Ireland	29 (2.4) ▽
	Austria	27 (2.4) ▽
	South Africa (5)	27 (1.6) ▽
	Morocco	27 (2.0) ▽
	Germany	23 (1.9) ▽
†	Hong Kong SAR	23 (2.3) ▽
	Chile	20 (2.0) ▽
†	Belgium (Flemish)	18 (1.7) ▽
2	Philippines	15 (1.5) ▽
	Chinese Taipei	10 (1.2) ▽

Four Levels of International Benchmarks

High International Benchmark

Students communicate and apply knowledge of life, physical, and Earth sciences.

- Students communicate knowledge of characteristics of plants and animals. For example, they can distinguish living things from non-living things and demonstrate some knowledge of life cycles of plants and animals.
- Students can apply knowledge of ecosystems and of organisms' interactions with their environment. They can complete food chains and recognize some plant and animal features that provide advantages in a given environment. Students demonstrate an understanding of how germs spread.

Four Levels of International Benchmarks

High International Benchmark

Students communicate and apply knowledge of life, physical, and Earth sciences.

- Students demonstrate knowledge of states and properties of matter. They understand basic properties of magnets, including the forces between two magnets. Students show some elementary knowledge about how shadows are formed. They apply knowledge of energy transfer in practical contexts and show some understanding of forces and motion, including gravity and air resistance.

Four Levels of International Benchmarks

High International Benchmark

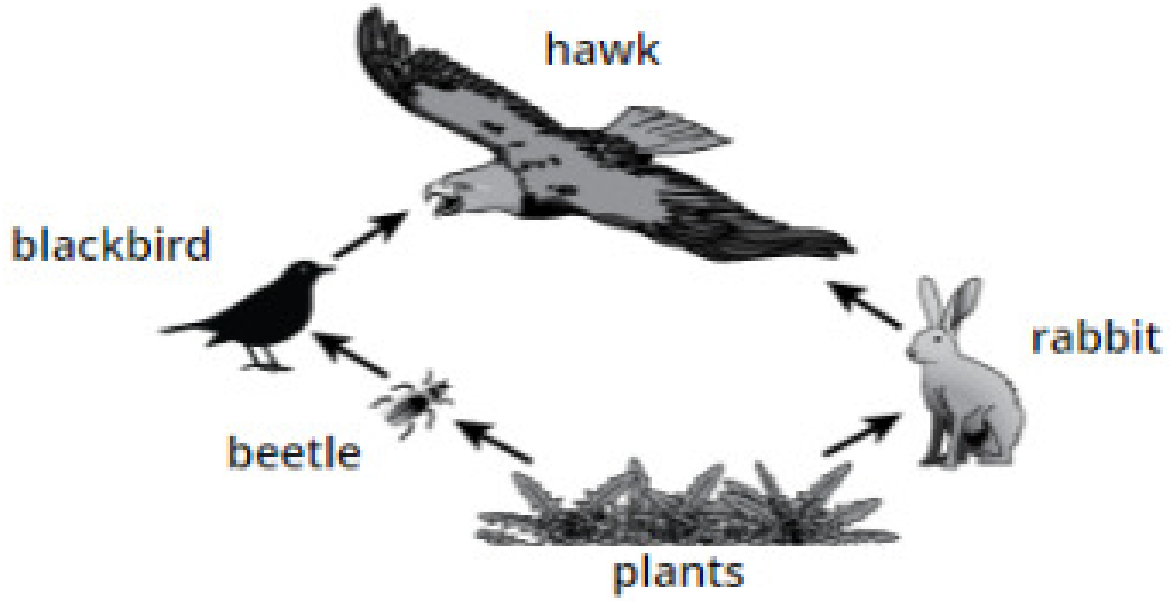
Students communicate and apply knowledge of life, physical, and Earth sciences.

- Students know various facts about the Earth's physical characteristics and climates, and show basic understanding of the Earth-Moon-Sun system.
- Students can make simple inferences using models, tables, and diagrams.

Four Levels of International Benchmarks

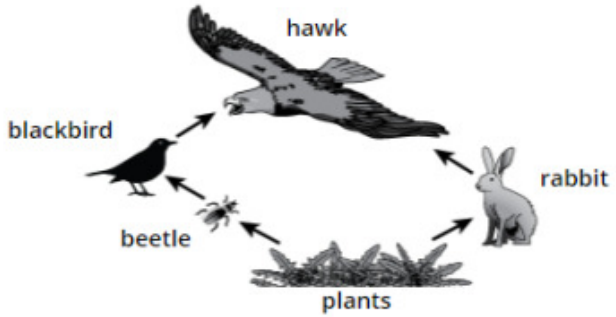
Advanced International Benchmark

The picture below shows a food web in a forest ecosystem.



Based on what you see in the food web above, which two animals compete with each other for food?

The picture below shows a food web in a forest ecosystem.



Based on what you see in the food web above, which two animals compete with each other for food?

	Bulgaria	69 (2.3) ▲
	Korea, Rep. of	56 (2.3) ▲
3	Singapore	54 (2.0) ▲
	Chinese Taipei	45 (2.2) ▲
	Sweden	45 (2.6) ▲
†	Norway (5)	44 (2.2) ▲
	Finland	43 (1.7) ▲
2	Slovak Republic	42 (2.3) ▲
2	Serbia	40 (2.7) ▲
2†	United States	40 (1.8) ▲
†	Hong Kong SAR	40 (2.6) ▲
†	Denmark	40 (2.4) ▲
†	Northern Ireland	39 (2.8) ▲
	Austria	38 (2.9) ▲
	Germany	38 (2.3) ▲
	Australia	37 (2.3) ▲
2	England	37 (2.7) ▲
	Japan	37 (1.9) ▲
2	Russian Federation	37 (2.4) ▲
	Poland	37 (2.2) ▲
	France	36 (2.8) ▲
	Bahrain	35 (1.8) ▲
	Ireland	35 (2.1) ▲
	Czech Republic	34 (2.2)
	Spain	34 (1.7) ▲
	Malta	33 (2.1)
	Italy	31 (2.6)
	Hungary	31 (2.0)
2	New Zealand	31 (1.6)
2	Portugal	31 (2.2)
1 2	Canada	31 (1.9)
	International Average	**30 (0.3)**

Four Levels of International Benchmarks

Advanced International Benchmark

- Students demonstrate knowledge of characteristics and life processes of a variety of organisms.
- Students communicate understanding of relationships in ecosystems and interactions between organisms and their environment, such as explaining adaptations and identifying animals that compete for food.
- They can evaluate experimental designs to test how light and water affect the growth of plants.
- …….
- …

Intermediate Benchmark Item – Primary 4

Country	Percent Correct	
Finland	88 (1.4)	▲
Korea, Rep. of	87 (1.6)	▲
3 Singapore	85 (1.2)	▲
Chinese Taipei	85 (1.5)	▲
† Hong Kong SAR	83 (2.1)	▲
2 Russian Federation	82 (2.1)	▲
2 Lithuania	82 (1.9)	▲
Sweden	81 (1.7)	▲
Ireland	80 (1.9)	▲
2 Latvia	80 (2.0)	▲
2 England	77 (2.1)	▲
† Northern Ireland	76 (2.0)	▲
2 Serbia	76 (2.3)	▲
Australia	76 (2.1)	▲
Hungary	75 (1.9)	▲
† Belgium (Flemish)	74 (2.2)	▲
† Denmark	73 (2.0)	▲
Poland	72 (1.8)	▲
Italy	72 (2.6)	▲
Germany	72 (2.2)	▲
2 New Zealand	72 (2.0)	▲
1 2 Canada	72 (2.1)	▲
2† United States	71 (1.4)	▲
† Norway (5)	71 (2.2)	▲
2 Slovak Republic	70 (2.1)	▲
Croatia	70 (2.8)	
≡ Netherlands	70 (2.4)	
Czech Republic	69 (2.2)	
2 Kazakhstan	68 (1.9)	
Cyprus	68 (1.8)	
Austria	67 (2.2)	
Spain	67 (2.1)	
International Average	**66 (0.3)**	

Content Domain: Physical Science

Cognitive Domain: Applying

Description: Recognizes the best explanation for why a box on a cart is easier to pull than a box resting directly on the floor

Tina and Mary need to move identical heavy boxes. Tina has to pull harder on her box to move it than Mary does.

Why is it easier for Mary to move her box?

A. Gravity acting on Tina's box is much stronger.

B. Air resistance acting on Tina's box is much greater.

C. The cart increases the magnetic force acting on Mary's box.

D. The cart's wheels decrease the force needed to move Mary's box.

• Example of a High Benchmark Item – Primary 4

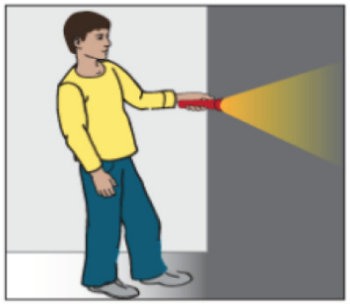
Country	Percent Correct	
Chinese Taipei	82 (1.8)	▲
Korea, Rep. of	81 (2.0)	▲
† Hong Kong SAR	80 (1.9)	▲
Sweden	77 (2.1)	▲
Croatia	75 (2.8)	▲
Finland	74 (2.0)	▲
Japan	74 (1.9)	▲
2 Lithuania	74 (2.1)	▲
Iran, Islamic Rep. of	73 (1.8)	▲
Poland	73 (2.0)	▲
Bulgaria	72 (2.5)	▲
3 Singapore	72 (1.6)	▲
† Belgium (Flemish)	71 (1.7)	▲
2 Slovak Republic	70 (2.3)	▲
2 Serbia	69 (2.1)	▲
† Norway (5)	69 (2.4)	▲
2 Russian Federation	69 (2.0)	▲
Spain	68 (2.0)	▲
Czech Republic	68 (2.2)	▲
† Denmark	67 (2.2)	
Australia	67 (2.0)	
2 Latvia	67 (2.6)	
France	66 (2.3)	
Bahrain	66 (1.8)	
Germany	66 (2.0)	
2 England	66 (2.3)	
Bosnia and Herzegovina	66 (1.8)	
Italy	65 (2.5)	
1 2 Canada	65 (1.4)	
2† United States	65 (1.6)	
Austria	64 (2.1)	
2 New Zealand	64 (2.1)	
International Average	**64 (0.3)**	

Content Domain: Physical Science

Cognitive Domain: Knowing

Description: Recognizes the energy change that occurs when a flashlight is turned on

Jake switches on a flashlight.



One kind of energy changes into another kind of energy in the flashlight.

Which statement describes this change?

A. Electrical energy changes into light energy.

B. Motion energy changes into light energy.

C. Light energy changes into electrical energy.

D. Light energy changes into motion energy.

• Example of an Advanced Benchmark Item – Primary 4

Country	Percent Full Credit	
Chinese Taipei	59 (2.6)	▲
Sweden	55 (2.7)	▲
2 Russian Federation	54 (2.4)	▲
3 Singapore	53 (2.3)	▲
† Norway (5)	52 (2.4)	▲
2 England	48 (2.4)	▲
2 Latvia	47 (2.2)	▲
Finland	47 (2.5)	▲
2 Lithuania	47 (2.1)	▲
Korea, Rep. of	46 (2.4)	▲
2 Slovak Republic	45 (2.4)	▲
Ireland	44 (2.5)	▲
2† United States	44 (1.5)	▲
Germany	43 (2.2)	▲
Australia	43 (2.7)	▲
† Denmark	42 (2.6)	▲
Poland	41 (2.4)	▲
Croatia	41 (3.2)	
United Arab Emirates	41 (1.1)	▲
Hungary	40 (2.5)	
† Hong Kong SAR	40 (2.1)	
Czech Republic	40 (2.6)	
2 Turkey (5)	40 (2.4)	
Bulgaria	40 (2.3)	
France	39 (2.2)	
1 2 Canada	39 (1.4)	
Austria	39 (2.4)	
† Belgium (Flemish)	38 (2.5)	
2 New Zealand	38 (1.8)	
† Northern Ireland	37 (2.6)	
≡ Netherlands	37 (2.5)	
Japan	37 (2.0)	
2 Portugal	36 (2.2)	
International Average	**36 (0.3)**	

Content Domain: Earth Science

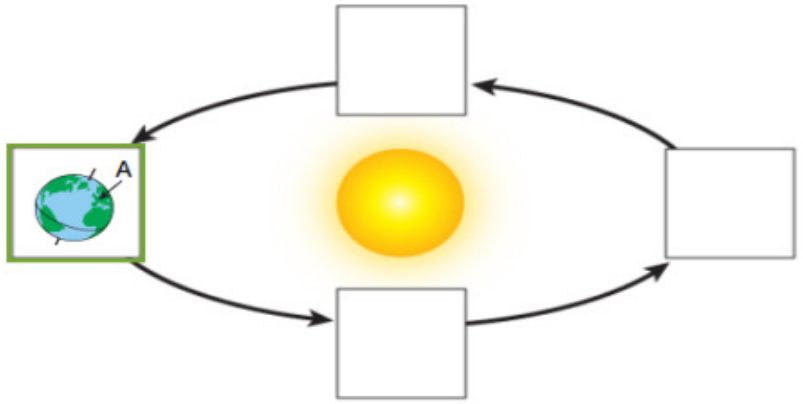
Cognitive Domain: Applying

Description: Places the Earth in a model to show its position relative to the Sun when a labeled city is experiencing summer

Earth's seasons are caused by the tilt of its axis.

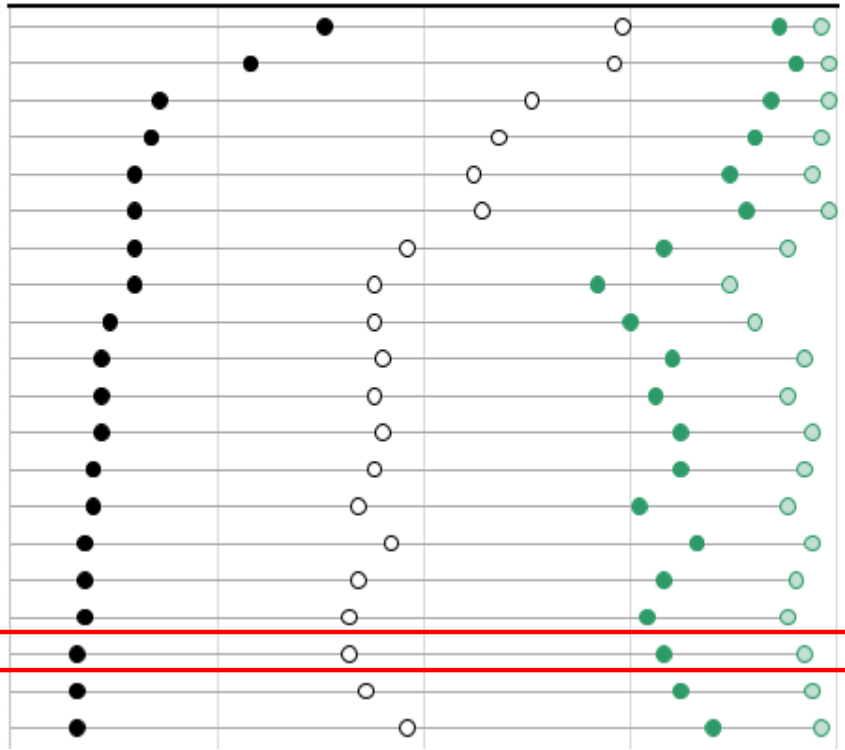
It is summer in City A. In what position is the Earth when it is summer in City A?

Drag the Earth to the position that shows it is summer in City A.



The answer shown illustrates the type of response that would receive full credit (1 point).

International Benchmarks (P4)

Country	Percentages of Students Reaching International Benchmarks (● Advanced ○ High ● Intermediate ○ Low)	Advanced Benchmark (625)	High Benchmark (550)	Intermediate Benchmark (475)	Low Benchmark (400)
[3] Singapore		38 (1.9)	74 (1.7)	93 (0.9)	98 (0.4)
Korea, Rep. of		29 (1.2)	73 (1.3)	95 (0.6)	99 (0.2)
[2] Russian Federation		18 (1.3)	63 (1.9)	92 (1.0)	99 (0.3)
Japan		17 (0.8)	59 (1.2)	90 (0.7)	98 (0.4)
Finland		15 (1.1)	56 (1.4)	87 (1.0)	97 (0.5)
Chinese Taipei		15 (0.9)	57 (1.1)	89 (0.9)	99 (0.3)
[2] † United States		15 (0.8)	48 (1.3)	79 (1.1)	94 (0.6)
Bulgaria		15 (1.0)	44 (2.0)	71 (2.1)	87 (1.4)
[2] Turkey (5)		12 (1.0)	44 (1.9)	75 (1.7)	90 (1.1)
Sweden		11 (1.0)	45 (1.8)	80 (1.5)	96 (0.6)
Australia		11 (0.9)	44 (1.5)	78 (1.2)	94 (0.7)
[2] Lithuania		11 (0.9)	45 (1.5)	81 (1.4)	97 (0.4)
[2] England		10 (1.1)	44 (1.7)	81 (1.2)	96 (0.6)
Hungary		10 (0.6)	42 (1.3)	76 (1.4)	94 (0.7)
† Norway (5)		9 (0.7)	46 (1.6)	83 (1.2)	97 (0.5)
Poland		9 (0.8)	42 (1.6)	79 (1.3)	95 (0.5)
Ireland		9 (0.6)	41 (1.6)	77 (1.7)	94 (0.8)
† Hong Kong SAR		8 (0.9)	41 (1.8)	79 (1.6)	96 (0.6)
Czech Republic		8 (0.9)	43 (2.2)	81 (1.2)	97 (0.5)
[2] Latvia		8 (0.9)	48 (1.6)	85 (1.2)	98 (0.5)
International Median		**6**	**32**	**71**	**92**

International Benchmarks: Trends for P4

	Advanced	High	Intermediate	Low
2019	8%	41%	79%	96%
2015	16%	55%	88%	98%
2011	9%	45%	82%	96%
2007	14%	55%	88%	98%
2003	7%	47%	87%	98%
1995	5%*	30%*	69%*	91%*

A Short Summary

- There are four levels of benchmarks in TIMSS
  - They can be a great reference for your curriculum planning
- We were ok having 96% students achieving low benchmark
  - Though we had 98% students
- The percentages of students achieving intermediate, high and advanced benchmark were lower than most of the previous rounds (2015, 2007, 2003)

What do the scores mean? (Secondary 2)

Four Levels of International Benchmarks

Intermediate International Benchmark

Students show and apply some knowledge of biology and the physical sciences.

Dixon read a fact sheet about crocodiles.

Crocodile Facts

1. Crocodiles have a lifespan of up to 75 years.

2. Crocodiles today look like ancient crocodiles found in fossils.

3. Crocodiles have an angle of vision of 290° as shown in the diagram.

How can a crocodile's angle of vision help it to survive in its environment?

Give one reason.

The crocodile can see predators and prey almost all of the way around body without moving its head.

Dixon read a fact sheet about crocodiles.

Crocodile Facts

1. Crocodiles have a lifespan of up to 75 ye

2. Crocodiles today look like ancient crocod

3. Crocodiles have an angle of vision of 290 diagram.

How can a crocodile's angle of vision help it to environment?

Give one reason.

	Japan	85 (1.6)	▲
2	Singapore	84 (1.5)	▲
	Portugal	79 (1.9)	▲
	Ireland	76 (2.2)	▲
	Korea, Rep. of	75 (2.1)	▲
	Turkey	75 (2.0)	▲
3	Israel	72 (1.9)	▲
	Finland	72 (1.8)	▲
	France	69 (2.2)	▲
	Australia	68 (1.9)	▲
	Lithuania	68 (2.4)	▲
2	Sweden	68 (2.2)	▲
	England	67 (2.7)	▲
†	United States	66 (1.5)	▲
2	Russian Federation	65 (2.3)	▲
	Hungary	63 (2.4)	▲
	Chinese Taipei	63 (1.8)	▲
†	New Zealand	62 (2.5)	▲
	Italy	62 (2.1)	▲
†	Norway (9)	62 (2.7)	▲
	Cyprus	56 (2.3)	
	International Average	**55 (0.3)**	
2	Kazakhstan	54 (2.9)	
	Bahrain	54 (1.6)	
	Romania	49 (2.8)	▽
	Chile	48 (2.5)	▽
	Qatar	44 (1.8)	▽
	Jordan	44 (2.3)	▽
	United Arab Emirates	44 (1.0)	▽
	Iran, Islamic Rep. of	44 (2.1)	▽
†	Hong Kong SAR	40 (2.7)	▽

Four Levels of International Benchmarks

High International Benchmark

Students apply understanding of concepts from biology, chemistry, physics, and Earth science.

In some large cities, owners of large buildings and houses have installed gardens on the roofs. Having more gardens helps reduce the amount of carbon dioxide in the air.

How does increasing the number of gardens help reduce the amount of carbon dioxide in the air?

The trees and plants in the gardens take carbon dioxide out of the air during photosynthesis and give off oxygen.

[2] Singapore	85 (1.5)	▲
Chinese Taipei	69 (2.0)	▲
[2] Kazakhstan	68 (2.3)	▲
Turkey	67 (2.4)	▲
[2] Russian Federation	65 (2.5)	▲
[2] Sweden	63 (2.6)	▲
† Hong Kong SAR	60 (2.9)	▲
Korea, Rep. of	58 (2.5)	▲
Australia	57 (2.0)	▲
Qatar	57 (2.0)	▲
[3] Israel	57 (2.2)	▲
Ireland	56 (2.3)	▲
	53 (2.7)	
	52 (2.3)	
United States	51 (2.5)	
Bahrain	50 (2.1)	
Romania	49 (2.5)	
United Arab Emirates	49 (1.2)	
Finland	49 (1.8)	
Kuwait	49 (2.8)	
International Average	**48 (0.4)**	
Jordan	48 (2.6)	
Portugal	47 (3.0)	

So this is not true HK students are always poor at writing.

Four levels of International benchmarks

Advanced International Benchmark

Students communicate understanding of concepts related to biology, chemistry, physics, and Earth science in a variety of contexts.

Four Levels of International Benchmarks

Advanced International Benchmark

Here is a list of animals.

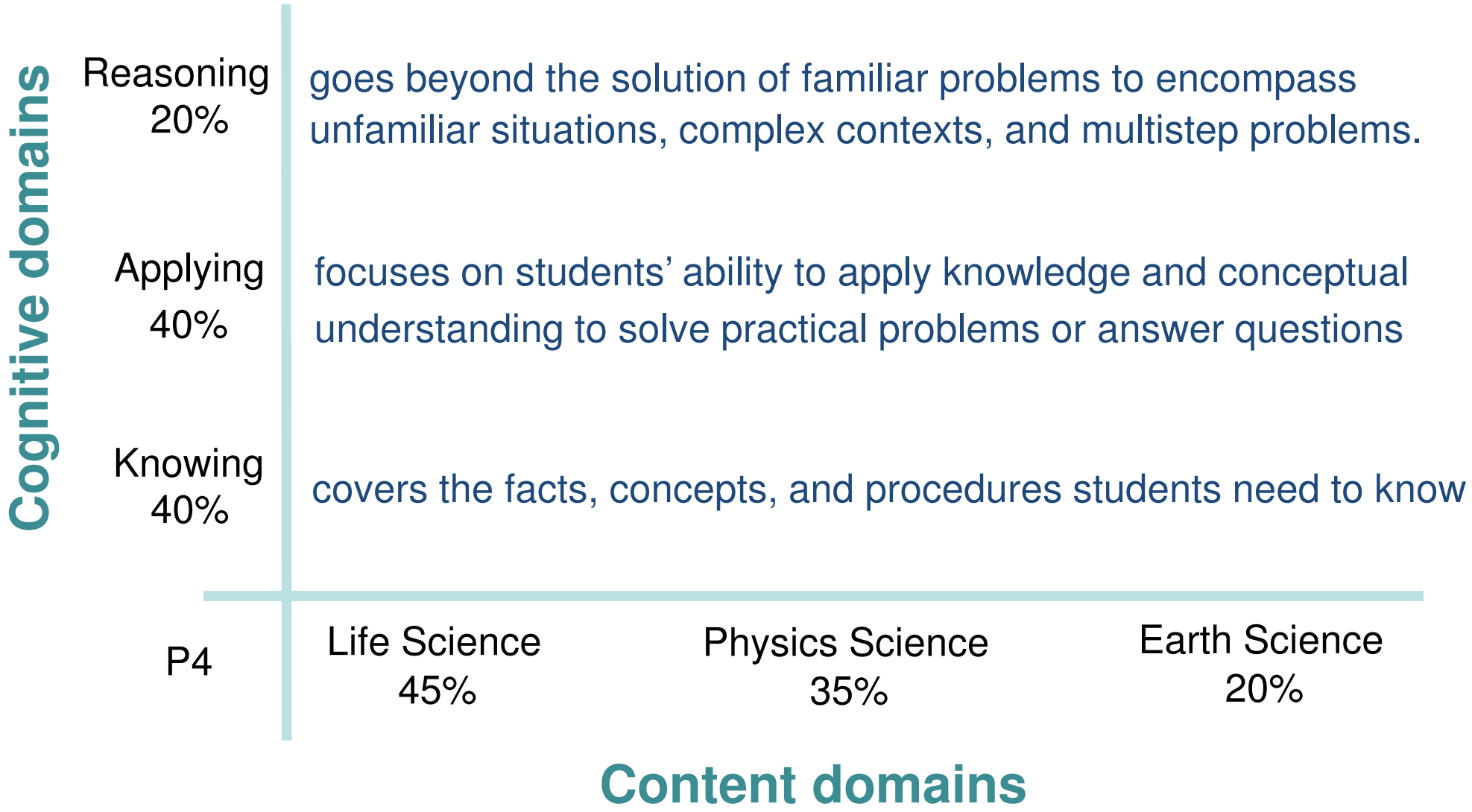
ant	**cat**	**dolphin**	**earthworm**
fish	**frog**	**jellyfish**	

Classify the animals into two groups based on whether or not the animal is a mammal. List the animals in each group in the table.

Mammal	Not a mammal
cat dolphin	ant earthworm fish frog jellyfish

	Japan	75 (1.9)	▲
	Chinese Taipei	63 (1.9)	▲
2	Singapore	62 (2.0)	▲
	Hungary	53 (2.8)	▲
†	Hong Kong SAR	46 (2.6)	▲
2	Russian Federation	44 (2.5)	▲
1	Georgia	42 (3.2)	▲
	Italy	41 (2.6)	▲
	Romania	40 (2.4)	▲
	Finland	37 (1.7)	▲
	Lithuania	37 (2.7)	▲
2	Kazakhstan	35 (2.6)	▲
	Australia	35 (1.6)	▲
	Portugal	35 (2.6)	▲
3	Israel	33 (2.5)	
	Korea, Rep. of	31 (2.1)	
†	New Zealand	30 (2.0)	
†	United States	30 (1.9)	
	International Average	**30 (0.3)**	
	England	27 (2.5)	
	Cyprus	27 (2.0)	
	United Arab Emirates	27 (1.2)	▽
	Lebanon	26 (2.2)	

Content domains and Cognitive domains


Cognitive domains
Reasoning
20%
goes beyond the solution of familiar problems to encompass unfamiliar situations, complex contexts, and multistep problems.
Applying
40%
focuses on students' ability to apply knowledge and conceptual understanding to solve practical problems or answer questions
Knowing
40%
covers the facts, concepts, and procedures students need to know
P4
Life Science
45%
Physics Science
35%
Earth Science
20%
Content domains

Content and Cognitive Domains (P4)

	Life Science	Physical Science	Earth Science
HKSAR	523	529	549

	Knowing	Applying	Reasoning
HKSAR	537	526	531

Content and Cognitive Domains by Gender (P4)

	Life Science		Physical Science		Earth Science	
	Girls	Boys	Girls	Boys	Girls	Boys
HKSAR	**529***	**518**	**525**	**532**	**544**	**554***
International	**510***	**503**	**504**	**506***	**499**	**503***

	Knowing		Applying		Reasoning	
	Girls	Boys	Girls	Boys	Girls	Boys
HKSAR	**531**	**542***	**528**	**525**	**534**	**528**
International	**504**	**507***	**506***	**503**	**509***	**503**

***Achievement significantly higher**

Attitudinal results

https://padlet.com/mauricec/attitude

You may be aware that HK students' attitude towards learning science has not been very positive.

(1) What could we do to enhance it?
(2) Respond to posts of others.
(3) Like

Attitudinal results

padlet

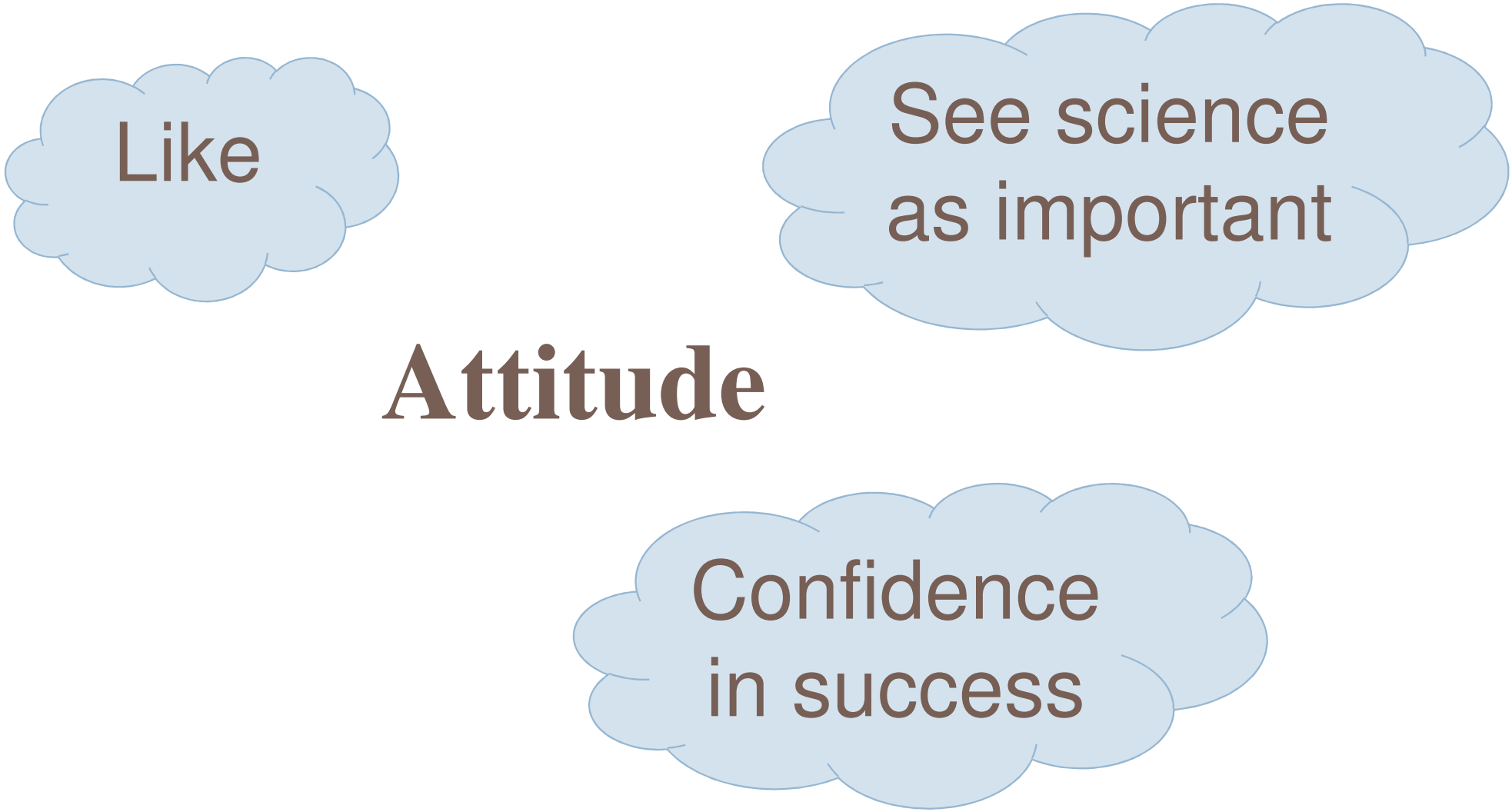
REMAKE SHARE

Maurice M.W. Cheng • 16h

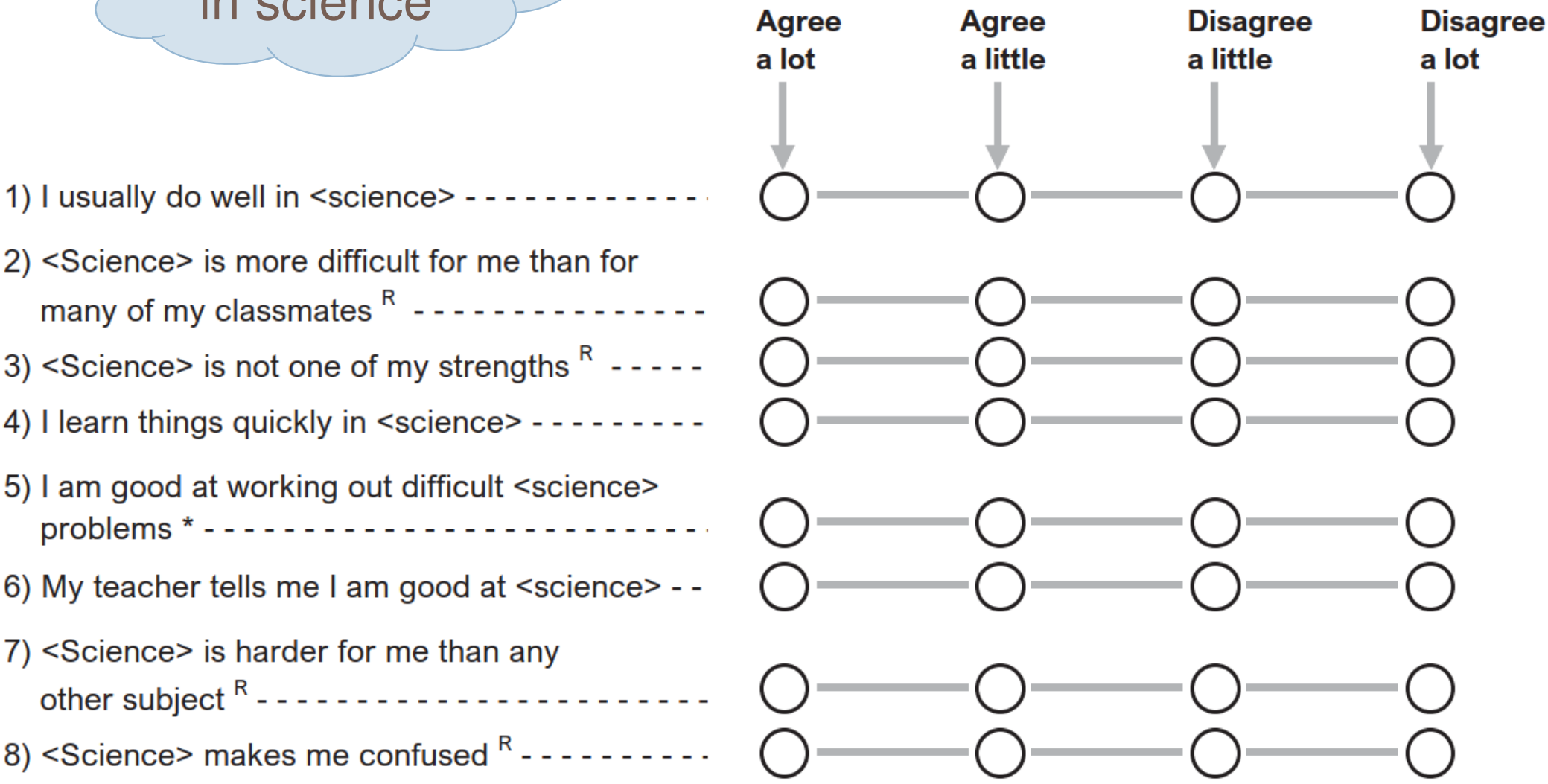
Enhancing attitude towards science

What could we do to enhance it? (be specific)

+

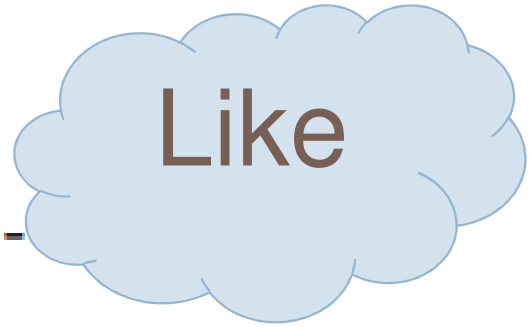

Like
See science as important
Attitude
Confidence in success

Confidence in science



See science as important

1) I think learning science will help me in my daily life
2) I need science to learn other school subjects
3) I need to do well in science to get into the university of my choice
4) I need to do well in science to get the job I want
5) I would like a job that involves using science
6) It is important to learn about science to get ahead in the world
7) Learning science will give me more job opportunities when I am an adult
8) My parents think that it is important that I do well in science
9) It is important to do well in science



1) I enjoy learning <science> - - - - - - - - - - - - - - -

2) I wish I did not have to study <science> [R] - - - -

3) <Science> is boring [R] - - - - - - - - - - - - - - - - - -

4) I learn many interesting things in <science> - -

5) I like <science> -

6) I look forward to learning <science> in school -

7) <Science> teaches me how things in the world work -

8) I like to conduct <science> experiments - - - - -

9) <Science> is one of my favorite subjects - - - - -

Attitudinal Results (Primary 4)

	Students Very Much Like Learning Science	Students Somewhat Like Learning Science	Students Do Not Like Learning Science
HK % (Scale Avg.)	49% (547)	37% (519)	15% (509)
Int'l % (Scale Avg.)	52% (506)	36% (478)	12% (467)

	Students Very Confident in Science	Students Somewhat Confident in Science	Students Not Confident in Science
HK % (Scale Avg.)	23% (562)	49% (532)	29% (506)
Int'l % (Scale Avg.)	38% (520)	43% (486)	19% (453)

Country	Very Much Like Learning Science		Somewhat Like Learning Science		Do Not Like Learning Science	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Albania	83 (1.1)	498 (3.3)	15 (1.0)	457 (7.8)	1 (0.2)	~ ~
Portugal	74 (1.0)	513 (2.6)	21 (0.9)	480 (3.7)	4 (0.4)	477 (6.9)
Kosovo	72 (1.5)	429 (3.9)	25 (1.3)	383 (5.0)	3 (0.4)	364 (14.2)
Iran, Islamic Rep. of	70 (1.1)	459 (3.4)	24 (1.0)	402 (6.6)	5 (0.5)	402 (9.1)
Bulgaria	69 (1.6)	533 (4.5)	25 (1.2)	504 (6.8)	6 (0.9)	486 (18.3)
Morocco	69 (1.3)	401 (5.8)	26 (1.1)	322 (7.6)	5 (0.4)	294 (12.9)
Turkey (5)	69 (1.6)	544 (3.4)	25 (1.2)	493 (6.5)	6 (0.7)	473 (10.0)
Bahrain	68 (1.2)	514 (2.9)	24 (0.9)	454 (4.9)	7 (0.6)	445 (7.4)
Oman	68 (1.3)	464 (4.7)	27 (1.2)	387 (5.4)	5 (0.5)	360 (9.2)
Armenia	66 (1.3)	483 (3.2)	27 (1.2)	450 (5.3)	8 (0.6)	439 (6.7)
United Arab Emirates	64 (0.6)	500 (2.2)	28 (0.5)	435 (2.6)	8 (0.3)	410 (4.4)
Georgia	62 (1.6)	459 (4.1)	32 (1.4)	442 (6.0)	6 (0.6)	459 (9.1)
Saudi Arabia	61 (1.2)	438 (3.5)	29 (1.0)	356 (5.7)	9 (0.6)	369 (8.2)
Montenegro	61 (1.2)	467 (2.6)	32 (0.9)	440 (3.3)	7 (0.5)	434 (7.8)
Azerbaijan	61 (1.4)	448 (2.8)	33 (1.3)	414 (4.2)	6 (0.5)	409 (8.6)
Kazakhstan	59 (1.3)	503 (3.8)	36 (1.2)	484 (3.4)	5 (0.5)	488 (7.4)
North Macedonia	59 (1.7)	455 (4.9)	36 (1.7)	397 (8.2)	6 (0.7)	383 (12.5)
Kuwait	58 (1.4)	430 (6.4)	33 (1.1)	360 (7.7)	9 (0.7)	333 (10.0)
Malta	58 (0.8)	509 (1.6)	29 (0.6)	484 (3.0)	13 (0.6)	466 (4.0)
Qatar	56 (1.6)	485 (3.5)	34 (1.3)	415 (5.4)	10 (0.6)	396 (7.4)
Ireland	56 (1.3)	537 (3.3)	33 (1.0)	523 (4.0)	12 (0.7)	507 (5.2)
Northern Ireland	56 (1.1)	530 (2.4)	33 (1.0)	510 (3.4)	11 (0.7)	487 (4.5)
Italy	55 (1.1)	514 (3.5)	35 (0.8)	509 (3.4)	10 (0.7)	495 (4.8)
Lithuania	53 (1.7)	541 (3.0)	38 (1.3)	538 (3.5)	9 (0.8)	524 (5.0)
Japan	52 (1.2)	569 (2.1)	39 (1.0)	554 (2.3)	9 (0.6)	551 (4.0)
United States	52 (1.0)	551 (2.6)	34 (0.8)	533 (3.6)	14 (0.7)	523 (4.8)
New Zealand	52 (1.1)	513 (3.0)	34 (0.9)	500 (2.8)	14 (0.8)	479 (3.5)
Chinese Taipei	51 (1.5)	566 (2.0)	37 (1.1)	554 (2.6)	12 (0.9)	537 (4.3)
Australia	50 (1.4)	539 (3.1)	34 (0.9)	533 (2.9)	16 (1.0)	515 (4.6)
Singapore	49 (1.0)	605 (3.6)	39 (0.7)	588 (3.9)	12 (0.5)	574 (4.7)
Bosnia and Herzegovina	49 (1.1)	467 (3.5)	35 (0.8)	453 (3.6)	16 (0.8)	454 (4.6)
Hong Kong SAR	49 (1.5)	547 (3.5)	37 (1.2)	519 (4.8)	15 (1.0)	509 (6.7)
Austria	49 (1.1)	533 (2.8)	38 (0.9)	517 (3.5)	13 (0.7)	501 (5.3)
Canada	49 (1.0)	528 (2.2)	36 (0.8)	524 (2.2)	15 (0.6)	511 (2.8)
Spain	48 (1.4)	520 (2.7)	40 (1.0)	506 (2.5)	13 (0.8)	503 (6.7)
Germany r	47 (1.4)	535 (2.6)	38 (1.0)	517 (3.7)	15 (0.9)	498 (4.4)
Norway (5)	47 (1.4)	546 (2.6)	41 (1.0)	540 (2.7)	12 (0.8)	524 (5.2)
England	46 (1.6)	542 (3.7)	37 (1.2)	540 (3.6)	16 (1.1)	528 (4.8)
Hungary	46 (1.3)	538 (2.5)	38 (1.0)	523 (3.6)	15 (1.0)	520 (5.0)
Cyprus	46 (1.7)	525 (3.5)	32 (1.1)	504 (3.2)	22 (1.4)	496 (4.4)
France	45 (1.2)	496 (3.8)	38 (0.9)	487 (3.4)	17 (1.0)	467 (5.1)
Russian Federation	44 (1.3)	570 (3.8)	42 (0.9)	565 (3.1)	14 (0.9)	567 (4.2)
Chile	44 (1.1)	486 (3.2)	44 (0.9)	462 (3.2)	12 (0.8)	450 (5.9)
South Africa (5)	43 (1.2)	390 (5.2)	45 (0.9)	284 (5.1)	11 (0.5)	264 (6.3)
Pakistan	42 (3.2)	323 (15.0)	49 (2.5)	269 (15.2)	9 (1.5)	258 (16.1)
Netherlands	41 (1.3)	530 (3.1)	40 (0.9)	516 (3.6)	19 (0.9)	504 (4.6)
Belgium (Flemish)	41 (1.4)	507 (2.9)	41 (0.9)	502 (2.8)	19 (1.0)	486 (3.0)
Latvia	39 (1.3)	546 (3.0)	47 (1.2)	542 (2.7)	14 (0.8)	534 (4.5)
Sweden	39 (1.5)	538 (4.5)	41 (1.2)	543 (3.4)	20 (1.3)	527 (4.5)
Serbia	39 (1.5)	522 (4.2)	46 (1.1)	512 (4.3)	15 (1.1)	527 (4.3)
Slovak Republic	38 (1.6)	525 (4.1)	43 (0.9)	522 (4.7)	19 (1.1)	512 (5.5)
Poland	38 (1.3)	541 (3.3)	44 (1.0)	527 (2.8)	18 (0.9)	528 (3.7)
Korea, Rep. of	37 (1.3)	602 (2.7)	47 (0.9)	581 (2.8)	16 (1.0)	572 (3.6)
Denmark	35 (1.4)	534 (3.1)	43 (1.1)	521 (3.0)	22 (1.3)	509 (3.3)
Croatia	34 (1.3)	531 (3.2)	50 (1.0)	521 (2.4)	16 (0.9)	518 (4.1)
Czech Republic	34 (1.4)	541 (4.0)	44 (1.0)	534 (2.9)	22 (1.1)	527 (2.9)
Philippines	32 (1.8)	334 (7.5)	53 (1.4)	221 (7.1)	15 (0.9)	180 (7.3)
Finland	26 (1.0)	554 (3.2)	45 (0.9)	556 (3.1)	29 (1.1)	554 (3.1)
International Average	**52 (0.2)**	**506 (0.5)**	**36 (0.1)**	**478 (0.6)**	**12 (0.1)**	**467 (0.9)**

Primary 4

Students Like Learning Science Scale

Primary 4

Students Confident in Science Scale

Country	Very Confident in Science		Somewhat Confident in Science		Not Confident in Science	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Albania	60 (1.6)	509 (3.7)	30 (1.4)	474 (5.0)	9 (0.7)	428 (9.0)
Bulgaria	58 (1.8)	555 (3.9)	30 (1.1)	499 (6.5)	12 (1.1)	443 (8.3)
Iran, Islamic Rep. of	57 (1.4)	472 (4.2)	30 (1.0)	416 (5.5)	13 (1.0)	374 (7.5)
Bahrain	57 (1.3)	521 (3.2)	30 (0.9)	473 (4.0)	13 (0.7)	430 (6.3)
Montenegro	53 (1.1)	482 (2.8)	30 (0.8)	443 (3.2)	17 (0.7)	403 (4.5)
Saudi Arabia	51 (1.2)	444 (3.7)	32 (1.0)	386 (5.6)	16 (0.9)	341 (7.7)
Turkey (5)	50 (1.4)	556 (3.8)	36 (1.0)	510 (4.6)	14 (0.9)	470 (7.0)
Oman	50 (1.4)	480 (5.2)	35 (1.1)	412 (4.4)	15 (0.8)	363 (6.3)
Austria	49 (1.1)	544 (2.7)	37 (1.0)	511 (3.0)	13 (0.7)	474 (4.8)
North Macedonia	49 (2.0)	471 (5.1)	35 (1.7)	403 (7.1)	16 (0.9)	365 (8.2)
Azerbaijan	48 (1.4)	457 (3.2)	36 (1.2)	422 (3.8)	16 (0.8)	395 (6.0)
Armenia	47 (1.3)	490 (3.3)	36 (1.1)	462 (4.2)	17 (0.8)	436 (5.8)
Kosovo	47 (1.2)	444 (3.9)	37 (1.0)	404 (4.2)	16 (0.9)	361 (7.0)
United Arab Emirates	46 (0.6)	505 (2.5)	36 (0.5)	465 (2.5)	17 (0.4)	417 (3.2)
Kuwait	46 (1.4)	435 (6.7)	36 (0.9)	384 (6.7)	18 (0.9)	338 (9.0)
Bosnia and Herzegovina	46 (0.9)	482 (3.3)	36 (0.7)	451 (3.5)	19 (0.7)	425 (4.3)
Morocco	46 (1.2)	416 (4.9)	39 (0.8)	355 (7.9)	15 (0.8)	305 (9.0)
Hungary	45 (1.2)	553 (2.6)	39 (0.8)	520 (3.2)	16 (0.8)	484 (5.1)
Georgia	44 (1.4)	472 (4.3)	38 (1.1)	448 (5.3)	19 (1.1)	423 (6.1)
Kazakhstan	43 (1.4)	511 (3.9)	46 (1.1)	485 (3.4)	11 (0.7)	479 (5.4)
Portugal	43 (1.2)	522 (2.8)	44 (1.0)	499 (2.8)	13 (0.6)	463 (4.0)
Qatar	42 (1.4)	488 (3.9)	38 (1.0)	441 (6.2)	20 (1.0)	395 (5.6)
Malta	42 (0.9)	521 (2.1)	38 (0.8)	488 (2.4)	20 (0.7)	457 (3.0)
Norway (5)	41 (1.1)	557 (2.4)	46 (1.1)	535 (3.0)	12 (0.8)	511 (5.0)
Germany r	40 (1.1)	551 (2.8)	44 (0.8)	517 (3.1)	17 (0.9)	471 (4.6)
Cyprus	39 (1.5)	535 (3.1)	37 (1.1)	504 (2.9)	23 (1.1)	485 (4.6)
Italy	39 (1.0)	522 (3.8)	46 (0.9)	509 (3.1)	15 (0.9)	483 (4.5)
Croatia	39 (1.2)	541 (2.5)	49 (1.2)	518 (2.4)	12 (0.9)	496 (4.9)
United States	38 (0.9)	565 (2.7)	42 (0.7)	540 (2.9)	20 (0.7)	500 (4.4)
Belgium (Flemish)	37 (1.1)	521 (2.5)	45 (0.9)	498 (2.5)	18 (0.8)	467 (3.5)
Serbia	37 (1.4)	540 (4.0)	47 (1.2)	515 (4.1)	17 (1.0)	476 (6.7)
Sweden	36 (1.5)	552 (4.0)	49 (1.1)	538 (3.2)	14 (0.9)	504 (6.5)
Spain	35 (1.1)	535 (2.7)	41 (1.0)	508 (2.2)	23 (1.0)	486 (3.4)
Canada	35 (0.7)	540 (2.4)	46 (0.7)	523 (2.1)	19 (0.7)	498 (2.5)
Ireland	35 (0.9)	542 (4.0)	48 (0.9)	529 (3.9)	18 (0.9)	502 (4.4)
Slovak Republic	33 (1.2)	546 (3.4)	46 (1.0)	519 (4.1)	21 (0.9)	487 (6.9)
Netherlands	32 (1.1)	541 (3.7)	48 (1.0)	519 (3.1)	19 (1.0)	486 (3.8)
Australia	32 (1.1)	553 (3.0)	47 (0.9)	532 (2.8)	21 (0.9)	508 (4.1)
Poland	32 (1.2)	553 (3.3)	49 (0.9)	531 (2.8)	19 (0.8)	503 (3.6)
Chinese Taipei	31 (1.0)	583 (2.2)	51 (0.9)	556 (2.1)	18 (1.0)	522 (3.4)
Latvia	31 (1.1)	559 (2.8)	51 (1.1)	540 (2.8)	18 (1.0)	520 (3.7)
Russian Federation	29 (1.0)	583 (3.1)	46 (1.1)	567 (3.5)	24 (0.9)	550 (3.5)
Lithuania	29 (1.2)	564 (3.0)	52 (1.0)	533 (3.1)	19 (1.0)	516 (4.3)
Northern Ireland	29 (1.0)	536 (3.1)	49 (0.9)	523 (2.9)	22 (0.8)	487 (4.1)
Denmark	29 (1.2)	545 (3.3)	50 (1.1)	522 (2.6)	21 (1.0)	493 (3.2)
England	28 (1.0)	559 (4.2)	47 (1.0)	538 (3.2)	25 (1.2)	516 (3.9)
Finland	27 (0.8)	573 (3.4)	57 (0.9)	555 (2.6)	16 (0.7)	525 (4.0)
France	27 (0.9)	517 (3.8)	48 (1.0)	492 (3.3)	25 (1.0)	451 (4.1)
Japan	27 (0.9)	582 (2.7)	59 (0.8)	558 (1.9)	14 (0.7)	540 (3.7)
Czech Republic	25 (1.0)	560 (3.9)	50 (1.0)	535 (3.3)	25 (1.2)	507 (2.9)
South Africa (5)	23 (0.8)	421 (6.3)	47 (0.7)	317 (5.4)	30 (0.7)	274 (5.2)
Singapore	23 (0.6)	626 (3.6)	44 (0.7)	599 (3.6)	33 (0.7)	567 (3.9)
Pakistan	23 (3.2)	333 (19.9)	49 (2.3)	289 (14.4)	28 (3.5)	262 (14.1)
Chile	23 (1.0)	508 (3.8)	48 (0.8)	473 (2.8)	30 (0.9)	439 (3.6)
Hong Kong SAR	23 (0.9)	562 (3.9)	49 (1.1)	532 (3.5)	29 (1.2)	506 (4.9)
New Zealand	21 (0.7)	529 (3.3)	53 (0.9)	508 (2.7)	26 (0.8)	476 (3.3)
Korea, Rep. of	17 (0.8)	620 (3.1)	59 (1.1)	587 (2.6)	23 (1.0)	564 (3.2)
Philippines	10 (0.9)	372 (10.6)	52 (0.9)	258 (7.2)	38 (1.2)	212 (7.4)
International Average	**38 (0.2)**	**520 (0.6)**	**43 (0.1)**	**486 (0.6)**	**19 (0.1)**	**453 (0.7)**

Country	Strongly Value Science		Somewhat Value Science		Do Not Value Science	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Egypt	67 (1.1)	412 (5.2)	26 (0.9)	362 (6.7)	7 (0.5)	344 (7.8)
Jordan	64 (1.2)	468 (4.4)	29 (0.9)	438 (4.8)	7 (0.5)	418 (8.6)
Oman	57 (0.9)	483 (3.0)	35 (0.8)	440 (3.7)	8 (0.6)	409 (7.9)
Iran, Islamic Rep. of	57 (1.2)	462 (4.3)	33 (1.0)	434 (3.8)	11 (0.6)	436 (7.3)
United Arab Emirates	55 (0.7)	501 (2.6)	34 (0.6)	453 (2.8)	11 (0.3)	417 (4.4)
Saudi Arabia	55 (1.3)	442 (3.3)	34 (0.9)	427 (3.4)	11 (0.7)	414 (4.5)
Kuwait	54 (1.2)	460 (5.5)	34 (1.1)	439 (5.9)	12 (0.7)	419 (7.3)
South Africa (9)	54 (0.7)	380 (3.5)	34 (0.5)	353 (3.1)	12 (0.4)	387 (4.4)
Bahrain	51 (0.9)	507 (1.8)	36 (0.7)	479 (3.5)	13 (0.6)	445 (5.9)
Morocco	49 (0.9)	409 (2.7)	39 (0.7)	383 (3.2)	12 (0.6)	386 (4.0)
Qatar	49 (1.0)	495 (5.4)	37 (0.8)	467 (5.0)	15 (0.9)	436 (5.8)
Lebanon	49 (1.1)	404 (5.3)	39 (0.9)	360 (5.0)	12 (0.6)	350 (9.2)
Turkey	46 (1.2)	529 (4.1)	38 (0.8)	506 (4.4)	15 (0.9)	499 (5.8)
Malaysia	45 (1.2)	492 (3.0)	46 (0.9)	445 (4.2)	9 (0.7)	384 (6.9)
Georgia	43 (1.2)	457 (4.2)	43 (1.1)	445 (4.3)	14 (0.9)	430 (5.6)
Singapore	42 (1.0)	632 (3.5)	48 (0.8)	598 (4.1)	11 (0.6)	557 (6.3)
United States	36 (0.9)	540 (5.9)	43 (0.7)	526 (4.7)	21 (0.6)	503 (4.3)
Israel	36 (1.3)	531 (5.2)	36 (0.9)	518 (4.7)	29 (1.2)	498 (5.6)
England	33 (1.1)	540 (5.3)	45 (1.1)	523 (5.6)	22 (1.0)	491 (5.5)
Cyprus	33 (1.0)	510 (2.9)	43 (1.2)	485 (2.5)	24 (0.9)	458 (3.4)
Russian Federation	32 (1.0)	548 (4.8)	50 (0.8)	540 (4.7)	18 (0.9)	545 (4.5)
Romania	31 (1.3)	487 (5.3)	41 (1.1)	468 (4.6)	28 (1.2)	462 (4.5)
Kazakhstan	30 (1.0)	487 (4.0)	51 (0.9)	477 (3.4)	19 (0.8)	471 (5.1)
Australia	28 (0.9)	561 (4.1)	42 (0.6)	530 (3.5)	29 (0.8)	501 (3.1)
Portugal	27 (1.1)	542 (4.2)	44 (1.1)	517 (3.4)	28 (1.1)	503 (3.0)
Lithuania	27 (1.0)	549 (4.3)	51 (1.1)	531 (3.4)	21 (0.8)	526 (4.0)
New Zealand	26 (0.9)	520 (5.0)	47 (0.8)	503 (3.9)	28 (1.0)	479 (4.2)
Chile	25 (0.9)	471 (3.8)	48 (0.8)	462 (3.4)	27 (1.0)	459 (3.9)
Ireland	25 (1.0)	555 (3.9)	42 (1.1)	534 (2.8)	33 (1.1)	500 (3.7)
Hong Kong SAR	23 (0.9)	526 (7.6)	49 (1.1)	509 (5.5)	29 (1.1)	478 (6.4)
Norway (9)	21 (0.9)	516 (5.4)	48 (0.9)	501 (3.1)	31 (1.1)	478 (4.4)
Hungary	21 (1.1)	553 (4.8)	47 (0.9)	527 (3.5)	33 (1.1)	519 (3.0)
Sweden	20 (0.9)	541 (5.7)	48 (1.1)	527 (3.9)	32 (1.0)	510 (3.6)
Italy	19 (0.8)	515 (4.0)	45 (1.0)	506 (2.9)	35 (1.1)	487 (2.9)
France	19 (0.8)	516 (4.5)	47 (0.9)	496 (3.2)	34 (1.1)	465 (2.7)
Finland	18 (0.9)	586 (4.3)	48 (0.9)	550 (3.2)	35 (1.1)	514 (3.0)
Korea, Rep. of	16 (0.7)	611 (4.2)	50 (0.9)	573 (2.6)	34 (1.1)	519 (2.7)
Chinese Taipei	14 (0.7)	609 (4.4)	41 (0.8)	589 (2.5)	45 (1.0)	551 (2.4)
Japan	11 (0.6)	598 (4.9)	48 (1.0)	581 (2.5)	41 (1.1)	550 (2.5)
International Average	**36 (0.2)**	**511 (0.7)**	**42 (0.1)**	**487 (0.6)**	**22 (0.1)**	**467 (0.8)**

Secondary 2

Students Value Science Scale

Trends in Valuing Science

Students Value Science – Secondary 2		
	Strongly Value Science	
	Hong Kong	International
2019	23 (0.9)	36 (0.2)
2015	24 (1.0)	40^ (0.2)
2011	26^ (1.0)	41^ (0.2)

^ Result significantly higher than 2019

	Very Much Like Learning Science		Very Confident in Science	
	% of P4 Students		% of P4 Students	
	Hong Kong	International	Hong Kong	International
2019	49 (1.5)	52 (0.2)	23 (0.9)	38 (0.2)
2015	57^ (1.0)	56^ (0.2)	25 (1.2)	40^ (0.2)
2011	52 (1.3)	53^ (0.2)	25 (0.9)	43^ (0.2)

	Very Much Like Learning Science		Very Confident in Science	
	% of S2 Students		% of S2 Students	
	Hong Kong	International	Hong Kong	International
2019	23 (1.0)	35 (0.2)	11 (0.6)	23 (0.2)
2015	30^ (1.0)	37^ (0.2)	13^ (0.6)	22^ (0.2)
2011	28 (1.3)	35^ (0.2)	8^ (0.6)	20^ (0.2)

https://padlet.com/mauricec/attitude

Expand on your strategies based on the items and data
(1) What could we do to enhance it?
(2) Respond to posts of others.
(3) Like

Further data for your consideration:

Science Labs, Science Experiments

School Resources for Conducting Experiment (Primary 4)

	Having a Science Lab in Schools	Teachers Having Assistance When Students Are Conducting Experiments
Hong Kong	42% (543)	62% (534)
Chinese Taipei	93% (557)	90% (558)
Japan	100% (562)	36% (559)
Korea	99% (588)	74% (590)
Singapore	98% (595)	67% (597)
International	36% (496)	35% (491)

Frequency on Conducting Experiments in Science Lessons (Primary 4)

	At Least Once a Week	Once or Twice a Month	A Few Times a Year	Never
Hong Kong	13% (512)	28% (535)	36% (546)	22% (515)
Chinese Taipei	58% (562)	31% (558)	6% (546)	5% (529)
Japan	64% (561)	32% (572)	3% (505)	1% (~ ~)
Korea	72% (587)	25% (591)	3% (585)	1% (~ ~)
Singapore	39% (588)	40% (605)	17% (595)	4% (558)
International	31% (475)	26% (499)	24% (503)	18% (478)

Take Home / Stay Home Message (P4)

- There have been ups and downs over the past 25 years.
  - No evidence that ‘we have been getting worse’
  - Nor evidence that ‘we have been getting better’
- The achievement score in 2019 was worse than that of 2015, but was similar to that of 2011
- Switching to e-test negatively impacted on students’ achievement
- There’s no gender differences overall
- The association between Socioeconomic status and achievement in HK is weaker than the international association
- Issues of well-beings and absence

Take Home / Stay Home Message (P4)

- Benchmarking levels are a useful tool for our curriculum planning
- While there's up and down in the overall result, the % of students achieved intermediate, high and advanced levels seem to be lower than the previous years
- Different components of 'attitude':
  - Like science
  - Value science
  - Confidence in learning science
- Doing experiments is important in science. But more doesn't directly translate into better learning
  - Situational interest vs personal interest

Now we look at items…

Go to Part 2

Summary

- What is TIMSS?
- What does it test? And what does it measure?
  - More than achievement
  - Benchmarks
  - Three components of attitude:
    - like, confidence, value of science
  - SES, absence, well-being
- Findings in TIMSS 2019 HK study

Summary

- HK students performance in selected items
  - Pedagogies (card sorting/ talk)
  - Curriculum

祝大家牛年
身體健康, 教學相長!

TIMSS Materials

- International reports of TIMSS 2019 may be downloaded at:
  - → https://timss.bc.edu

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