Characteristics of East-Asian Learners: What we Learned from the PISA studies

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Paradox of the East Asian Learners

- Learning Outcomes: Cognitive vs Affective
- Motivation: Intrinsic vs Extrinsic
- Attribution of Success: Effort vs Ability
- Concept of learning : Rote vs Depth
- Concept of teaching :Transmission-teacher-center vs Facilitative student center approach
- Learners' Characteristics : Passive vs Active

Basic Design of OECD/PISA

- Age-based target population *(15 year-olds)*
- National samples of 150 schools with 5,000 students
- Two hours of testing time for each student
  (In PISA2006, embedded attitudinal measures)
- Context questionnaires for the students and schools; Parent questionnaire is optional

Testing Scope

- To test students' competencies for real-life situations which are not constrained by the common denominator of national curricula.
- Three Domains + problem solving (2003 only):

Reading

Mathematics

Science

(Problem Solving)

OECD/PISA Project 2006

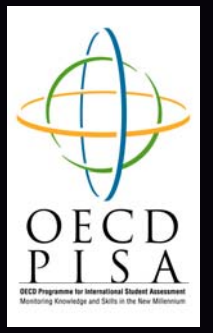
Countries participating in the OECD PISA Project 2006:

Western Europe
Austria
Belgium
Denmark
Finland
France
Germany
Iceland
Ireland
Italy
Luxembourg
Netherlands
Norway
Portugal
Spain
Sweden
Switzerland
United Kingdom

Asia/Pacific Rim
Australia
Hong Kong - China
Indonesia
Japan
Korea
Macao - China
New Zealand
Chinese Taipei
Thailand

Eastern Europe
Bulgaria
Czech Republic
Croatia
Estonia
Greece
Hungary
Jordan
Latvia
Lithuania
Poland
Russian Federation
Serbia – Montenegro
Slovak Republic
Slovenia
Turkey

Americas & others
Argentina
Brazil
Canada
Chile
Colombia
Israel
Mexico
United States
Uruguay
Tunisia



Focus of the Analysis

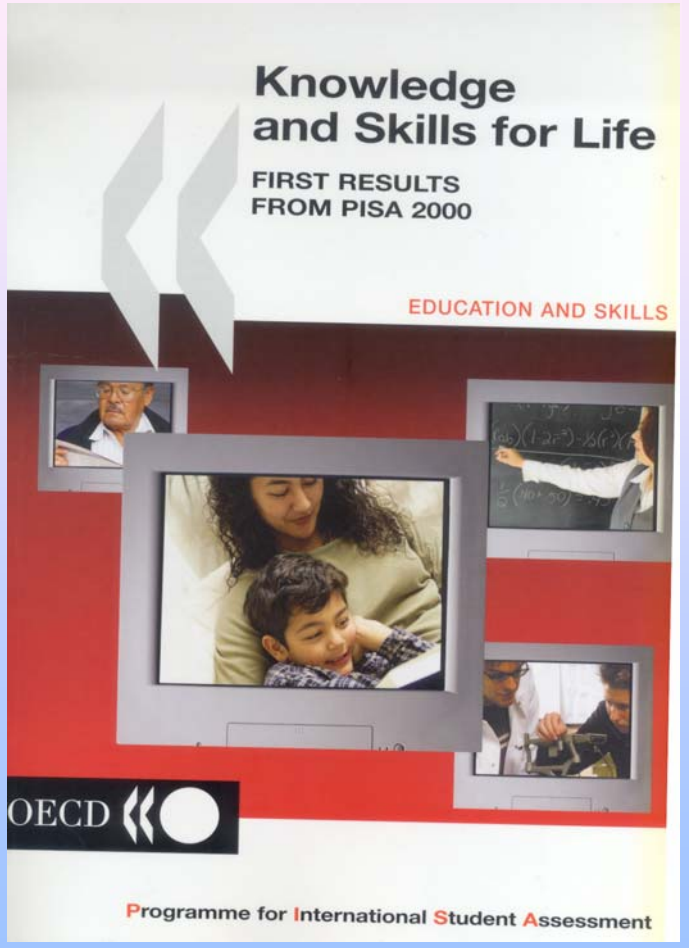
- East Asian Societies: Hong Kong, Chinese Taipei, Macao, Japan, Korea (Canada and USA as references)
- Database: PISA2003 and PISA2006
- Analysis:

(1) cognitive and affective outcomes

(2) family structure and resources

(3) student learning strategies

(4) school climate



Mean Performance of 15-year-0lds in the Top Ten Countries in PISA 2003

Mathematical Literacy			Reading Literacy			Scientific Literacy			Problem Solving Skills		
Country	*Mean*	*S.E.*	*Country*	*Mean*	*S.E.*	*Country*	*Mean*	*S.E.*	*Country*	*Mean*	*S.E.*
Hong Kong	550	(4.5)	Finland	543	(1.6)	Finland	548	(1.9)	Korea	550	(3.1)
Finland	544	(1.9)	Korea	534	(3.1)	Japan	548	(4.1)	Hong Kong	548	(4.2)
Korea	542	(3.2)	Canada	528	(1.7)	Hong Kong	539	(4.3)	Finland	548	(1.9)
Netherlands	538	(3.1)	Australia	525	(2.1)	Korea	538	(3.5)	Japan	547	(4.1)
Liechtenstein	536	(4.1)	Liechtenstein	525	(3.6)	Liechtenstein	525	(4.3)	New Zealand	533	(2.2)
Japan	534	(4.0)	New Zealand	522	(2.5)	Australia	525	(2.1)	Macao	532	(2.5)
Canada	532	(1.8)	Ireland	515	(2.6)	Macao	525	(3.0)	Australia	530	(2.0)
Belgium	529	(2.3)	Sweden	514	(2.4)	Netherlands	524	(3.1)	Liechtenstein	529	(3.9)
Macao	527	(2.9)	Netherlands	513	(2.9)	Czech Republic	523	(3.4)	Canada	529	(1.7)
Switzerland	527	(3.4)	Hong Kong	510	(3.7)	New Zealand	521	(2.4)	Belgium	525	(2.2)

Asian Students' performance in scientific literacy: cognitive domain (PISA 2006)

Scientific Literacy

Knowledge and use of that knowledge

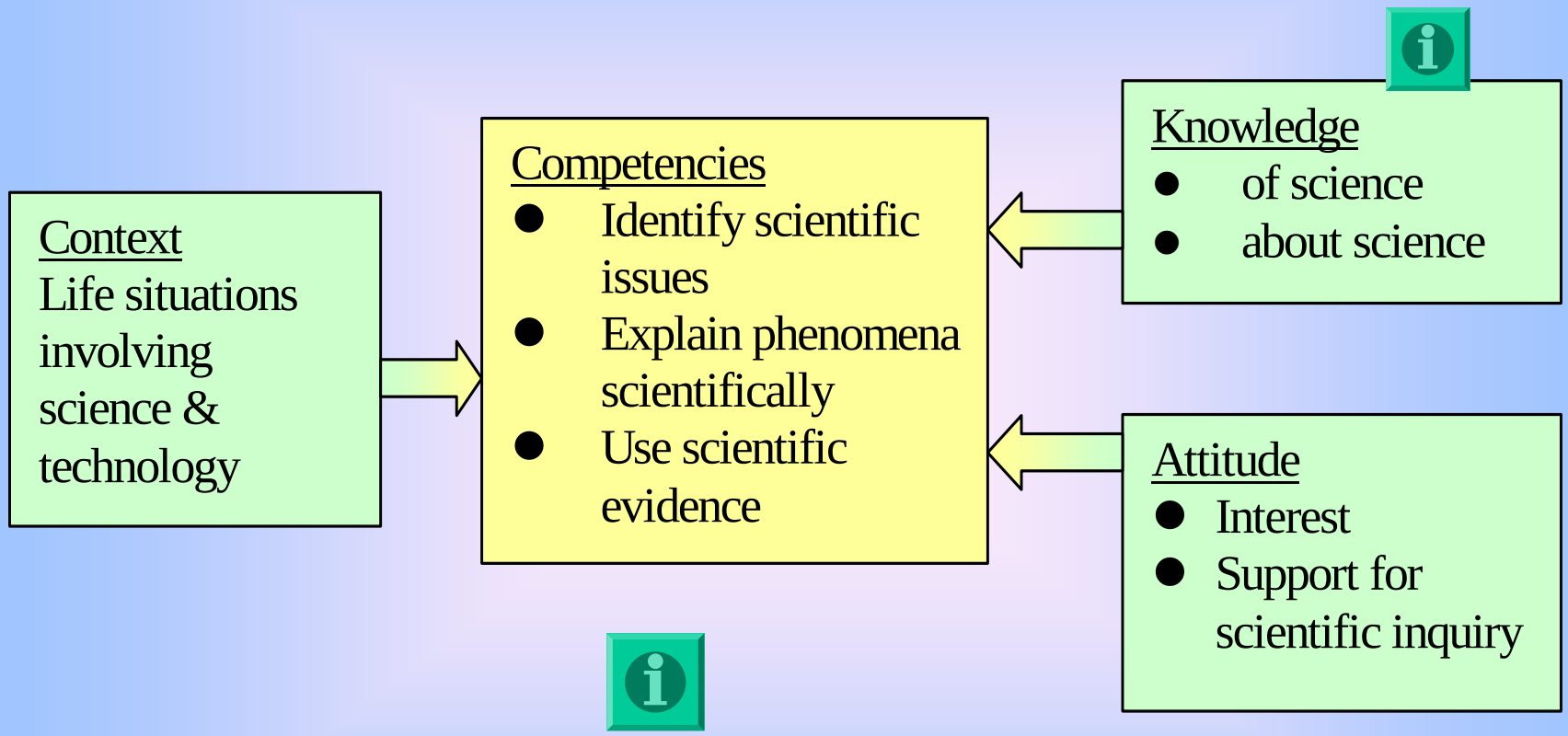
to identify questions,

to acquire new knowledge,

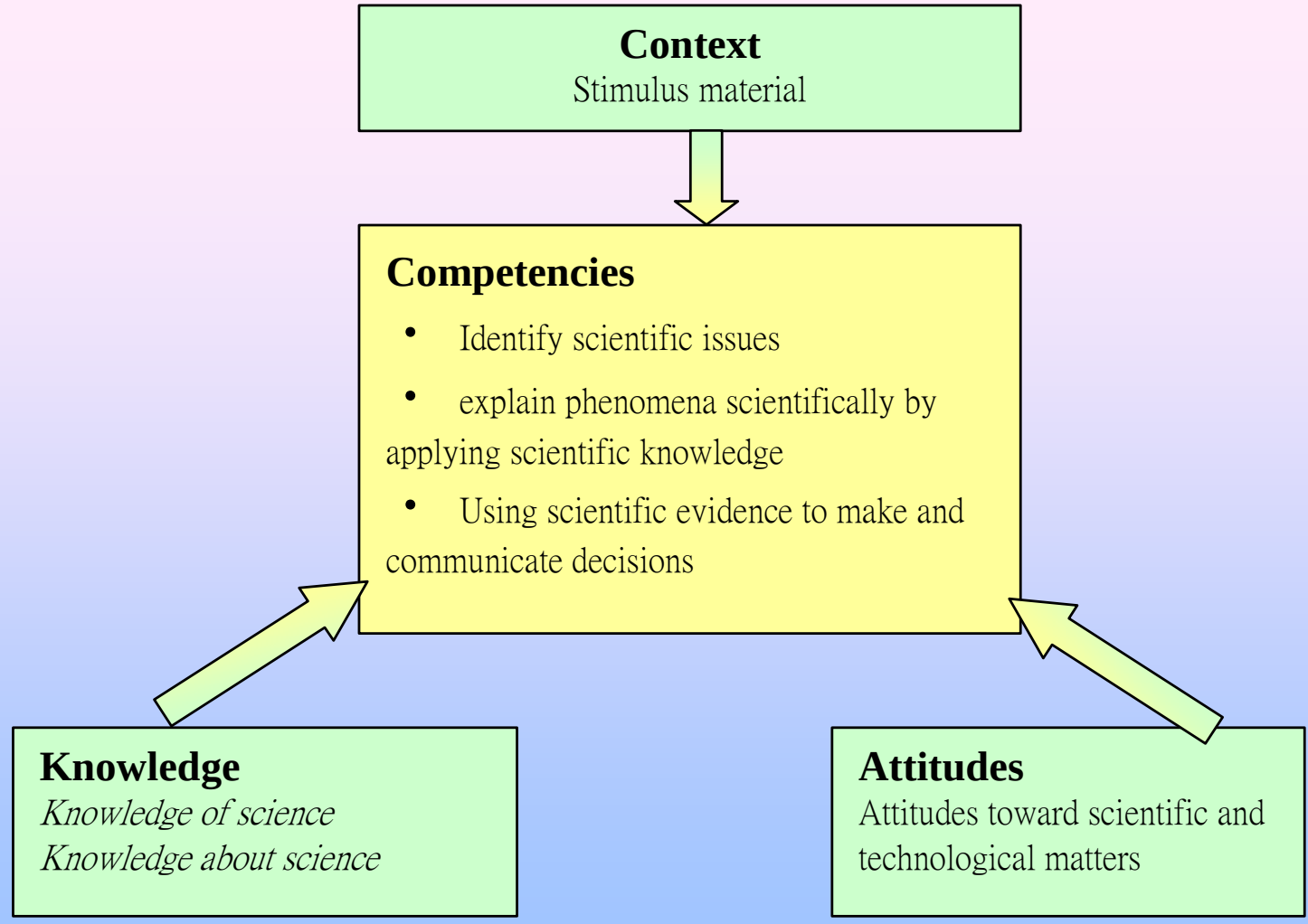
to explain scientific phenomena and

to draw evidence-based conclusions

Framework for PISA 2006 science assessment



From framework to assessment units and items



Performance in PISA 2006

Science	Mean	S.E.	Reading	Mean	S.E.	Mathematics	Mean	S.E.
Finland	563	(2.0)	**Korea**	**556**	**(3.8)**	**Chinese Taipei**	**549**	**(4.1)**
Hong Kong-China	**542**	**(2.5)**	Finland	547	(2.1)	Finland	548	(2.3)
Canada	534	(2.0)	**Hong Kong-China**	**536**	**(2.4)**	**Hong Kong-China**	**547**	**(2.7)**
Chinese Taipei	**532**	**(3.6)**	Canada	527	(2.4)	**Korea**	**547**	**(3.8)**
Estonia	531	(2.5)	New Zealand	521	(3.0)	Netherlands	531	(2.6)
Japan	**531**	**(3.4)**	Ireland	517	(3.5)	Switzerland	530	(3.2)
New Zealand	530	(2.7)	Australia	513	(2.1)	Canada	527	(2.0)
Australia	527	(2.3)	Liechtenstein	510	(3.9)	**Macao-China**	**525**	**(1.3)**
Netherlands	525	(2.7)	Poland	508	(2.8)	Liechtenstein	525	(4.2)
Liechtenstein	522	(4.1)	Sweden	507	(3.4)	**Japan**	**523**	**(3.3)**
Korea	**522**	**(3.4)**	Netherlands	507	(2.9)	New Zealand	522	(2.4)
OECD average	500	(0.5)	*OECD average*	492	(0.6)	*OECD average*	498	(0.5)

Asian students: strong in mathematics and science

Comparing performance on the sub-scales of scientific literacy

	Science Score	Competency		
		Identifying scientific issues	Explaining phenomena	Using scientific evidence
Finland	**563**	-8.4	2.8	4.1
Hong Kong-China	**542**	-14.4	7.0	0.2
Chinese Taipei	**532**	-23.8	12.7	-0.6
Japan	**531**	-9.3	-4.1	13.0
Korea	**522**	-3.1	-10.5	16.3
Macao-China	**511**	-20.8	9.2	0.7
Canada	**534**	-2.6	-3.6	7.1

Source: OECD PISA database 2006, Tables 2.1c, 2.2c, 2.3c, 2.4c, 2.7, 2.8, 2.9 and 2.10

Each scale is 20 or more score points higher than the combined science scale

Each scale is between 10 and 19.99 score points higher than the combined science scale

Each scale is between 0 to 9.99 score points higher than the combined science scale

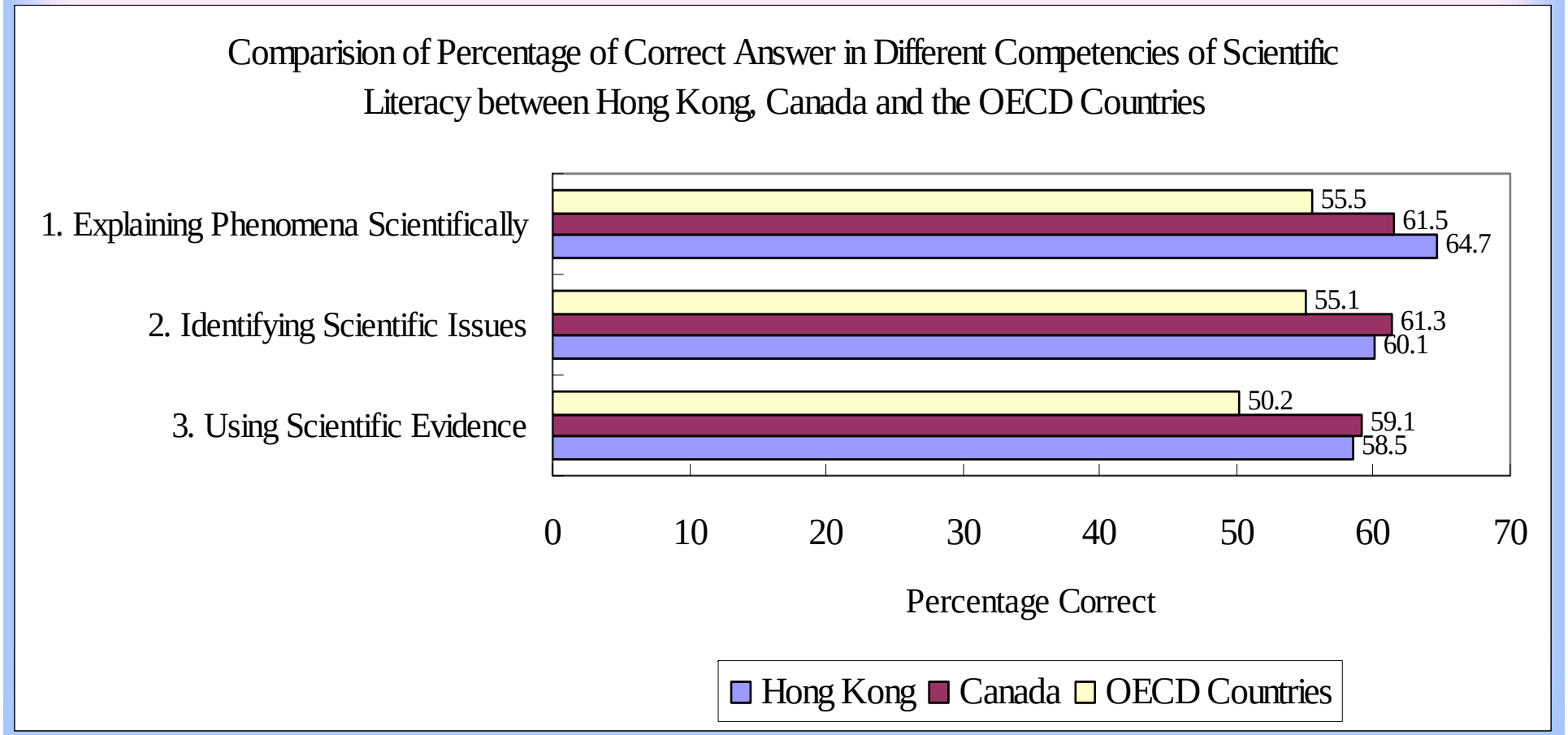
Each scale is 20 or more score points lower than the combined science scale

Each scale is between 10 and 19.99 score points lower than the combined science scale

Each scale is between 0 to 9.99 score points lower than the combined science scale

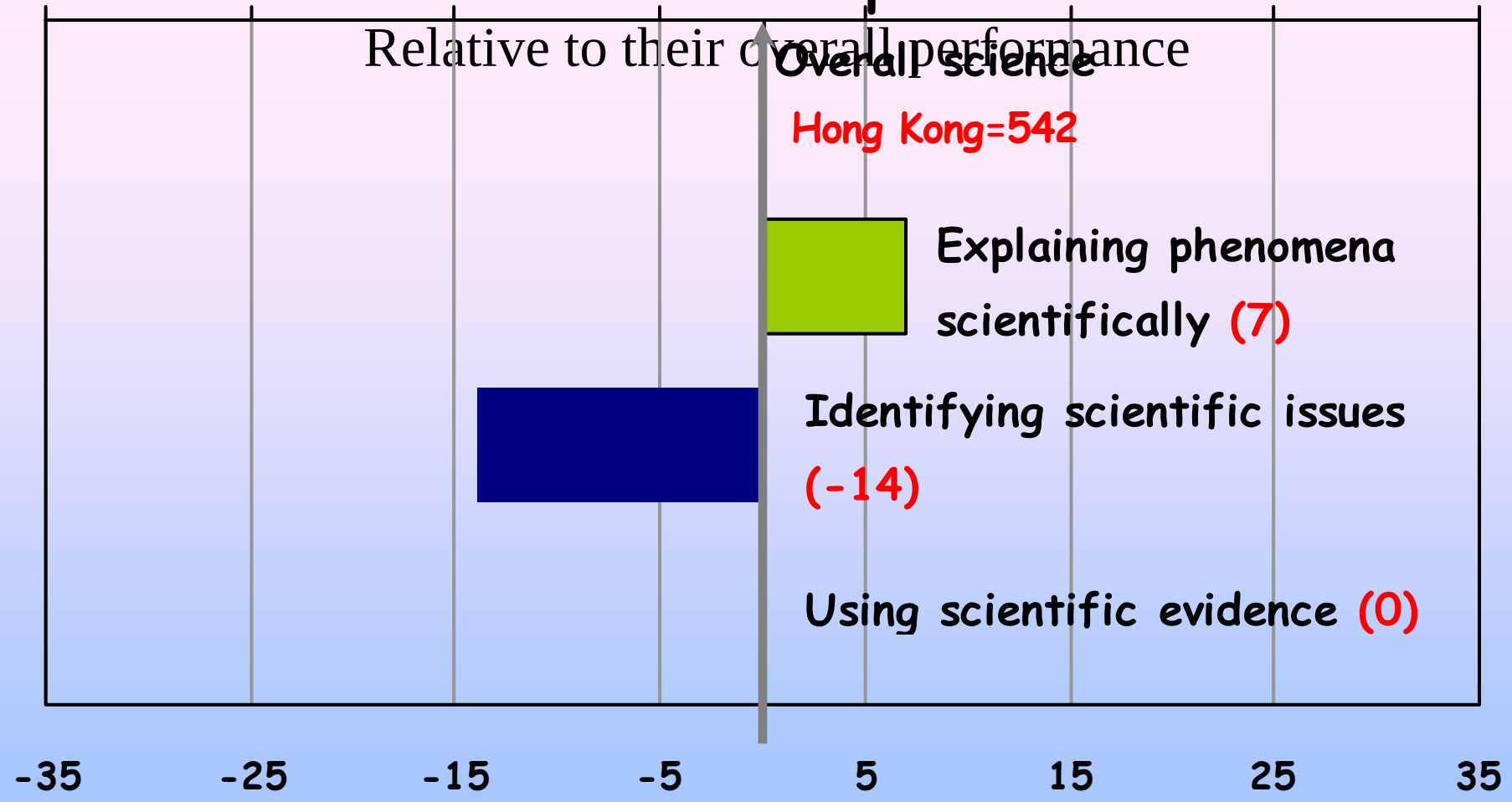
Chinese students: strong in explaining phenomena scientifically and weak in identifying scientific issues

Performance in different competencies of scientific literacy



HK students' performance in different competencies

Relative to their overall performance

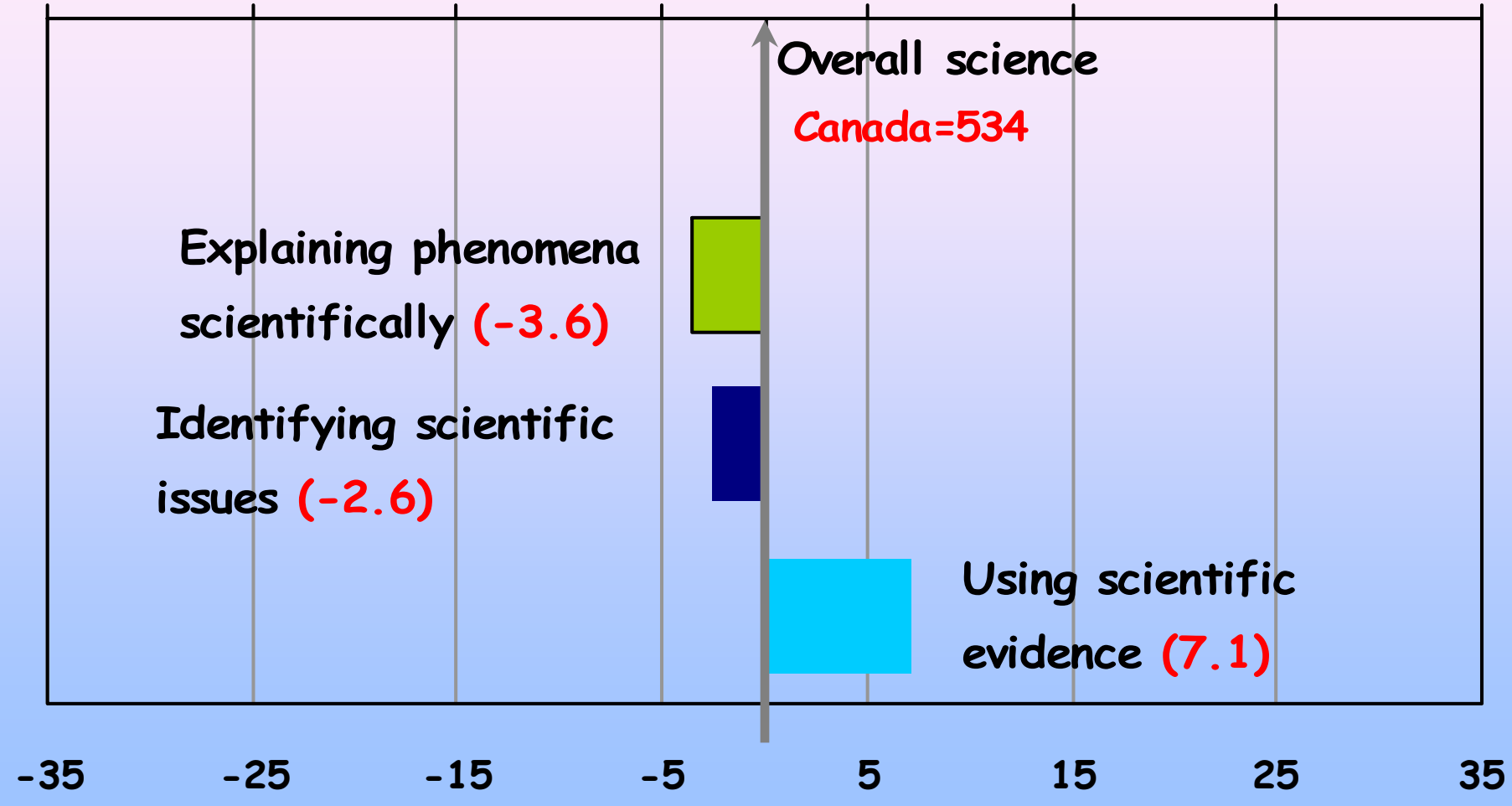


Chinese students: Stronger in 'Explaining phenomena scientifically'

Weaker in 'Identifying scientific issues'

Canadian students' performance in different competencies

Relative to their overall performance



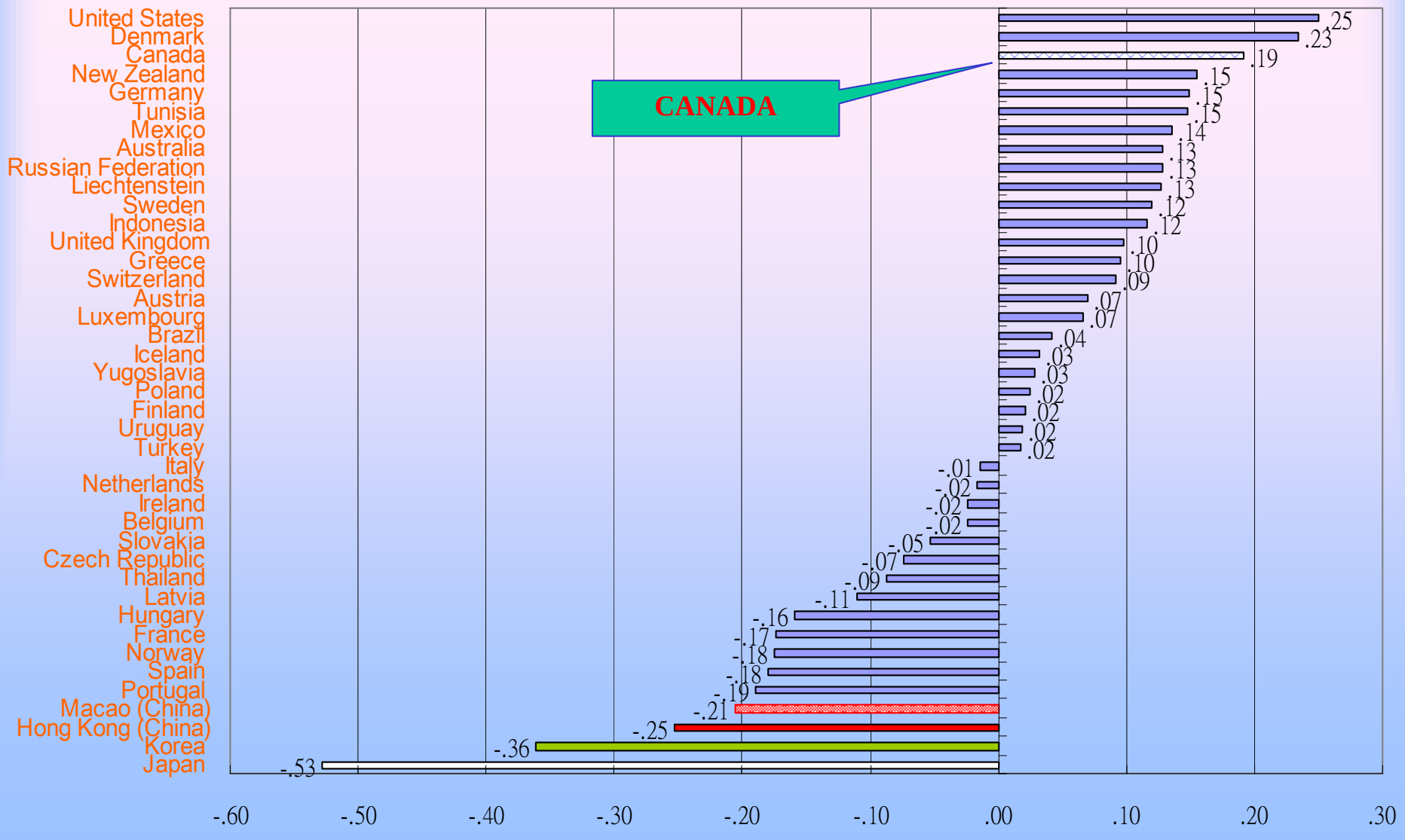
Affective Outcomes

Self concept and Self Efficacy in Math and Science

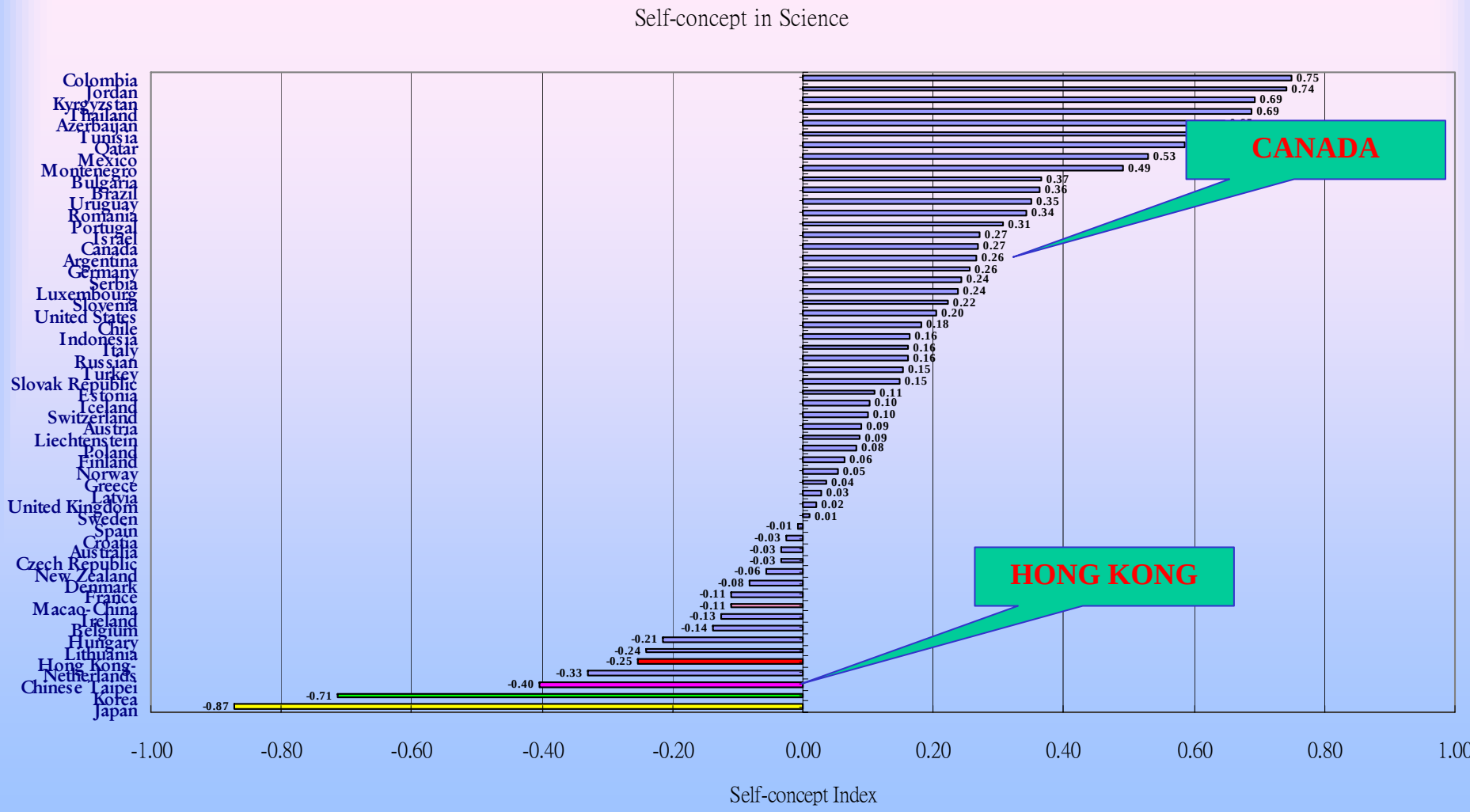
Self concept and self efficacy of East Asian Societies (PISA2003 & 2006)

	Hong Kong	Macao	Japan	Korea	CANADA	USA
Self-concept in Math	-0.26	-0.20	-0.53	-0.35	0.19	0.25
Self-Concept in Science	-0.25	-0.11	-0.87	-0.71	0.27	0.20
Self-Efficacy in Science	0.06	-0.11	-0.53	-0.21	0.21	0.22
Self-efficacy in Math	0.11	0.08	-0.53	-0.42	0.25	0.27

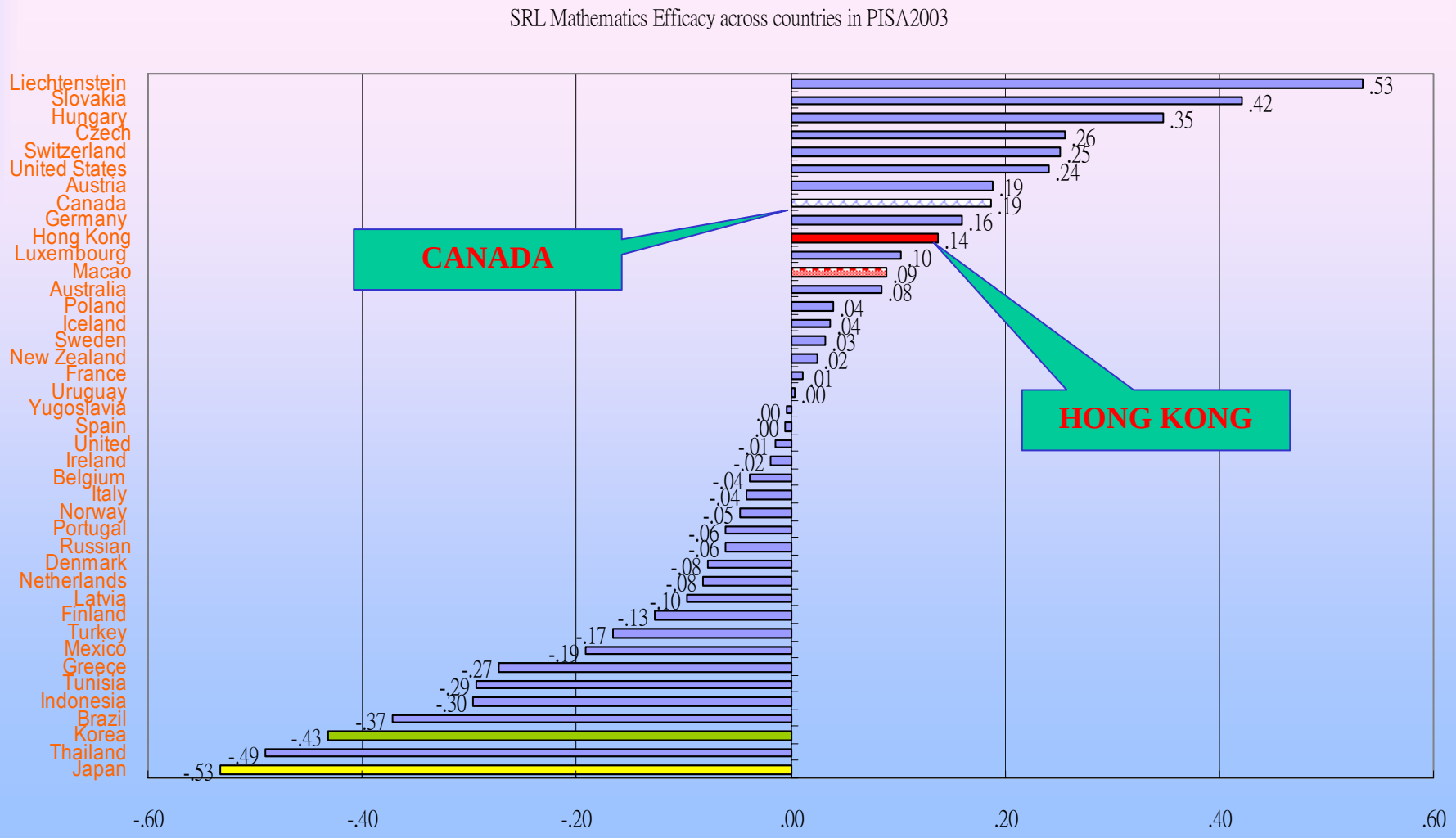
Self concept in Math



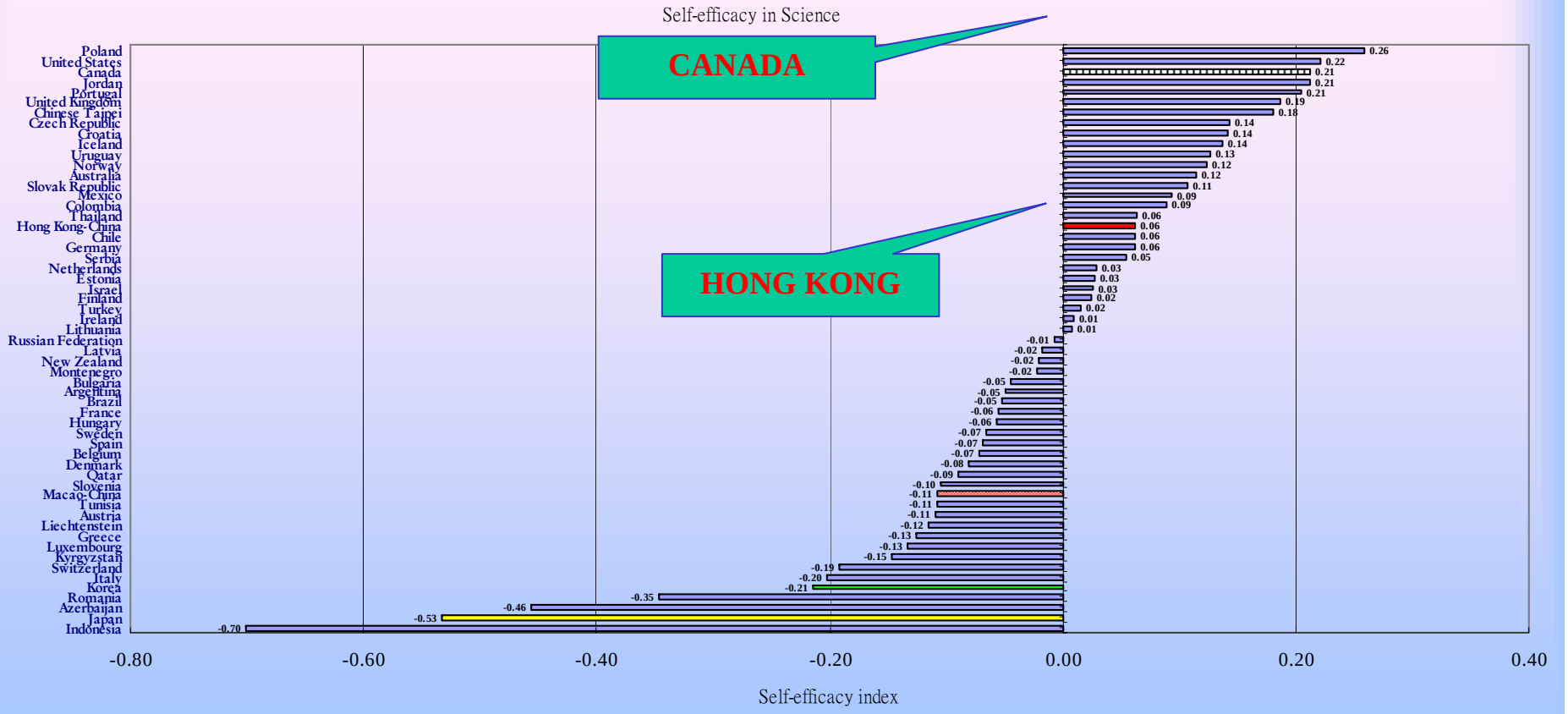
Self-concept in Science



Self-efficacy in Math



Self-efficacy in Science



Student Learning Characteristics

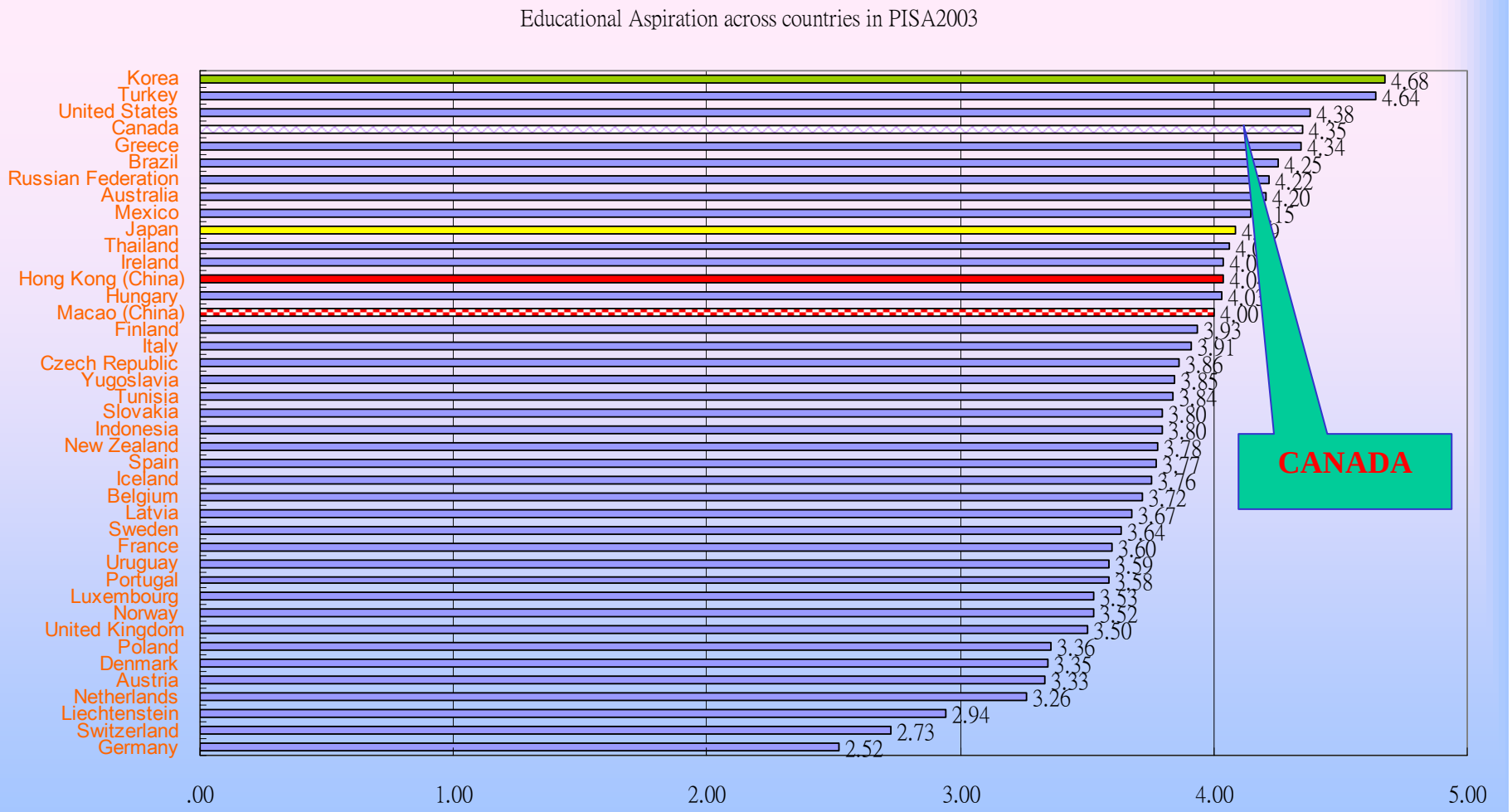
- Educational Aspiration
- Anxiety in Math
- Intrinsic motivation
  (Interest or Enjoyment in Math and Science)
- Extrinsic motivation
  (Instrumental)

Learners' Characteristics (1)
Aspiration and Anxiety

Table 2. Educational Aspiration and Anxiety of East Asian Societies (PISA2003)

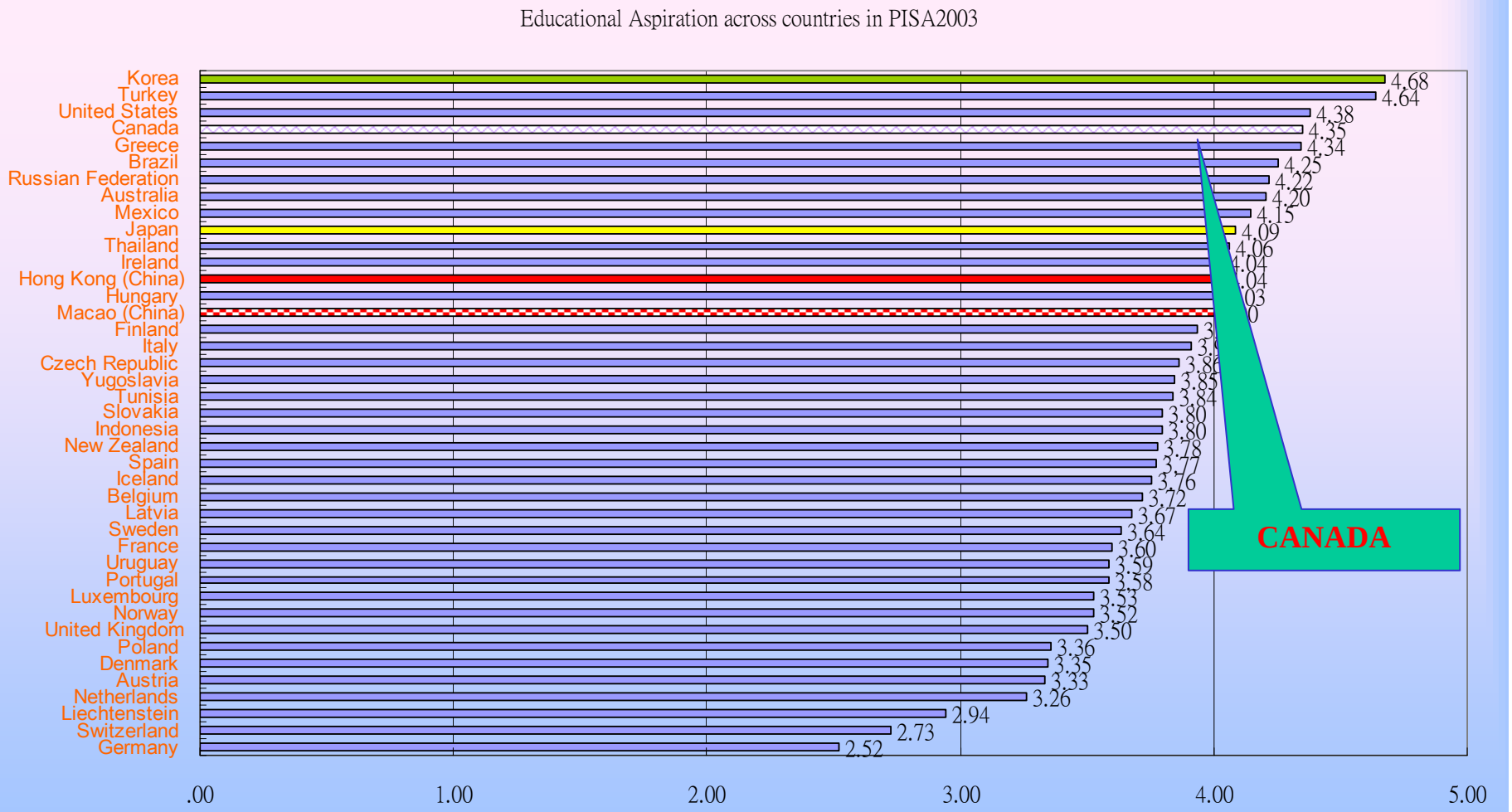
	Hong Kong	Macao	Japan	Korea	CANADA	USA
Educational Aspiration	4.01	4.04	4.10	4.69	4.39	4.38
Anxiety in Math	0.23	0.24	0.44	0.41	-0.04	-0.10

Educational Aspiration



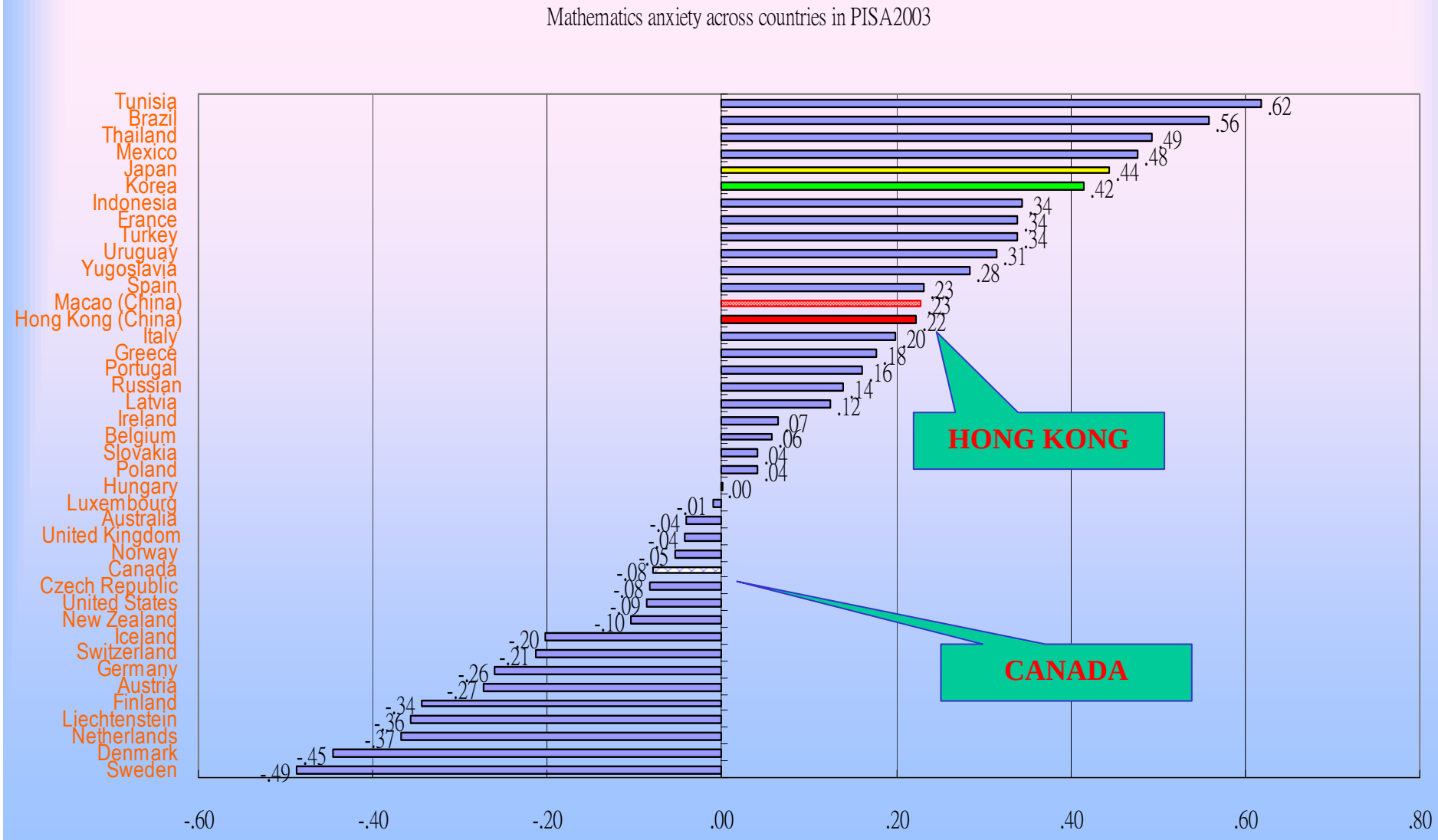
- Relative high educational aspiration across the 4 East Asian Societies

Educational Aspiration



•Relative high educational aspiration across the 4 East Asian Societies

Anxiety in Math

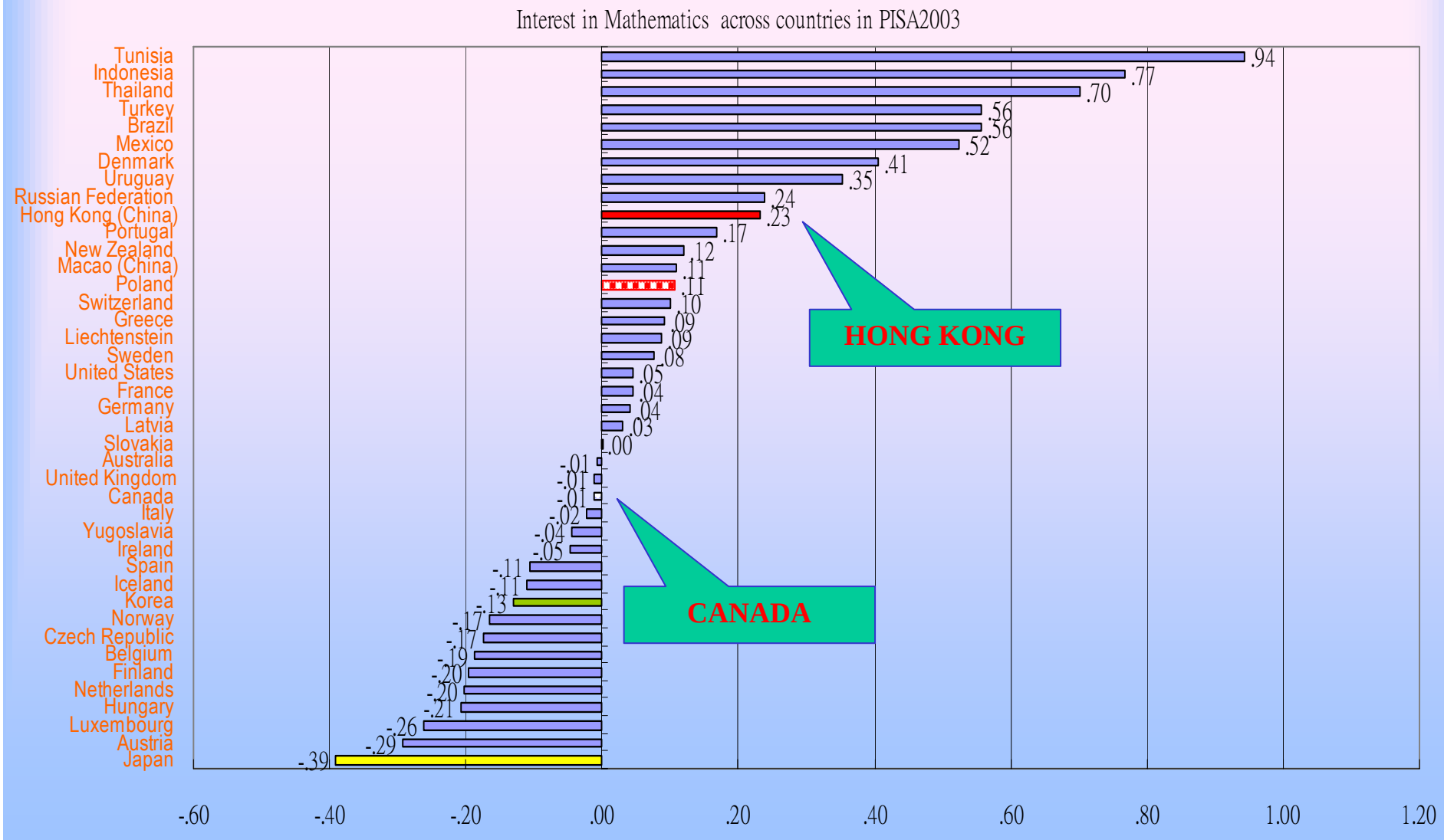


Learners' Characteristics (2) Motivation in Math and Science

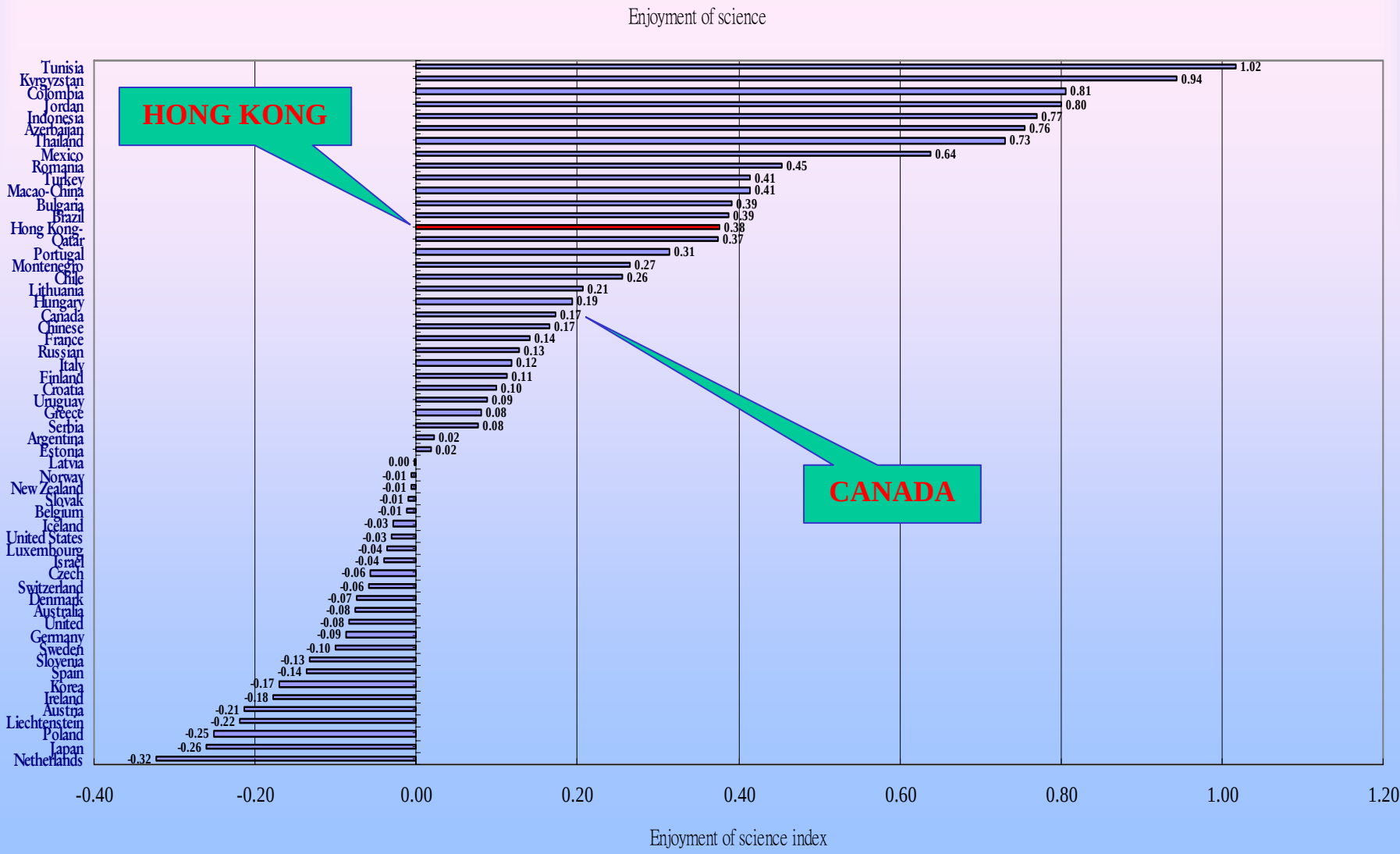
Intrinsic and Extrinsic Motivation of East Asian Societies (PISA2003 & 2006)

	Hong Kong	Macao	Japan	Korea	CANADA	USA
Intrinsic Motivation in Math	0.22	0.13	-0.39	-0.12	-0.01	0.04
Enjoyment of Science	0.38	0.41	-0.26	-0.17	0.17	-0.03
Extrinsic Motivation in Math	-0.12	-0.03	-0.66	-0.44	0.23	0.17
Instrumental Motivation in Science	0.16	0.39	-0.43	-0.26	0.32	0.29

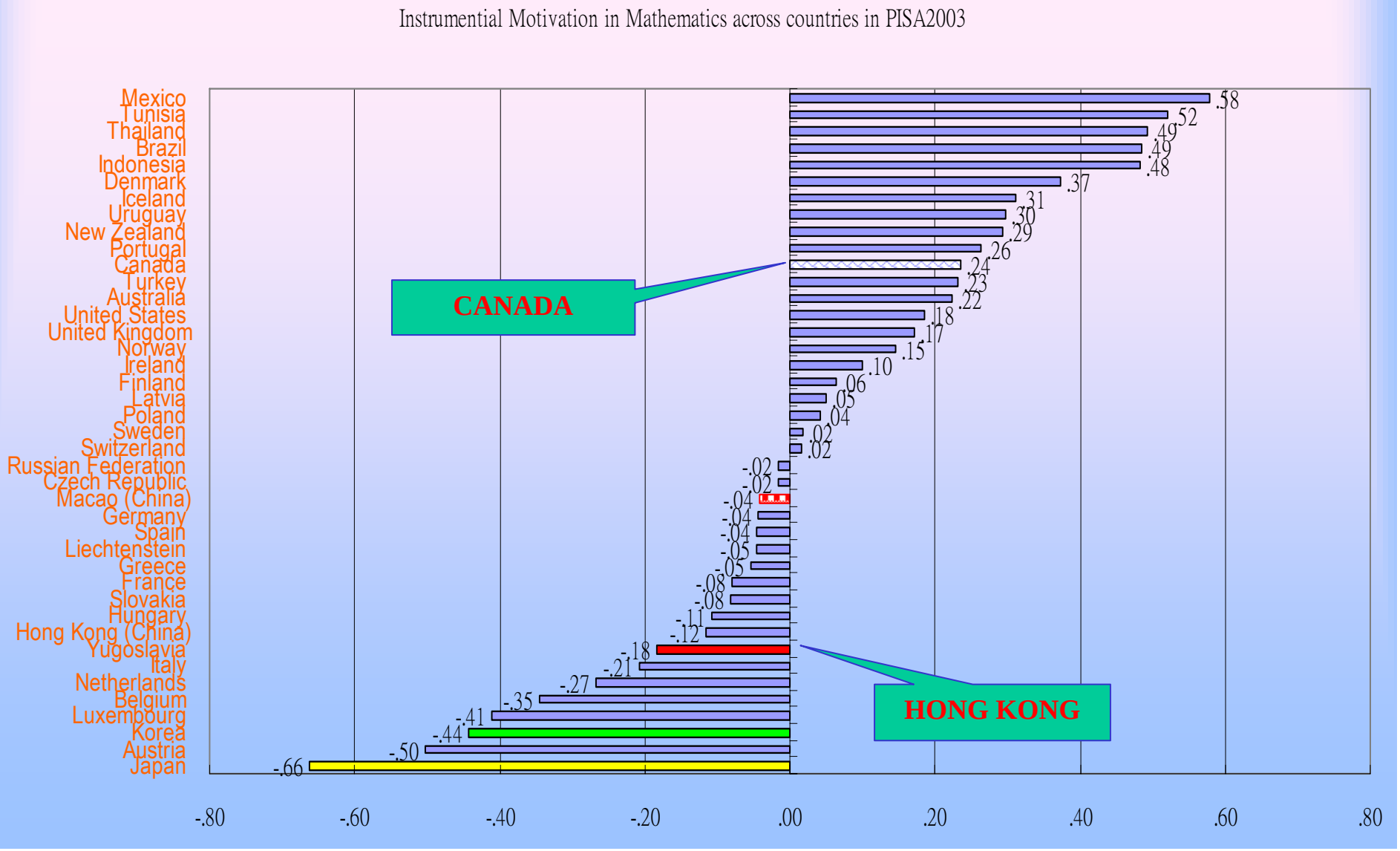
Intrinsic Motivation in Math



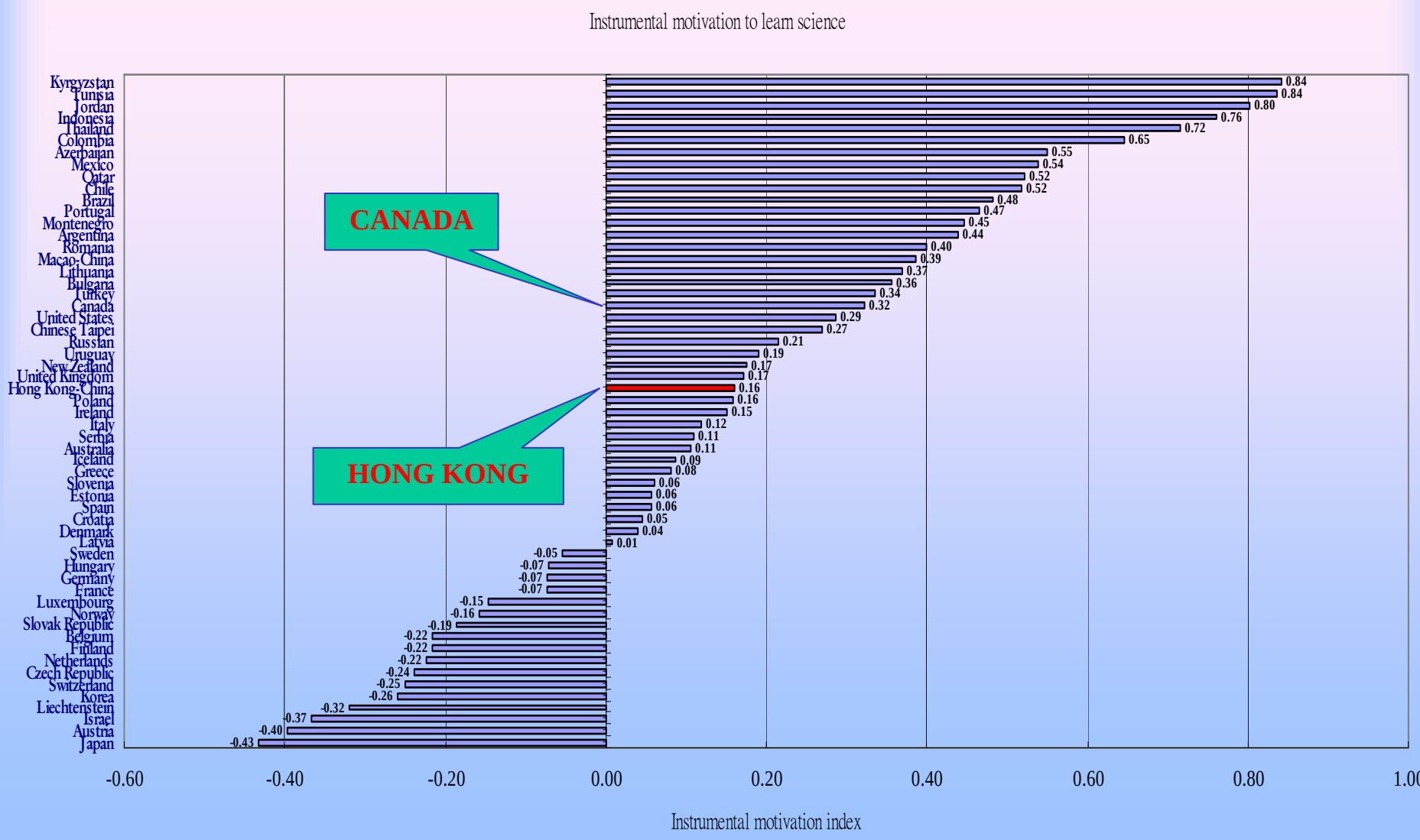
Enjoyment of Science



Extrinsic Motivation in Math



Instrumental Motivation in Science

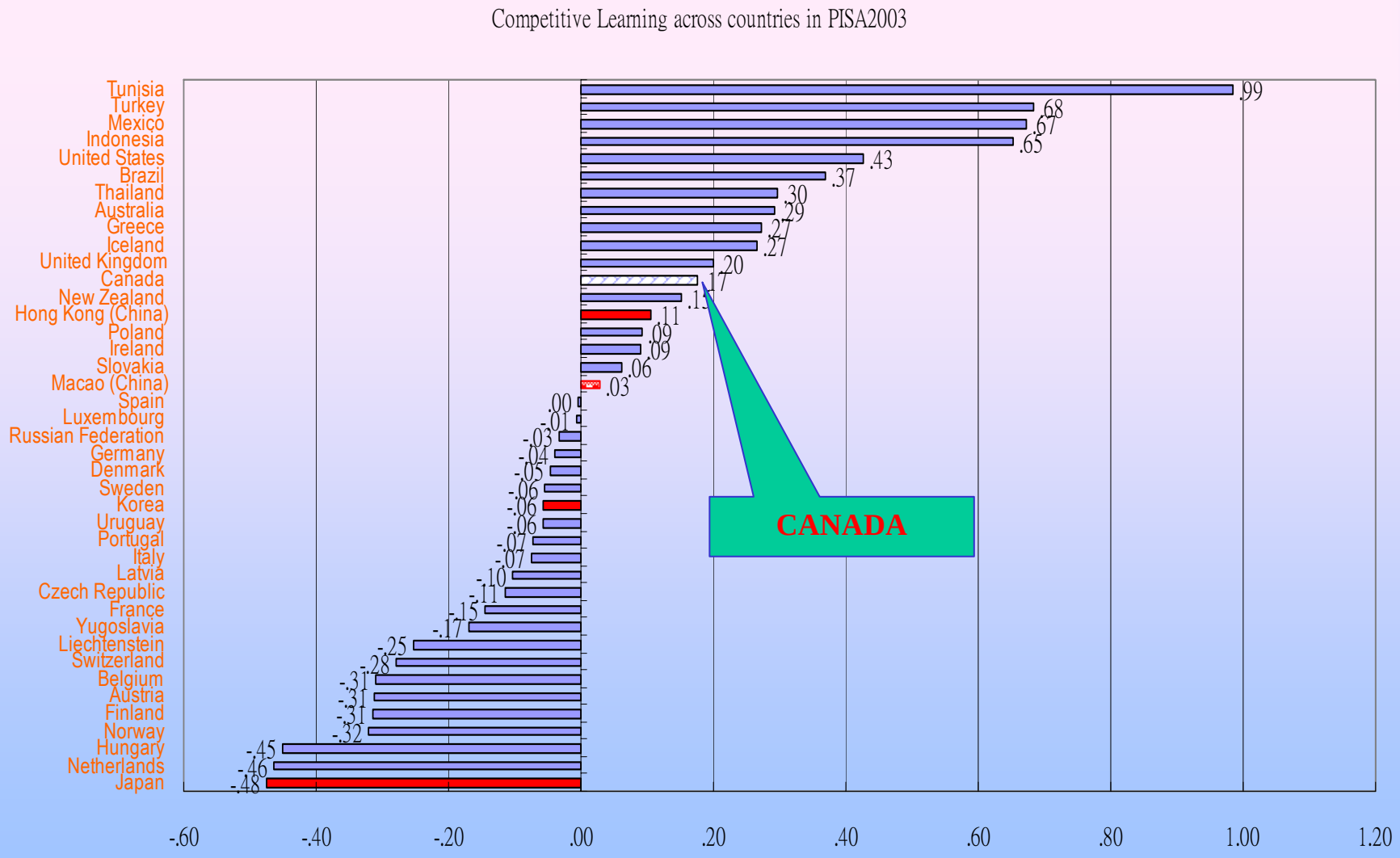


Learning Strategies in Math Class

Table 5 Learning Strategies and Learning Environment of East Asian Learners (PISA2003)

	Hong Kong	Macao	Japan	Korea	CANADA	USA
Memorization strategies	-0.15	-0.03	-0.56	-0.35	0.16	0.31
Elaboration strategies	0.00	0.04	-0.75	-0.39	0.08	0.18
Competitive learning	0.10	0.02	-0.47	-0.05	0.19	0.41
Co-operative learning	-0.04	0.11	-0.73	-0.77	0.14	0.27

Competitive Learning



Cooperative Learning

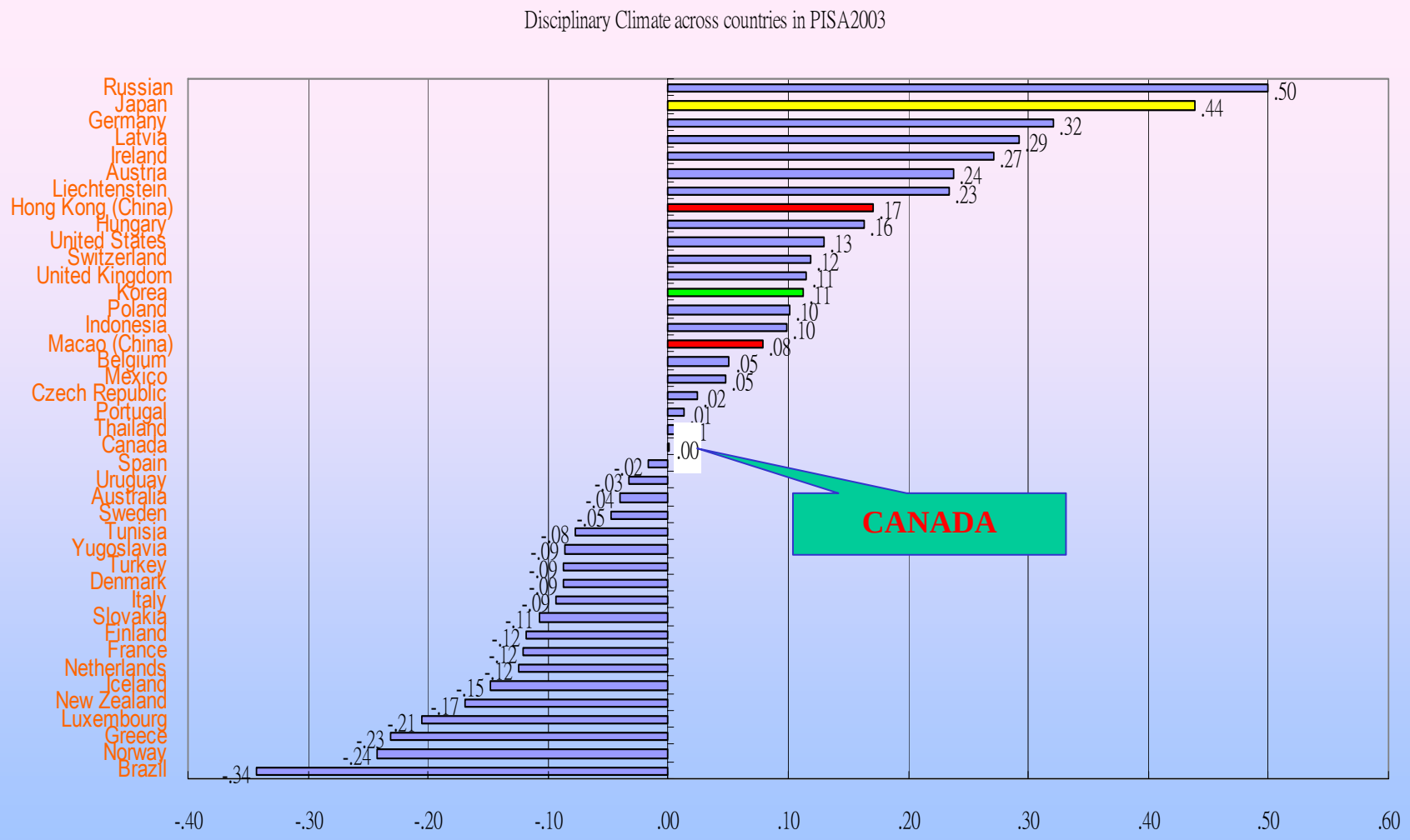
OECD average=0.00

School Climate

Table 6. Teaching and Learning Environment of Four East Asian Societies (PISA2003)

	Hong Kong	Macao	Japan	Korea	CANADA	USA
Disciplinary climate in Math lessons	0.15	0.09	0.44	0.12	0.02	0.12
Attitudes towards school	-0.52	-0.37	-0.50	-0.37	0.06	0.09
Sense of belonging to school	-0.61	-0.61	-0.53	-0.39	0.02	NA

Disciplinary Climate

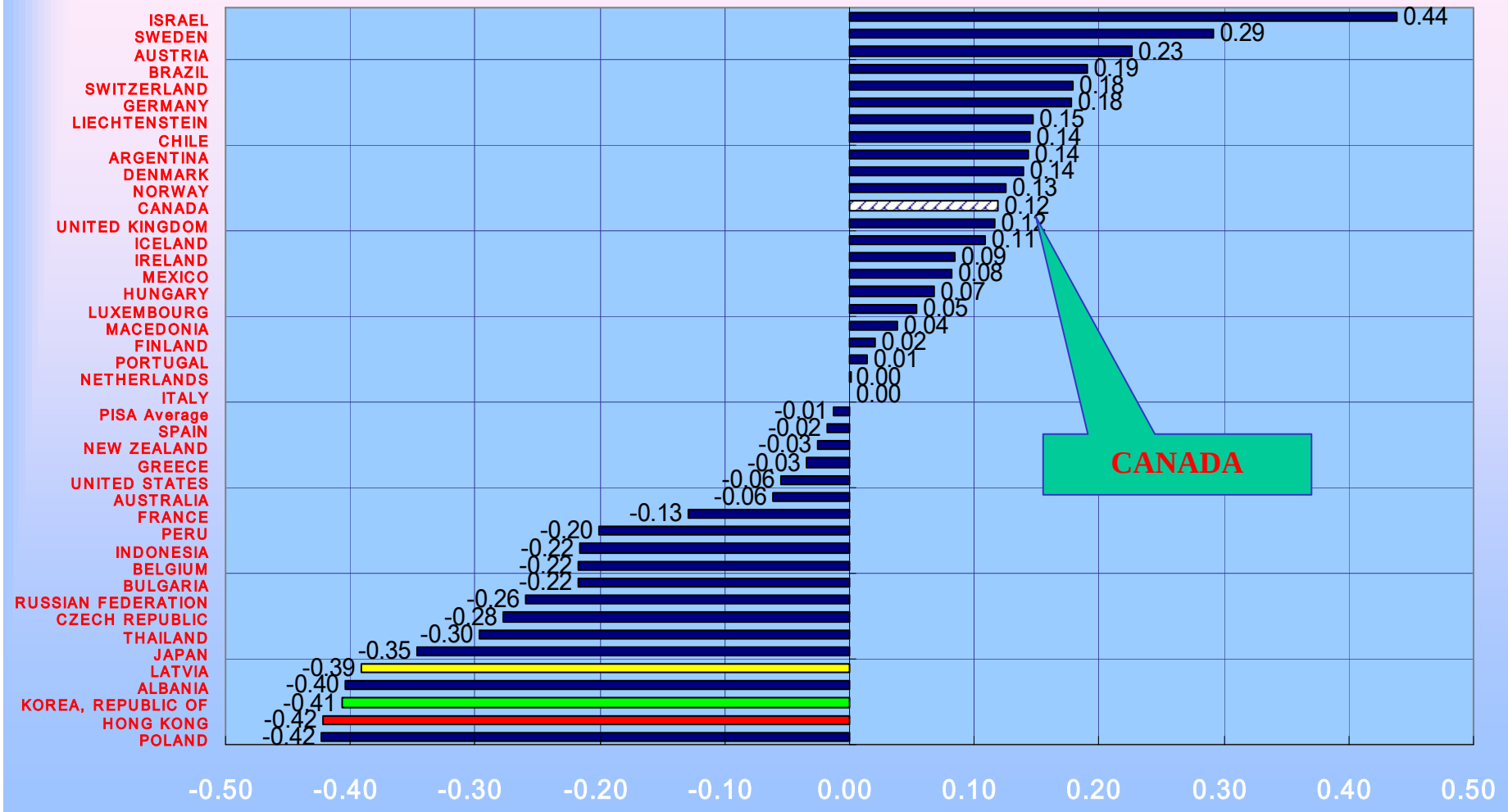


Sense of Belonging

Sample items:

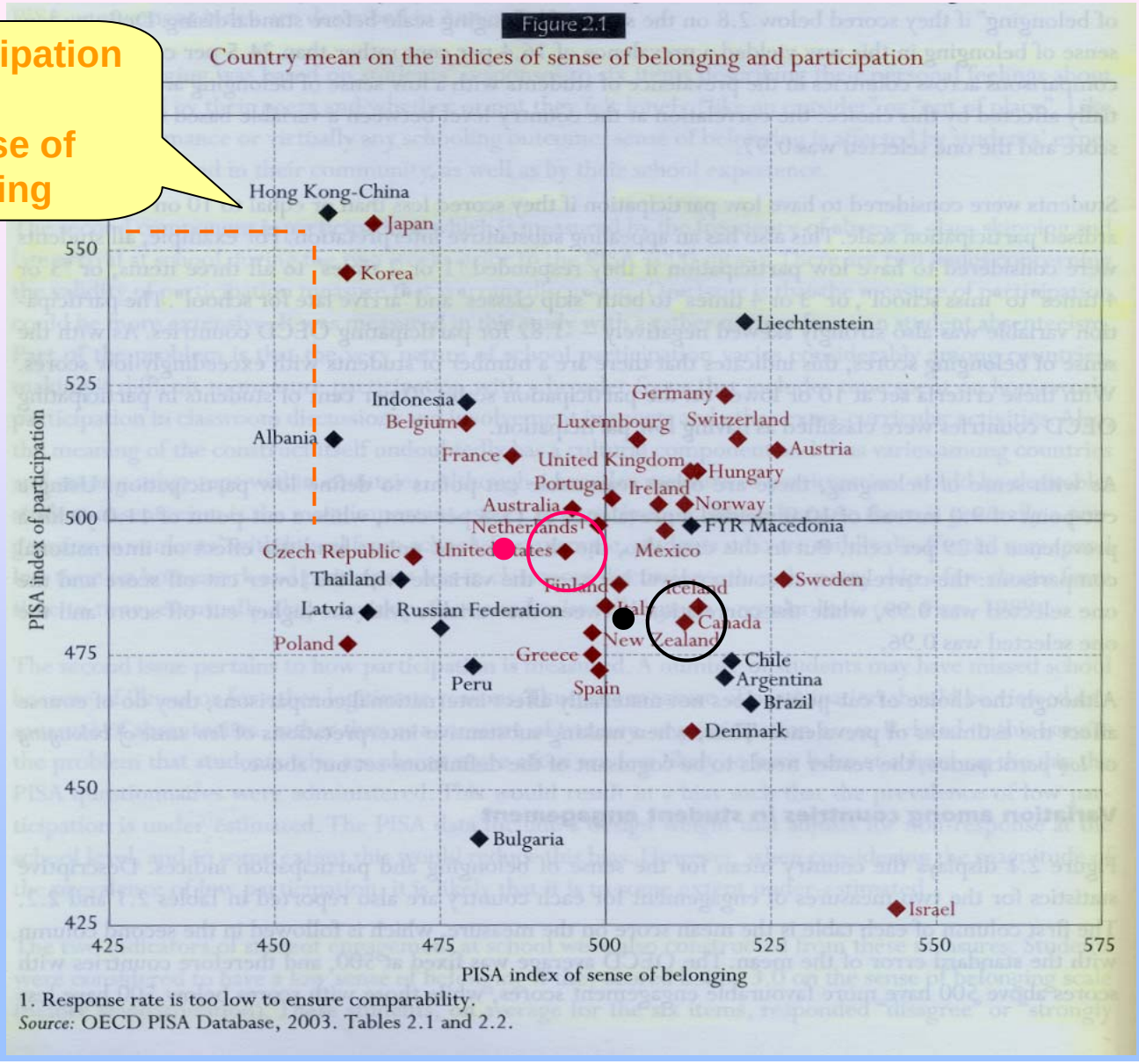
I feel like an outsider; I make friends easily; I feel like I belong; I feel lonely

School Climate: Sense of Belonging



Challenges of East-Asian Schools

High participation but low sense of belonging



1. Response rate is too low to ensure comparability.
Source: OECD PISA Database, 2003. Tables 2.1 and 2.2.

Concluding Remarks (1)

Similarities across four East-Asian countries

		Hong Kong	Macao	Japan	Korea
1.	Educational Aspiration	4.04	4.00	4.09	4.68
2.	Anxiety in Math	0.22	0.23	0.44	0.42
3.	Self-concept in Math	-0.25	-0.21	-0.53	-0.36
4.	Extrinsic Motivation in Math	-0.12	-0.04	-0.66	-0.44
5.	Disciplinary climate in Math lessons	0.17	0.08	0.44	0.11
6.	Attitudes towards school	-0.52	-0.36	-0.50	-0.37
7.	Sense of belonging to school	-0.60	-0.62	-0.53	-0.40
8.	Memorisation strategies	-0.15	-0.05	-0.57	-0.35

Concluding Remarks (2)

Differences between the Chinese vs non-Chinese Societies

		Hong Kong	Macao	Japan	Korea
1.	Self-efficacy in Math	0.14	0.09	-0.53	-0.43
2.	Interest in Math	0.23	0.11	-0.39	-0.13
3.	Enjoyment of Science	0.38	0.41	-0.26	-0.17
4.	Elaboration strategies	0.01	0.05	-0.75	-0.40
5.	Competitive learning	0.11	0.03	-0.48	-0.06
6.	Co-operative learning	-0.02	0.14	-0.72	-0.78

Convergences and Divergences of the Characteristics of East Asian Learners

- High Academic Achievement in Math and Science for all the five East Asian Learners.
- High Educational Aspiration and also High Testing Anxiety across the East Asian Societies
- Extremely Low Self-concept for all the East Asian Learners but relatively higher level of Self-efficacy for Chinese Learners
- Low Extrinsic Motivation across the four East Asian Learners, but relatively higher level of intrinsic motivation for Chinese Learners.
- Low Memorization across the East Asian Learners, but relatively higher level of Elaboration for Chinese Learners
- Higher level of Competitive and Cooperative learning in the Chinese Classroom.
- Orderly Disciplinary Climate but extremely low Sense of Belongings in the East Asian Societies.

HKPISA Centre

Further information

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THANK YOU!