Trends in International Mathematics and Science Study
TIMSS 2007

Results of Québec Students on the 2007 Mathematics and Science Assessments

Québec

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Ministère de l'Éducation, du Loisir et du Sport

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1. Introduction

TIMSS 2007 is the fifth international mathematics and science study to be led by the International Association for the Evaluation of Education Achievement (IEA).

This study, which took place in April 2007, was designed to assess the knowledge of students in the second year of Elementary Cycle Two (Elementary 4, or four years of schooling), and those in the second year of Secondary Cycle One (Secondary II, or eight years of schooling), in order to compare the performance of participating countries and school jurisdictions and to provide information on school curricula and instructional methods. The 2007 study also gave participants of the 2003, 1999, 1995 and 1991 assessments the opportunity to track any changes that may have occurred during the four-year interval between each of the studies.

Thirty-six countries and seven school jurisdictions, including Québec, took part in the 2007 study involving Elementary 4 students. Canada, as a whole, did not participate in the 2007 study, but three other Canadian provinces (Alberta, British Columbia and Ontario) did. Although the United States participated as a country, two American states (Massachusetts and Minnesota) also took part individually. Dubai, one of the United Arab Emirates, also participated individually in the study. The report therefore covers the results of 43 countries and school jurisdictions in total, representing a significant 50% increase from four years ago.

Québec's sample of Elementary 4 students comprised 200 public and private schools in both the French and English sectors (4645 students); however, 186 schools actually took part in the study, that is, 3885 students, of whom 51% were girls and 49%, boys. The students all wrote a mathematics assessment and a science assessment, each lasting 36 minutes. They then answered a brief questionnaire on their attitudes regarding these two school subjects. Teachers and school principals also filled out a questionnaire, and specialists provided information about the mathematics and science curricula.

Forty-nine countries and seven school jurisdictions, including Québec, took part in the 2007 study involving Secondary II students. Canada, as a whole, did not participate, but two other Canadian provinces (British Columbia and Ontario) did. Although the United States participated as a country, two American states (Massachusetts and Minnesota) also took part individually. The Basque Country, an autonomous community of Spain, and Dubai, one of the United Arab Emirates, also participated individually in the study. The report therefore covers the results of 56 countries and school jurisdictions in total.

Québec's sample of Secondary II students comprised 191 public and private schools in both the French and English sectors (4739 students); however, 170 schools actually took part in the

study, that is, 3956 students, of whom 49% were girls and 51%, boys. The students wrote a mathematics assessment and a science assessment, each lasting 45 minutes. They then answered a brief questionnaire on their attitudes regarding these two school subjects. Teachers and school principals also filled out a questionnaire, and specialists provided information about the mathematics and science curricula.

This report presents the results achieved by Québec students, compares their performance with those of the other international and Canadian participants, and highlights any changes observed since the other assessments, in which Québec also participated. The data are taken from the international report entitled *TIMSS 2007, Trends in International Mathematics and Science Study at the Fourth and Eighth Grades.*[1] This report does not present the information gathered from teachers, school principals and content specialists.

2. Mathematics achievement of Elementary 4 students

The TIMSS 2007 mathematics assessment covered three major content domains, namely *number*, *geometric shapes and measures*; and *data display*. It also covered three cognitive domains: *knowing*, *applying* and *reasoning*. The assessment consisted of multiple-choice, short-answer, constructed response and problem-solving questions.

2.1 Performance on the mathematics assessment

Québec ranked 14th among the participating countries. Québec's result was significantly higher than the international average, but two other school jurisdictions (Massachusetts and Minnesota) performed better.

[1] Available on the Boston College site at http://timss.bc.edu/.

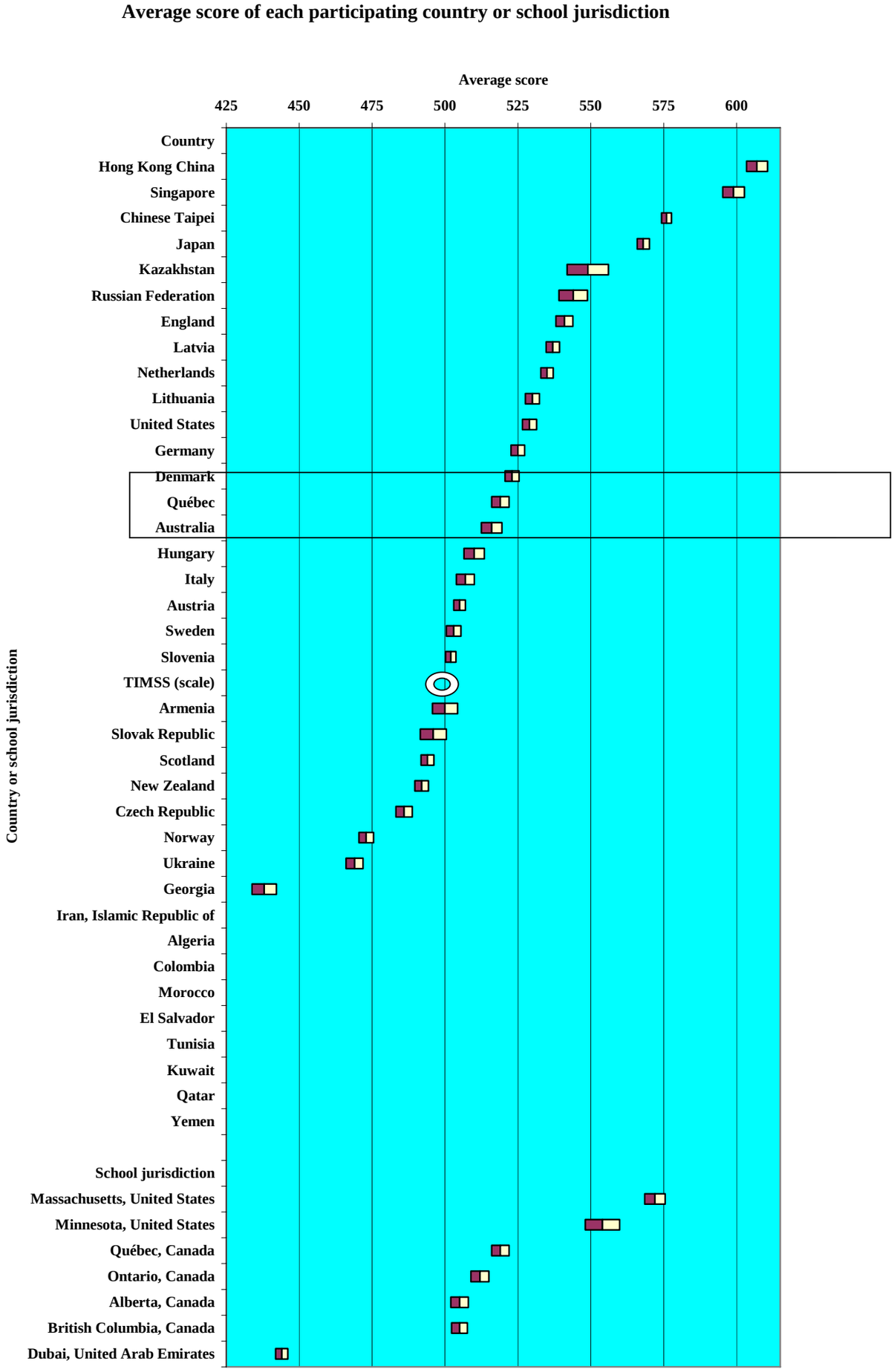
Table 1: Mathematics achievement of Elementary 4 students, by country or school jurisdiction

Country or school jurisdiction	Score	Standard error
Hong Kong SAR	607	3.6
Singapore	599	3.7
Chinese Taipei	576	1.7
Japan	568	2.1
Kazakhstan	549	7.1
Russian Federation	544	4.9
England	541	2.9
Latvia	537	2.3
Netherlands	535	2.1
Lithuania	530	2.4
United States	529	2.4
Germany	525	2.3
Denmark	523	2.4
Québec	**519**	**3.0**
Australia	516	3.5
Hungary	510	3.5
Italy	507	3.1
Austria	505	2.0
Sweden	503	2.5
Slovenia	502	1.8
TIMSS (scale)	500	
Armenia	500	4.3
Slovak Republic	496	4.5
Scotland	494	2.2
New Zealand	492	2.3
Czech Republic	486	2.8
Norway	473	2.5
Ukraine	469	2.9
Georgia	438	4.2
Iran, Islamic Republic of	402	4.1
Algeria	378	5.2
Colombia	355	5.0
Morocco	341	4.7
El Salvador	330	4.1
Tunisia	327	4.5
Kuwait	316	3.6
Qatar	296	1.0
Yemen	224	6.0
Massachusetts, United States	572	3.5
Minnesota, United States	554	5.9
Québec, Canada	**519**	**3.0**
Ontario, Canada	512	3.1
Alberta, Canada	505	3.0
British Columbia, Canada	505	2.7
Dubai, United Arab Emirates	444	2.1

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

Key	
Ranked higher than Québec	
Ranked equal to Québec	
Ranked lower than Québec	

Graph 1: Mathematics achievement of Elementary 4 students, by country or school jurisdiction



Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

2.2 Achievement by gender

No significant differences were observed between boys and girls in 19 of the participating countries and school jurisdictions. Of the others, 16 countries and school jurisdictions, including Québec, showed a significant difference in favour of boys, while 8 countries and jurisdictions reported a significant difference in favour of girls. In Québec, the difference between boys and girls was significant, at 9 points in favour of the boys.

Table 2: Mathematics achievement of Elementary 4 students, by gender

	Québec score	Standard error	International average	Standard error
Girls	**515**	**3.5**	473	0.7
Boys	**524**	**3.3**	473	0.7

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

2.3 Achievement by language of instruction

A significant 22-point difference in the achievement of Anglophone and Francophone students in Québec was observed, in favour of the Francophone students. However, all the results for Québec were significantly above the international average.

Table 3: Mathematics achievement of Elementary 4 students, by language of instruction

	Québec score	Standard error
English	**499**	**4.0**
French	**521**	**3.2**

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

2.4 Achievement by content domain

Québec students obtained their lowest score in *number*. Boys performed better than girls in all three domains, but particularly in *number*, where the difference was 14 points. The smallest difference (2 points) was observed in *geometric shapes and measures* and *data display*. Québec's students were most successful in *data display*.

Table 4: Mathematics achievement of Elementary 4 students, by content domain

Content domain	All		Girls		Boys	
	Score	Standard error	Score	Standard error	Score	Standard error
Number	511	3.0	**504**	**3.3**	**518**	**3.8**
Geometric shapes and measures	525	3.2	524	3.4	526	4.1
Data display	527	3.6	526	4.8	528	3.9

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

2.5 Achievement by cognitive domain

Québec's students were most successful in *reasoning*, and this was also the domain where the difference between boys and girls was the smallest, at just 6 points. Boys outperformed girls in all three domains, but not always significantly. The difference was greatest in the domain of *knowing* (11 points).

Table 5: Mathematics achievement of Elementary 4 students, by cognitive domain

Cognitive domain	All		Girls		Boys	
	Score	Standard error	Score	Standard error	Score	Standard error
Knowing	517	2.8	**512**	**3.1**	**523**	**3.2**
Applying	517	2.7	514	3.9	521	3.6
Reasoning	524	3.2	520	3.7	526	3.2

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

2.6 Achievement levels

What students know and can do in mathematics is summarized in Table 6 for the TIMSS 1995, 2003 and 2007 assessments in terms of the percentage of students reaching the four international benchmarks identified for mathematics achievement. The *advanced* benchmark corresponds to a scale score of 625, the *high* benchmark to 550, the *intermediate* benchmark to 475 and the *low* benchmark to 400. In general, the countries with very good scores also obtained the best percentages for each of the benchmarks. Countries with poor results had virtually no students reaching the *advanced* benchmark. Internationally, 90% of the students reached the *low* benchmark, compared with 96% of Québec students. Québec ranked 9th among the participating countries and school jurisdictions.

In Québec, the 2007 percentages were significantly higher than their 2003 levels for each benchmark. Internationally, the results for three of the four benchmarks were lower than in 2003; only the results for the *low* benchmark were better.

Table 6: Percentage of Elementary 4 students reaching the TIMSS international benchmarks of mathematics achievement

	International benchmarks (achievement levels)							
	Advanced (625 points)		High (550 points)		Intermediate (475 points)		Low (400 points)	
	% of students		% of students		% of students		% of students	
Year	International	Québec	International	Québec	International	Québec	International	Québec
2007	5	5 (0.7)	26	34 (2.2)	67	74 (1.6)	90	96 (0.6)
2003	10	3 (0.4)	36	25 (1.5)	69	69 (1.4)	88	94 (0.8)
1995	10	13 (1.9)	33	50 (3.4)	63	87 (1.7)	85	98 (0.7)

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

3. Mathematics achievement of Secondary II students

The TIMSS 2007 mathematics assessment covered four major content domains: *number*, *algebra*, *geometry* and *data and chance*. It also covered three cognitive domains: *knowing*, *applying* and *reasoning*. The assessment consisted of multiple-choice, short-answer, constructed response and problem-solving questions.

3.1 Performance on the mathematics assessment

Québec came out as one of the top-ranking participants among the 56 countries and school jurisdictions that took part in the study, in 6th position behind Chinese Taipei, Korea, Singapore, Hong Kong SAR and Japan. Two school jurisdictions (Massachusetts and Minnesota) also performed better than Québec. The other two participating Canadian provinces (Ontario and British Columbia) ranked below Québec.

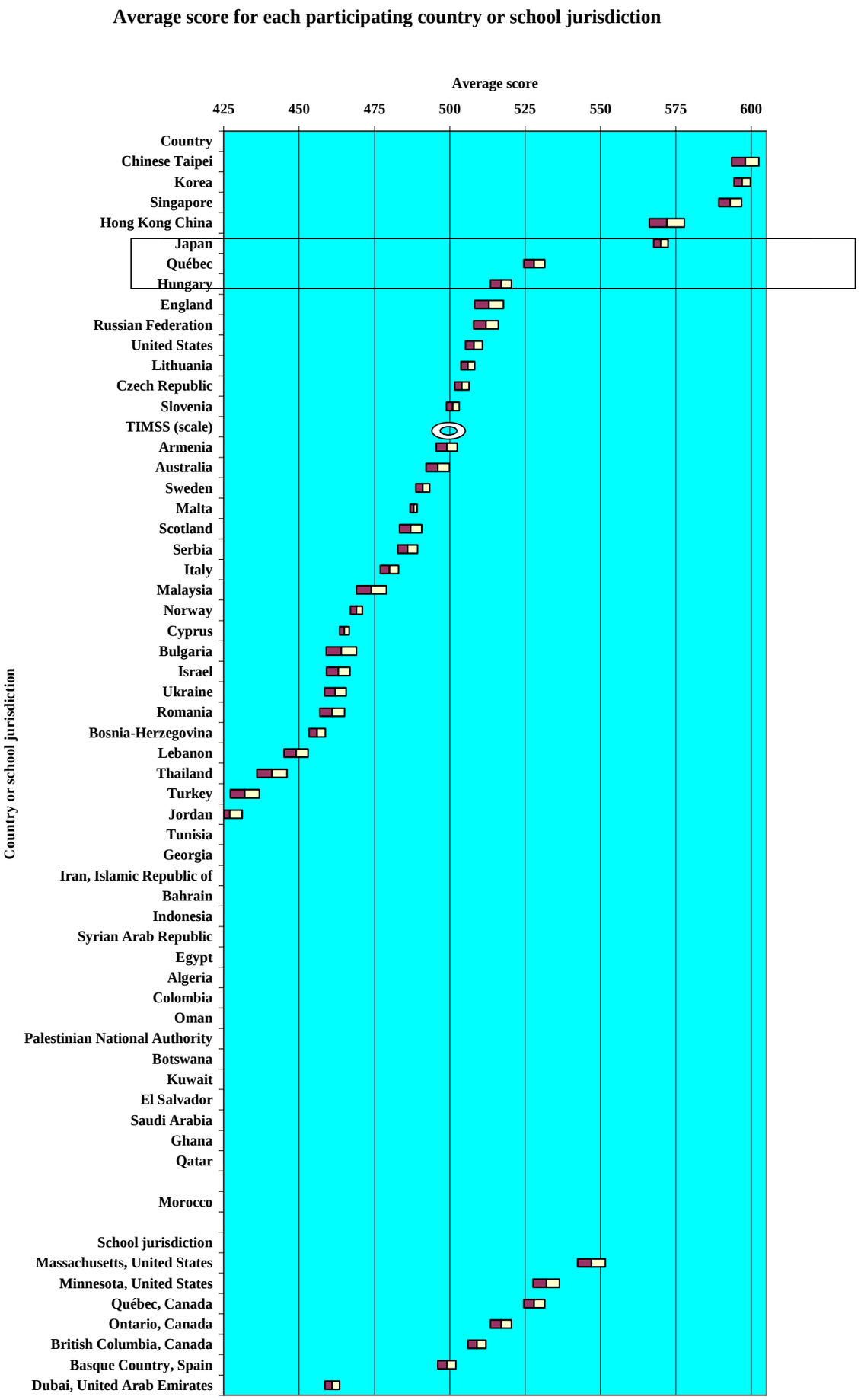
Table 7: Mathematics achievement of Secondary II students, by country or school jurisdiction

Country or school jurisdiction	Score	Standard error
Chinese Taipei	598	4.5
Korea	597	2.7
Singapore	593	3.8
Hong Kong SAR	572	5.8
Japan	570	2.4
Québec	**528**	**3.5**
Hungary	517	3.5
England	513	4.8
Russian Federation	512	4.1
United States	508	2.8
Lithuania	506	2.3
Czech Republic	504	2.4
Slovenia	501	2.1
TIMSS (scale)	500	
Armenia	499	3.5
Australia	496	3.9
Sweden	491	2.3
Malta	488	1.2
Scotland	487	3.7
Serbia	486	3.3
Italy	480	3.0
Malaysia	474	5.0
Norway	469	2.0
Cyprus	465	1.6
Bulgaria	464	5.0
Israel	463	3.9
Ukraine	462	3.6
Romania	461	4.1
Bosnia-Herzegovina	456	2.7
Lebanon	449	4.0
Thailand	441	5.0
Turkey	432	4.8
Jordan	427	4.1
Tunisia	420	2.4
Georgia	410	5.9
Iran, Islamic Republic of	403	4.1
Bahrain	398	1.6
Indonesia	397	3.8
Syrian Arab Republic	395	3.8
Egypt	391	3.6
Algeria	387	2.1
Colombia	380	3.6
Oman	372	3.4
Palestinian National Authority	367	3.5
Botswana	364	2.3
Kuwait	354	2.3
El Salvador	340	2.8
Saudi Arabia	329	2.9
Ghana	309	4.4
Qatar	307	1.4
Morocco	381	3.0
Massachusetts, United States	547	4.6
Minnesota, United States	532	4.4
Québec, Canada	**528**	**3.5**
Ontario, Canada	517	3.5
British Columbia, Canada	509	3.0
Basque Country, Spain	499	3.0
Dubai, United Arab Emirates	461	2.4

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

Key	
Ranked higher than Québec	
Ranked equal to Québec	
Ranked lower than Québec	

Graph 2: Mathematics achievement of Secondary II students, by country or school jurisdiction



Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

3.2 Achievement by gender

No significant differences were observed between the boys' and the girls' performances in 30 of the 56 participating countries and school jurisdictions. In 10 of the countries and school jurisdictions, a significant difference in favour of boys was observed, while in 16 countries, a significant difference in favour of girls was observed. The average international difference was 5 points in favour of girls. In Québec, the difference of just 2 points, in favour of boys, was not significant.

Table 8: Mathematics achievement of Secondary II students, by gender

	Québec score	Standard error	International average	Standard error
Girls	527	3.5	453	0.7
Boys	529	4.6	448	0.7

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

3.3 Achievement by language of instruction

Although Anglophone students outperformed Francophone students by 11 points, the difference was not significant. However, Québec's results overall were significantly better than the international average.

Table 9: Mathematics achievement of Secondary II students, by language of instruction

	Québec score	Standard error
English	538	7.5
French	527	3.7

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

3.4 Achievement by content domain

Québec students performed best in the *number* domain. Boys outperformed girls in three of the four domains, but the difference was significant (8 points) only in *data and chance*. Girls outperformed boys in *algebra*, but the difference, at just 5 points, was not significant.

Table 10: Mathematics achievement of Secondary II students, by content domain

Content domain	All		Girls		Boys	
	Score	Standard error	Score	Standard error	Score	Standard error
Algebra	505	3.3	507	3.4	502	4.6
Data and chance	533	3.0	**529**	**3.1**	**537**	**4.1**
Number	534	3.4	531	3.5	537	4.7
Geometry	523	3.3	520	3.6	526	4.4

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

3.5 Achievement by cognitive domain

Québec students performed best in the *knowing* domain. Boys outperformed girls in this domain, by a nonsignificant 8 points. In *applying*, girls outperformed boys by 7 points. In *reasoning*, the difference between the two genders was small and not significant.

Table 11: Mathematics achievement of Secondary II students, by cognitive domain

Cognitive domain	All		Girls		Boys	
	Score	Standard error	Score	Standard error	Score	Standard error
Knowing	529	3.1	525	3.3	533	4.3
Applying	520	2.7	523	3.0	516	3.9
Reasoning	524	3.0	522	3.5	526	4.0

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

3.6 Achievement levels

What students know and can do in mathematics is summarized in Table 12 for the TIMSS assessments since 1995 in terms of the percentage of students reaching the four international benchmarks identified for mathematics achievement. The *advanced* benchmark corresponds to a scale score of 625, the *high* benchmark to 550, the *intermediate* benchmark to 475 and the *low* benchmark to 400. In general, the countries with very good scores also obtained the best percentages for each of the benchmarks. Countries with poor results had virtually no students reaching the *advanced* benchmark. Internationally, only 75% of the students reached the *low* benchmark, compared with 97% of Québec students. Québec ranked 2nd among the participating countries and school jurisdictions, behind Korea.

In Québec, the 2007 percentages were lower than their 2003 levels for three of the four benchmarks. The only percentage to not change was that for the *advanced* benchmark, where

8% of Québec's students remained. Internationally, all four percentages declined from their 2003 levels.

Table 12: Percentage of Secondary II students reaching the TIMSS international benchmarks of mathematics achievement

	International benchmarks (achievement levels)							
	Advanced (625 points)		High (550 points)		Intermediate (475 points)		Low (400 points)	
	% of students		% of students		% of students		% of students	
Year	International	Québec	International	Québec	International	Québec	International	Québec
2007	2	8 (1.2)	15	37 (2.0)	46	78 (1.8)	75	97 (0.8)
2003	8	8 (1.4)	28	45 (2.2)	55	88 (1.1)	80	99 (0.2)
1999	10	18 (4.4)	31	60 (3.5)	57	93 (1.1)	80	99 (0.4)
1995	11	14 (2.8)	37	54 (4.2)	69	90 (2.6)	89	99 (0.5)

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

4. Science achievement of Elementary 4 students

The TIMSS 2007 science assessment covered three major content domains: *life science*, *earth science* and *physical science*. It also covered three cognitive domains: *knowing*, *applying* and *reasoning*. The assessment consisted of multiple-choice, short-answer, constructed-response and problem-solving questions.

4.1 Performance on the science assessment

Québec ranked 19th among the participating countries, and was below five of the school jurisdictions participating in the study, which included the other three Canadian provinces (Alberta, British Columbia and Ontario).

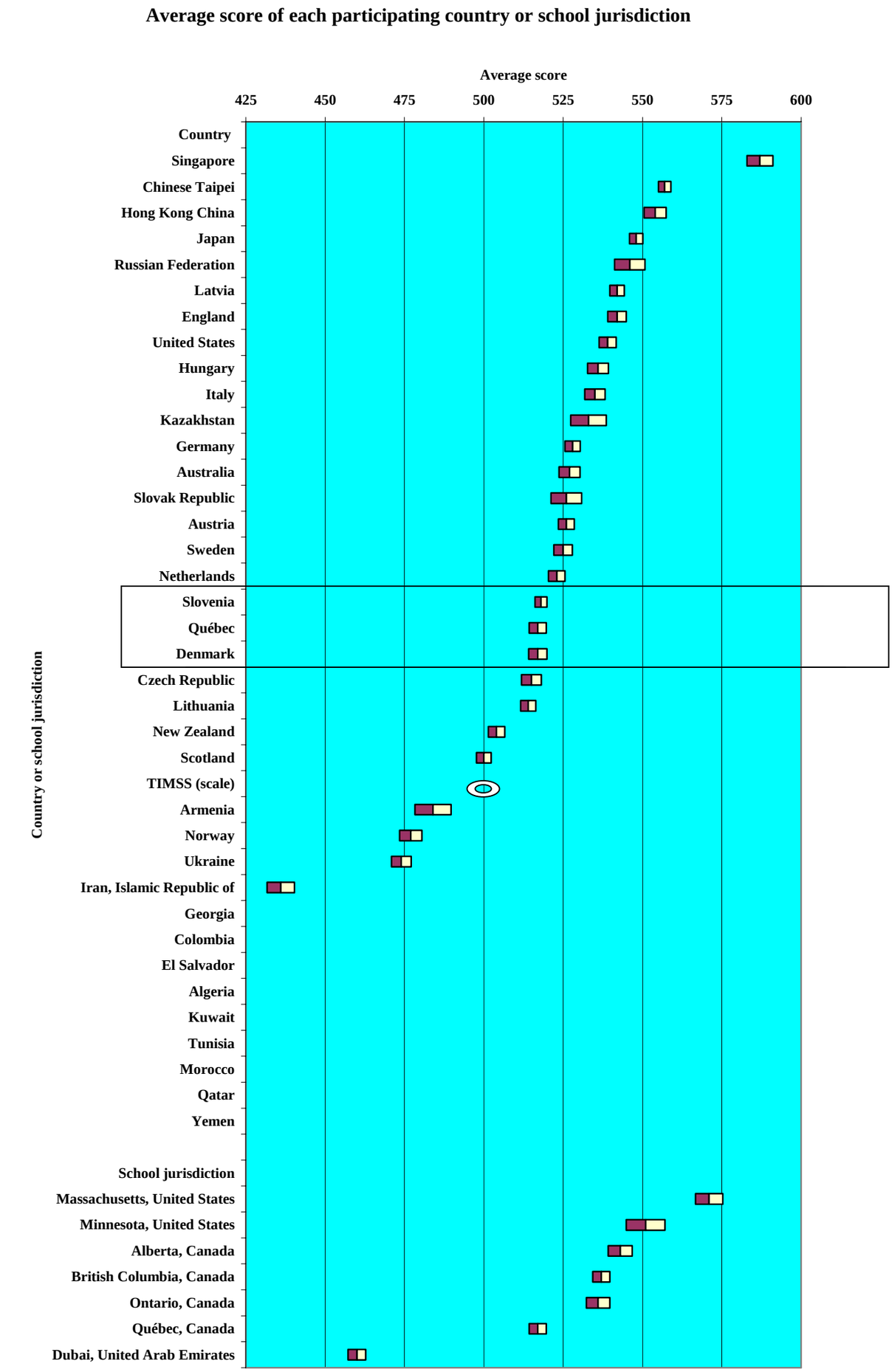
Table 13: Science achievement of Elementary 4 students, by country or school jurisdiction

Country or school jurisdiction	Score	Standard error
Singapore	587	4.1
Chinese Taipei	557	2.0
Hong Kong SAR	554	3.5
Japan	548	2.1
Russian Federation	546	4.8
Latvia	542	2.3
England	542	2.9
United States	539	2.7
Hungary	536	3.3
Italy	535	3.2
Kazakhstan	533	5.6
Germany	528	2.4
Australia	527	3.3
Slovak Republic	526	4.8
Austria	526	2.5
Sweden	525	2.9
Netherlands	523	2.6
Slovenia	518	1.9
Québec	**517**	**2.7**
Denmark	517	2.9
Czech Republic	515	3.1
Lithuania	514	2.4
New Zealand	504	2.6
Scotland	500	2.3
TIMSS (scale)	500	
Armenia	484	5.7
Norway	477	3.5
Ukraine	474	3.1
Iran, Islamic Republic of	436	4.3
Georgia	418	4.6
Colombia	400	5.4
El Salvador	390	3.4
Algeria	354	6.0
Kuwait	348	4.4
Tunisia	318	5.9
Morocco	297	5.9
Qatar	294	2.6
Yemen	197	7.2
Massachusetts, United States	571	4.3
Minnesota, United States	551	6.1
Alberta, Canada	543	3.8
British Columbia, Canada	537	2.7
Ontario, Canada	536	3.7
Québec, Canada	**517**	**2.7**
Dubai, United Arab Emirates	460	2.8

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

Key	
Ranked higher than Québec	
Ranked equal to Québec	
Ranked lower than Québec	

Graph 3: Science achievement of Elementary 4 students, by country or school jurisdiction



Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

4.2 Achievement by gender

No significant difference was observed between boys and girls in 27 of the 43 participating countries and school jurisdictions. Nine countries and school jurisdictions showed a significant difference in favour of boys, while 7 reported a significant difference in favour of girls. Internationally, there was a significant 3-point difference in favour of girls. In Québec, however, boys outperformed girls by only 2 points and the difference was not significant.

Table 14: Science achievement of Elementary 4 students, by gender

	Québec score	Standard error	International average	Standard error
Girls	516	3.1	477	1.2
Boys	518	3.5	474	1.2

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

4.3 Achievement by language of instruction

Francophone students outperformed Anglophone students significantly, by 11 points. However, all the results for Québec students were significantly higher than the international average.

Table 15: Science achievement of Elementary 4 students, by language of instruction

	Québec score	Standard error
English	**507**	**4.5**
French	**518**	**2.8**

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

4.4 Achievement by content domain

Québec students performed best in *earth science*, and the variation between the scores of boys and girls was also the greatest in this domain (a significant 14 points in favour of boys). Québec's scores were lowest in *physical science*. Boys performed better in two of the three domains, and girls outperformed boys only in *life science*, although the 4-point difference was not significant.

Table 16: Science achievement of Elementary 4 students, by content domain

Content domain	All		Girls		Boys	
	Score	Standard error	Score	Standard error	Score	Standard error
Life science	522	2.7	524	3.3	520	2.9
Earth science	523	2.6	**516**	**3.4**	**530**	**3.0**
Physical science	513	2.6	512	2.9	515	3.2

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

4.5 Achievement by cognitive domain

Québec students performed best in *reasoning*. Girls also outperformed boys in this domain, with a significant 11-point difference. However, boys did better than girls in the other two domains, with a significant 9-point difference in *knowing* and a nonsignificant 4-point difference in *applying*.

Table 17: Science achievement of Elementary 4 students, by cognitive domain

Cognitive domain	All		Girls		Boys	
	Score	Standard error	Score	Standard error	Score	Standard error
Knowing	515	2.7	**511**	**3.1**	**520**	**3.3**
Applying	516	2.8	514	3.4	518	3.3
Reasoning	528	3.3	**533**	**3.8**	**522**	**3.7**

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

4.6 Achievement levels

What students know and can do in science is summarized in Table 18 for the TIMSS 1995, 2003 and 2007 assessments in terms of the percentage of students reaching the four international benchmarks identified for science achievement. The *advanced* benchmark corresponds to a scale score of 625, the *high* benchmark to 550, the *intermediate* benchmark to 475 and the *low* benchmark to 400. In general, the countries with very good scores also obtained the best percentages for each of the benchmarks. Countries with poor results had virtually no students reaching the *advanced* benchmark. Internationally, 93% of students achieved the *low* benchmark, compared with 96% of Québec students. Québec ranked 7th among the participating countries and school jurisdictions.

In Québec, the 2007 percentages were higher than their 2003 levels for all four benchmarks. Internationally, the percentages for the *advanced* and *high* benchmarks fell by 1 point compared with 2003, while those for the *intermediate* and *low* benchmarks increased by 3 points each.

Québec's 2007 percentage for the *low* benchmark was the highest it has ever been, exceeding the 1995 level by 2 points.

Table 18: Percentage of Elementary 4 students reaching the TIMSS international benchmarks of science achievement

	International benchmarks (achievement levels)							
	Advanced (625 points)		High (550 points)		Intermediate (475 points)		Low (400 points)	
	% of students		% of students		% of students		% of students	
Year	International	Québec	International	Québec	International	Québec	International	Québec
2007	7	5 (0.6)	34	32 (1.9)	74	74 (1.9)	93	96 (0.6)
2003	8	3 (0.4)	35	25 (1.3)	71	66 (1.4)	90	91 (0.8)
1995	9	9 (1.3)	32	40 (3.7)	63	77 (2.5)	85	94 (1.3)

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

5. Science achievement of Secondary II students

The TIMSS 2007 science assessment covered four content domains: *chemistry*, *earth science*, *biology* and *physics*. It also covered three cognitive domains: *knowing*, *applying* and *reasoning*. The assessment consisted of multiple-choice, short-answer, constructed response and problem-solving questions.

5.1 Performance on the science assessment

Québec ranked 15th among the participating countries, but was outranked by four other school jurisdictions, namely the other two participating Canadian provinces (Ontario and British Columbia) and the two US states (Massachusetts and Minnesota).

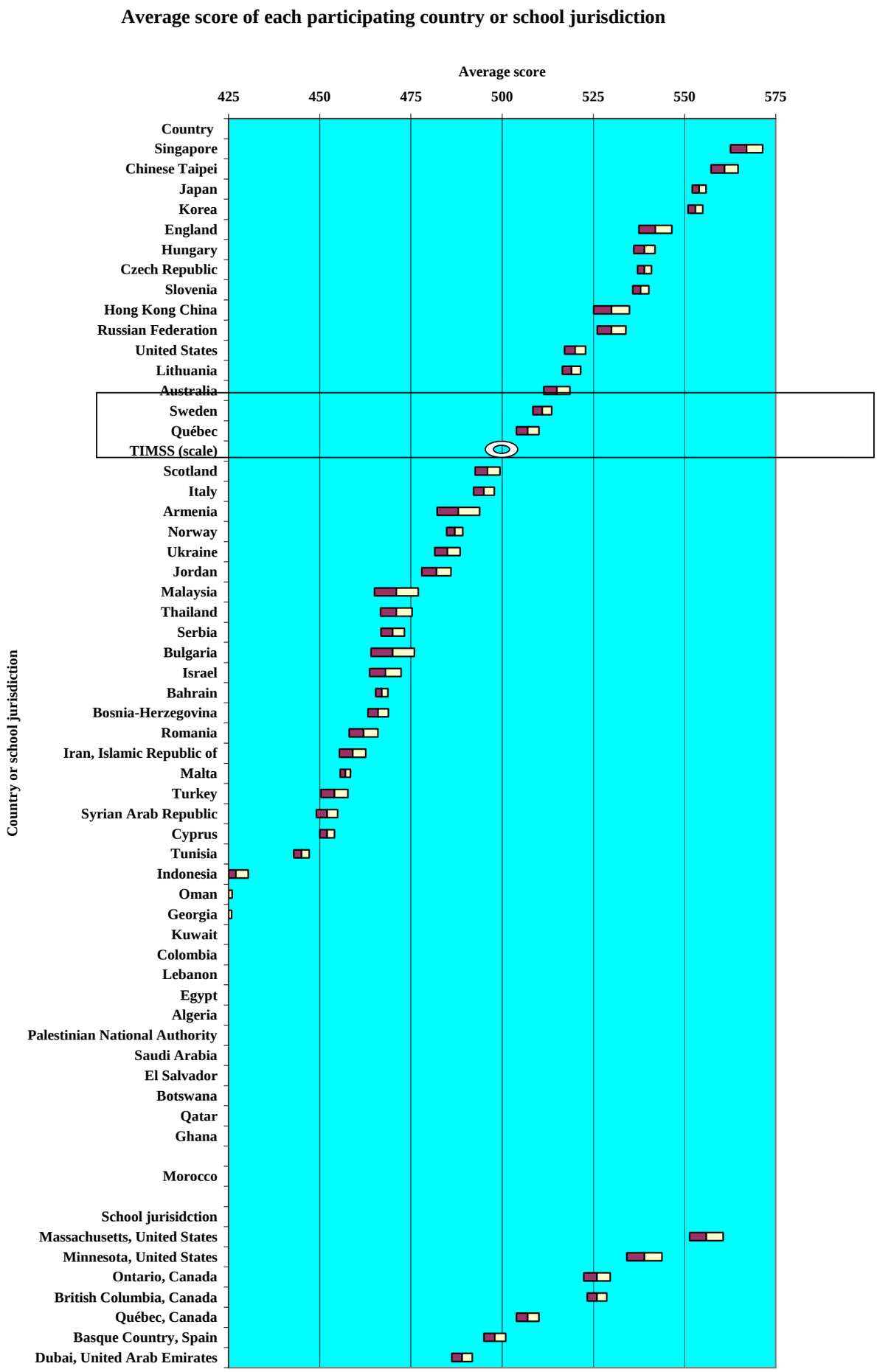
Table 19: Science achievement of Secondary II students, by country or school jurisdiction

Country or school jurisdiction	Score	Standard error
Singapore	567	4.4
Chinese Taipei	561	3.7
Japan	554	1.9
Korea	553	2.0
England	542	4.5
Hungary	539	2.9
Czech Republic	539	1.9
Slovenia	538	2.2
Hong Kong SAR	530	4.9
Russian Federation	530	3.9
United States	520	2.9
Lithuania	519	2.5
Australia	515	3.6
Sweden	511	2.6
Québec	**507**	**3.1**
TIMSS (scale)	500	
Scotland	496	3.4
Italy	495	2.8
Armenia	488	5.8
Norway	487	2.2
Ukraine	485	3.5
Jordan	482	4.0
Malaysia	471	6.0
Thailand	471	4.3
Serbia	470	3.2
Bulgaria	470	5.9
Israel	468	4.3
Bahrain	467	1.7
Bosnia-Herzegovina	466	2.8
Romania	462	3.9
Iran, Islamic Republic of	459	3.6
Malta	457	1.4
Turkey	454	3.7
Syrian Arab Republic	452	2.9
Cyprus	452	2.0
Tunisia	445	2.1
Indonesia	427	3.4
Oman	423	3.0
Georgia	421	4.8
Kuwait	418	2.8
Colombia	417	3.5
Lebanon	414	5.9
Egypt	408	3.6
Algeria	408	1.7
Palestinian National Authority	404	3.5
Saudi Arabia	403	2.4
El Salvador	387	2.9
Botswana	355	3.1
Qatar	319	1.7
Ghana	303	5.4
Morocco	402	2.9
Massachusetts, United States	556	4.6
Minnesota, United States	539	4.8
Ontario, Canada	526	3.6
British Columbia, Canada	526	2.7
Québec, Canada	**507**	**3.1**
Basque Country, Spain	498	3.0
Dubai, United Arab Emirates	489	2.8

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

Key	
Ranked higher than Québec	
Ranked equal to Québec	
Ranked lower than Québec	

Graph 4: Science achievement of Secondary II students, by country or school jurisdiction



Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

5.2 Achievement by gender

No significant difference was observed between boys and girls in 27 of the 56 participating countries and school jurisdictions. In 15 countries and school jurisdictions, a significant difference in favour of boys was observed, while in 14, a significant difference in favour of girls was observed. The international average shows a significant 6-point difference in favour of girls. In Québec, boys outperformed girls by 8 points, but the difference was not significant.

Table 20: Science achievement of Secondary II students, by gender

	Québec score	Standard error	International average	Standard error
Girls	503	3.3	469	0.8
Boys	511	4.1	463	0.7

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

5.3 Achievement by language of instruction

Anglophone students outperformed Francophone students by 7 points in Québec, but the difference was not significant. Overall, Québec students performed significantly better than the international average.

Table 21: Science achievement of Secondary II students, by language of instruction

	Québec score	Standard error
English	513	6.1
French	506	3.3

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

5.4 Achievement by content domain

Québec students achieved their worst results in *physics*, followed closely by *chemistry*. The other two domains were equal, although the gender distribution was different. In *biology*, the results for boys and girls were virtually identical, but in *earth science*, boys outperformed girls by a significant 14 points. Boys also performed better than girls in *physics*, by a significant 11 points.

Table 22: Science achievement of Secondary II students, by content domain

Content domain	All		Girls		Boys	
	Score	Standard error	Score	Standard error	Score	Standard error
Chemistry	497	3.1	494	4.1	499	4.5
Earth science	513	3.5	**506**	**3.3**	**520**	**4.6**
Biology	513	2.9	512	2.9	513	4.1
Physics	492	3.4	**486**	**4.5**	**497**	**4.5**

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

5.5 Achievement by cognitive domain

Québec students obtained their worst results in *applying*, but performed well in *reasoning*. The greatest difference between boys and girls (a significant difference of 13 points in favour of boys) was also observed in *applying*. Boys performed better than girls in two of the three domains, and in the third, girls obtained the same results as boys.

Table 23: Science achievement of Secondary II students, by cognitive domain

Cognitive domain	All		Girls		Boys	
	Score	Standard error	Score	Standard error	Score	Standard error
Knowing	500	3.1	497	3.4	504	4.1
Applying	495	2.9	489	2.8	502	4.2
Reasoning	523	3.1	523	3.1	523	4.8

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

5.6 Achievement levels

What students know and can do in science is summarized in Table 24 for the TIMSS assessments since 1995 in terms of the percentage of students reaching the four international benchmarks identified for science achievement. The *advanced* benchmark corresponds to a scale score of 625, the *high* benchmark to 550, the *intermediate* benchmark to 475 and the *low* benchmark to 400. In general, the countries with very good scores also obtained the best percentages for each of the benchmarks. Countries with poor results had virtually no students reaching the *advanced* benchmark. Internationally, only 78% of students reached the *low* benchmark, compared with 94% of Québec students. Québec ranked 12th among the participating countries and school jurisdictions.

In Québec, the percentages of students reaching all four benchmarks were lower in 2007 than in 2003. The same applies to the international average. Québec's percentage for the *advanced* benchmark was its lowest since the TIMSS study first began; just 4% of students achieved a 625-point score.

Table 24: Percentage of Secondary II students reaching the TIMSS international benchmarks of science achievement

	International benchmarks (achievement levels)							
	Advanced (625 points)		High (550 points)		Intermediate (475 points)		Low (400 points)	
	% of students		% of students		% of students		% of students	
Year	International	Québec	International	Québec	International	Québec	International	Québec
2007	3	4 (0.8)	17	27 (1.5)	49	68 (1.7)	78	94 (0.9)
2003	7	6 (1.0)	30	39 (2.0)	61	82 (1.5)	84	98 (0.4)
1999	9	10 (2.2)	30	43 (3.7)	58	83 (2.4)	81	98 (0.5)
1995	11	7 (1.5)	37	30 (2.8)	69	69 (3.5)	90	92 (2.6)

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

6. Results of the student questionnaire on attitudes

6.1 Results of Elementary 4 students in mathematics

6.1.1 Results by gender and number of hours spent watching television or videos

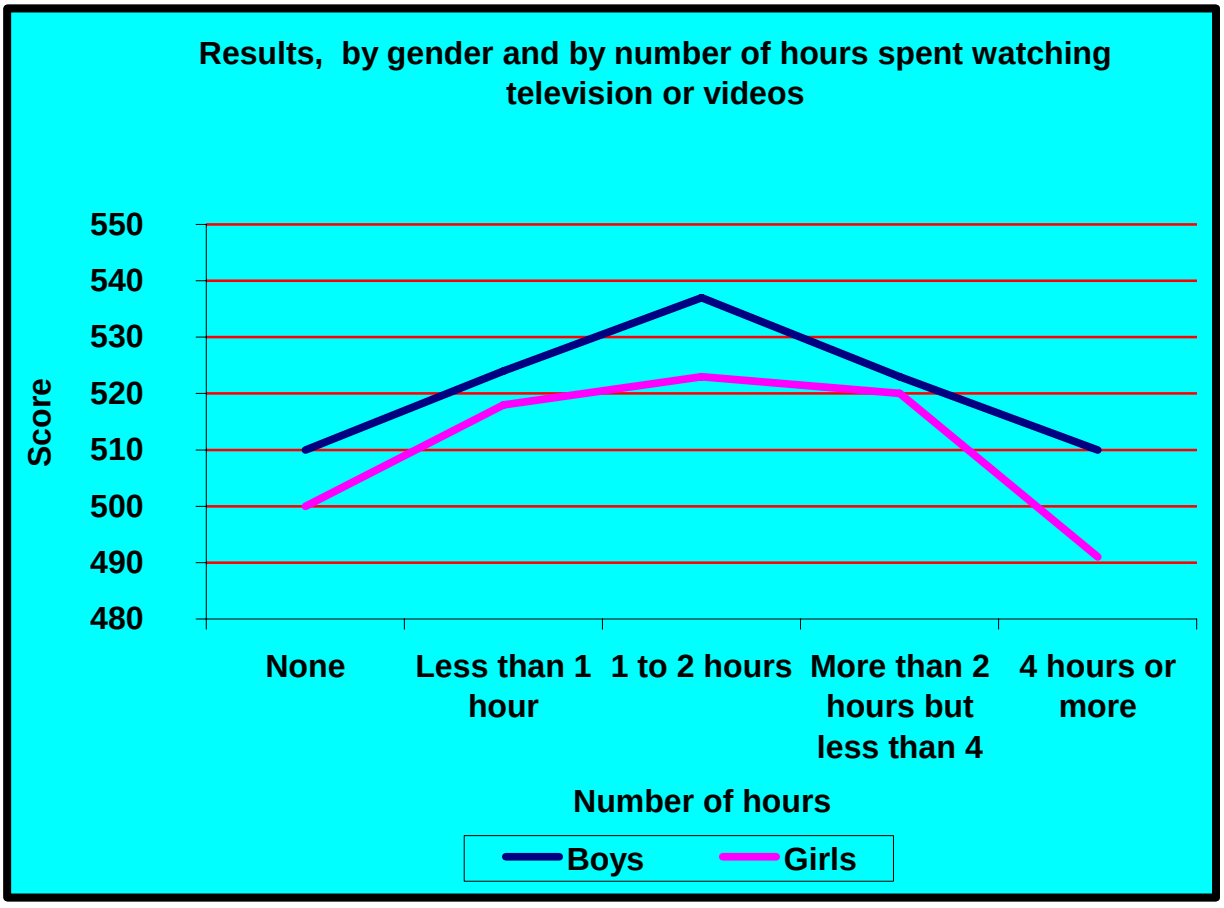
The following table and graph show that students who watch television or videos less than one hour or more than two hours are less successful than those who do not watch any at all or who spend one to two hours a day on that activity. The results are virtually symmetrical for boys, and slightly less so for girls. Boys do better than girls in mathematics, regardless of the number of hours spent watching television or videos.

Table 25: Mathematics achievement of Elementary 4 students, by gender and number of hours spent watching television or videos

Gender	Number of hours spent watching television or videos	Score	Standard error	(%)
Girls	None	500	7.5	11.2
	Less than 1 hour	518	4.9	41.9
	1 to 2 hours	523	4.6	28.6
	More than 2 hours but less than 4	520	6.2	9.2
	4 hours or more	491	7.6	9.2
Boys	None	510	5.3	11.5
	Less than 1 hour	524	4.7	32.7
	1 to 2 hours	537	4.5	32.5
	More than 2 hours but less than 4	523	6.8	10.3
	4 hours or more	510	6.8	13.0

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

Graph 5: Mathematics achievement of Elementary 4 students, by gender and number of hours spent watching television or videos



Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

6.1.2 Results by number of books at home and perception of not being good at mathematics

The following table shows that the more books students have at home, the better their mathematics achievement. Similarly, the more strongly they disagree with the statement "I am just not good at mathematics," the better their results. The combined results for the two answers show that the more books students have at home and the more strongly they disagree with the statement, the better their results.

Table 26: Mathematics achievement of Elementary 4 students, by number of books at home and perception of not being good at mathematics

Number of books at home	I am just not good at mathematics	Score	Standard error	(%)
0 to 10 books (11.0%)	Strongly agree	447	10.3	10.3
	Agree	459	8.1	20.3
	Disagree	497	8.8	24.3
	Strongly disagree	506	8.5	45.2
11 to 25 books (23.5%)	Strongly agree	457	11.9	6.1
	Agree	478	8.4	15.2
	Disagree	499	6.2	27.7
	Strongly disagree	525	6.0	51.1
26 to 100 books (39.4%)	Strongly agree	480	8.5	6.2
	Agree	482	5.6	12.4
	Disagree	518	5.1	23.4
	Strongly disagree	548	2.7	58.0
101 to 200 books (15.1%)	Strongly agree	479	23.4	3.4
	Agree	480	9.5	12.1
	Disagree	513	6.1	24.7
	Strongly disagree	559	4.7	59.9
More than 200 books (11.0%)	Strongly agree	467	22.2	7.4
	Agree	480	11.8	10.0
	Disagree	519	12.3	19.8
	Strongly disagree	550	5.7	62.8

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

6.1.3 Results by gender, computer ownership and home Internet connection

The following table shows that students who have a computer at home score higher in mathematics than those who do not. The students who perform best are those who have both a computer and an Internet connection at home. Interestingly, the students who said they had an Internet connection at home but no computer were those who achieved the worst results (less than 1.6% of the girls in the study and less than 1.8% of the boys). The students who did not have either a computer or an Internet connection at home performed moderately. More than 94% of the Québec students in the study said they had a computer at home.

Table 27: Mathematics achievement of Elementary 4 students, by gender, computer ownership and home internet connection

Gender	Computer at home	Internet connection	Result	Standard error	(%)
Girls	Yes (94.1%)	Yes	521	3.3	90.5
		No	478	6.7	9.5
	No (5.9%)	Yes (1.6%)	466	12.0	27.5
		No	491	9.4	72.5
Boys	Yes (95.4%)	Yes	530	3.1	90.3
		No	494	8.0	9.7
	No (4.6%)	Yes (1.8%)	477	15.2	39.2
		No	495	12.5	60.8

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

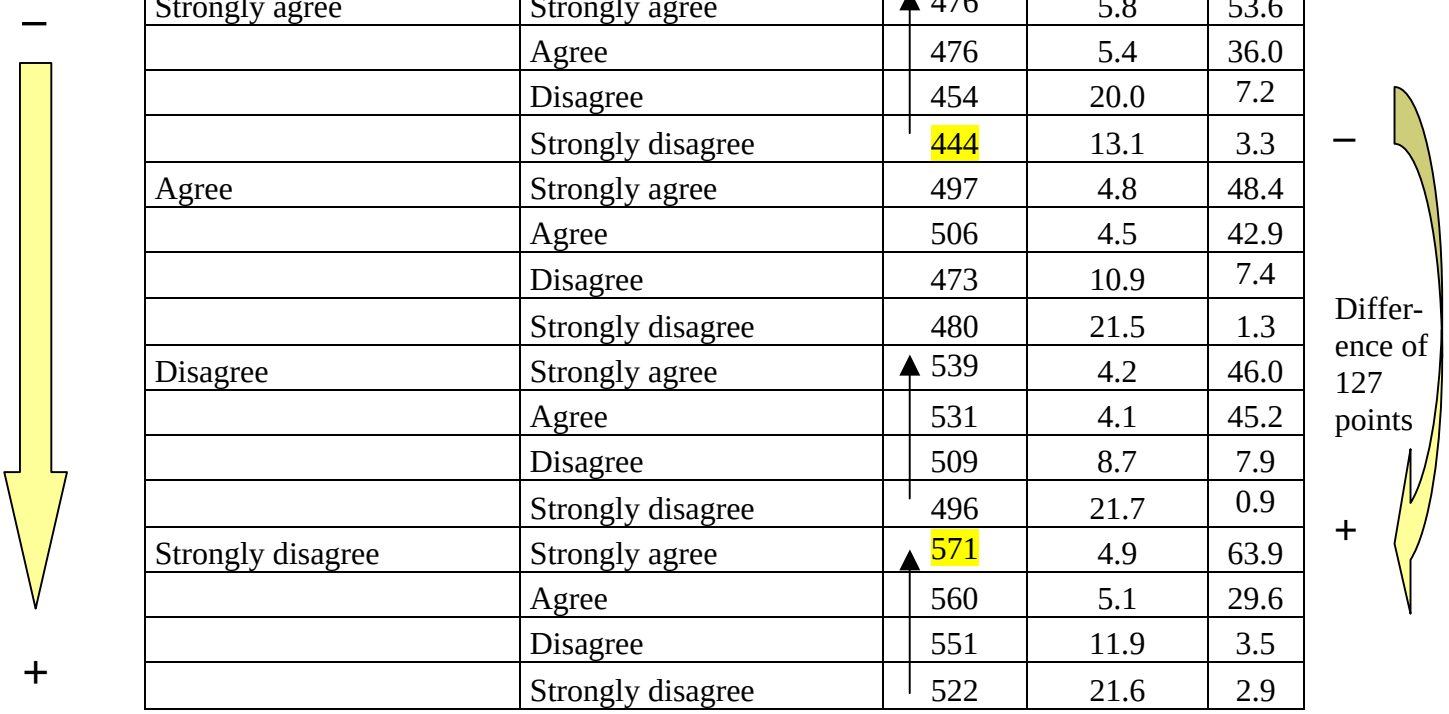
6.2 Results of Secondary II students in mathematics

6.2.1 Results by perceived difficulty of mathematics as a subject and the need for mathematics for postsecondary education

The following table shows that the more students do not consider mathematics to be difficult, the better their mathematics marks. Similarly, the stronger their perception that mathematics is required for postsecondary education, the more successful they are. When students meet both these criteria (i.e. they do not perceive mathematics as being difficult and they consider mathematics to be essential for postsecondary education), they are even more successful. There was a 127-point difference between the students who said they found mathematics difficult and did not think they needed it for postsecondary education (or did not intend to pursue postsecondary studies) and those who said they did not find mathematics difficult and thought they needed it for postsecondary education.

Table 28: Mathematics achievement of Secondary II students, by perceived difficulty of mathematics and the need for mathematics for postsecondary education

Mathematics is more difficult for me	I need to do well in mathematics to pursue postsecondary studies	Score	Standard error	(%)
Strongly agree	Strongly agree	476	5.8	53.6
	Agree	476	5.4	36.0
	Disagree	454	20.0	7.2
	Strongly disagree	444	13.1	3.3
Agree	Strongly agree	497	4.8	48.4
	Agree	506	4.5	42.9
	Disagree	473	10.9	7.4
	Strongly disagree	480	21.5	1.3
Disagree	Strongly agree	539	4.2	46.0
	Agree	531	4.1	45.2
	Disagree	509	8.7	7.9
	Strongly disagree	496	21.7	0.9
Strongly disagree	Strongly agree	571	4.9	63.9
	Agree	560	5.1	29.6
	Disagree	551	11.9	3.5
	Strongly disagree	522	21.6	2.9



Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

6.2.2 Results by perceived need for mathematics for postsecondary education and the perception of being good at mathematics

The following table shows that students who strongly agree that their mathematics marks are good, do in fact achieve good results, and vice-versa. The table also shows that those who strongly agree that they need mathematics for postsecondary education achieve better results than those who disagree. Given the fairly small number of students who strongly disagreed with this statement, the standard error is very high (nearly 33 points), meaning that the measurement is somewhat less representative than the others. The score of 578 for students who did not think they needed mathematics for postsecondary education but who nevertheless had good results clearly shows that students can perform well and aspire to a career that does not require a postsecondary education, or that they can perform well in mathematics but aspire to a career for which mathematics is not a requirement.

Table 29: Mathematics achievement of Secondary II students, by perceived need for mathematics for postsecondary education and the perception of being good at mathematics

I need to do well in mathematics to pursue postsecondary studies	I usually do well in mathematics	Score	Standard error	(%)
Strongly agree	Strongly agree	576	4.8	34.3
	Agree	535	4.0	42.1
	Disagree	486	4.5	19.5
	Strongly disagree	457	8.9	4.1
Agree	Strongly agree	575	4.8	20.1
	Agree	532	3.8	51.0
	Disagree	489	4.3	25.7
	Strongly disagree	460	10.1	3.1
Disagree	Strongly agree	546	14.9	12.6
	Agree	514	8.1	50.6
	Disagree	470	13.6	29.9
	Strongly disagree	450	9.5	6.9
Strongly disagree	Strongly agree	578	32.6	17.6
	Agree	523	15.0	35.2
	Disagree	480	17.9	20.4
	Strongly disagree	425	12.0	26.9

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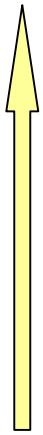

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Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

6.2.3 Results by perceived need for mathematics for postsecondary education and the need for mathematics to obtain the desired employment

The following table shows that students who strongly agree that they need mathematics to obtain the job they want do not always achieve better results than the others. This suggests that not all students are interested in careers for which mathematics is needed. However, those who strongly agree that mathematics is needed for postsecondary education obtain better results than those who disagree with the statement.

Table 30: Mathematics achievement of Secondary II students, by perceived need for mathematics for postsecondary education and the need for mathematics to obtain the desired employment

I need to do well in mathematics to pursue postsecondary studies	I need to do well in mathematics to get the job I want	Score	Standard error	(%)
Strongly agree	Strongly agree	535	3.6	74.6
	Agree	545	6.7	19.9
	Disagree	530	11.0	4.6
	Strongly disagree	498	19.4	0.9
Agree	Strongly agree	529	4.9	26.5
	Agree	529	3.9	54.3
	Disagree	518	6.4	16.4
	Strongly disagree	524	9.9	2.8
Disagree	Strongly agree	515	12.6	12.3
	Agree	498	11.1	32.0
	Disagree	502	8.4	44.8
	Strongly disagree	482	22.7	10.9
Strongly disagree	Strongly agree	465	26.9	8.0
	Agree	508	47.1	10.0
	Disagree	500	19.8	18.9
	Strongly disagree	500	18.5	63.0

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

6.2.4 Results by number of books at home

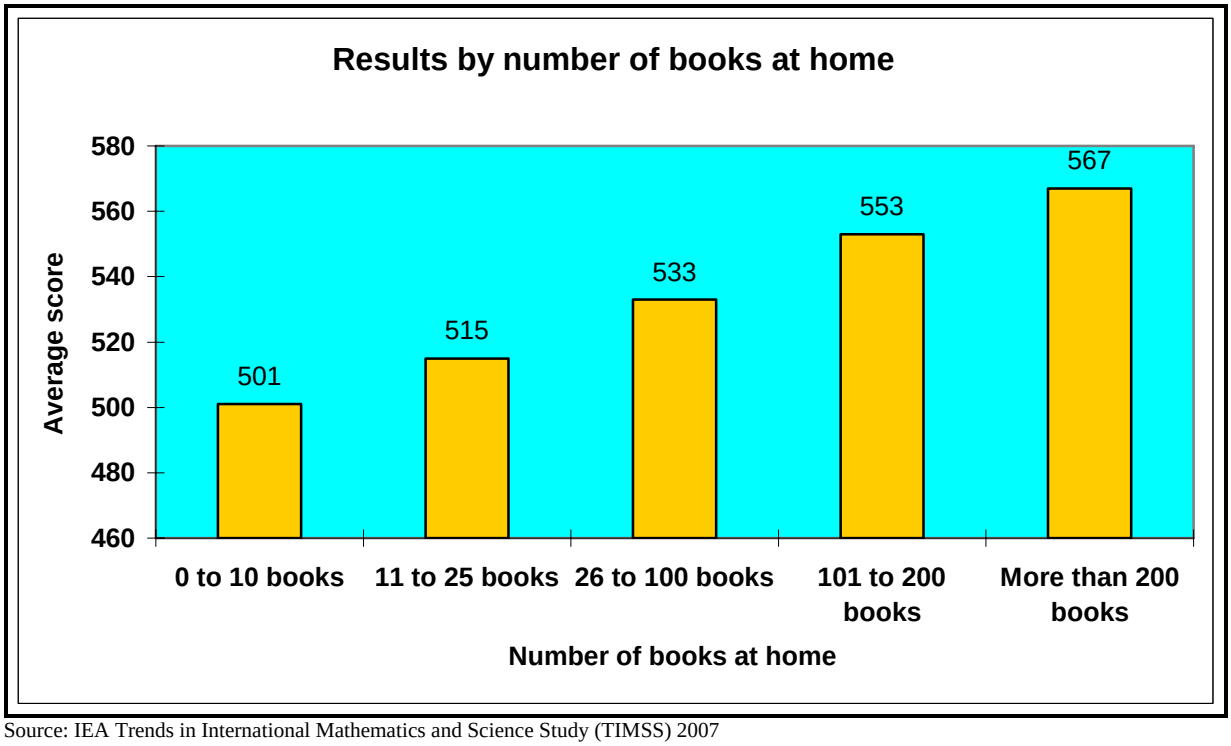
The following table and graph show that the more books students have at home, the better their mathematics achievement. There is a 66-point difference between the students who have between 0 and 10 books at home, and those who have more than 200 books.

Table 31: Mathematics achievement of Secondary II students, by number of books at home

Number of books at home	Average score	Standard error	%
0 to 10 books	501	3.0	17.5
11 to 25 books	515	3.6	26.1
26 to 100 books	533	3.6	31.8
101 to 200 books	553	6.1	13.0
More than 200 books	567	7.6	11.7

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

Graph 6: Mathematics achievement of Secondary II students, by number of books at home



Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

6.2.5 Results by gender and number of hours spent playing computer games

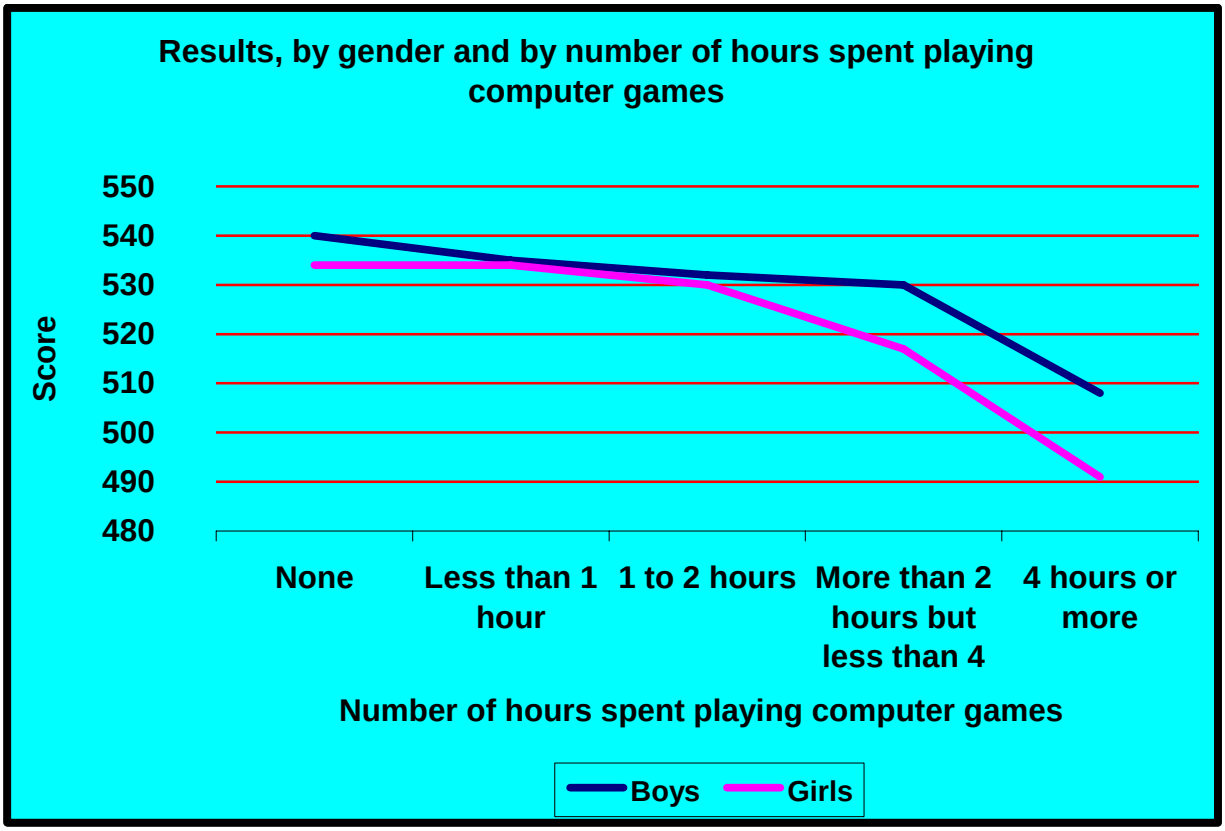
The following table and graph show that the more hours students spend playing computer games, the less successful they are in mathematics. The difference is greater for girls (43 points) than for boys (32 points). The girls' scores are all slightly lower than the boys' scores and the difference is sometimes significant.

Table 32: Mathematics achievement of Secondary II students, by gender and number of hours spent playing computer games

Gender	Number of hours spent playing on computer	Score	Standard error	(%)
Girls	None	534	4.5	26.9
	Less than 1 hour	534	4.8	32.3
	1 to 2 hours	530	5.3	23.9
	More than 2 hours but less than 4	517	5.7	10.1
	4 hours or more	491	7.2	6.8
Boys	None	540	9.2	19.3
	Less than 1 hour	535	5.1	31.1
	1 to 2 hours	532	5.1	26.1
	More than 2 hours but less than 4	530	5.7	11.8
	4 hours or more	508	6.9	11.7

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

Graph 7: Mathematics achievement of Secondary II students, by gender and number of hours spent playing computer games



Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

6.3 Results of Elementary 4 students in science

6.3.1 Results by gender and number of hours spent watching television or videos

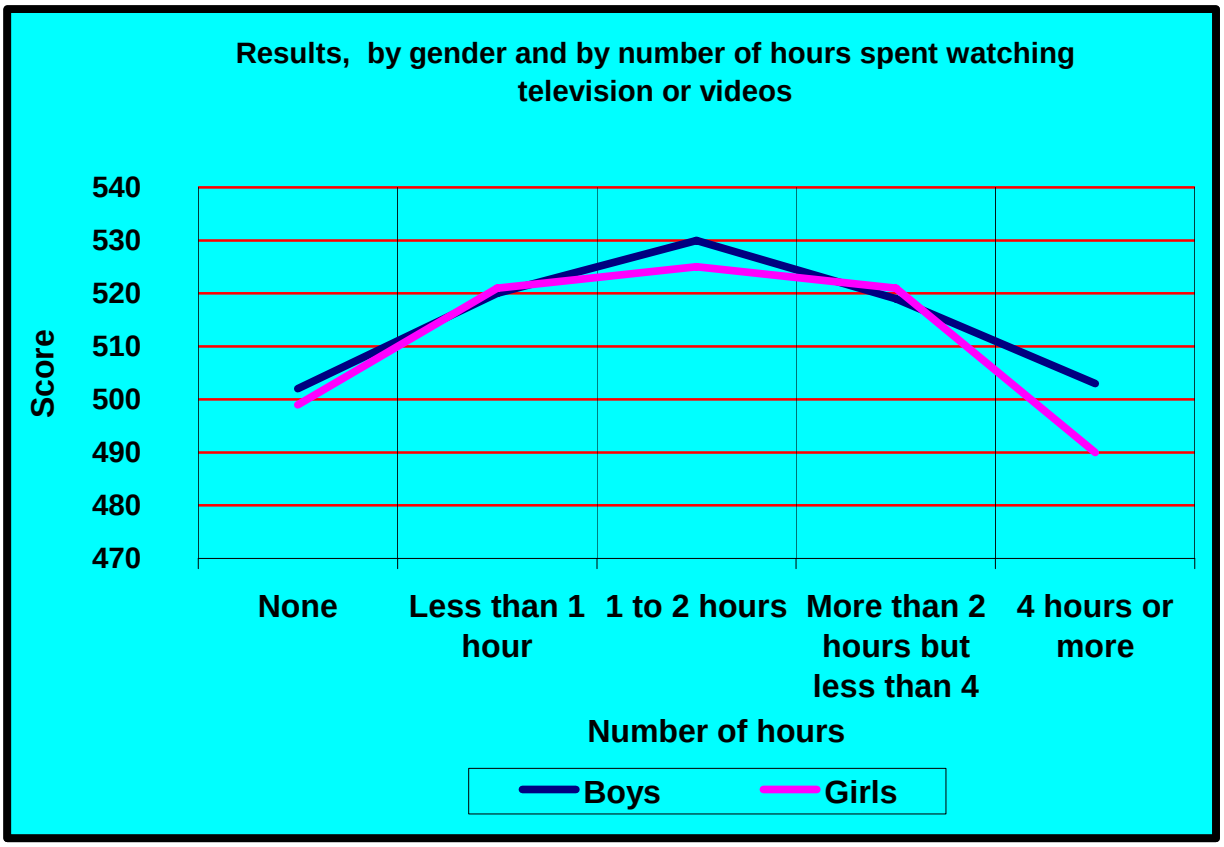
The following table and graph show that students who watch television or videos less than one hour or more than two hours are less successful in science than those who spend one to two hours per day on this activity. The results are virtually symmetrical for boys, and slightly less so for girls, except among students who watch more than four hours of television or videos, where the difference is 13 points. Boys do better in science than girls, even in the "4 hours or more" group.

Table 33: Science achievement of Elementary 4 students, by gender and number of hours spent watching television or videos

Gender	Number of hours spent watching television or videos	Score	Standard error	(%)
Girls	None	499	9.1	11.2
	Less than 1 hour	521	4.3	41.9
	1 to 2 hours	525	4.2	28.6
	More than 2 hours but less than 4	521	6.2	9.2
	4 hours or more	490	7.0	9.2
Boys	None	502	6.9	11.5
	Less than 1 hour	520	4.6	32.7
	1 to 2 hours	530	4.3	32.5
	More than 2 hours but less than 4	519	6.7	10.3
	4 hours or more	503	8.1	13.0

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

Graph 8: Science achievement of Elementary 4 students, by gender and number of hours spent watching television or videos



Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

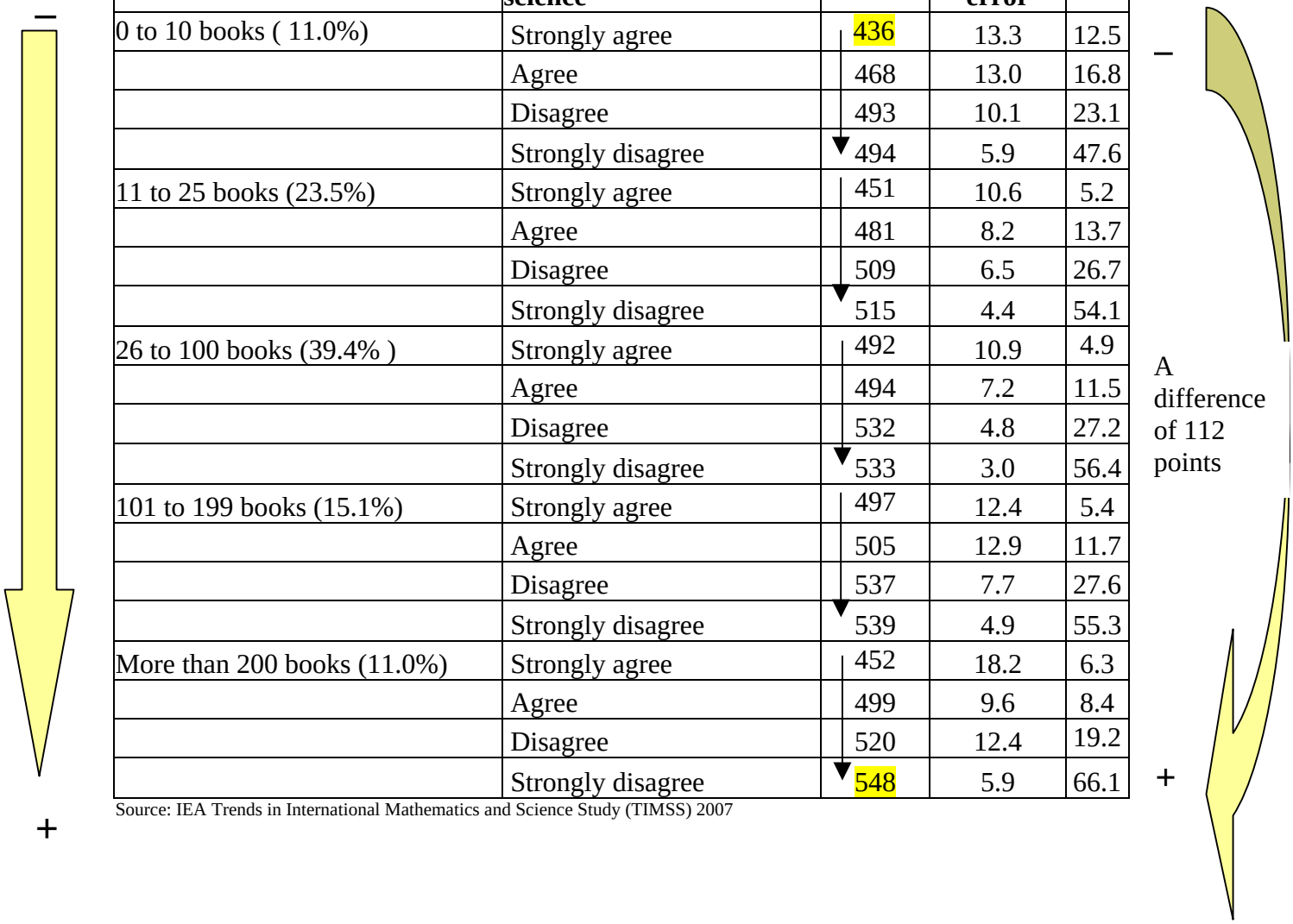
6.3.2 Results by number of books at home and perception of not being good at science

The following table shows that the more books students have at home, the better their science achievement. Similarly, the more strongly they disagree with the statement "I am just not good at science," the better their results. The combined results for the two answers show that the more books students have at home and the more strongly they disagree with the statement, the better their results.

Table 34: Science achievement of Elementary 4 students, by number of books at home and perception of not being good at science

Number of books at home	I am just not good at science	Score	Standard error	(%)
0 to 10 books (11.0%)	Strongly agree	436	13.3	12.5
	Agree	468	13.0	16.8
	Disagree	493	10.1	23.1
	Strongly disagree	494	5.9	47.6
11 to 25 books (23.5%)	Strongly agree	451	10.6	5.2
	Agree	481	8.2	13.7
	Disagree	509	6.5	26.7
	Strongly disagree	515	4.4	54.1
26 to 100 books (39.4%)	Strongly agree	492	10.9	4.9
	Agree	494	7.2	11.5
	Disagree	532	4.8	27.2
	Strongly disagree	533	3.0	56.4
101 to 199 books (15.1%)	Strongly agree	497	12.4	5.4
	Agree	505	12.9	11.7
	Disagree	537	7.7	27.6
	Strongly disagree	539	4.9	55.3
More than 200 books (11.0%)	Strongly agree	452	18.2	6.3
	Agree	499	9.6	8.4
	Disagree	520	12.4	19.2
	Strongly disagree	548	5.9	66.1

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007



6.3.3 Results by gender, computer ownership and home Internet connection

The following table shows that students who have a computer at home score higher in science than those who do not. The students who perform best are those who have both a computer and an Internet connection at home. Interestingly, the students who said they had an Internet connection at home but no computer were those who achieved the worst results (less than 1.6% of the girls in the study and less than 1.8% of the boys). The students who did not have either a computer or an Internet connection at home performed moderately. More than 94% of Québec students in the study said they had a computer at home.

Table 35: Science achievement of Elementary 4 students, by gender, computer ownership and home Internet connection

Gender	Computer at home	Internet connection	Score	Standard error	(%)
Girls	Yes (94.1%)	Yes	522	3.2	90.5
		No	484	6.9	9.5
	No (5.9%)	Yes	466	12.7	27.5
		No	489	10.0	72.5
Boys	Yes (95.4%)	Yes	523	3.3	90.3
		No	496	9.1	9.7
	No (46%)	Yes	472	15.8	39.2
		No	493	11.0	60.8

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

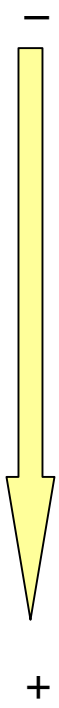
6.4 Results of Secondary II students in science

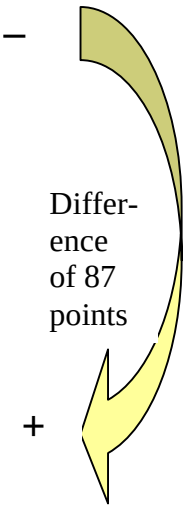
6.4.1 Results by perceived difficulty of science as a subject and the need for science for postsecondary education

The following table shows that the more students do not consider science to be difficult, the better their science marks. Similarly, the stronger their perception that science is required for postsecondary education, the more successful they are. When students meet both these criteria (i.e. they do not perceive science as being difficult, and they consider science to be essential for postsecondary education), they are even more successful. There was an 87-point difference between students who said they found science difficult and did not think they needed it for postsecondary education (or did not intend to pursue postsecondary studies) and those who said they did not find science difficult and thought they needed it for postsecondary education.

Table 36: Science achievement of Secondary II students, by perceived difficulty of science as a subject and the need for science for postsecondary education

Science is more difficult for me	I need to do well in science to pursue postsecondary studies	Score	Standard error	(%)
Strongly agree	Strongly agree	494	11.6	27.6
	Agree	460	17.1	28.5
	Disagree	479	11.3	22.1
	Strongly disagree	463	12.7	21.8
Agree	Strongly agree	497	8.7	14.8
	Agree	492	5.4	41.2
	Disagree	482	5.1	34.2
	Strongly disagree	489	9.5	9.8
Disagree	Strongly agree	524	5.5	15.8
	Agree	514	3.7	41.3
	Disagree	499	4.3	33.9
	Strongly disagree	492	8.7	9.0
Strongly disagree	Strongly agree	550	7.5	37.2
	Agree	531	5.8	33.5
	Disagree	512	6.0	18.3
	Strongly disagree	492	7.0	11.0





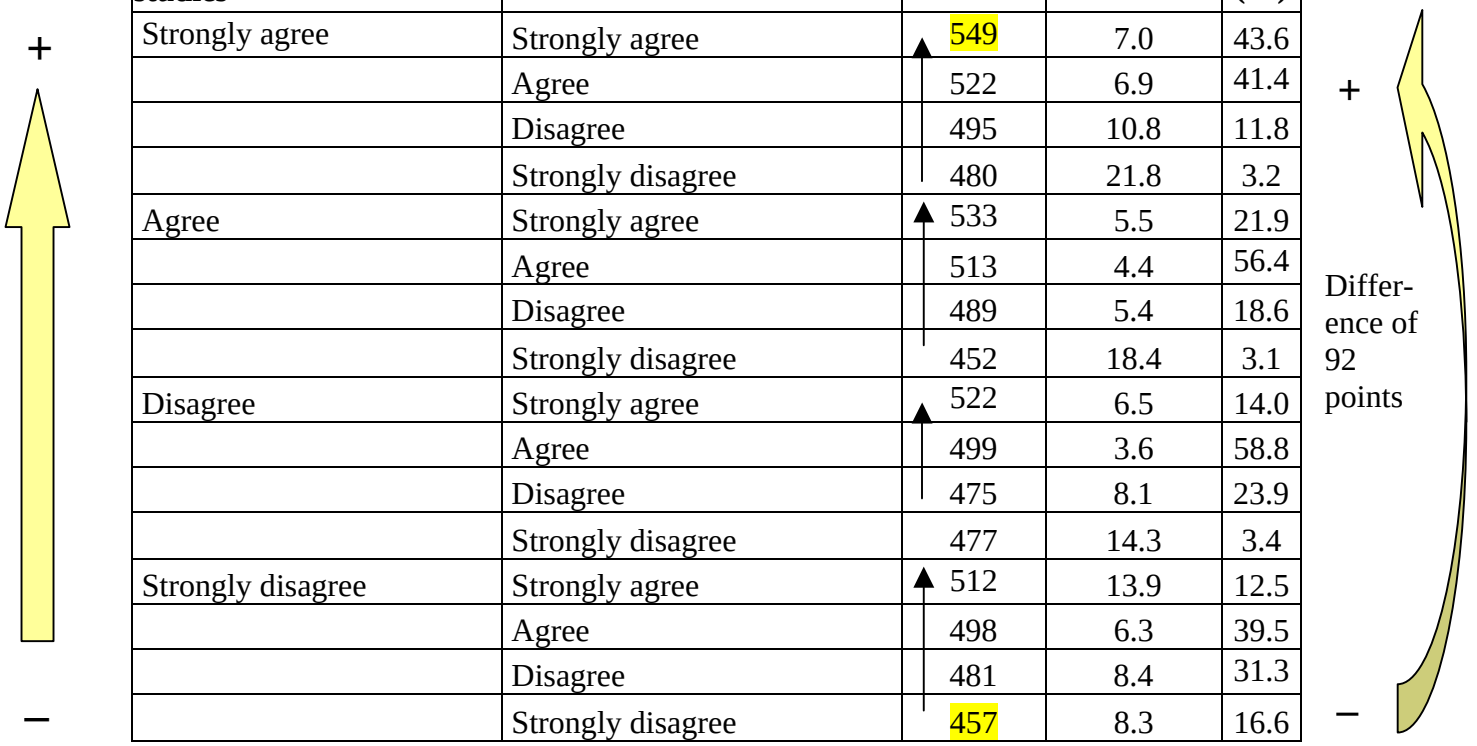
Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

6.4.2 Results by perceived need for science for postsecondary education and the perception of being good at science

The following table shows that students who strongly agree that their science marks are good, do in fact achieve good results, and vice-versa. The table also shows that those who strongly agree that they need science for postsecondary education achieve better results than those who disagree. Students who meet both these criteria (i.e. they believe they have good marks and they think they need science for postsecondary education) perform even better.

Table 37: Science achievement of Secondary II students, by perceived need for science for postsecondary education and the perception of being good at science

I need to do well in science to pursue postsecondary studies	I usually do well in science	Score	Standard error	(%)
Strongly agree	Strongly agree	549	7.0	43.6
	Agree	522	6.9	41.4
	Disagree	495	10.8	11.8
	Strongly disagree	480	21.8	3.2
Agree	Strongly agree	533	5.5	21.9
	Agree	513	4.4	56.4
	Disagree	489	5.4	18.6
	Strongly disagree	452	18.4	3.1
Disagree	Strongly agree	522	6.5	14.0
	Agree	499	3.6	58.8
	Disagree	475	8.1	23.9
	Strongly disagree	477	14.3	3.4
Strongly disagree	Strongly agree	512	13.9	12.5
	Agree	498	6.3	39.5
	Disagree	481	8.4	31.3
	Strongly disagree	457	8.3	16.6



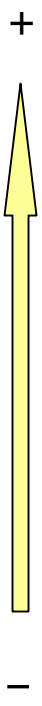
Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

6.4.3 Results by perceived need for science for postsecondary education and the need for science to obtain the desired employment

The following table shows that not all students are interested in science-related employment, because the percentages vary significantly in each subsector. The results vary, but within a limited range. However, a slight trend emerges when the two variables are combined; the more strongly students agree that science is needed for postsecondary education and to obtain the desired job, the better their performance.

Table 38: Science achievement of Secondary II students, by perceived need for science for postsecondary education and the need for science to obtain the desired employment

I need to do well in science to pursue postsecondary studies	I need to do well in science to get the job I want	Score	Standard error	(%)
Strongly agree	Strongly agree	532	5.6	81.0
	Agree	532	10.5	11.9
	Disagree	490	17.1	4.1
	Strongly disagree	497	11.9	3.0
Agree	Strongly agree	514	7.7	12.4
	Agree	509	3.6	57.7
	Disagree	516	5.2	25.4
	Strongly disagree	490	8.5	4.6
Disagree	Strongly agree	514	8.5	4.3
	Agree	498	6.2	16.9
	Disagree	494	4.0	65.4
	Strongly disagree	497	7.7	13.5
Strongly disagree	Strongly agree	504	20.2	2.4
	Agree	484	11.0	6.8
	Disagree	479	14.8	11.6
	Strongly disagree	489	5.8	79.2



Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

6.4.4 Results by number of books at home

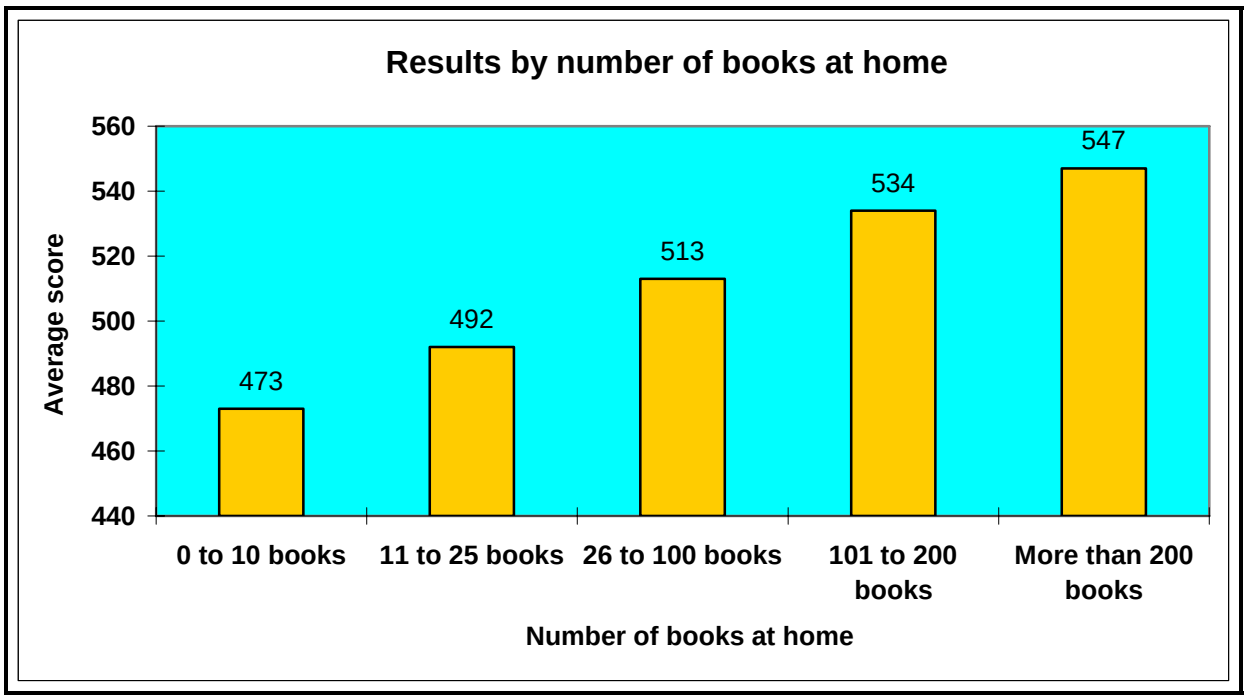
The following table and graph show that the more books students have at home, the better their science achievement. There is a 74-point difference between the students who have between 0 and 10 books at home and those who have more than 200 books.

Table 39: Science achievement of Secondary II students, by number of books at home

Number of books at home	Average score	Standard error	%
0 to 10 books	473	3.8	17.5
11 to 25 books	492	3.3	26.1
26 to 100 books	513	3.2	31.8
101 to 200 books	534	6.4	13.0
More than 200 books	547	7.0	11.7

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

Graph 9: Science achievement of Secondary II students, by number of books at home



Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

6.4.5 Results by gender and number of hours spent playing computer games

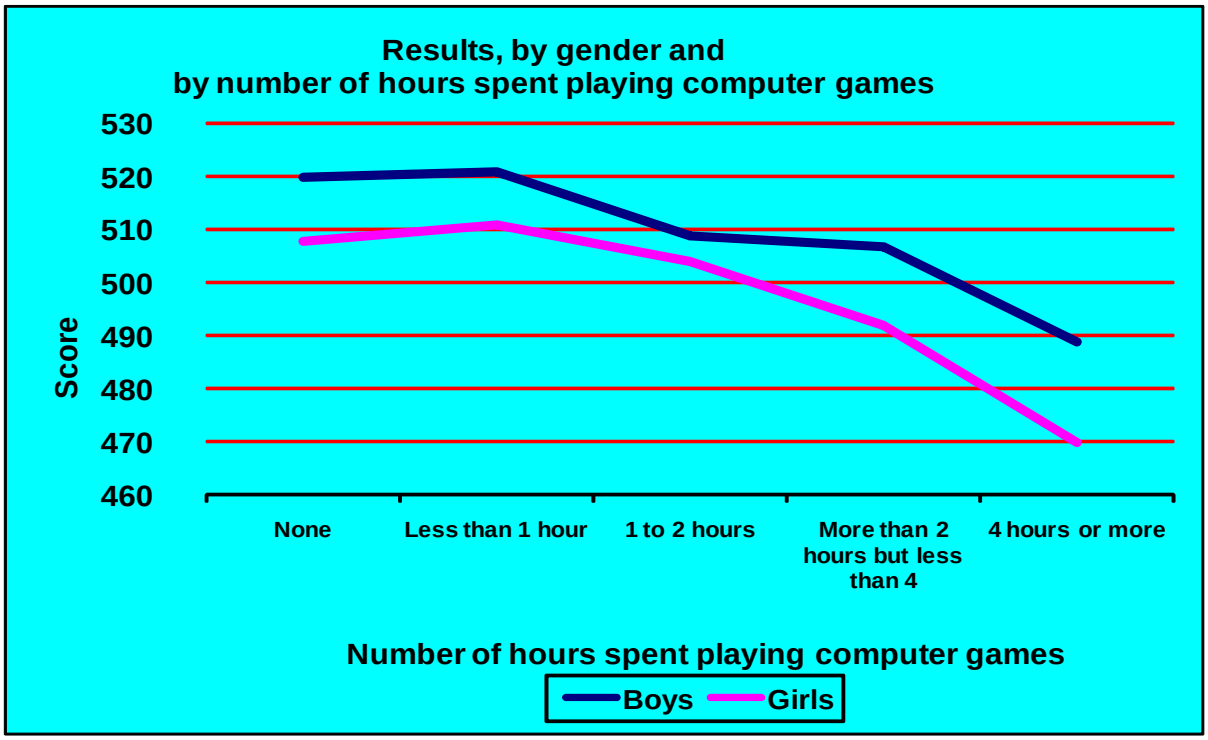
The following table and graph show that the more hours students spend playing computer games, the less successful they are in science. The difference is greater for girls (41 points) than for boys (32 points). The girls' results are all slightly lower than the boys' results, and the difference is sometimes significant.

Table 40: Science achievement of Secondary II students, by gender and number of hours spent playing computer games

Gender	Number of hours spent playing computer games	Score	Standard error	(%)
Girls	None	508	4.4	26.9
	Less than 1 hour	**511**	**4.7**	32.3
	1 to 2 hours	504	4.9	23.9
	More than 2 hours but less than 4	**492**	**6.9**	10.1
	4 hours or more	**470**	**7.7**	6.8
Boys	None	520	8.2	19.3
	Less than 1 hour	**521**	**4.4**	31.1
	1 to 2 hours	509	4.6	26.1
	More than 2 hours but less than 4	**507**	**6.4**	11.8
	4 hours or more	**489**	**6.8**	11.7

Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

Graph 10: Science achievement of Secondary II students, by gender and number of hours spent playing computer games



Source: IEA Trends in International Mathematics and Science Study (TIMSS) 2007

7. Conclusion

7.1 Mathematics achievement of Elementary 4 students

Québec's Elementary 4 students performed better in the mathematics assessment than the average, but remained in 14th place overall. However, more than 11 countries and school jurisdictions joined the study since 2003, meaning that Québec's relative ranking improved; in 2003, Québec placed in the bottom half of the participants, whereas in 2007, it was almost in the top third.

Boys were more successful than girls, with a significant difference of 9 points. Boys therefore continue to dominate this area of learning.

Francophone students had better results than their Anglophone counterparts, with a significant difference of 22 points, but both groups did better than in 2003.

Québec students were most successful in the content domain of *data display* and the cognitive domain of *reasoning*. They were least successful in the content domain of *number*.

Overall, the percentage of Québec students who reached the various international benchmarks has improved since 2003, and Québec now ranks 9th among the countries and school jurisdictions with the highest percentage of students achieving the *low* benchmark (400 points) (96% of students). However, only 5% of Québec's students achieved the *advanced* benchmark (625 points).

7.2 Mathematics achievement of Secondary II students

Québec's Secondary II students performed remarkably well in the mathematics assessment. Québec still ranks in the top six, even though the average score of its students dropped by 15 points from its 2003 level. Despite the addition of a number of new countries and school jurisdictions to the 2007 study, Québec still ranks immediately after the Asian countries, which are renowned for their excellence in mathematics.

Boys were more successful than girls, but with only a nonsignificant 2-point difference.

Anglophone students performed better than their Francophone counterparts, with a nonsignificant difference of 11 points.

Québec's students were most successful in the content domain of *number* and the cognitive domain of *knowing*. They were least successful in the content domain of *algebra*.

Overall, the percentage of Québec students who reached the various international benchmarks has declined since 2003. This is not surprising, given that the average result was also lower. In fact, the percentage of students achieving the *advanced* benchmark (625 points) remained unchanged at 8%. Despite an overall drop of 2% since 2003, Québec nevertheless ranks 2nd (behind Korea) among the countries and school jurisdictions with the highest percentage of students in the *low* benchmark (400 points), with 97% of its students reaching this level.

7.3 Science achievement of Elementary 4 students

Québec's Elementary 4 students performed better in science than in 2003. Although its average score improved by 17 points, Québec slipped two places in the overall ranking. Nevertheless, its relative performance improved; in 2007, it ranked 19th overall among 37 countries and school jurisdictions, putting it very close to the top half, whereas in 2003, it came in 17th among 26 countries and school jurisdictions. The 2007 ranking is its lowest since it began participating in the study in 1991.

Boys performed better than girls, but with a 2-point difference that is not significant.

Francophone students did better than their Anglophone counterparts, with a significant difference of 11 points.

Québec's students were most successful in the content domain of *earth science* and the cognitive domain of *reasoning*. They were least successful in the content domain of *physical science*.

Overall, the percentage of Québec students who reached the various international benchmarks has improved since 2003. Québec now ranks 7th among the countries and school jurisdictions with the highest percentage of students in the *low* benchmark (96%). However, only 5% of Québec students achieved the *advanced* benchmark of 625 points.

7.4 Science achievement of Secondary II students

Québec's Secondary II students were not as successful in 2007 as in previous years. Their average score fell by 24 points, and Québec slipped six places in the overall ranking. This outcome is explained at least in part by the fact that some countries left the study, others joined, and a number of countries achieved better results than in the past. Québec's 2007 ranking is its lowest since it began participating in the study in 1991.

Boys performed better than girls, but with an 8-point difference that is not significant.

Anglophone students did better than their Francophone counterparts, with a nonsignificant difference of 7 points.

Québec's students were most successful in the content domain of *earth science* and *biology* and in the cognitive domain of *reasoning*. They were least successful in the content domain of *physics*.

Overall, in view of the 24-point drop from 2003 levels, the percentage of Québec students who reached the various international benchmarks has also declined since 2003. Only 4% of Secondary II students achieved the *advanced* benchmark of 625 points in science–the lowest percentage of all Québec's groups. The percentage of students placing in the *low* benchmark (400 points) was also the lowest of all the groups, at 94%. Despite this, Québec ranked 12th among the countries and school jurisdictions taking part in the 2007 TIMSS study.

7.5 Summary of students' perceptions from the questionnaire on attitudes

7.5.1 Perception of Elementary 4 students regarding mathematics and science

Québec students who watch television or videos for one to two hours per day are more successful than those who watch less or more, in both mathematics and science. Overall, the boys performed better than the girls, regardless of the number of hours of television or video viewing.

The students who said they had more books at home performed better than those who had less. The more strongly students disagreed that they were not good at mathematics or science and the more books they had at home, the better their performance. In the table showing the perceived difficulty of the subject and the number of books at home, there was a difference of 112 points between the lowest and highest scores, in both mathematics and science.

The students, boys and girls alike, who had computers and Internet connections at home performed better than those who did not.

7.5.2 Perception of Secondary II students regarding mathematics and science

Québec students who strongly agreed that mathematics and science are needed for postsecondary education performed better than the others. Those who disagreed that mathematics and science were difficult also performed better. According to the table showing the results for both these statements, students who thought they needed these subjects for postsecondary education and did not think the subjects were difficult were more successful. There was a difference of 127 points in mathematics and 87 points in science between the lowest and highest scores.

Québec students who agreed more strongly that they had good marks in mathematics or science performed better than those who did not. Those who agreed that science was needed for postsecondary education also performed better. The same was not necessarily true for mathematics, since some students who strongly disagreed that mathematics was needed for postsecondary education also performed well; in fact, they achieved the highest average score in the table, but with the highest standard error. When the two perceptions were combined, the students who agreed with both statements tended to perform better. The more strongly they agreed that they had good marks and needed the subject for postsecondary education, the better their marks appeared to be.

There was a slight upward trend in the achievement of students who agreed that these subjects were needed for postsecondary education and to obtain the jobs they wanted. The trend was less marked for mathematics and more marked for science.

There is also a positive correlation between the number of books at home and student achievement. The greater the number of books at home, the better the student's performance, in both mathematics and science.

There is also a correlation–negative this time–between the number of hours spent playing computer games and student achievement. The more hours a student spends playing computer games, the worse his or her performance. Boys outperformed girls in this respect, and the difference grows in proportion to the number of hours spent on the computer. In both mathematics and science, the difference was roughly 40 points for girls and 30 points for boys.

7.6 Summary of results

Québec's Elementary 4 students improved their mathematics and science scores by 13 and 17 points, respectively. Québec's overall ranking remained unchanged in mathematics, but slipped by two places in science.

The mathematics and science scores for Secondary II students fell by 15 and 24 points, respectively. Québec's overall ranking remained unchanged in mathematics, but slipped by six places in science.

Boys outperformed girls at both the elementary and secondary level, and in both subjects. However, the difference was significant only in elementary-level mathematics.

Francophone Elementary 4 students significantly outperformed their Anglophone counterparts in both subjects. At the secondary level, Anglophone students outperformed the Francophone students, but the difference was not significant in either subject.

In mathematics, Québec's Elementary 4 school students obtained their lowest scores in the content domain of *number*, but the Secondary II students obtained their highest scores in this same domain. In science, both the Elementary 4 and Secondary II students obtained their highest scores in *earth science*.

In the cognitive domains, Québec's students scored highest in *reasoning*, in three of the four sectors (elementary-level mathematics, and elementary- and secondary-level science). In secondary-level mathematics, the highest scores were obtained in the domain of *knowing*.