Measuring up: Canadian Results of the OECD PISA Study

The Performance of Canada's Youth in Science, Reading and Mathematics

2006 First Results for Canadians Aged 15

Highlights

Human Resources and Social Development Canada
Statistics Canada

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Council of Ministers of Education, Canada
Conseil des ministres de l'Éducation (Canada)

Canada

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Highlights

Canadian 15-year-olds perform well in science in international comparison

Among the 57 participating countries, students from only Hong Kong-China and Finland outperformed Canadian 15-year-olds on the combined science scale. While all provinces performed at or above the OECD average on the combined science scale, there were some notable provincial differences. The average performance of students in Alberta was significantly above the Canadian average. Quebec, Ontario and British Columbia performed about the same as the Canadian average. Students in Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick, Manitoba and Saskatchewan performed significantly below the Canadian average.

In the science sub-domains of 'identifying scientific issues' and 'using scientific evidence' (see text box *What is PISA* for definitions), only Finland had higher average scores than Canada. In the sub-domain of 'explaining phenomena scientifically' only students in Finland, Hong Kong-China, Chinese Taipei and Estonia outperformed Canadian students.

What is PISA?

The Programme for International Student Assessment (PISA) was initiated by the member countries of the Organisation for Economic Co-operation and Development (OECD) to provide policy-oriented international indicators of the skills and knowledge of 15-year-old students. It assesses youth outcomes in three domains – reading, mathematics and science – focussing on what students can do with what they have learned in school, at home and in the community.

PISA was first implemented in 2000 and is repeated every three years with each cycle providing detailed assessment in one of the three domains and summary assessments in the other two. In PISA 2006, science was the major assessment domain and it included three competency areas also referred to as sub-domains:

- 'Identifying scientific issues' involves recognizing issues that are possible to investigate scientifically, identifying keywords to search for scientific information and recognizing the key features of a scientific investigation.
- 'Explaining phenomena scientifically' involves applying knowledge of science in a given situation, describing or interpreting phenomena scientifically and predicting changes and identifying appropriate descriptions, explanations and predictions.
- 'Using scientific evidence' involves interpreting scientific evidence and making and communicating conclusions, identifying the assumptions, evidence and reasoning behind conclusions, and reflecting on the societal implications of science and technological developments.

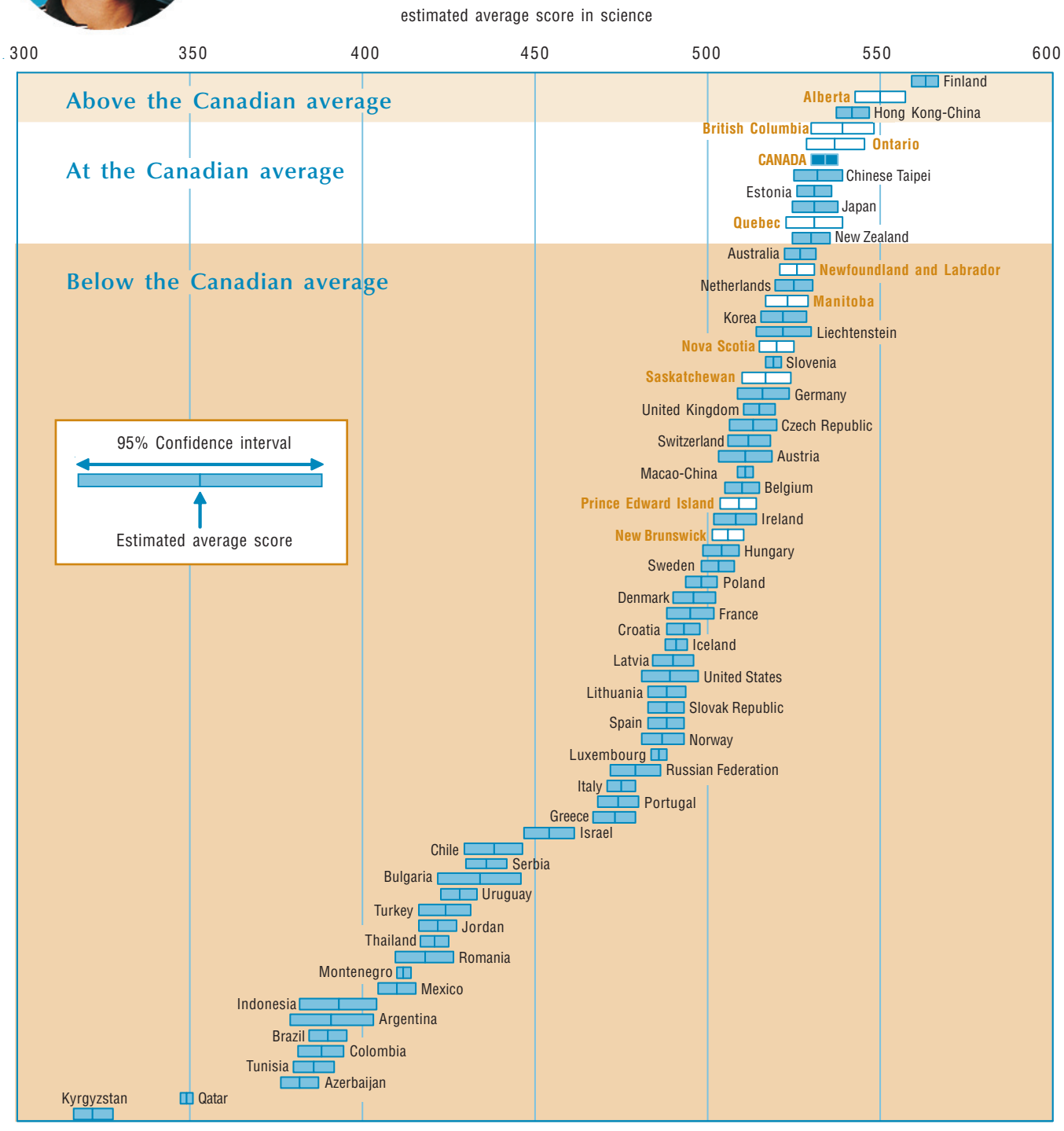
In addition to science, reading and mathematics were included in PISA 2006 as minor domains.

Fifty-seven countries[1] participated in PISA 2006, including all 30 OECD countries. In Canada, about 22,000 15-year-old students from around 1,000 schools participated. A large sample was drawn in Canada so that information could be provided at both the Canadian and provincial levels[2].

The PISA 2006 included a direct assessment of students' skills, a student questionnaire and a school questionnaire completed by principals. The school and student questionnaire were used to collect background and contextual information related to student performance.

1. Three Special Administrative Regions (Chinese Taipei, Hong Kong-China and Macao-China) are included among the 57 countries.
2. No data were collected in the three territories or on First Nations schools.

Only students from Finland and Hong Kong-China outperformed Canadian students in science



Note : The OECD average is 500 with a standard error of 0.5.

Between 2003 and 2006, the performance of Canadian students remained unchanged in reading and mathematics however more countries outperformed Canada

Canadian 15 year-olds also performed well in the other domains measured by PISA 2006. Only Korea, Finland and Hong Kong-China performed better than Canada in reading and mathematics. Additionally, Chinese Taipei performed better than Canada in mathematics.

All provinces performed at or above the OECD average in reading and mathematics. Students in Quebec performed above the Canadian average in mathematics and at the Canadian average in reading. Students in Ontario, Manitoba, Alberta and British Columbia performed at the Canadian average in both reading and mathematics. Students in Newfoundland and Labrador, Prince Edward Island, Nova Scotia, New Brunswick and Saskatchewan performed below the Canadian average in both domains.

Overall, reading and mathematics performance among Canadian 15-year-olds remained high but unchanged between 2000 and 2006. However, improved performance in reading in Hong Kong-China and Korea resulted in these two countries outperforming Canada for the first time since PISA was implemented. This suggests that although Canada's performance in reading is strong, in order to maintain its competitive edge in the future, the performance of Canadian 15-year olds will need to improve at the rate of other leading countries.

While performance remained unchanged for Canada as a whole, change in performance was observed in some provinces. Reading performance decreased between 2000 and 2006 in Prince Edward Island, Nova Scotia and Saskatchewan and remained the same in other provinces. Mathematics performance decreased between 2003 and 2006 in Alberta and British Columbia and remained unchanged in the other provinces.

Students in minority language school systems had lower performance in science compared to those in majority language school systems

The PISA 2006 results are provided for students in the English-language and French-language school systems for the five Canadian provinces that sampled these population groups separately. The performance of the minority language group – students in French-language school systems in Nova Scotia, New Brunswick, Ontario and Manitoba and students in the English-language school system in Quebec – are compared to the majority.

In the combined science scale, students in the minority language group performed lower than those in the majority language group in the same province.

As was the case in PISA 2000 and PISA 2003, students enrolled in the French-language school systems in Nova Scotia, New Brunswick, Ontario and Manitoba performed significantly lower in reading than did students in the English-language system in the same province. In Quebec, student performance in reading did not differ between the English-language and French-language school systems.

For mathematics, there were significant differences favouring the English-language system in New Brunswick, and Ontario and differences favouring the French-language school system in Quebec. No significant differences in mathematics were observed between the English-language and the French-language school systems in Nova Scotia and Manitoba.

Girls and boys do equally well in science though they excel in different science competencies

In Canada, as well as in a majority of other countries, there were no gender differences in combined science performance and in the sub-domain of 'using scientific evidence'. However, in Canada as well as in most countries and in eight of the ten provinces boys out performed girls in the sub-domain of 'explaining phenomena scientifically' while girls outperformed boys in the sub-domain 'identifying scientific issues'. The performance patterns on these two sub-scales suggest that boys and girls have very different levels of performance in different areas of science. It appears that boys may be better at mastering scientific knowledge whereas girls may be better at seeing the larger picture that enables them to identify scientific questions that arise from a given situation.

In Canada, as was observed in previous PISA assessments, as well as in a majority of countries, boys outperformed girls in mathematics, but the difference was relatively small at 14 score points. Furthermore, there was no difference between girls and boys in three provinces (Newfoundland and Labrador, Prince Edward Island, and Saskatchewan). On the other hand, there was a relatively large difference (33 score points for Canada) favouring girls in reading in the vast majority of countries and in all Canadian provinces.

Canadian students performed well in reading and mathematics

	Countries and provinces performing significantly better than Canada	Countries and provinces performing the same as Canada
Reading	Korea, Finland, Hong Kong-China	Alberta, Ontario, British Columbia, Quebec, New Zealand
Mathematics	Chinese Taipei, Finland, Hong Kong-China, Korea, Quebec	Netherlands, Alberta, Switzerland, Ontario, Macao-China, Liechtenstein, British Columbia, Japan, New Zealand, Manitoba, Belgium

Summary of gender differences, Canada and the provinces

	Girls performed significantly higher than boys	Boys performed significantly higher than girls	No significant differences between boys and girls
Science – combined scale	Newfoundland and Labrador		**Canada,** Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Saskatchewan, Alberta, British Columbia
Science – using scientific evidence	Newfoundland and Labrador, Saskatchewan		**Canada,** Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Alberta, British Columbia
Science – explaining phenomena scientifically		**Canada,** Prince Edward Island, Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Alberta, British Columbia	Newfoundland and Labrador, Saskatchewan
Science – identifying scientific issues	**Canada,** All provinces		
Reading	**Canada,** All provinces		
Mathematics		**Canada,** Nova Scotia, New Brunswick, Quebec, Ontario, Manitoba, Alberta, British Columbia	Newfoundland and Labrador, Prince Edward Island, Saskatchewan

The impact of family socio-economic status on science achievement is smaller in Canada compared to all OECD countries combined

Canadian students tend to be more advantaged in their socio-economic status (SES) than students in all OECD countries combined, but students in some provinces are more advantaged than others. As such, Canada is held as a model for achieving both excellence and equity.

In every province, students with higher SES (that is those whose parents had higher occupational status and education, and more resources at home) tended to have higher performance in science. However, differences in the performance of students with different levels of SES were less pronounced for Canada than they were for all OECD countries combined suggesting that the impact of family socio-economic status on science achievement is smaller in Canada.

Looking forward

The performance of Canadian 15-year-olds in international comparison merits recognition yet also raises some concerns. Overall, when compared to their peers in other participating countries, Canadian students continue to do well on the PISA assessment, however the top performing country in each of the domains has considerably higher average scores than Canada. Significant provincial differences in many domains continue to exist. Nevertheless, the performance of Canadian youth in the PISA assessment suggests that the strong performance of Canadian 15-year olds in an international context is promising to their future and the future of Canada.

Further Canadian results are available in the report, **Measuring up: Canadian Results of the OECD PISA Study – The Performance of Canada's Youth in Science, Reading and Mathematics – 2006 First Results for Canadians Aged 15**. This publication is available electronically without charge, through the internet at:

www.pisa.gc.ca **www.cmec.ca**
www.statcan.ca **www.hrsdc-rhdsc.ca**

The printed version of this report, listed as Catalogue no. 81-590-XPE at a price of $11.00 per issue can be ordered by:

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