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OECD Programme for International Student Assessment

FACT SHEET

General facts about PISA

What is PISA?
The Programme for International Student Assessment (PISA) is one of the most ambitious international educational projects ever undertaken. Coordinated by the Organisation for Economic Co-operation and Development (OECD), PISA 2003 involved approximately 272,000 students from 41 countries. PISA is significant because it provides education researchers and policy makers with comprehensive international data in three core learning areas: mathematics, science, and reading. Problem-solving skills were also tested in 2003.

Why did Canada participate in the PISA Study?
Canada participated in PISA 2003 to assess the performance of 15-year-old students in mathematics, science, and reading. This information, together with the review mechanisms of individual provinces, will give the ministers of education a basis for examining their own curriculum and other aspects of their school system, and compare the performance of their students with the performance of their provincial and international counterparts.

In Canada, students who participated in PISA 2000 also participated in the Youth in Transition Survey (YITS) — a longitudinal study of major transitions in young people's lives. The link between PISA and YITS will enable researchers and policy makers to study the impact of social and economic factors on the achievement of Canadian youth as well as the influence of their level of skills and knowledge at age 15 on their future school-to-work transitions.

Who participated in PISA?
In Canada, approximately 28,000 students from 1,000 different schools took part in PISA. The total number of students who participated from each province is outlined in Appendix A of the Canadian report. None of the three Canadian territories participated in either the PISA 2000 or the PISA 2003 cycle.

What is the planned OECD PISA assessment cycle?
In 2000, OECD PISA assessed reading as the major domain and mathematics and science as the minor domains. In 2003, mathematics was the major domain and science and reading were minor domains. Problem-solving skills were also tested in 2003. A future assessment in 2006 will assess science as the major domain with mathematics and reading as minor domains. The cyclical nature of the assessments allows countries and provinces, in Canada's case, to compare achievement over time in all three domains.

How can student performance across OECD countries be compared?
Educational systems and school programs differ from one country to the next. Making comparisons of results from these various countries is a complex task. However, OECD countries developed a framework for each of the three domains that reflected in general terms what 15-year-old students are expected to know and be able to do. While PISA does assess students' knowledge and skills in reading, mathematics, and science, it focuses on what students will need in their future lives. PISA then seeks to assess what they can do with what they have learned. The results obtained from PISA will help determine whether students in OECD countries reach similar levels of performance at about the same age.

How can student performance across Canada be compared?
Education is the responsibility of the provinces and territories in Canada; therefore, school programs differ from one part of the country to another. However, because of the universality of PISA's global benchmarks in mathematical, scientific, and reading literacy, the comparison between individual provinces and distinct countries is quite feasible.

In the Canadian report, the provincial breakdown of the PISA results allows us to compare the performance of students within each jurisdiction with the performance of those from neighboring provinces, as well as with the performance of students from other developed countries. In all provinces, gender comparisons are also made. In some provinces (Manitoba, Ontario, Quebec, New Brunswick, and Nova Scotia), comparisons were made along linguistic lines.

How can we compare average scores?
Because scores were based on samples of students from each country and province, we cannot say with certainty that these scores are the same as those that would have been obtained had all 15-year-olds been tested. A "confidence interval" is a range of scores within which the score for the population is likely to fall 95% of the time or 19 times out of 20.

When comparing two countries or two provinces, the two average scores cannot be said to be different from each other if the confidence interval for the two average scores overlaps. For example, countries performing about the same as Canada have a confidence interval for the average score that overlaps with Canada's confidence interval.

What are the levels of mathematics achievement?
Mathematics achievement was divided into 6 levels representing a group of tasks of increasing difficulty with level 6 as the highest and level 1 as the lowest. A difference of one level can be considered an important difference in student performance.

Included below are examples of what was expected of students from level 6, level 3, and level 1 on the mathematics scales.

Level 6 Example
Students are presented with a truncated bar graph showing the number of robberies per year in two specified years. A television reporter's statement interpreting the graph is given. Students are asked to consider whether or not the reporter's statement is a reasonable interpretation of the graph, and to give an explanation as to why.

Level 3 Example
Students are presented with a graph of the average height of young males and young females from the age of 10 to the age of 20. They are asked to identify the age range when females are, on average, taller than males of the same age.

Level 1 Example
Students are presented with the rate for exchanging Singapore Dollars (SGD) into South African Rand (ZAR), namely 1 SGD = 4.2 ZAR. The question requires students to apply the rate to convert 3000 SGD into ZAR.

How does PISA define mathematical literacy, scientific literacy, and reading literacy?
In PISA, **mathematical literacy** is defined as the capacity to identify and understand the role that mathematics plays in the world, to make well-founded judgments, and to use and engage with mathematics in ways that meet the needs of that individual's life as a constructive, concerned, and reflective citizen.

Mathematics focuses on both overall skills in mathematics and specific mathematics sub-domains such as space and shape, change and relationships, quantity, and uncertainty.

The OECD defined these four subdomains as follows:

- "Space and shape" involves mathematical skills required to study shapes and forms and to understand and represent the relative positions of objects. This domain relates most closely to geometry.

- "Change and relationships" involves the ability to model or measure patterns of change and growth. This subdomain relates most closely to algebra.

- "Quantity" focuses on the ability to understand size, recognize patterns, and generally use numbers to count and measure objects and their characteristics. This subdomain is most closely associated with arithmetic.

- "Uncertainty" involves mathematical skills related to statistics and the understanding of probability and chance.

Scientific literacy is defined in PISA as an individual's capacity to use scientific knowledge, to identify questions, and to draw evidence-based conclusions in order to understand and help make decisions about the natural world and the changes made to it through human activity.

Reading literacy is defined in PISA as an individual's capacity to understand, use and reflect on written texts in order to achieve one's goals, to develop one's knowledge and potential, and to participate in society.

In PISA 2003, what skills were assessed in problem solving?
Problem solving is defined as an individual's capacity to use cognitive processes to confront and resolve real cross-disciplinary situations where the solution path is not immediately obvious and where the literacy domains or curricular areas that might be applicable are not within the separate domains of mathematics, science, or reading.

Is the assessment fair to students across Canada?
Canada actively participated in PISA to ensure that the uniqueness of our country's education systems would be taken into account. Factors such as linguistic differences, rural and urban school locations, and cultural influences were all considered. In addition, the universal framework for each subject incorporated an agreed-upon philosophy for all countries that is based upon the latest pedagogical research.

In the sense that Canadian students answered the same questions as students from every other country, it is very fair. The assessment is also unique in that it is not tied to the curriculum of any province or participating country, but is instead a fair measurement of students' abilities to use their learning skills to solve real-life situations.

What did we learn from this assessment?
The report gives parents and educators important information on the relationship between student engagement in mathematics, student learning, and their performance in mathematics. In the Canadian report, these factors are outlined in chapter three.

In chapter four, the report provides information on the impact of student socioeconomic background on their performance in mathematics.

The report indicates that the performance of Canadian students is above the international average in all three subject areas and in problem-solving skills. In fact, Canadian students, on average, finished in the top tier of all countries surveyed in every domain tested in the assessment.

PISA has also shown Canadian educators where improvements could make our education systems even better.

In mathematics performance, the main domain tested in 2003, there was no difference between English-language and French-language school systems with the exception of Ontario where students in the English-language school system had higher performance. In general, in the other assessment areas, French-minority-language students in most provinces did not perform as well as their English-language counterparts.

In mathematics, on the combined scale, only two countries performed better than Canada, (Hong Kong-China and Finland). In the sub-domains of "change and relationships," "quantity," and "uncertainty," only one or two countries had higher scores than Canada while in the subdomain of "space and shape," eight countries performed significantly better than Canada.

Most provinces performed well in mathematics, with all provinces performing at or above the OECD mean and several provinces performing as well as the top-ranked countries.

In science and problem solving, only Finland, Japan, Hong Kong-China, and Korea outperformed Canada. Canada fell within a group that included Australia and New Zealand.

In reading, Canada finished second behind Finland as it did in PISA 2000 where reading was the major domain.

How did the performance of 15-year-olds change between PISA 2000 and PISA 2003?

In mathematics, comparisons were only possible in the two subdomains tested in 2000. In "space and shape," student performance did not change, whereas in "change and relationships," performance improved.

Student performance in reading remained unchanged, but performance was lower in science. In PISA 2006, when science will be the major domain assessed, Canada will be better able to assess trends over time.

How do boys and girls compare?

In Canada, boys outperformed girls by 11 points in mathematics. This pattern was observed in twenty-seven countries and in seven provinces. The gap in mathematics was not as large as in reading, where girls outperformed boys by 32 points. This pattern was observed in all but one country and in all provinces.

In PISA 2000, no significant gender differences were observed between boys and girls in any country or any province on the science test. In PISA 2003, in Canada as well as in eleven other countries, boys performed significantly better than girls on the science test. However, as with mathematics, the gap was small at 11 points in Canada and 6 points at the OECD average. At the provincial level, boys outperformed girls in Manitoba, Nova Scotia, and Ontario.

For problem solving, girls outperformed boys in six countries. There were only two provinces where significant gender differences were observed in Canada.

What kind of information does the Canadian report contain that differs from the OECD PISA report?
The Canadian report gives a provincial breakdown of the results and also quantitative information on some of the student and home factors that influence the performance of Canadian students.

How will the results be used?
The results will be used by provincial education departments as they seek quantitative information to help determine not only where their students are succeeding but also where improvement is needed.

OECD plans to produce further thematic reports based on the PISA 2003 performance data and the results of the student and school questionnaires.

As with other assessments, PISA 2003 will be a valuable resource for education researchers and policy makers who wish to study and propose improvements to Canada's systems of education. The federal government will also conduct analyses of PISA data sets.

Who developed the test?
The OECD developed PISA, with contributions and regular input from all the countries who participated in the assessment.

What is the cost to date of PISA?
The direct costs for PISA are funded by HRSDC; some indirect costs are assumed by the participating provinces. In each of three years, the direct cost for PISA 2003 was $1.9 M per year; the total was approximately $11.4 M for the two PISA administrations.

Who are the Canadian partners involved in OECD/PISA?
Human Resources and Skills Development Canada, Statistics Canada, and the Council of Ministers of Education, Canada, are partners in administering PISA and in producing the Canadian PISA report.