



CHAPTER 6: PROGRAMME FOR INTERNATIONAL STUDENT ASSESSMENT

The Programme for International Student Assessment (PISA) measures student ability in reading literacy, mathematics literacy, and scientific literacy. It was started in 2000 by the Organisation for Economic Co-operation and Development (OECD) and occurs every three years.

During each testing cycle, one of the three subject areas assessed (i.e., reading, mathematics or science) is considered a main domain and the other two are minor domains. The subject area identified as the major domain for that year involves a more intensive assessment. This allows information to be provided on several sub-domains. For example, the main focus in 2009 testing was on reading literacy and included the following reading sub-domains: accessing and retrieving, integrating and interpreting, reflecting and evaluating, continuous texts and non-continuous texts.

Information in this chapter was obtained from *Measuring Up: Canadian Results of the OECD PISA Study* published by Statistics Canada. This report can be viewed at <http://www.statcan.gc.ca/pub/81-590-x/81-590-x2010001-eng.pdf>.

Test Administration

In 2009, approximately 470,000 15 year old students from 65 countries and economies around the world were assessed (OECD, 2010, p.3). In Canada, roughly 23,000 students from about 1,000 schools across ten provinces participated. This includes 1,412 students from Newfoundland and Labrador (Knighton, Brochu & Gluszynski, 2010, p8).

Students completed the 2009 PISA assessment during regular school hours between the months of April and May. This was a paper-and-pencil test that lasted two hours. Students also completed a 20-minute student background questionnaire providing information about themselves and their home and a 10-minute questionnaire on information technology and communications, while school principals completed a 20-minute questionnaire about their schools. Canadian students completed an additional 20-minute student questionnaire to collect more information on the school experiences of 15-year-olds, their work activities and their relationships with others.

Scoring

Two scores can be derived from the PISA assessment data: the mean (or average) score and the proficiency level. Since the assessment scales were developed according to levels of difficulty, student performance can be ranked according to proficiency. Each successive level is associated with tasks of increased difficulty (OECD, 2009a, p.134). In other words, a student achieving a proficiency of five is more knowledgeable in a subject matter compared to a student achieving a level of two. In general, a proficiency level of one means a student demonstrates a limited knowledge of the subject and a level of five or six means a student can identify more complex concepts and knowledge. Based on performance, each student is assigned to the highest proficiency level for which s/he would be expected to answer the majority of the assessment questions correctly.

Confidence intervals were used to determine if differences among the provinces were significantly different. PISA uses a 95% confidence interval to represent the actual high and low end points where the actual mean score should fall 95% of the time. Scores are considered to be significantly different if the respective confidence intervals do not overlap. If the confidence intervals overlap, then the differences are not significant.

The remainder of this chapter will focus on the performance of students in Newfoundland and Labrador on each of the three domains. This will include exploring the two measures of student performance (i.e., average scores and proficiency levels). Trend data over the four test administrations will also be provided.

Assessing Reading Literacy

The reading assessment focuses on determining the ability of students to use written information in situations they will encounter in life. Specifically, PISA defines 'reading literacy' as the ability to understand, use, reflect on and engage with written texts to achieve one's goals, develop one's knowledge and potential and to participate in society (OECD, 2009b, p.23).

Since reading was the major domain, student performance was also assessed on five additional sub-domains. These include:

- **Accessing and retrieving:** Involves going to the information space provided and navigating in that space to locate and retrieve one or more distinct pieces of information.
- **Integrating and interpreting:** Involves processing what is read to make internal sense of a text.
- **Reflecting and evaluating:** Involves drawing upon knowledge, ideas or attitudes beyond the text in order to relate the information provided within the text to one's own conceptual and experiential frames of reference.
- **Continuous texts:** Are formed by sentences organized into paragraphs. These include newspaper articles, essays, short stories, reviews or letters.
- **Non-continuous texts:** Are documents that combine several text elements such as lists, tables, graphs, diagrams, advertisements, schedules, catalogues, indexes or forms.

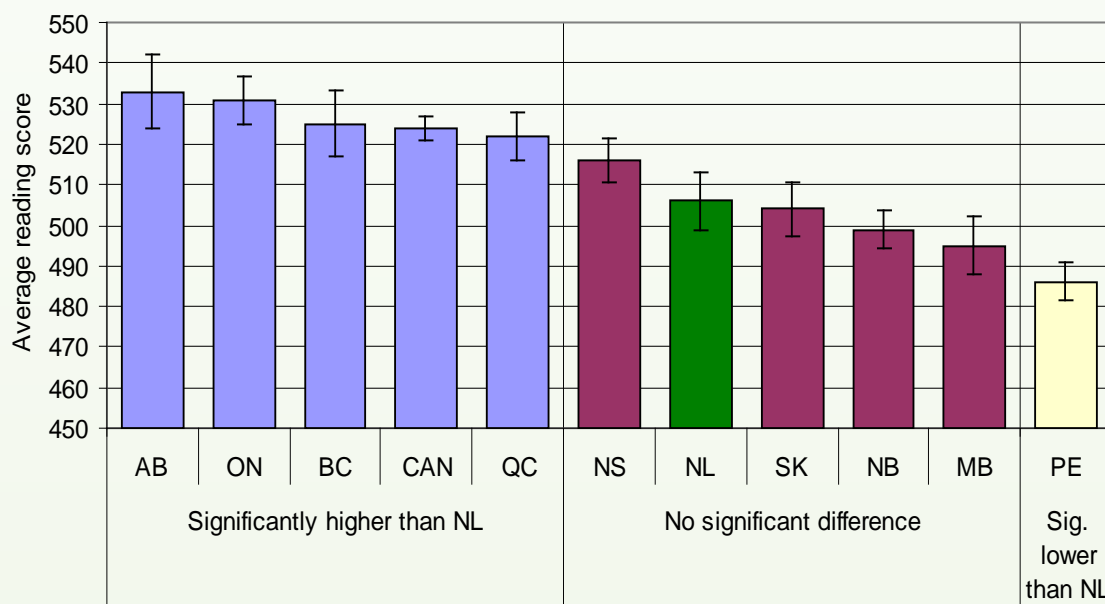




Average reading scores

Students in Newfoundland and Labrador achieved an average combined reading score of 506 on the 2009 assessment. As shown in figure 6.1, students in four provinces achieved significantly higher average scores. Students in Prince Edward Island scored a significantly lower average score.

Figure 6.1: Average reading scores across Canada (PISA 2009)



(Source: Table 6.1)



Performance on the sub-domains

Table A presents student performance on the five sub-domains in relation to Newfoundland and Labrador. It reports the provinces where the average score was significantly higher, significantly lower, or similar to (i.e., no significant difference present) Newfoundland and Labrador. As shown, the province's students rank in the middle of the country. In each sub-domain, Alberta and Ontario achieved a significantly higher score than Newfoundland and Labrador and Prince Edward Island consistently achieved a significantly lower average score.

Table A: Significant differences in average scores

Reading sub-domain	List of provinces where the average score was:		
	Significantly higher than NL	Not significantly different	Significantly lower than NL
Accessing and Retrieving	Alberta Ontario	British Columbia Saskatchewan Manitoba Québec Nova Scotia New Brunswick	Prince Edward Island
Integrating and Integrating	British Columbia Alberta Ontario Québec	Saskatchewan Manitoba Nova Scotia New Brunswick	Prince Edward Island
Reflecting and Evaluating	British Columbia Alberta Ontario	Saskatchewan Québec Nova Scotia	Manitoba New Brunswick Prince Edward Island
Continuous Texts	Alberta Ontario	British Columbia Saskatchewan Manitoba Québec Nova Scotia New Brunswick	Prince Edward Island
Non-continuous Texts	British Columbia Alberta Ontario	Saskatchewan Manitoba Québec Nova Scotia	New Brunswick Prince Edward Island



Gender differences

Girls consistently outperform boys on the reading assessment. Significant differences existed between the average combined reading scores of boys and girls in each of the ten provinces. This gender gap ranged from a low of 29 points in Nova Scotia to a high of 48 points in Prince Edward Island (see figure 6.2). As shown in table 6.2 in Appendix A, this significant gender gap was also seen in five reading sub-domains. This gap was wider in the average scores of Canadian students in accessing and retrieving and the reflecting and evaluating (38 points) sub-domains. This significant gender gap in student performance on the sub-domains was present in each province across Canada. In Newfoundland and Labrador, the female average score was between 5.0 and 10.0 percentage points higher than the male (see figure 6.3).

Figure 6.2: Gender differences in average combined reading scores across Canada (PISA 2009)

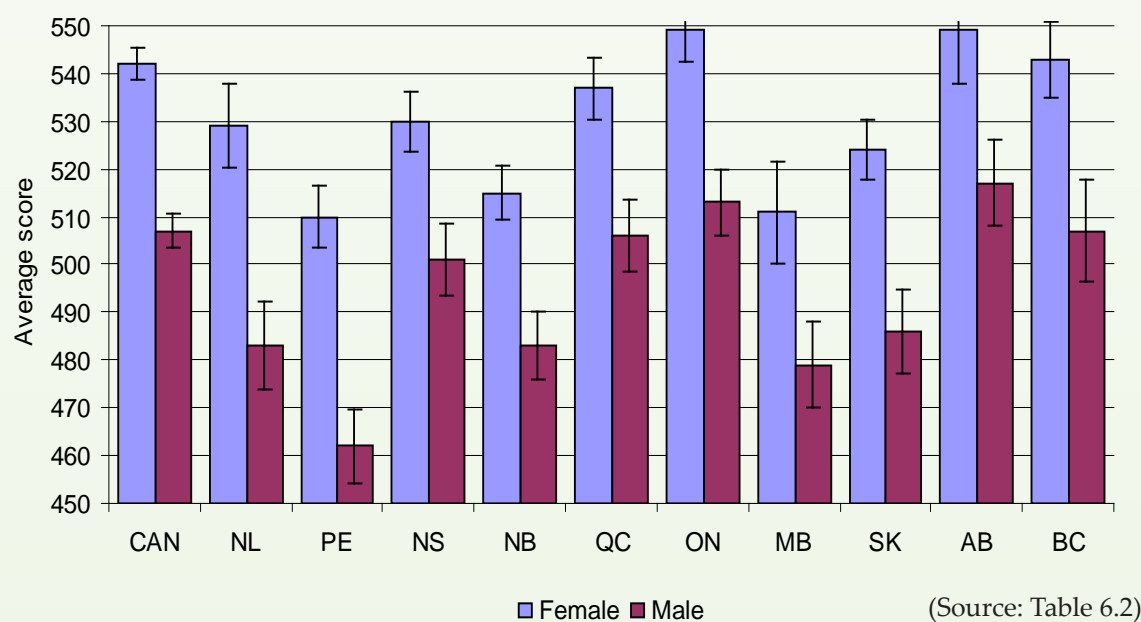
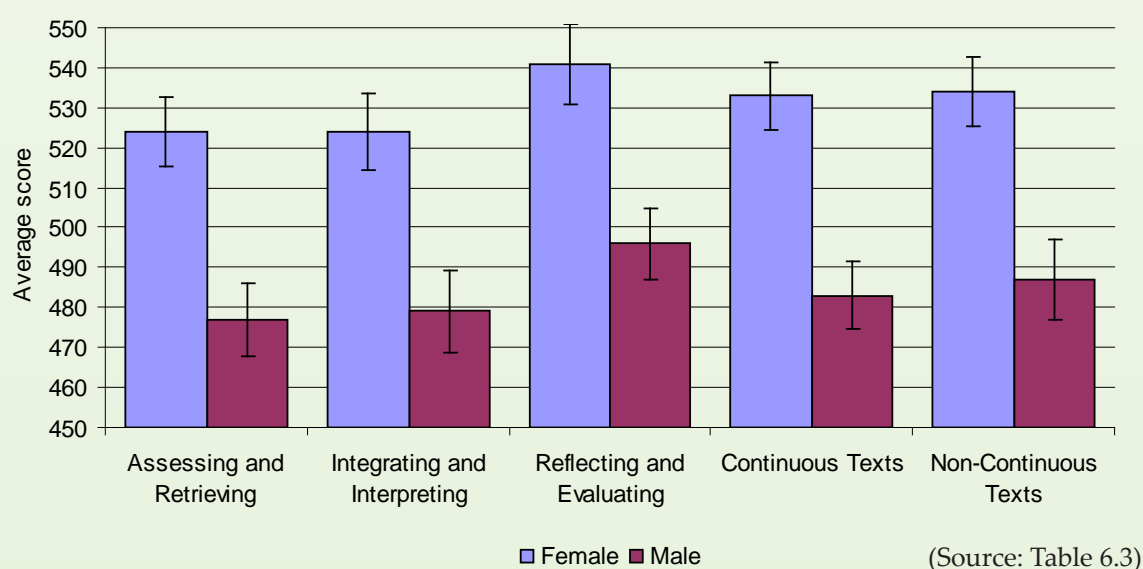


Figure 6.3: Gender differences in average reading scores of Newfoundland and Labrador students on the English sub-domains (PISA 2009)



Reading proficiency

Student reading performance can be divided into six proficiency levels. According to the OECD, level 2 can be considered a baseline level where students begin to demonstrate the reading literacy competencies that will enable them to participate effectively and productively in life. These students are able to determine the main idea in a text, understand relationships or infer meaning when the information is not prominent.

Students assessed with a proficiency level below 2 are considered low performers. While they can still accomplish some reading tasks successfully, they lack some of the fundamental skills needed to prepare them to either enter the workforce or pursue post-secondary education. On the higher end of the reading scale, students with a level 4 or above proficiency level have acquired the level of literacy required to participate effectively and productively in life. These students are capable of the moderately difficult reading tasks. Finally, students assessed at level 5 and above can be considered to be the top performers. These students have a full and detailed understanding of a text whose content or form is unfamiliar (Jakubowski, 2011, p.3; Knighton, Brochu, & Gluszynski, 2010, p.17).

Figure 6.4 reports Canadian and provincial proficiency levels for combined reading. These levels are grouped into three categories:

- (1) Low performers (students performing below the baseline measure of level 2),
- (2) Typical performers (those with a proficiency level between 2 and 4), and
- (3) High performers (students achieving a proficiency level of 5 or higher)

Overall, Alberta had the highest percentage (16.1%) of high performers and Ontario had the lowest percentage (8.5%) of low performers in the country. Students in Prince Edward Island did not fare very well in the reading assessment. They had the highest percentage of low performers (21.2%) and the lowest percentage of high performers (6.9%) in the country.

The proficiency levels of students in Newfoundland and Labrador were in the same range as the other ten Canadian provinces. There were four provinces with a higher percentage of low performers compared to Newfoundland and Labrador and six with a higher percentage of high performers. With the exception of Prince Edward Island, there was a difference of five percentage points separating the high and low percentages of students across Canada with a proficiency level between two and four (the typical performers).

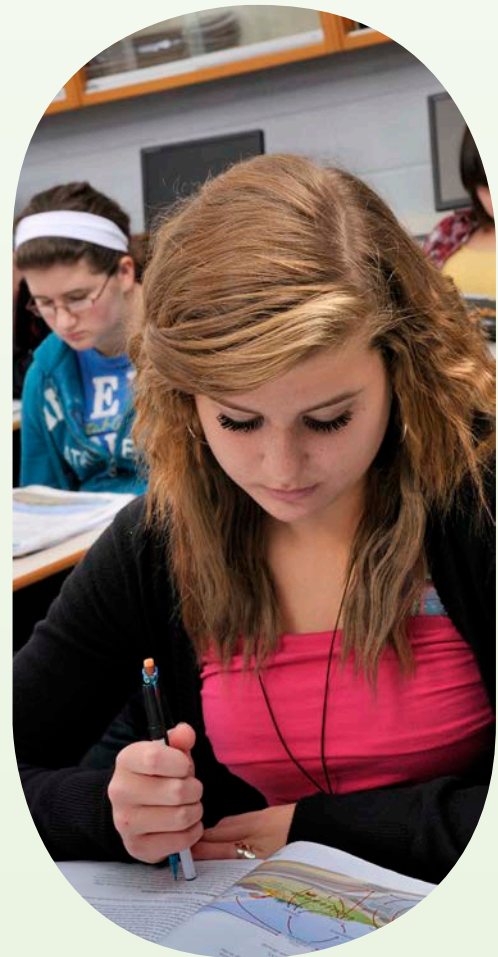
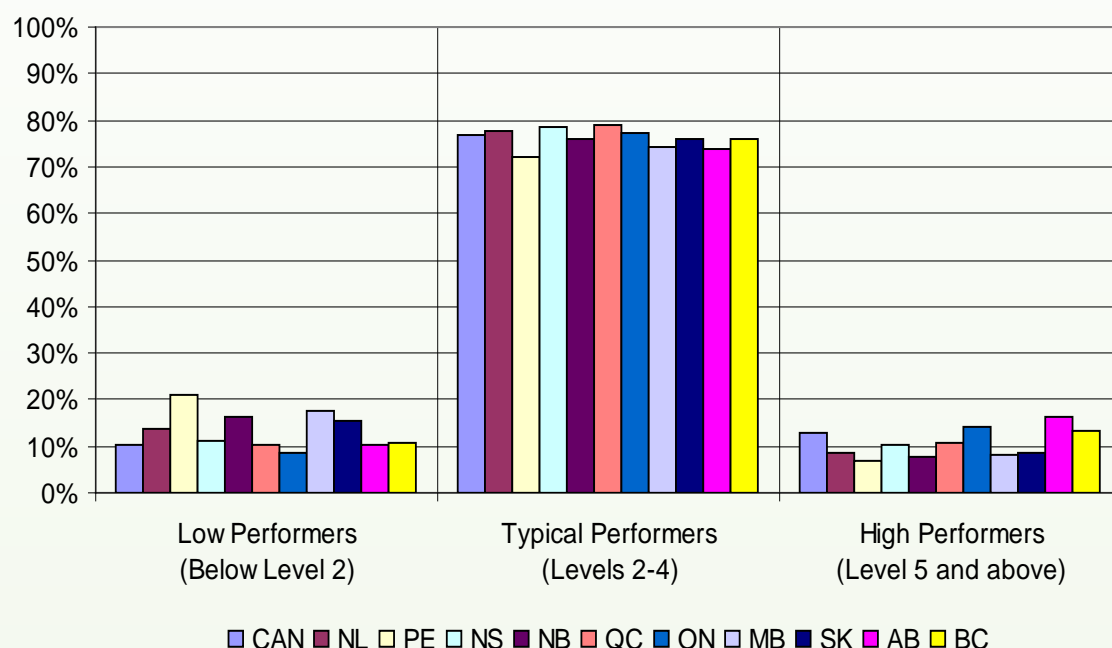




Figure 6.4: Reading proficiency levels across Canada (PISA 2009)



(Source: Table 6.4)

Proficiency on the reading sub-domains

Table B compares two groups of students (low performers and high performers) from each province. It reports the provinces with a higher percentage of low performers and high performers in relation to Newfoundland and Labrador.

Newfoundland and Labrador consistently ranks in the middle of the country with four provinces consistently having a higher percentage of low performers and four or five provinces and the country as a whole having a higher percentage of high performers. British Columbia, Alberta, Ontario and Nova Scotia consistently had a higher percentage of high performers.

The percentage of typical performers (i.e., students with a proficiency level between 2 and 4) was fairly consistent across the country in each of the five sub-domains with the difference between the high and low percentages ranging between 5.0 and 10.0 percentage points. The data tables for each sub-domain are provided in table 6.4 in Appendix A.

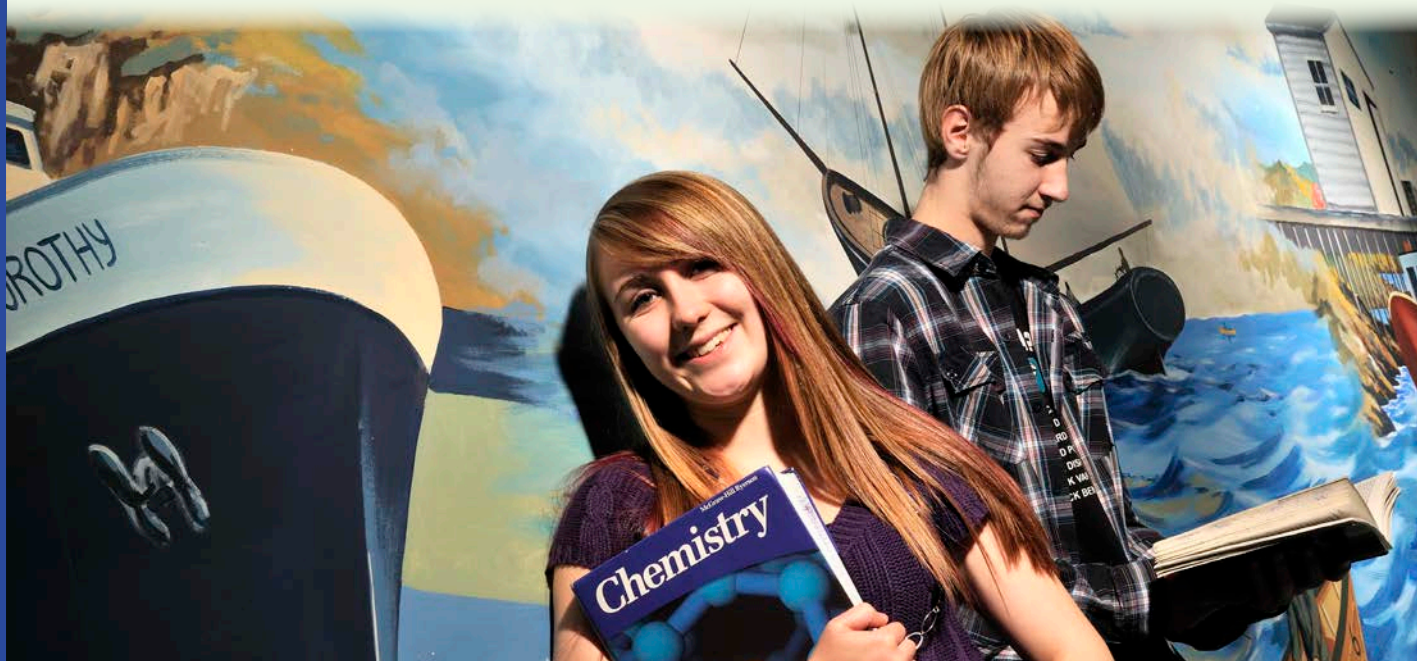


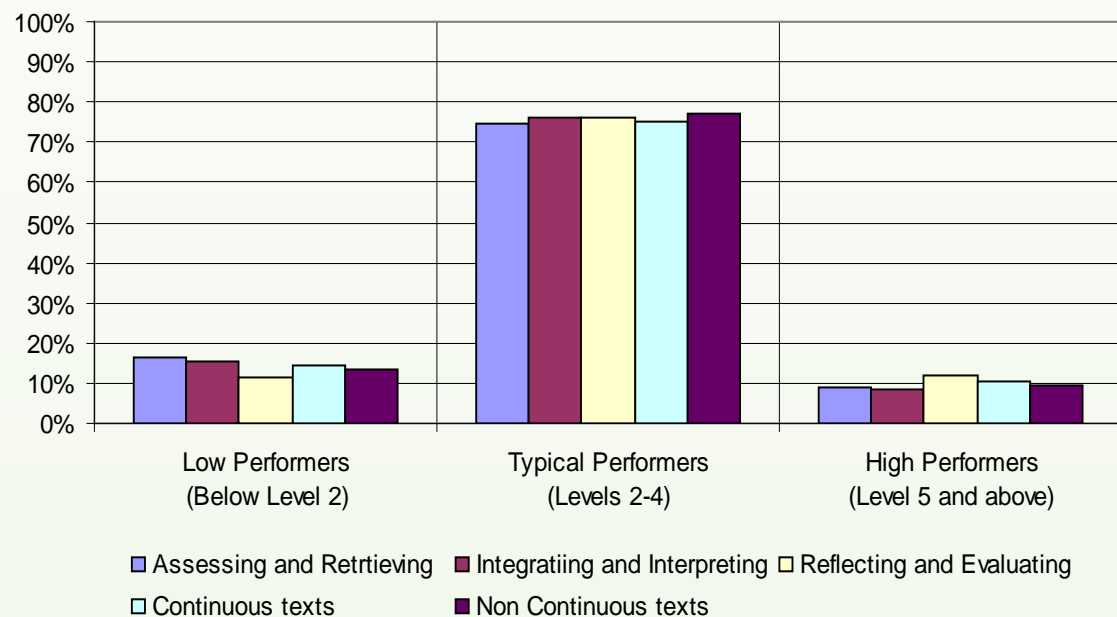
Table B: Comparison of provincial and jurisdictional proficiency levels on the reading sub-domains

Reading sub-domain	Provinces with a higher percentage of ...	
	Low performers as compared to Newfoundland and Labrador	High performers as compared to Newfoundland and Labrador
Assessing and Retrieving	Saskatchewan Manitoba New Brunswick Prince Edward Island	British Columbia Alberta Saskatchewan Ontario Québec Nova Scotia
Integrating and Interpreting	Saskatchewan Manitoba New Brunswick Prince Edward Island	British Columbia Alberta Ontario Québec Nova Scotia
Reflecting and Evaluating	Saskatchewan Manitoba New Brunswick Prince Edward Island	British Columbia Alberta Ontario Nova Scotia
Continuous texts	Saskatchewan Manitoba New Brunswick Prince Edward Island	British Columbia Alberta Ontario Nova Scotia
Non Continuous texts	Saskatchewan Manitoba New Brunswick Prince Edward Island	British Columbia Alberta Ontario Québec Nova Scotia



In Newfoundland and Labrador, approximately three quarters of students were assessed as typical performers. As shown in figure 6.5, similar percentages of high and low performers were present across the five sub-domains.

Figure 6.5: Provincial student proficiency on the reading sub-domains (PISA 2009)



(Source: Table 6.5)

Mathematical and Scientific Literacy

In PISA 2009, mathematics and science were the minor domains. In other words, there was less time devoted to assessing student performance in these two areas. Due to this, only the average scores were calculated. The proficiency levels were not determined.

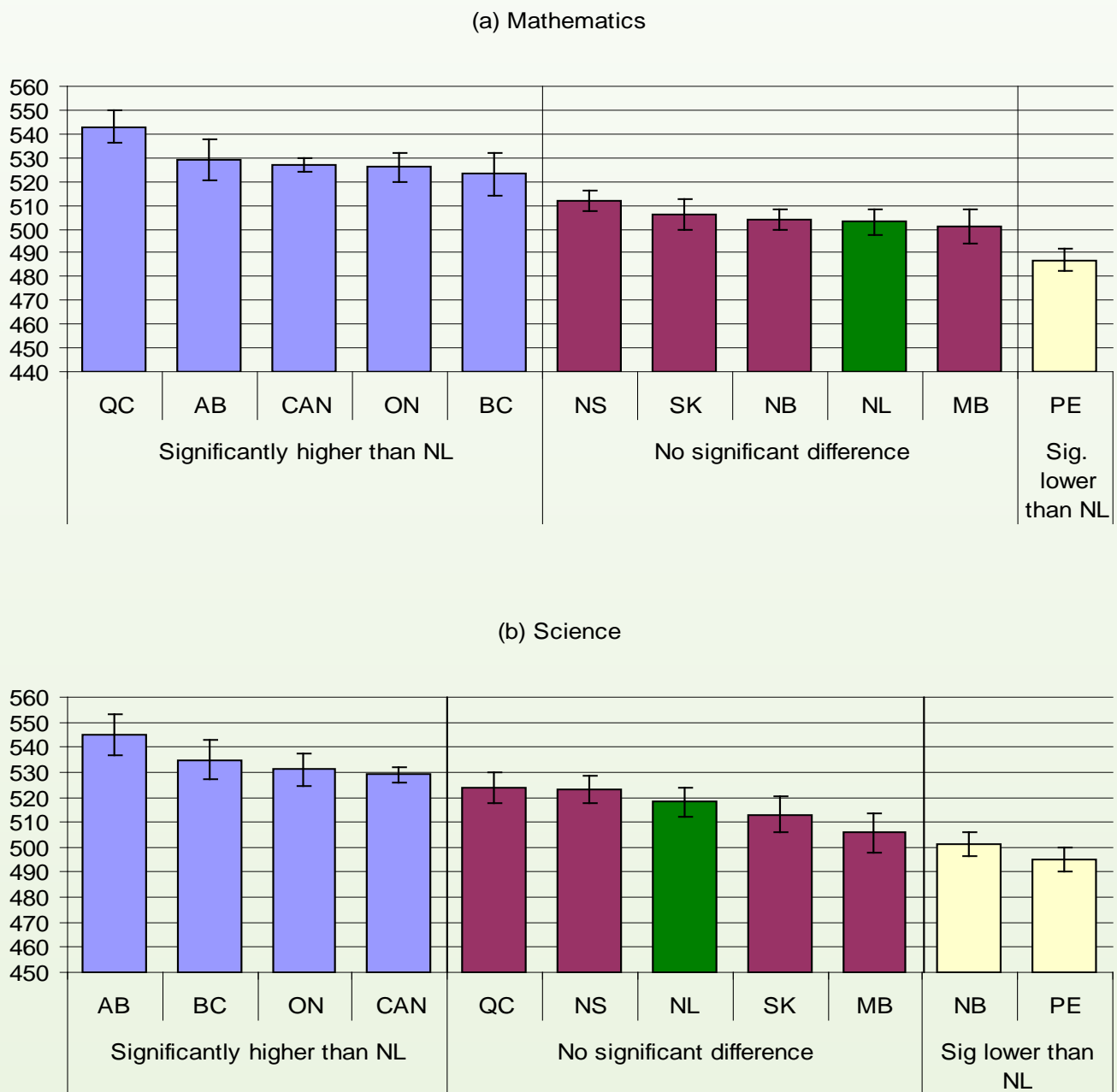
To assess proficiency in mathematics, PISA uses the concept of mathematical literacy. This is defined as the ‘capacity to identify, understand and to engage in mathematics and make well-founded judgements about the role that mathematics plays, as needed for individuals’ current and future private life, occupational life, social life with peers and relatives and as a constructive, concerned and reflective citizen’ (OECD, 2009b, p.14).

The science assessment was designed to determine how well students have learned fundamental scientific concepts and theories, and apply this information in life’s experiences. To accomplish this, PISA measures scientific literacy or ‘an individual’s scientific knowledge and use of that knowledge to identify questions, to acquire new knowledge, to explain scientific phenomena, and to draw evidence based conclusions about science-related issues, understanding of the characteristic features of science as a form of human knowledge and enquiry, awareness of how science and technology shape our material, intellectual, and cultural environments, and willingness to engage in science-related issues, and with the ideas of science, as a reflective citizen’ (OECD, 2009b, p.14).

Average mathematical and science scores

Across Canada, the average mathematics score ranged from 487 in Prince Edward Island to 543 in Québec. As shown in figure 6.6a, four provinces and Canada scored significantly higher average scores and one province (Prince Edward Island) scored significantly lower. For science, average scores ranged from 495 in Prince Edward Island to 545 in Alberta. There were three provinces and Canada where the average score was significantly higher than Newfoundland and Labrador and two provinces where it was significantly lower (see figure 6.6b).

Figure 6.6: Average scores across Canada (PISA 2009)



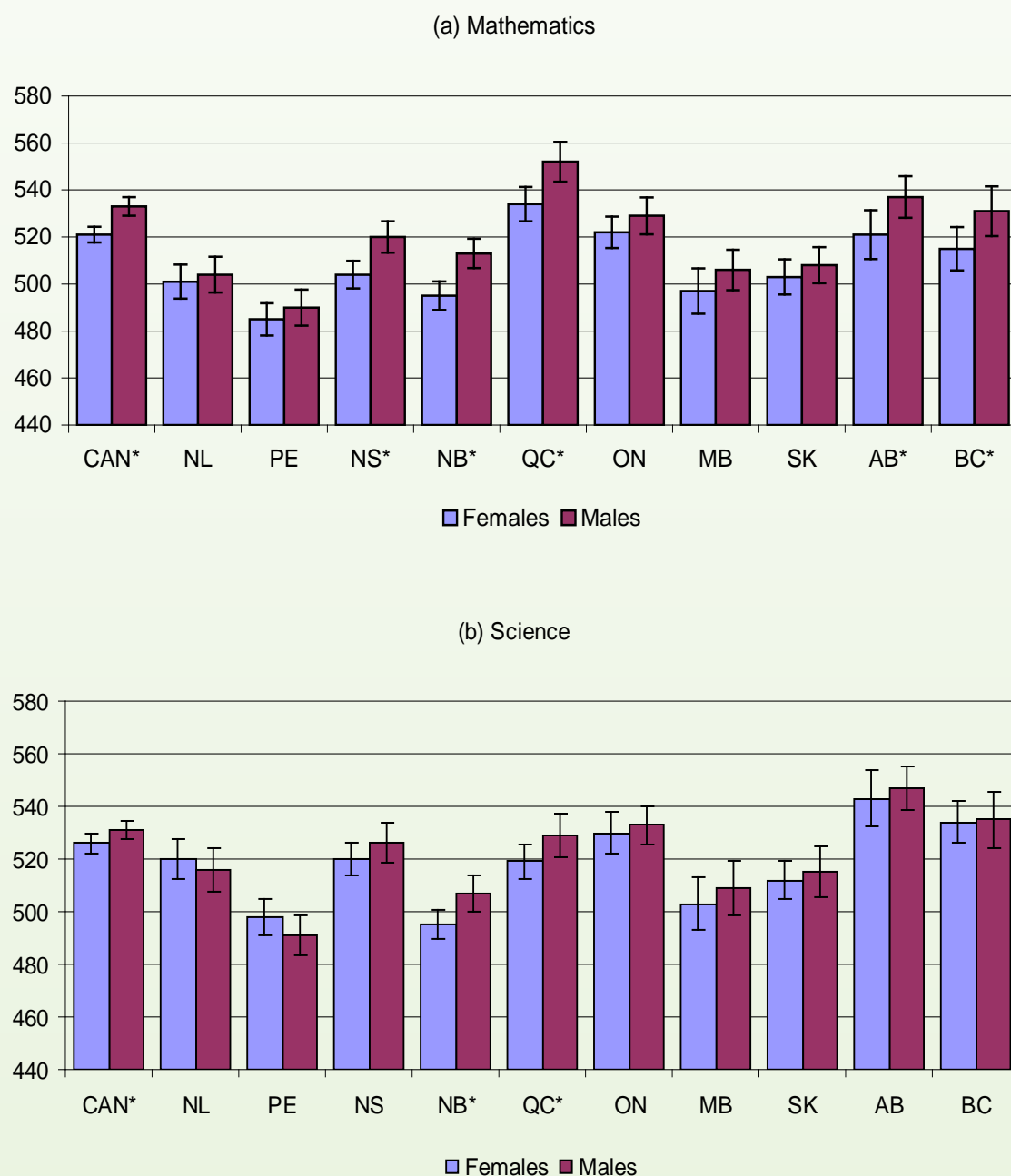
(Source: Table 6.6)



Gender differences in average scores

Overall, males performed better on both the mathematics and science assessments. In each of the provinces, males achieved a higher average score than females. As shown in figure 6.7a, there were five provinces where this gender difference in the average mathematics score was significantly different. For science, only two provinces (New Brunswick and Québec) had a significant gender difference (see figure 6.7b). In Newfoundland and Labrador, there was no significant gender difference present in either the mathematics or science assessments.

Figure 6.7: Gender differences in average scores (PISA 2009)



* Difference is significantly different

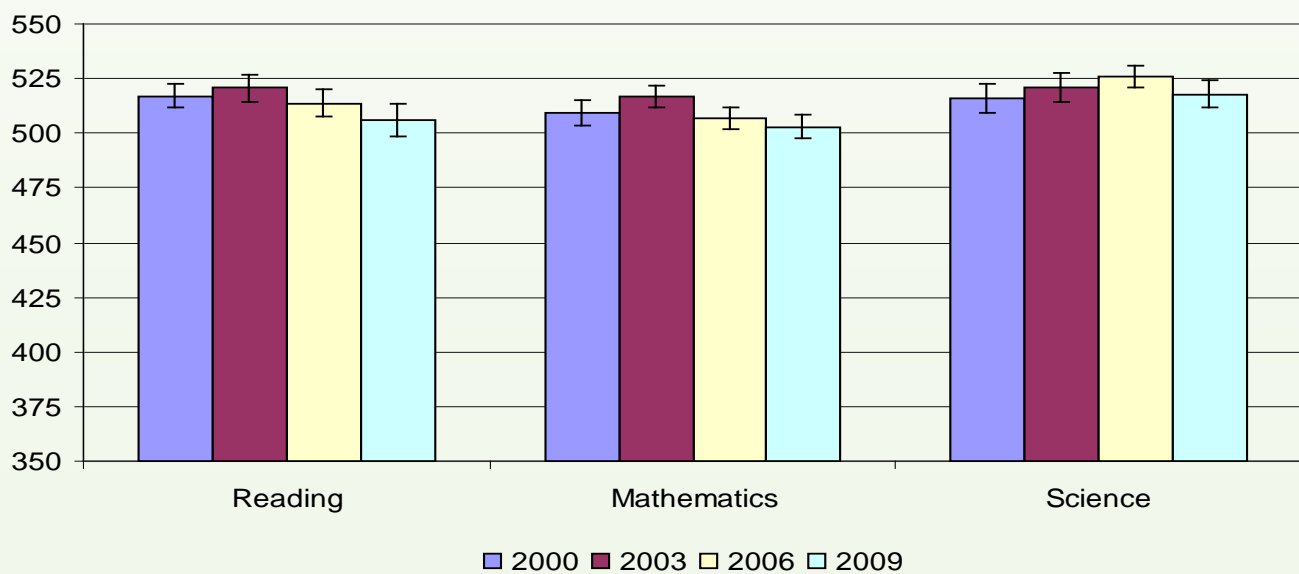
(Source: Table 6.7)

Provincial Trends in Student Performance

Since PISA started in 2000, there have been four assessment cycles (i.e. in 2000, 2003, 2006 and 2009). Figure 6.8 reports the average scores of Newfoundland and Labrador students in each of the three subject areas assessed. When a subject is a major domain for that specific year, the combined score was used. For example, during the 2006 administration, science was the major domain. As a result, the average score in combined science was used.

While there has been some variation in the average scores during the four cycles, there was no significant difference present from year to year. In other words, students in Newfoundland and Labrador have consistently scored about the same during each of the four assessments conducted.

Figure 6.8: Trends in provincial average scores (2000-2009)



(Source: Table 6.8)

