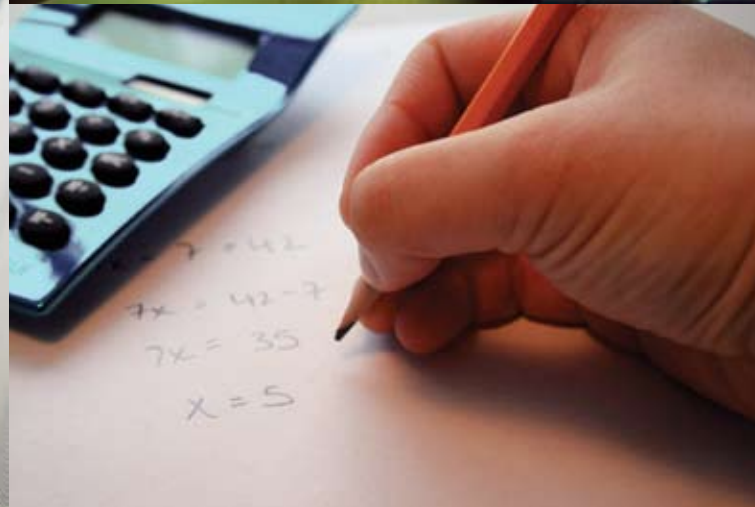


PCAP-13 2007

Contextual Report on Student Achievement in Reading



cmeC

Council of
Ministers
of Education,
Canada

Conseil des
ministres
de l'Éducation
(Canada)

The Council of Ministers of Education, Canada (CMEC) was formed in 1967 by the provincial and territorial ministers responsible for education to provide a forum in which they could discuss matters of mutual interest, undertake educational initiatives cooperatively, and represent the interests of the provinces and territories with national educational organizations, the federal government, foreign governments, and international organizations. CMEC is the national voice for education in Canada and, through CMEC, the provinces and territories work collectively on common objectives in a broad range of activities at the elementary, secondary, and postsecondary levels.

Through the CMEC Secretariat, the Council serves as the organization in which ministries and departments of education undertake cooperatively the activities, projects, and initiatives of particular interest to all jurisdictions¹. One of the activities on which they cooperate is the development and implementation of pan-Canadian testing based on contemporary research and best practices in the assessment of student achievement in core subjects.

Note of Appreciation

The Council of Ministers of Education (Canada) would like to thank the students, teachers, and administrators whose participation in the Pan-Canadian Assessment Program ensured its success. The quality of your commitment has made this study possible. We are truly grateful for your contribution to a pan-Canadian understanding of educational policy and practices in reading, mathematics, and science and among 13-year-olds.

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¹ In this report, “ministry” includes “department” and “jurisdictions” includes participating “provinces” and “territories.”

TABLE OF CONTENTS

1. WHAT IS THE PAN-CANADIAN ASSESSMENT PROGRAM?.....	1
Goals	1
The development process.....	1
Design and development of contextual questionnaires	2
Features of the administration of PCAP reading 2007	3
<i>Sampling.....</i>	<i>3</i>
<i>Reporting results by language</i>	<i>3</i>
<i>Participation.....</i>	<i>3</i>
<i>Participation rates.....</i>	<i>4</i>
Scoring the student response booklets	4
Structure of this report.....	4
2. OVERVIEW OF ACHIEVEMENT RESULTS	5
Populations and samples	6
Table 2.1 Populations and samples	6
Pan-Canadian results in reading.....	7
Chart 2.1 Mean reading scores and confidence intervals by jurisdiction	7
Chart 2.2 Mean reading scores and confidence intervals by jurisdiction and language.....	8
Reading proficiency levels	8
Chart 2.3 Reading proficiency levels by jurisdiction	9
Chart 2.4 Reading proficiency levels by jurisdiction and language	10
3. STUDENT, TEACHER, AND SCHOOL CHARACTERISTICS	11
Student characteristics.....	11
<i>Student gender.....</i>	<i>11</i>
Chart 3.1 Males and females by jurisdiction.....	12
Chart 3.2 Males and females by jurisdiction and language.....	12

Chart 3.3 Reading proficiency levels by gender	13
Chart 3.4 Mean reading scores by gender	13
<i>Grade level</i>	14
Chart 3.5 Grade levels of PCAP students by jurisdiction.....	14
Chart 3.6 Grade levels of PCAP students by jurisdiction and language	15
Chart 3.7 Reading proficiency levels by grade.....	15
Chart 3.8 Mean reading scores by grade	16
<i>Language</i>	16
Chart 3.9 Language most often spoken at home by jurisdiction and language	17
Chart 3.10 Language spoken at home by majority and minority language groups	18
Chart 3.11 Reading proficiency levels by majority and minority language and language spoken at home	18
Chart 3.12 Mean reading scores by majority and minority language and language spoken at home.....	19
<i>Student socioeconomic status</i>	19
Chart 3.13 Mother’s education by jurisdiction	19
Chart 3.14 Mother’s education by jurisdiction and language.....	20
Chart 3.15 Books in the home by jurisdiction	20
Chart 3.16 Books in the home by jurisdiction and language	21
Chart 3.17 Reading proficiency levels by mother’s education.....	21
Chart 3.18 Reading proficiency levels by books in the home	22
Chart 3.19 Mean reading scores by mother’s education	22
Chart 3.20 Mean reading scores by number of books in the home	22
<i>Immigration status</i>	23
Chart 3.21 Percentage of students born in Canada, and not born in Canada, by jurisdiction.....	23
Chart 3.22 Percentage of students born in Canada, and not born in Canada, by jurisdiction and language	23
Chart 3.23 Reading proficiency levels by place of birth (born in Canada, not born in Canada)	24
Chart 3.24 Mean reading scores by place of birth (born in Canada, not born in Canada).....	24
Teacher characteristics	25
<i>Teacher gender</i>	25
Chart 3.25 Male and female teachers by jurisdiction and language	25
Chart 3.26 Mean teacher reading scores by teacher gender	25
<i>Teaching experience</i>	26
Chart 3.27 Range of teaching experience by jurisdiction and language.....	26
Chart 3.28 Mean teacher reading scores by teacher experience	26
<i>Teacher qualifications and specialization in language arts</i>	27
Chart 3.29 Teacher undergraduate university degrees by jurisdiction and language	27
Chart 3.30 Percentage of teachers holding graduate degrees by jurisdiction and language	28
Chart 3.31 Mean teacher reading scores by teacher university degrees	28
Chart 3.32 Percentage of teachers specializing in language arts by jurisdiction and language	29
Chart 3.33 Days of language arts professional development in the past five years by jurisdiction and language	29
Chart 3.34 Mean teacher reading scores by teacher language arts specialization and professional development	30

School characteristics	30
<i>School size</i>	<i>30</i>
Chart 3.35 Total school enrolment by jurisdiction and language	31
Chart 3.36 Grade 8 (secondary 2) enrolment by jurisdiction and language	31
Chart 3.37 Mean school reading scores by school enrolment	32
<i>School governance</i>	<i>32</i>
Chart 3.38 School governance by jurisdiction and language	32
Chart 3.39 Mean school reading scores by school governance.....	33
Chart 3.40 Mean student reading scores by school governance, selected populations	34
<i>Diversity of student populations</i>	<i>34</i>
Chart 3.41 Percentages of schools with ESL/FSL students by jurisdiction and language	34
Chart 3.42 Percentages of schools with students of Aboriginal ancestry by jurisdiction and language.....	35
Chart 3.43 Mean school reading scores by percentages of ESL/FSL students and students of Aboriginal ancestry.....	35
<i>School locations by community size.....</i>	<i>36</i>
Chart 3.44 Percentage of schools by community size by jurisdiction and language.....	36
Chart 3.45 Mean school reading scores by community size.....	37
<i>Multivariate effects</i>	<i>38</i>
Chart 3.46 Regression coefficients for student and school demographic variables	40
4. STUDENT ATTITUDES.....	41
Attitudes toward school.....	42
Chart 4.1 Response percentages for attitudes toward school.....	42
Chart 4.2 Mean factor scores for enjoyment of school by jurisdiction and language	43
Chart 4.3 Mean factor scores for sense of belonging to school by jurisdiction and language.....	43
Chart 4.4 Reading proficiency levels by attitude-toward-school quintiles.....	44
Chart 4.5 Mean reading scores by attitude-toward-school quintiles.....	44
Attitudes toward reading.....	45
Chart 4.6 Response percentages for attitudes toward reading	45
Table 4.1 Questionnaire items and factors for attitudes toward reading.....	46
Chart 4.7 Mean factor scores for enjoyment of reading by jurisdiction and language	47
Chart 4.8 Mean factor scores for good reader by jurisdiction and language.....	47
Chart 4.9 Mean factor scores for reading for information by jurisdiction and language.....	48
Chart 4.10 Reading proficiency levels by attitude-toward-reading quintiles.....	48
Chart 4.11 Mean reading scores by attitude-toward-reading quintiles.....	49
Attributions of success and failure	49
Chart 4.12 Response percentages for attributions of success and failure.....	50

Table 4.2 Questionnaire items for attribution factors	51
Chart 4.13 Mean factor scores for external attributions of failure by jurisdiction and language	52
Chart 4.14 Mean factor scores for external attributions of success by jurisdiction and language	52
Chart 4.15 Mean factor scores for fatalism by jurisdiction and language.....	53
Chart 4.16 Mean factor scores for internal attributions of success and failure to ability/work by jurisdiction and language	53
Chart 4.17 Reading proficiency levels by attributions of success-and-failure quintiles.....	54
Chart 4.18 Mean reading scores by attributions of success-and-failure quintiles.....	55
Multivariate effects.....	55
Chart 4.19 Regression coefficients for attitude variables	57
5. STUDENT READING BEHAVIOURS AND STRATEGIES	58
Reading strategies	58
Chart 5.1 Response percentages for reading strategies	58
Table 5.1 Questionnaire items and factors for reading strategies.....	59
Chart 5.2 Mean factor scores for reading for meaning by jurisdiction and language.....	60
Chart 5.3 Mean factor scores for decoding by jurisdiction and language	60
Chart 5.4 Mean factor scores for reading routines by jurisdiction and language.....	61
Chart 5.5 Mean factor scores for use of external sources in reading by jurisdiction and language.....	61
Chart 5.6 Reading proficiency levels by reading-strategy quintiles	62
Chart 5.7 Mean reading scores by reading-strategy quintiles	63
Activities outside-of-school hours.....	63
Chart 5.8 Response percentages for outside-of-school hours activities	64
Table 5.2 Questionnaire items and factors for activities outside-of-school hours.....	64
Chart 5.9 Mean factor scores for outside-of-school reading/research by jurisdiction and language	65
Chart 5.10 Mean factor scores for entertainment by jurisdiction and language	65
Chart 5.11 Mean factor scores for academic/cultural activities by jurisdiction and language.....	66
Chart 5.12 Reading proficiency levels by outside-of-school-activities quintiles.....	66
Chart 5.13 Mean reading scores by outside-of-school-activities quintiles	67
Chart 5.14 Mean reading scores by being tutored and time on community/cultural activities.....	67
Early reading activities	68
Chart 5.15 Student recollections of early reading strategies	68
Chart 5.16 Reading proficiency levels by early reading strategies	69
Chart 5.17 Mean reading scores by early reading strategies.....	69
Chart 5.18 Student recollections of how much others have helped them learn to read	70
Chart 5.19 Reading proficiency levels by parent/guardian and teacher help in learning to read	70
Chart 5.20 Mean reading scores by parent/guardian and teacher help in learning to read.....	71
Chart 5.21 Response percentages for how often parents/guardians encouraged early reading.....	71

Chart 5.22 Mean factor scores for parent/guardian encouragement of early reading by jurisdiction and language	72
Chart 5.23 Reading proficiency levels for parent/guardian-encouragement-of-reading quintiles.....	72
Chart 5.24 Mean reading scores by parent/guardian-encouragement-of-reading quintiles.....	73
Multivariate effects.....	73
Chart 5.25 Regression coefficients for reading behaviour and strategy factors	74
Chart 5.26 Regression coefficients for reading behaviour and strategy observed variables.....	75
6. INSTRUCTIONAL CLIMATE.....	76
Areas of emphasis in language arts	76
Chart 6.1 Areas of language arts emphasis in schools	76
Chart 6.2 Mean reading scores for schools “strongly agreeing” with language arts emphasis statements	77
Chart 6.3 Percentage of “strongly agree” responses regarding influence of emphasis on external assessments by jurisdiction and language	78
Class size and number of grades per class	78
Chart 6.4 Teacher-reported language arts class size ranges by jurisdiction and language.....	79
Chart 6.5 Smallest and largest language arts class size ranges by jurisdiction and language.....	79
Chart 6.6 Teacher mean reading scores by class size ranges.....	80
Chart 6.7 Percentage of teachers reporting single or multiple grades in the same classroom for all or some classes by jurisdiction and language	81
Chart 6.8 Mean reading scores for single-grade and multigrade classes.....	81
Sources of influence on school programs	82
Table 6.1 Questionnaire items and factors for sources of influence on school programs.....	82
Chart 6.9 Mean factor scores for student/parent/guardian influence by jurisdiction and language.....	83
Chart 6.10 Mean factor scores for internal influence by jurisdiction and language.....	83
Chart 6.11 Mean factor scores for external assessment influence by jurisdiction and language	84
Chart 6.12 Mean factor scores for external agencies influence by jurisdiction and language.....	84
Chart 6.13 Mean reading scores for sources-of-influence quintiles	85
Presence and accommodation of special-needs students	85
Chart 6.14 Principal perceptions of desired placement of special-needs students by jurisdiction and language	86
Chart 6.15 Effects of special-needs students on regular classes by jurisdiction and language.....	86
Chart 6.16 Mean reading scores for principal preferences for placement of special-needs students and effect of special-needs students on regular classes	87
Chart 6.17 Teacher reports of number of students requiring accommodations for various special needs	88
Chart 6.18 Mean reading scores for classes with different number of students requiring accommodations.....	89
Chart 6.19 Teacher reports of the extent to which teaching strategies for all students are modified and classes enhanced by special-needs students	90
Chart 6.20 Mean reading scores for adjustment of teaching strategies for and degree of enhancement of classes by special-needs students	90

Multivariate effects.....	91
Chart 6.21 Regression coefficients for areas of emphasis in language arts and class size.....	92
Chart 6.22 Regression coefficients for accommodation of special needs.....	93
7. TIME ALLOCATION AND USE	94
Time on language arts.....	94
Chart 7.1 Distribution of minutes per week schools spent on language arts by jurisdiction and language.....	94
Chart 7.2 School mean reading scores by minutes per week spent on language arts.....	95
Length of class periods.....	95
Chart 7.3 Length of class periods, in minutes, by jurisdiction and language.....	95
Chart 7.4 School mean reading scores by length of class periods in minutes.....	96
Student absence	96
Chart 7.5 The percentage of school absenteeism by jurisdiction and language.....	97
Chart 7.6 School mean reading scores by school absence rates	97
Chart 7.7 Student absence rates, by number of days, by jurisdiction and language.....	98
Chart 7.8 Reading proficiency levels by student absence rates, by number of days.....	98
Chart 7.9 Mean reading scores by student absence rates, by number of days.....	99
Time lost during school year	99
Chart 7.10 Teacher reports of instructional days lost by jurisdiction and language.....	99
Chart 7.11 Teacher reports of instructional hours lost by jurisdiction and language.....	100
Chart 7.12 Teacher mean reading scores by time lost.....	100
Homework.....	100
Chart 7.13 Teacher reports of frequency of homework assignments in language arts by jurisdiction and language	101
Chart 7.14 Teacher reports of expected time spent per week on homework in language arts by jurisdiction and language	101
Chart 7.15 Teacher mean reading scores by frequency of assignments and time expected in language arts homework.....	102
Chart 7.16 Teacher reports of frequency of monitoring and correcting homework.....	102
Chart 7.17 Teacher reports on how often students correct their own homework in class and the use of homework toward marks or grades by jurisdiction and language	103
Chart 7.18 Teacher mean reading scores by frequency of use of methods	104
Chart 7.19 Student weekly time spent on homework in all subjects by jurisdiction and language	105
Chart 7.20 Student weekly time spent on language arts homework by jurisdiction and language.....	105
Chart 7.21 Reading proficiency levels by weekly homework amounts	106
Chart 7.22 Mean reading scores by weekly homework amounts	106

Multivariate effects.....	107
Chart 7.23 Regression coefficients for time allocation and use	107
8. TEACHING STRATEGIES IN READING	108
 Before, during, and after reading strategies	108
Table 8.1 Questionnaire items and stages for teaching strategies used by teachers.....	109
Chart 8.1 Percentage of teachers using “a lot” of pre-reading, during reading, and after reading strategies by jurisdiction and language	110
Chart 8.2 Teacher mean reading scores by extent of teacher use of pre-reading, during reading, and after reading strategies.....	110
 Instructional strategies in reading	111
Table 8.2 Questionnaire items and factors for instructional strategies.....	111
Chart 8.3 Mean factor scores for teacher use of direct reading strategies by jurisdiction and language.....	111
Chart 8.4 Mean factor scores for teacher use of reading aloud strategies by jurisdiction and language	112
Chart 8.5 Mean factor scores for teacher use of indirect reading strategies by jurisdiction and language.....	112
Chart 8.6 Mean factor scores for teacher use of silent reading strategies by jurisdiction and language.....	112
Chart 8.7 Teacher mean reading scores for instructional-strategy quintiles	113
 Reading materials used by teachers	113
Table 8.3 Questionnaire items and factors for types of reading material used by teachers	113
Chart 8.8 Mean factor scores for frequency of teacher use of informational reading materials by jurisdiction and language	114
Chart 8.9 Mean factor scores for frequency of teacher use of creative reading materials by jurisdiction and language.....	114
Chart 8.10 Reading scores for teacher use of informational-and-creative-reading-material quintiles	115
 Reading assignments	115
Chart 8.11 Percentage of teachers “often” assigning reading tasks by jurisdiction and language.....	115
Chart 8.12 Teacher mean reading scores for frequency of teacher assignment of reading tasks	116
 Accommodating diversity of student reading skills	116
Chart 8.13 Percentage of teachers “often” re-teaching basic skills, adapting coursework, and providing enrichment by jurisdiction and language	117
Chart 8.14 Teacher mean reading scores for frequency of re-teaching basic reading skills, adapting coursework, and providing enrichment.....	118
 Student reports of reading materials and assignments	118
Table 8.4 Questionnaire items and factors for reading materials and assignments.....	118
Chart 8.15 Mean factor scores for use of media by jurisdiction and language	119
Chart 8.16 Mean factor scores for use of library/literature material by jurisdiction and language.....	119
Chart 8.17 Mean factor scores for use of classroom materials by jurisdiction and language.....	120

Chart 8.18 Mean factor scores for use of project/group work by jurisdiction and language	120
Chart 8.19 Reading proficiency levels for reading-materials-and-assignments quintiles	121
Chart 8.20 Mean reading scores for reading-materials-and-assignments quintiles	121
Disciplinary climate	122
Chart 8.21 Mean factor scores for disciplinary climate by jurisdiction and language	122
Chart 8.22 Reading proficiency levels by disciplinary-climate quintiles	123
Chart 8.23 Mean reading scores by disciplinary-climate quintiles	123
Multivariate effects.....	123
Chart 8.24 Regression coefficients for reading strategies factors	124
Chart 8.25 Regression coefficients for reading strategy observed variables.....	124
9. ASSESSMENT	125
Methods of classroom assessment	125
Table 9.1 Questionnaire items and factors for student responses to assessment questions	125
Chart 9.1 Mean factor scores for student-reported assessment by short-test items by jurisdiction and language	126
Chart 9.2 Mean factor scores for student-reported assessment by long-test items by jurisdiction and language	126
Chart 9.3 Mean factor scores for student-reported assessment by essays and presentations by jurisdiction and language	127
Chart 9.4 Reading proficiency levels by student-reported–assessment-method quintiles	127
Chart 9.5 Mean reading scores by student-reported–assessment-method quintiles.....	128
Table 9.2 Questionnaire items and factors for teacher responses to assessment questions	128
Chart 9.6 Mean factor scores for teacher-reported assessment by short-test items by jurisdiction and language.....	129
Chart 9.7 Mean factor scores for teacher-reported assessment by long-test items by jurisdiction and language	129
Chart 9.8 Teacher mean reading scores by teacher-reported–assessment-method quintiles.....	130
Assessment components contributing to student final marks or grades	130
Chart 9.9 Percentage of teachers who use provincial/territorial or district/school-wide assessments to assign marks or grades 1 to 2 times a year or more by jurisdiction and language.....	131
Chart 9.10 Mean reading scores by use of provincial/territorial and district/school-wide assessments for assigning grades	131
Chart 9.11 Percentage of teachers who use various types of classroom assessment to assign grades 1 to 2 times a year or more by jurisdiction and language	132
Chart 9.12 Mean reading scores by teacher use of classroom assessments for assigning marks or grades	133
Chart 9.13 Percentages of teachers who use non-academic criteria to assign grades by jurisdiction and language.....	134
Chart 9.14 Mean reading scores by number of non-academic criteria used for assigning grades.....	134
Chart 9.15 Mean reading scores by teacher use of specific non-academic criteria for assigning grades	135

Use of rubrics	135
Chart 9.16 Percentage of students who know what a rubric is and who are given a rubric at start of an assignment by jurisdiction and language	136
Chart 9.17 Student reports of frequency of use of rubrics for marking by jurisdiction and language	136
Chart 9.18 Reading proficiency levels by knowledge and use of rubrics.....	137
Chart 9.19 Mean reading scores by knowledge and use of rubrics.....	137
Assessment skills of teachers	138
Chart 9.20 Teacher composite ratings of assessment skills by jurisdiction and language.....	138
Chart 9.21 Teacher mean reading scores by composite teacher ratings of assessment skills.....	139
Multivariate effects.....	139
Chart 9.22 Regression coefficients for dichotomous assessment variables.....	139
Chart 9.23 Regression coefficients for scaled assessment variables	140
Chart 9.24 Regression coefficients for assessment factors	140
10. SUMMARY MODEL, ROBUST EFFECTS, AND FURTHER RESEARCH.....	141
Summary model	141
Chart 10.1 Regression coefficients for dichotomously scaled variables.....	143
Chart 10.2 Regression coefficients for variables with ordinal scales 1–3 and 1–4	144
Chart 10.3 Regression coefficients for variables with ordinal scales 1–5 and 1–6	145
Chart 10.4 Regression coefficients for variables scaled as factor scores.....	146
Robust effects	147
Table 10.1 Robust positive and negative effects	148
Further research	148
Table A.1. Bivariate and multivariate model coefficients for predictors of reading performance.....	149

1. WHAT IS THE PAN-CANADIAN ASSESSMENT PROGRAM?

The Pan-Canadian Assessment Program (PCAP) is the CMEC's most recent commitment to informing Canadians about how well their education systems are meeting the needs of students and society. The information gained from such a pan-Canadian assessment gives the ministers of education a basis for examining the curriculum and other aspects of their school systems.

School curriculum programs vary from jurisdiction to jurisdiction across the country, so comparing results from these varied programs is a complex task. However, young Canadians in the different jurisdictions learn many similar skills in reading, mathematics, and science. PCAP has been designed to determine whether students across Canada reach similar levels of performance in these core disciplines at about the same age and also to complement existing assessments in each jurisdiction so these jurisdictions can have access to comparative, Canada-wide data on the achievement levels attained by 13-year-olds across the country.

Goals

When the ministers of education began planning the development of PCAP in 2003, they set out the following goals for a conceptually new pan-Canadian instrument of assessment designed to:

- inform educational policies as a means of improving approaches to learning
- focus on mathematics, reading, and science, with the possibility of including other domains as the need arises
- reduce the testing burden on schools through a more streamlined administrative process
- provide useful background information using complementary contextual questionnaires for students, teachers, and school administrators
- enable jurisdictions to use both national and international results to validate the results of their own assessment programs and to improve them

The development process

In August 2003, a PCAP working group of experienced and knowledgeable representatives from several jurisdictions and including an external authority on measurement theory, large-scale assessment, and educational policy began the development process. A concept paper was commissioned that would elaborate on issues of structure, development planning, operations, and reporting. Drawing on this concept paper, the working group defined PCAP as a testing program that would:

- be administered at regular intervals
- be administered to students who are 13-year-olds at the start of the school year
- be based on the commonality of all current jurisdictional curricular outcomes across Canada
- assess reading, mathematics, and science
- provide a major assessment of one domain with a minor concentration on the two other domains
- focus on reading as the major domain in the first administration in 2007

For each subject area, a thorough review of curricula, current assessment practices, and research literature was then undertaken, and reports were written to indicate the common expectations among all jurisdictions.

The working groups for bilingual framework development, established for each of the three subject areas, were composed of representatives from several jurisdictions with knowledge and experience in curriculum and assessment for the particular subject. Each working group also had an external expert in the assessment of the particular subject to advise and assist with the development of a framework statement establishing the theory, design, and performance descriptors for each domain. The framework statements were reviewed and accepted by all participating jurisdictions as the basis for test item development.

Bilingual teams for developing the test items were then established; members of these teams were subject area educators selected from all jurisdictions, with a subject assessment expert to supervise. Each subject framework provided a blueprint, with its table of specifications describing the subdomains of each subject area, the types and lengths of texts and questions, the range of difficulty, and the distribution of questions assessing each specific curriculum expectation. Each jurisdiction was also encouraged to submit texts and test-ready materials that they felt were appropriate for the age group and that were not currently in use in their jurisdiction. The results in reading, for example, provided sufficient items for three complete forms for field testing, each 90 minutes in duration.

Texts and questions were developed in both official languages and cross-translated to be equivalent in meaning and difficulty. Jurisdictions reviewed and confirmed the validity of the French-English translations to ensure fair and equitable testing in both languages. All items were reviewed by outside validators and further revised by members of the item development team. These texts and items were then submitted to the framework development working group to be examined in light of the blueprint and to be structured into three comparable field-test forms. Each booklet contained both selected-response and constructed-response items with a range of difficulty accessible to the age group, based on scenarios meaningful to the age group and reflecting Canadian values, culture, and content.

Field testing involved the administration of these temporary forms to a representative sample of students from an appropriate range of jurisdictions in both languages. Approximately 2,000 students in 100 schools across Canada were involved in the field testing. The tests were then scored by teams of educators from the jurisdictions in July 2006. Following analysis of the data from the field tests, each framework development working group reviewed all items and selected the texts and items considered best, from a content and statistical viewpoint, to form two booklets in reading and a booklet consisting of half mathematics and half science, each booklet totalling 90 minutes. The final test booklets were then reviewed and approved by all participating jurisdictions.

Design and development of contextual questionnaires

The accompanying questionnaires for students, teachers, and school administrators were designed to provide jurisdictions with contextual information that would contribute to the interpretation of performance results in the field testing. Such information may also be examined and used by researchers, policy makers, and practitioners to help determine what factors influence learning outcomes.

A questionnaire development group composed of educators and research experts from selected jurisdictions developed a framework to ensure that the questions asked of students, teachers, and school principals were consistent with predetermined theoretical constructs or important research questions. The group reviewed models of questionnaire design found in the three large-scale assessment programs

Texts and questions were developed in both official languages and cross-translated to be equivalent in meaning and difficulty.

(The School Achievement Indicators Program [SAIP], The Trends in International Mathematics and Science Study [TIMSS], and the Programme for International Student Assessment [PISA]), worked to create a shorter, more streamlined model of the questionnaires; and attempted to maximize research value by shaping the questionnaires around selected research issues for the 2007 administration of the test.

Using initial drafts, a separate group (the chair of the questionnaire development working group and two reading experts) expanded the reading component of the questionnaire. This working group held briefing sessions with the chair of the reading working group and the CMEC coordinator, Education Data and Research, who suggested some areas of interest derived from the most recent round of consultations on the Pan-Canadian Education Research Agenda

(PCERA). It was determined that the main research focus would be on teaching and learning reading strategies. Additional areas of interest included the methods and uses of assessment and the ways in which special needs students are accommodated in schools and classrooms.

Features of the administration of PCAP reading 2007

In the spring of 2007, the test was administered to a random sample of schools and students, representing the national cohort of 13-year-olds and of the jurisdictions. Booklets were randomly assigned to students.

The sampling process resulted in approximately 30,000 13-year-old students writing the test.

Sampling

The sampling process refers to the way in which the schools and students were selected to write the assessment. It is necessary to select a large enough number of participants to allow for adequate representation of the population's performance (the word "population" refers to all eligible students within a jurisdiction and/or a linguistic group). This assessment adopted the following two-step stratified sampling process in the selection of participants:

- the random selection of schools from each jurisdiction, drawn from a complete list of publicly funded schools provided by the jurisdiction
- the random selection of students, drawn from a list of all eligible 13-year-olds within each school

In the case where numbers were smaller than the desired size, all schools and/or all students meeting the criteria within the jurisdiction were selected. This method ensured that we had an adequate number of participants to allow for reporting on their achievement as if all students within the jurisdiction had participated.

The sampling process resulted in approximately 30,000 13-year-old students writing the test. Approximately 20,000 wrote the reading segment, the primary domain, and about 10,000 wrote the mathematics and science segment, which represented the secondary domains. Approximately 15,000 wrote the reading segment in English and 5,000 wrote in French. For mathematics and science, the numbers were 7,500 in English and 2,500 in French.

Reporting results by language

The results obtained from students educated in the French system of their respective jurisdictions are reported as French. The results obtained from students educated in the English system of their respective jurisdictions are reported as English. In most jurisdictions, the results achieved by French immersion students who wrote in French are calculated as part of the English results. However, in Manitoba, the results achieved by French immersion students are calculated as part of the French results. All French and English students were expected to write for 90 minutes, with breaks deemed appropriate by the assessment administrator. Then they completed the contextual questionnaire at the back of their test booklet.

Participation

Each school received the assessment handbook that outlined the purposes of the assessment, the organization and administration requirements, and suggestions to encourage as full participation as possible. These suggestions included a common administration script to ensure that all students encountered the testing process in a similar manner and provided guidelines for accommodating special needs students. PCAP testing is intended to be as inclusive as possible in order to provide a complete picture of the range of performance for the age group. The students who were excused from participation were nevertheless recorded for statistical purposes; they included those with highly limited abilities in any one of the domains, those who would be adversely affected by the test, and those whose parents requested that their children be excused.

Participation rates

In large-scale assessments, participation rates are calculated in a variety of ways and are used to guide school administrators as they determine whether the number of students who completed the assessment falls within the norm established for all schools. In the case of PCAP, a formula for this purpose is provided to the test administrators, thereby ensuring that all schools use the same guidelines and that the set minimum of participating students is uniformly applied. Using this formula, the PCAP student participation rate was over 85%.

Schools were encouraged to prepare and motivate students for the test, aiming for as much positive participation and engagement in the process as possible by teachers, students, and parents. The materials provided included information pamphlets for parents and students; the school handbook also included sample questions in reading that illustrated the types of demands and the descriptions of achievement levels for each question provided.

Schools were also asked to have the teacher questionnaire completed by all the language arts teachers of the participating students in the school and to have the school questionnaire completed by the school principal. All three questionnaires (student, teacher and school) were linked to student results, and unique identifiers were used to preserve confidentiality.

Scoring the student response booklets

The scoring was conducted concurrently in both languages in one location over a three-week period. After all student booklets had been submitted from the jurisdictions, the booklets were scrambled into bundles of 10 so that any single bundle contained booklets from several jurisdictions. The scoring administration team, the table leaders, and the scorers themselves came from several jurisdictions. The whole scoring process included:

- parallel training of both table leaders and scorers in each subject area
- a bilingual committee with responsibility for reviewing all instruments and selecting anchor papers to ensure comparability at every level

- twice daily rater-reliability checks, in which all scorers marked the same student work in order to track the consistency of scoring on an immediate basis
- double scoring, in which 300 of each of the 3 booklets were returned to the scoring bundles to be re-scored, providing an overall inter-rater reliability score

Structure of this report

Detailed performance results were presented in the PCAP-13 2007 report released in April 2008 (CMEC, 2008). A brief summary of these results is reported in the next chapter.

The main focus of this report is on the questionnaire results and specifically on variables associated with achievement. The report is divided into chapters corresponding to major clusters of variables which, according to previous research and theory, may influence achievement. For example, these include demographic characteristics; attitudes; student out-of-school activities and behaviours; allocation and use of time; teaching and learning strategies; and finally, assessment practices.

In each chapter, questionnaire results are first presented descriptively by jurisdiction and language. This is followed by a two-stage analytic process. First, the reading performance levels and mean reading scores are compared for students across categories on each of the variables of interest. The mean comparisons are used to determine whether the variable is significantly associated with achievement. Second, the relationships between questionnaire variables and achievement are examined through a multilevel regression modelling process designed to allow the effects of a single variable to be examined while controlling for other variables in the model.

2. OVERVIEW OF ACHIEVEMENT RESULTS

Statistical note

Samples. The results presented in this report are based on samples. Separate samples were selected for each jurisdiction (province or territory) and for anglophone and francophone populations within each jurisdiction. (All provinces and Yukon participated in this assessment). Some of the francophone samples were quite small. Because statistics such as percentages or means are quite unstable for small samples, it was necessary to combine the two language groups in some jurisdictions when reporting results at the jurisdictional level. For student results, the language groups were combined for Saskatchewan, Prince Edward Island, Newfoundland and Labrador, and Yukon. For teacher and school data, the language groups were also combined for British Columbia, Alberta, and Nova Scotia because the numbers of teachers and schools were much smaller than the numbers of students. Students in French immersion programs were considered part of the anglophone population in all provinces except Manitoba, where these students were included in the francophone population. When pan-Canadian results were computed, all students, schools, and teachers were assigned to their appropriate language group.

Confidence intervals. The results from the samples are estimates of those that would have been achieved had all members of the populations been included in the assessment. The actual results may differ from their population values for a variety of reasons, including sampling error or unreliability in responses to test or questionnaire items. It is common practice in surveys of this sort to report a range within which the actual population value is expected to fall. This range is known as a **confidence interval**. Confidence intervals represent the range above or below the reported value in which the population value is expected to be found with a specified level of probability, typically 95%. In this report, confidence intervals are represented in bar graphs by error bars (—), which correspond to the 95% confidence interval above and below the number given by the bar. We can say that the population value would be expected to be within the range represented by the total width of the error bars, 95 times out of 100.

Statistical significance. When making comparisons between groups (such as the difference in mean reading scores for jurisdictions), the difference is said to be **statistically significant** if the observed difference is greater than the sum of the two confidence intervals. For graphical presentations, a difference can be considered statistically significant if the error bars for the groups being compared do not overlap. To keep the graphs as simple as possible, statistical significance is indicated in this report mainly for comparisons of mean reading scores across groups and for regression coefficients.

Weights. The ratio of population to sample size gives a statistic called the **weight**, which is applied when results are combined across groups. This ensures that each population or sub-population is represented in the combined results in proper proportion to its size. All results given in this report use weighted data so the results can be said to represent the whole population. However, error computations are based on actual sample sizes, as errors are strongly related to sample size.

Populations and samples

Table 2.1 gives the student, school, and teacher sample sizes and population sizes for each jurisdiction. The small sample sizes for some of the francophone populations can be seen here and account for the decision to combine some groups. All students completed the questionnaires, so student

questionnaire results are based on the complete sample. However, not all students wrote the reading test (some wrote the mathematics or science tests instead). The sample sizes used for computing results on the reading tests are reduced accordingly.

Table 2.1 Populations and samples

Jurisdiction	Students		Reading test	Schools		Teachers	
	Sample	Population	Sample	Sample	Population	Sample	Population ²
BCe	2,488	51,647	1,646	142	1,213	592	5,069
BCf	138	177	98	9	19	10	17
ABe	2,604	41,251	1,743	145	840	485	2,571
ABf	268	319	178	19	22	28	27
SKe	2,417	12,888	1,619	210	677	440	1,403
SKf	54	69	34	4	8	6	13
MBe	2,310	13,591	1,539	175	477	468	1,246
MBf	314	390	474	45	53	91	175
MB (French Immersion) ³	393	1,081					
ONe	2,476	157,085	1,651	153	3,901	449	11,677
ONf	2,132	6,486	1,418	180	308	295	500
QCe	1,531	10,792	1,019	86	169	252	507
QCf	1,775	85,831	1,179	118	605	438	2,355
NBe	2,315	6,400	1,540	113	118	333	337
NBf	2,189	2,575	1,467	77	79	167	171
NSe	2,400	10,999	1,611	120	125	302	348
NSf	286	342	198	10	11	14	32
PEe	1,659	2,121	1,137	30	34	103	199
PEf	21	44	16	2	2	5	2
NLe	1,967	5,699	1,325	118	170	271	328
NLf	7	14	4	1	4	1	8
YTe	252	395	179	10	16	25	37
YTF	26	26	19	1	1	4	2
CAN	30,022	410,222	20,094	1,768	8,852	4,779	24,167

² The teacher population was estimated by assuming that teachers are represented in the sample in the same proportion as schools.

³ Manitoba French immersion students were sampled separately but were combined with Manitoba French for analysis.

Pan-Canadian results in reading

Chart 2.1 gives mean reading scores for the jurisdictions. This shows that Quebec students perform at a level significantly above the Canadian average and those in Ontario are at the Canadian average, while students in all other jurisdictions perform below the Canadian average. While it may seem anomalous that only one jurisdiction is at the Canadian average

while many are below, this is a consequence of the high weight for Ontario in making up that average. This means that Ontario will always be at the Canadian average, while smaller jurisdictions can depart more substantially from the average, in either direction, without changing that average very much.

Chart 2.1 Mean reading scores and confidence intervals by jurisdiction

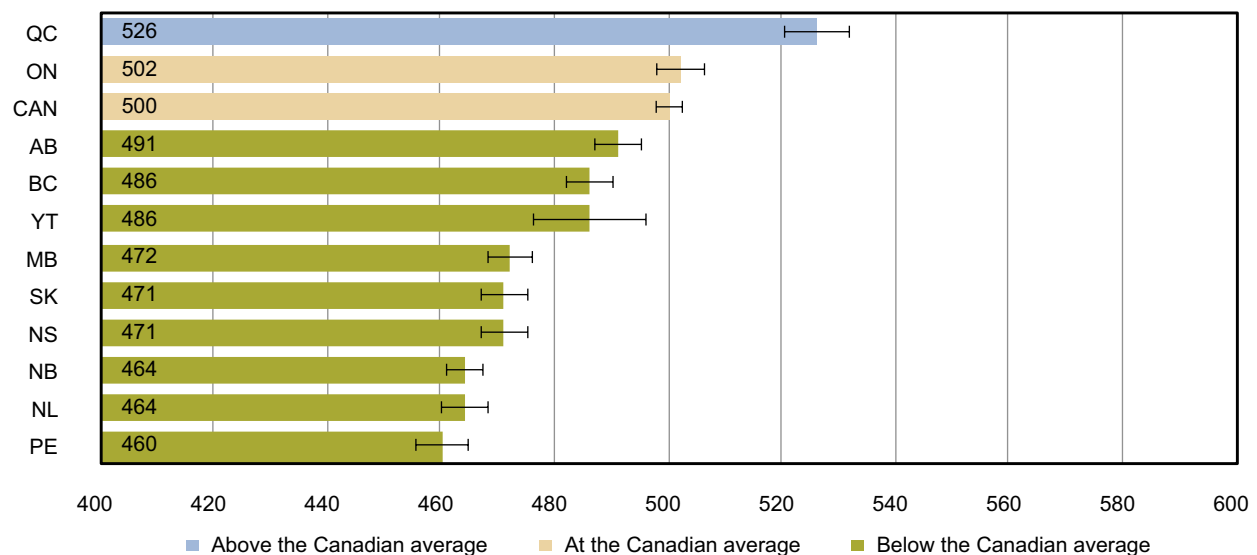
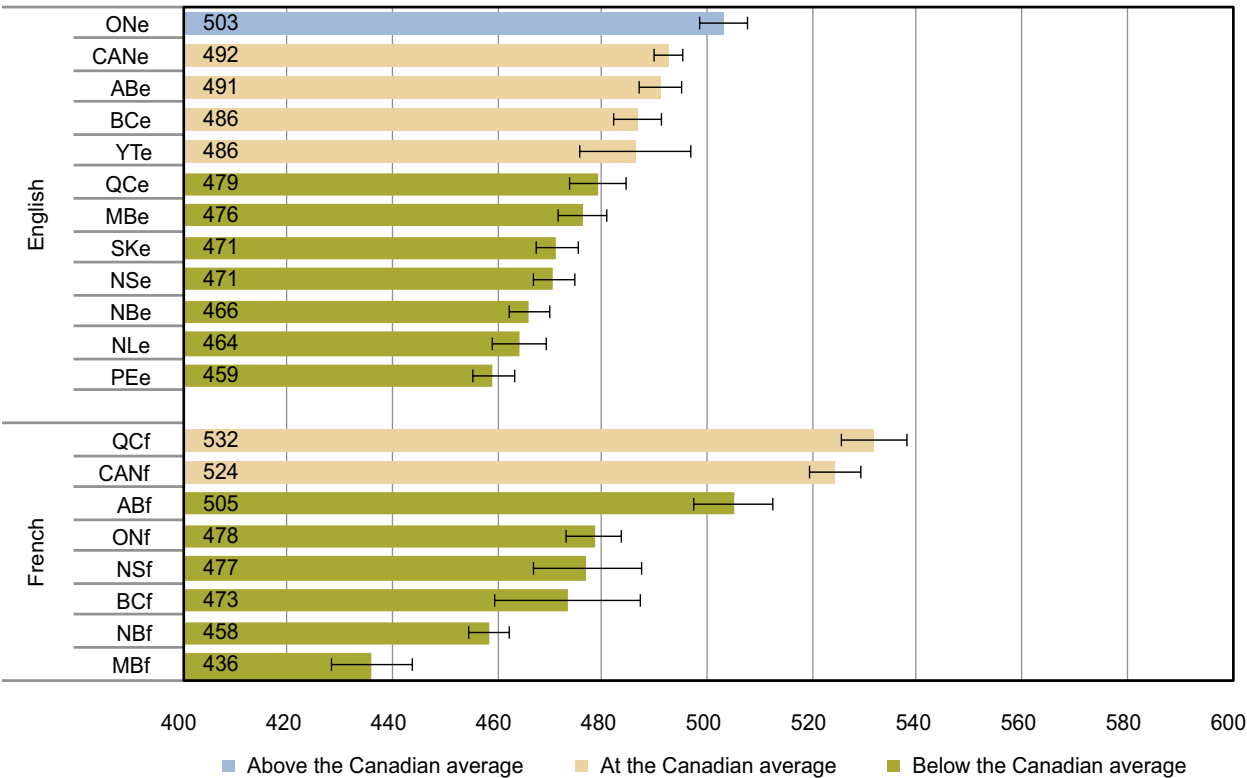


Chart 2.2 shows the mean reading scores for the two official language groups for each jurisdiction for which a breakdown is possible. The picture for the anglophone populations is similar to that shown in Chart 2.1, with the exception that the Quebec anglophone population shows significantly lower performance than the Quebec average. On the francophone side, the differences among the populations are generally larger than those for anglophone

populations. Here, the large weight for Quebec French means that Quebec French is at the Canadian French average, while all other jurisdictions are significantly below that average. Alberta French is significantly higher than all French jurisdictions other than Quebec, while Manitoba French is significantly lower than any other French jurisdiction.

Chart 2.2 Mean reading scores and confidence intervals by jurisdiction and language



Reading proficiency levels

Another way of looking at reading performance is to establish proficiency levels based on descriptions of what students can do at each level. For the reading test, three proficiency levels were defined, with level 2 considered the acceptable level of performance.⁴ Performance levels were summarized as the percentage of students reaching each level.

The reading proficiency levels by jurisdiction are given in Chart 2.3. Fewer than 20% of students were

found to perform below the acceptable level in any jurisdiction. However, the range for level 1 performance varies considerably, from 10% in Quebec to 19% in Newfoundland and Labrador, New Brunswick, and Prince Edward Island. The proportions of students at the highest level (level 3) are even more variable, ranging from 34% in Quebec to 9% in Saskatchewan. Saskatchewan has the largest and Quebec the smallest proportion of students at the middle level.

⁴ For details on the level definitions, please see the PCAP-13 2007 report (<http://www.cmec.ca/pcap/2007/pcap2007-report-en.pdf>).

Chart 2.3 Reading proficiency levels by jurisdiction

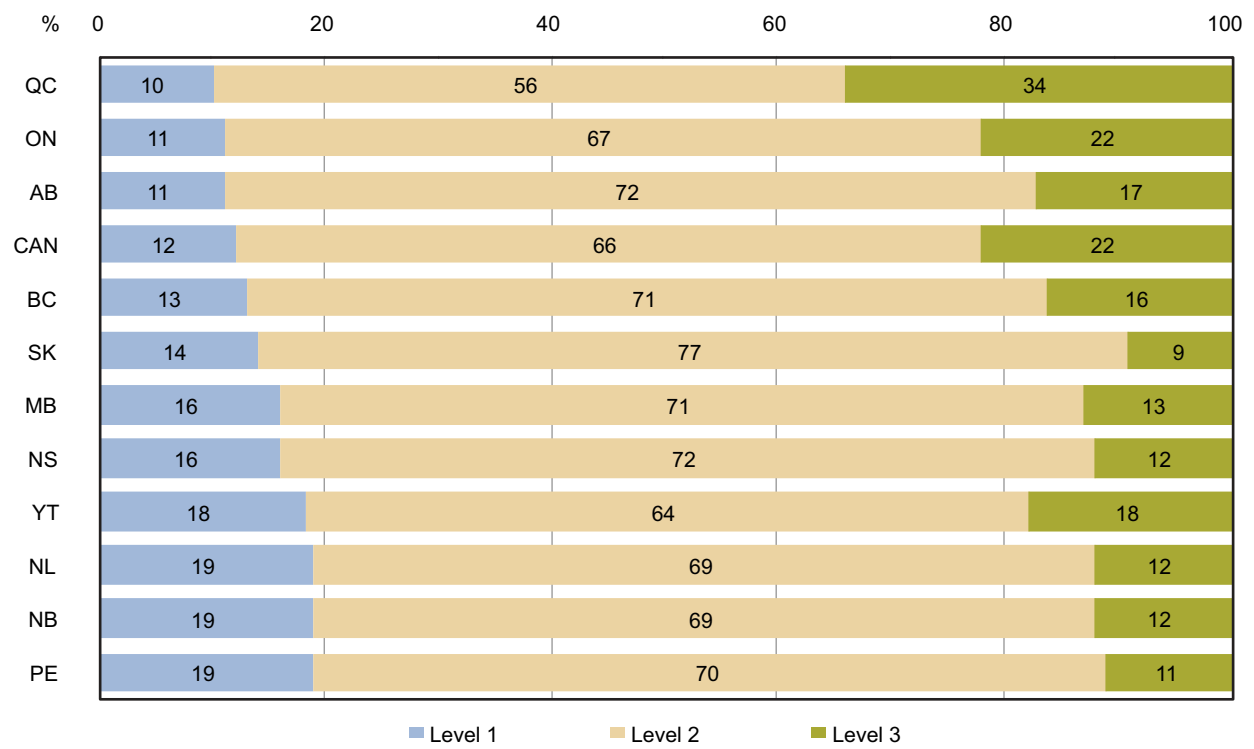
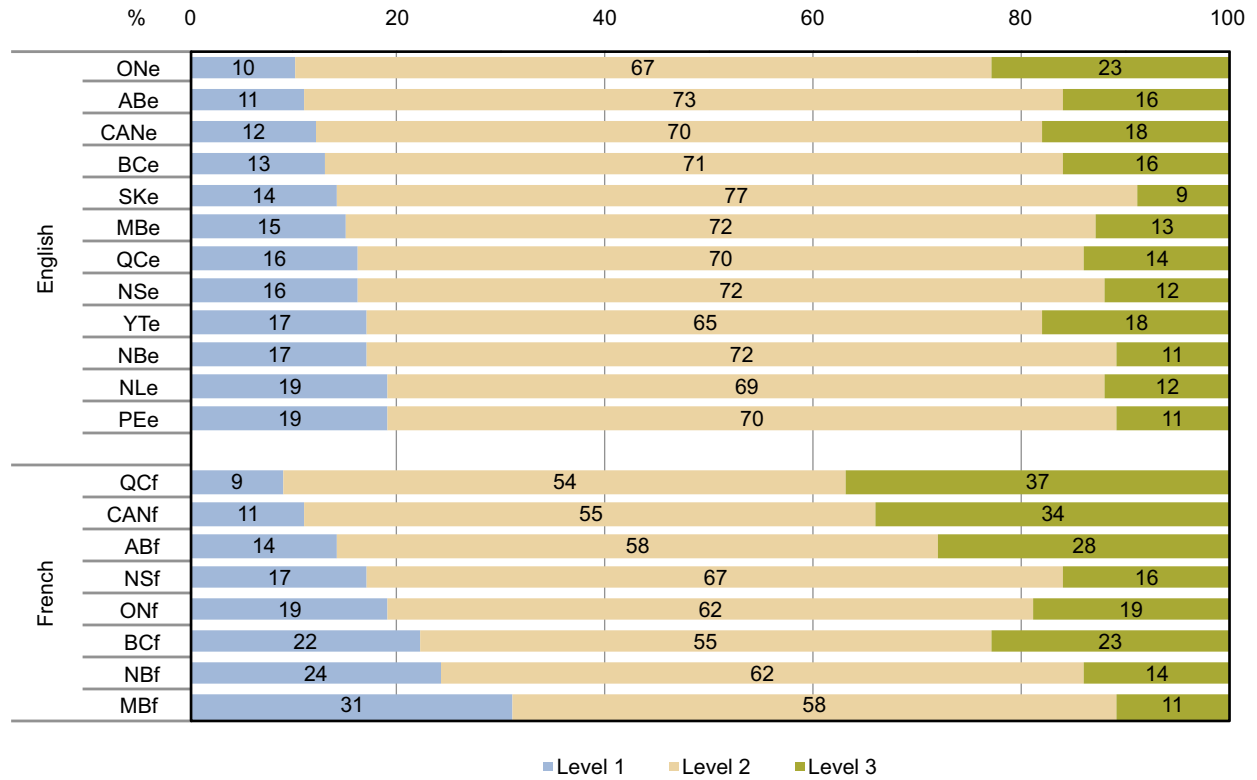


Chart 2.4 shows the reading proficiency levels by jurisdiction and language. The pattern here is similar to that for the other charts, with wider

variations among the French than among the English populations.

Chart 2.4 Reading proficiency levels by jurisdiction and language



3. STUDENT, TEACHER, AND SCHOOL CHARACTERISTICS

This chapter presents demographic and socioeconomic characteristics of students, teachers, and schools. These are considered as fixed characteristics of individuals and of the system and are thus treated in our models as antecedent conditions to teaching and learning. To facilitate comparisons, descriptive results are reported by jurisdiction and language. Analytical results are presented in two forms. First, comparisons are made of reading proficiency levels and mean scores between various groups, based on the characteristics of interest. Second, these characteristics were entered into a regression equation as predictors of achievement in reading. Regression analysis allows the effect of each variable to be examined while controlling for other variables in the model.

In subsequent parts of this report, these background variables are treated as covariates,⁵ as they are generally not within the control of the school system, and their influence on achievement is considered to be largely independent of educational policy or practice.

That is not to say that the system should not take these variables into account. In particular, since an important goal of schooling is to promote equity, it is appropriate to develop policies that can help overcome any disadvantage created by socioeconomic or other background characteristics.

Student characteristics

Student gender

Charts 3.1 and 3.2 give the gender distribution of students by jurisdiction and language. Generally, the proportions of males and females would be expected to depart from the expected 50% each only by random amounts, based on sampling error. However, statistically significant differences were found in several jurisdictions in particular, the overall proportions of males in francophone populations (specifically, in Manitoba and Nova Scotia) and in the Yukon were less than expected.

⁵ A covariate is a variable that is entered into a regression equation to act as a control against other variables of more direct interest. The effects for the variables of interest are computed after controlling for the covariates.

Chart 3.1 Males and females by jurisdiction⁶

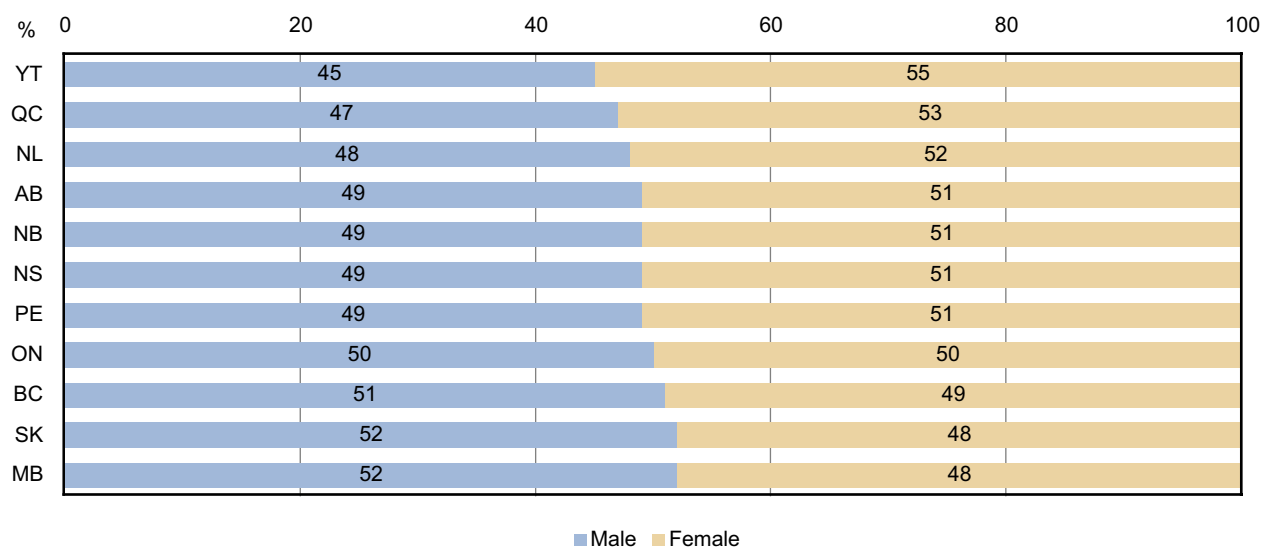
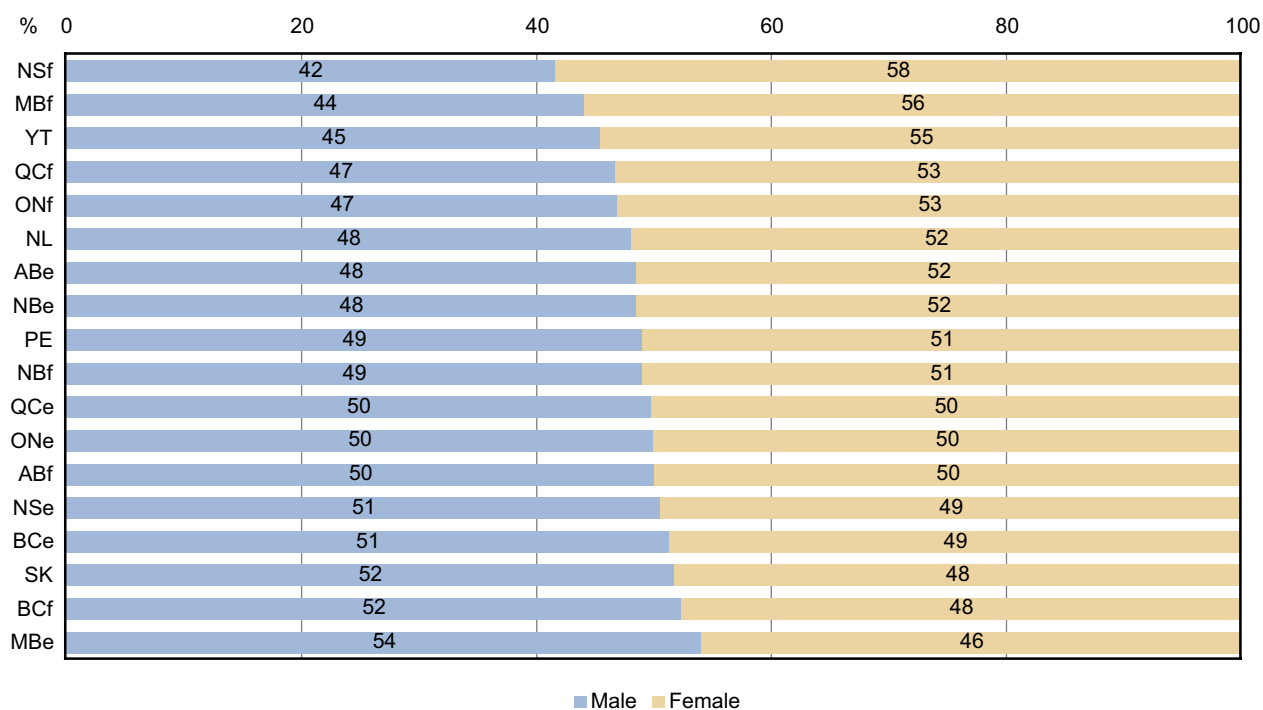


Chart 3.2 Males and females by jurisdiction and language



⁶ Throughout this report, where it is judged necessary to more clearly identify differences between jurisdictions, the results are sorted from highest to lowest on specific categories, rather than following the conventional west-east order.

Gender differences in reading proficiency levels are shown in Chart 3.3, and differences in mean reading scores by gender are shown in Chart 3.4.⁷ The comparison of means shows that females outperform males by a statistically significant margin. This is consistent with the results of many other studies. There appears to be no diminishment in the gender

differences that have been known for some time and that have been the subject of considerable policy debate. It is interesting to note, as well, that the differences in male and female participation rates in the test may have had a small impact on the reported performance levels for jurisdictions in which these differences are found.

Chart 3.3 Reading proficiency levels by gender

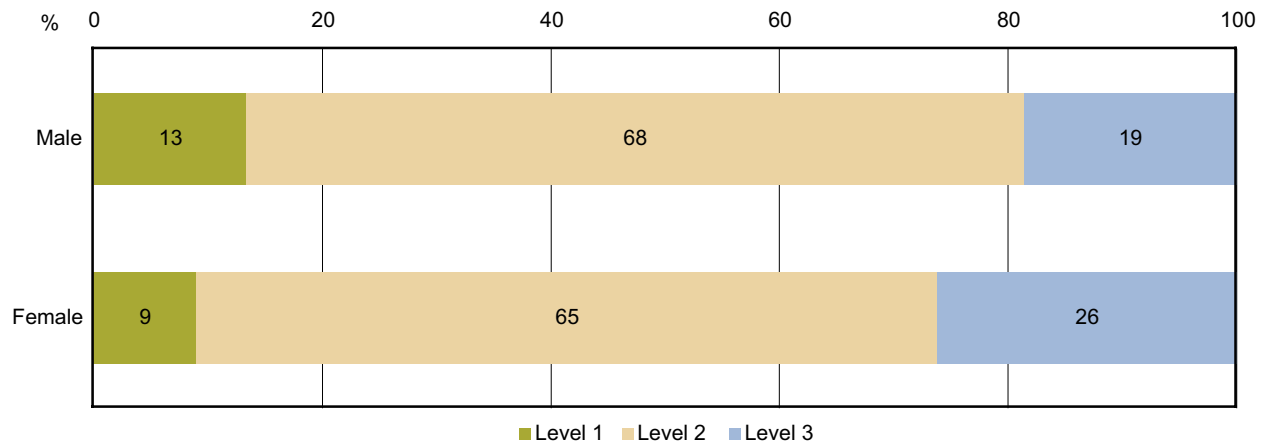
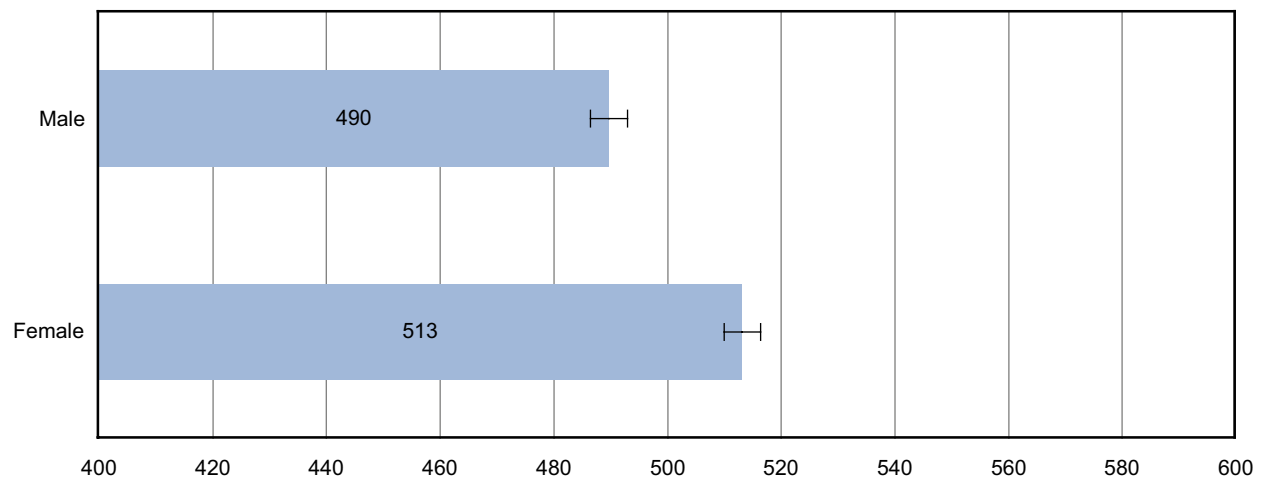


Chart 3.4 Mean reading scores by gender



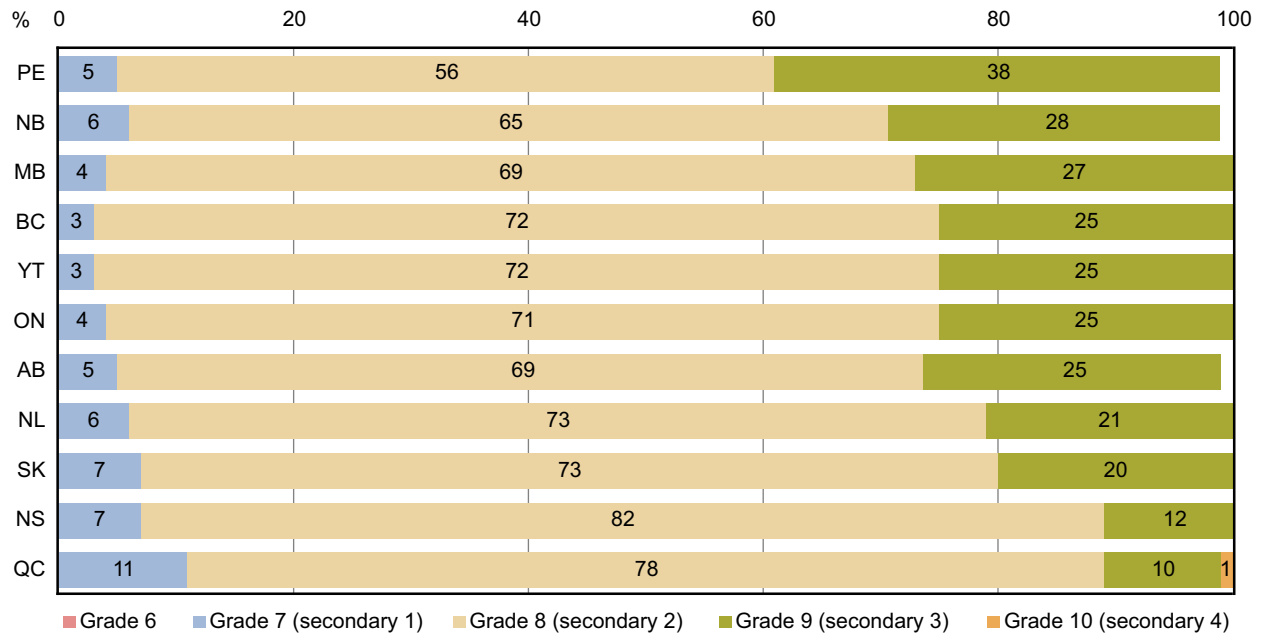
⁷ For simplicity, throughout this report, differences between means of groups (rather than percentages at each level for groups) will be used to determine the statistical significance of the effects on reading scores of individual variables.

Grade level

Because PCAP is an age-based, rather than a grade-based, assessment, students writing the assessment were found at more than one grade level. As Charts 3.5 and 3.6 show, most students were in grade 8 (secondary 2) at the time the test was written. The percentages at lower grade levels were generally

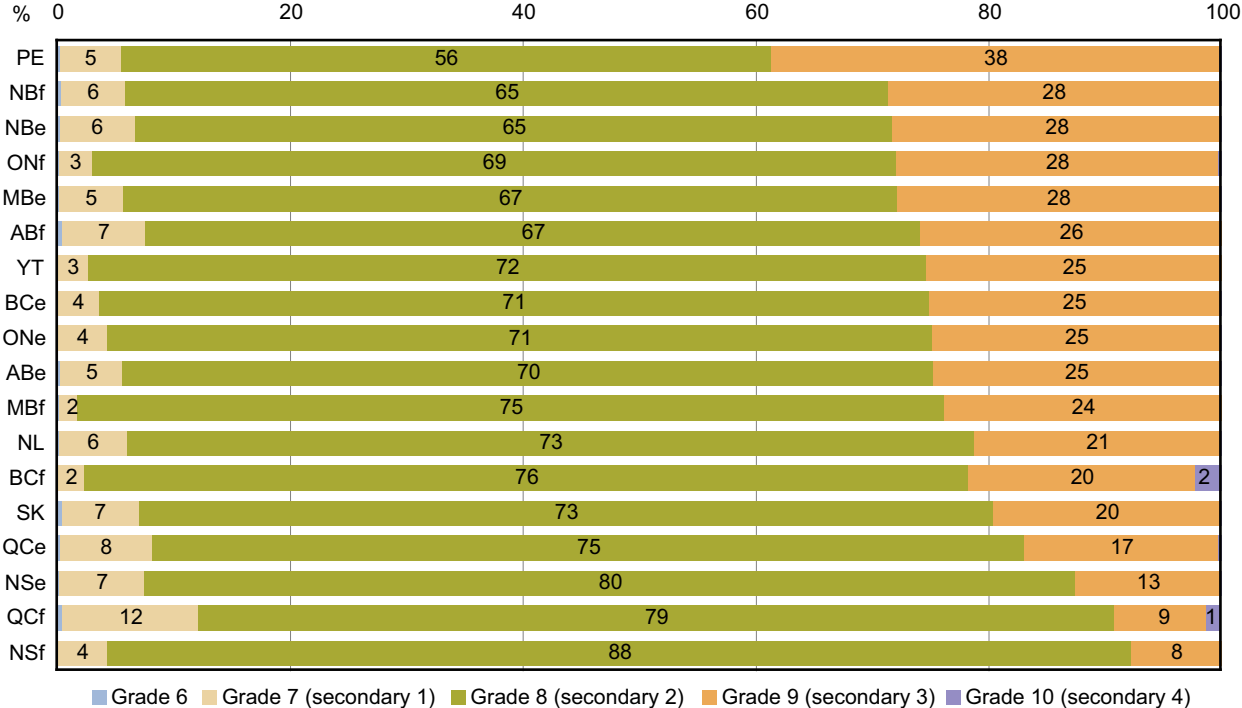
low, though they were slightly higher in Quebec than in other jurisdictions.⁸ The percentages at higher grade levels were more variable, ranging from 8% in Nova Scotia (French) to 38% in Prince Edward Island.

Chart 3.5 Grade levels of PCAP students by jurisdiction



⁸ Fewer than 1% of students were found in grades 6 and 10 (secondary 4), so these percentages are not visible on the chart.

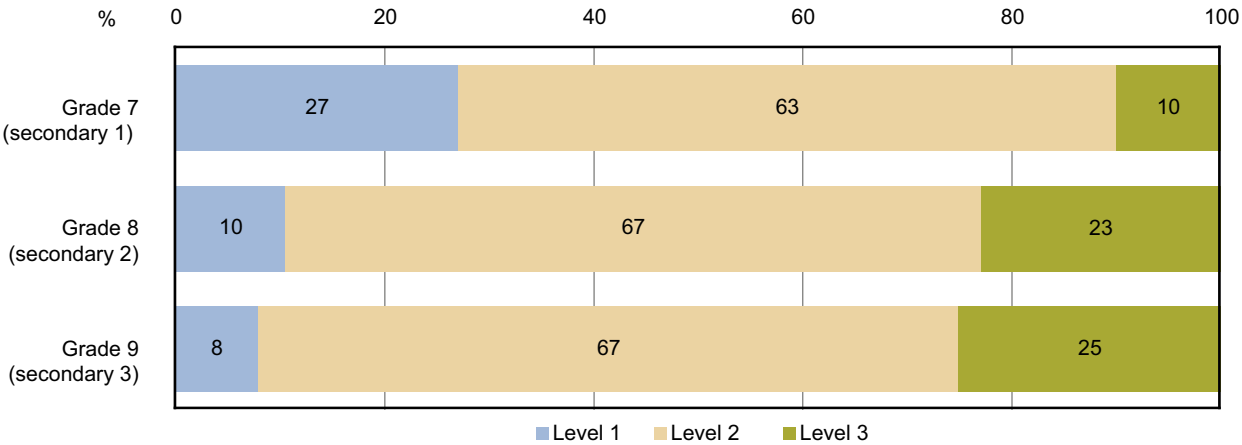
Chart 3.6 Grade levels of PCAP students by jurisdiction and language



Performance is associated with grade level, as revealed in Charts 3.7 and 3.8.⁹ In particular, students in grade 7 (secondary 1) have significantly lower mean scores than those in the two higher

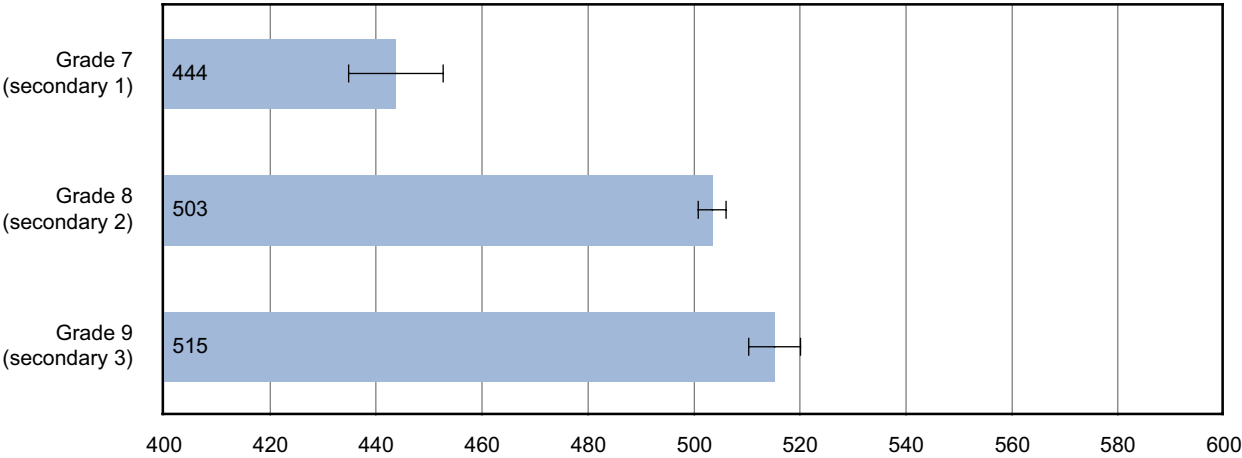
grades. The difference between grade 8 (secondary 2) and grade 9 (secondary 3) students is also statistically significant, though not as large as that for grade 7 (secondary 1).

Chart 3.7 Reading proficiency levels by grade



⁹ Grades 6 and 10 (secondary 4) were dropped from these comparisons because of small numbers.

Chart 3.8 Mean reading scores by grade

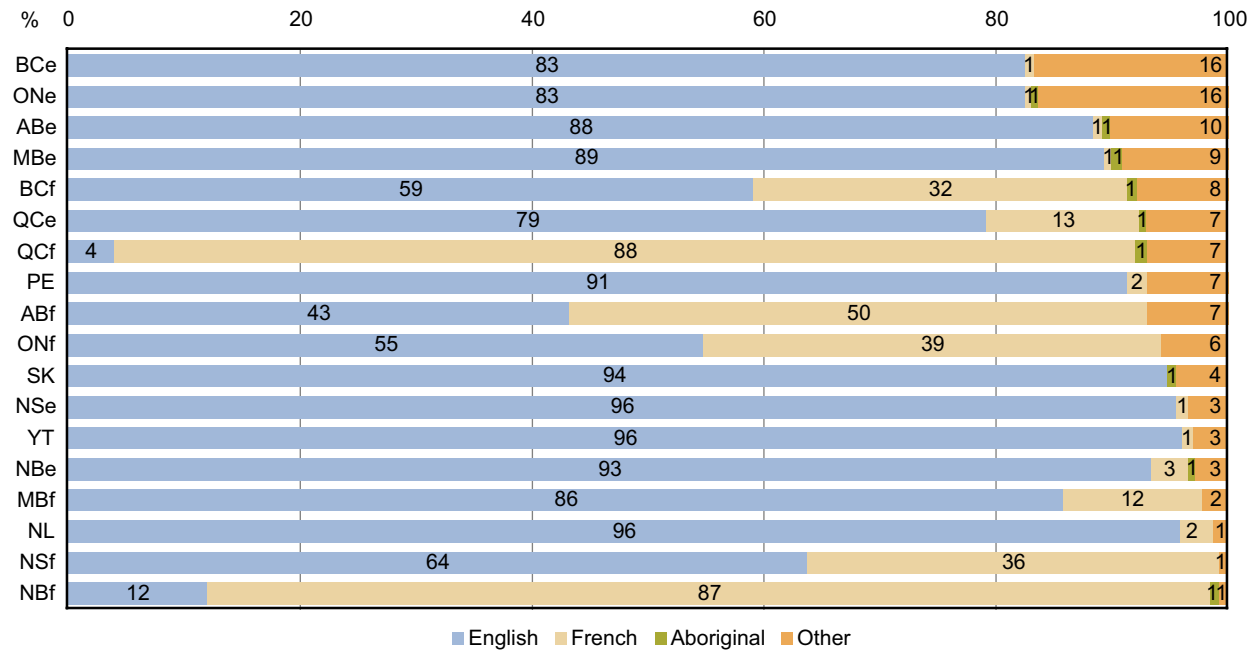


Language

The PCAP populations were defined by the language of the school and the tests were written in that language. However, the language of the school may not be the same as that used outside the school. Students were therefore asked to identify the language they used most often at home. Responses to this question by population are given in Chart 3.9. For most anglophone populations, English is spoken by a large majority of respondents and almost no one speaks French. However, the percentage speaking a language at home other than English or French

is close to 17% in Ontario (English) and British Columbia (English). The pattern for francophone populations is quite different, with majorities of these populations speaking French only in Quebec and New Brunswick. In most other jurisdictions, the francophone population is much smaller and is functioning mainly in an English-speaking environment outside the school. Aboriginal languages were reported as spoken at home by 1% of students or fewer in most jurisdictions.

Chart 3.9 Language most often spoken at home by jurisdiction and language



The relationship of language to achievement is reported only briefly here, as a separate report is being prepared on this issue. For purposes of this analysis, the overall English and French populations were further divided into whether they represent the majority or the minority official language. Majority French and Minority English, of course, are unique to Quebec, while Majority English and Minority French are found across the other jurisdictions.

Chart 3.10 shows the proportions of each of these groups who speak each of the official languages at

home. The patterns for the two majority groups and for Minority English are similar, with most students speaking the same language at home as the language of the test. However, the result for the Minority French population is quite different, with only 40% of this group speaking English at home. This clearly illustrates the point that many Minority French students are functioning in a language environment different from the language of the school. The implications of this for achievement will be investigated in detail in the language report.

Chart 3.10 Language spoken at home by majority and minority language groups

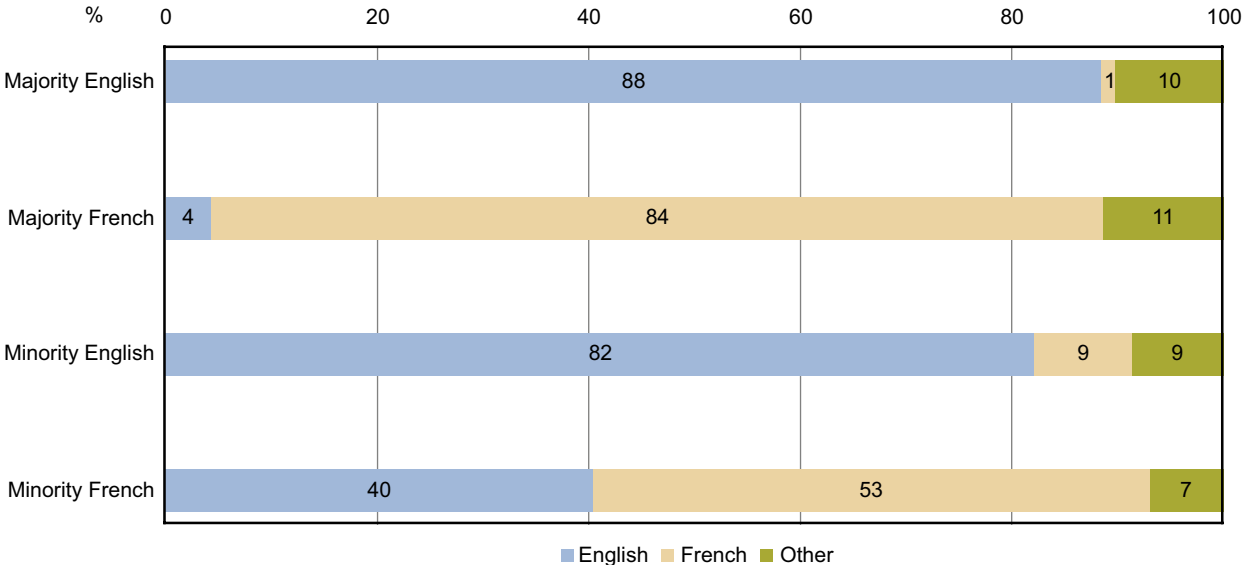


Chart 3.11 shows reading proficiency levels and Chart 3.12 shows mean reading scores for four population groupings defined by language and by majority and minority status within the jurisdiction. The largest difference evident from Chart 3.11 is the difference between the Majority French population and all others. More members of this population perform at level 3 than do members of any other population, regardless of the language spoken at

home. However, Chart 3.12 shows that the mean difference between the two Majority French subgroups is not statistically significant because the small number of English speakers in this population results in a large error. Chart 3.12 also shows a statistically significant difference within the Majority English population between those who speak English and those who speak French at home. None of the other within-population differences are significant.

Chart 3.11 Reading proficiency levels by majority and minority language and language spoken at home

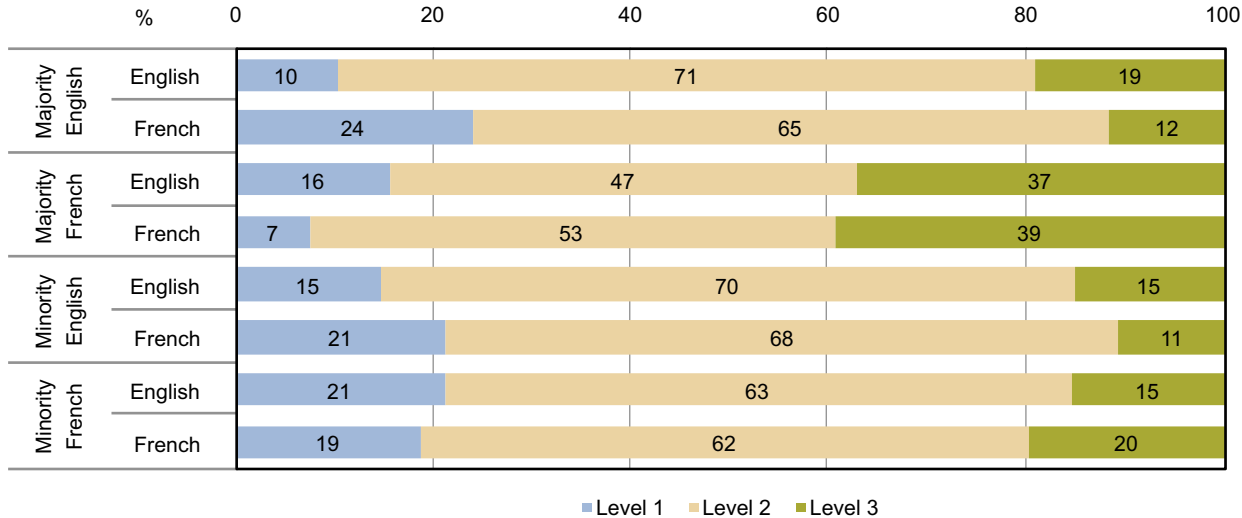
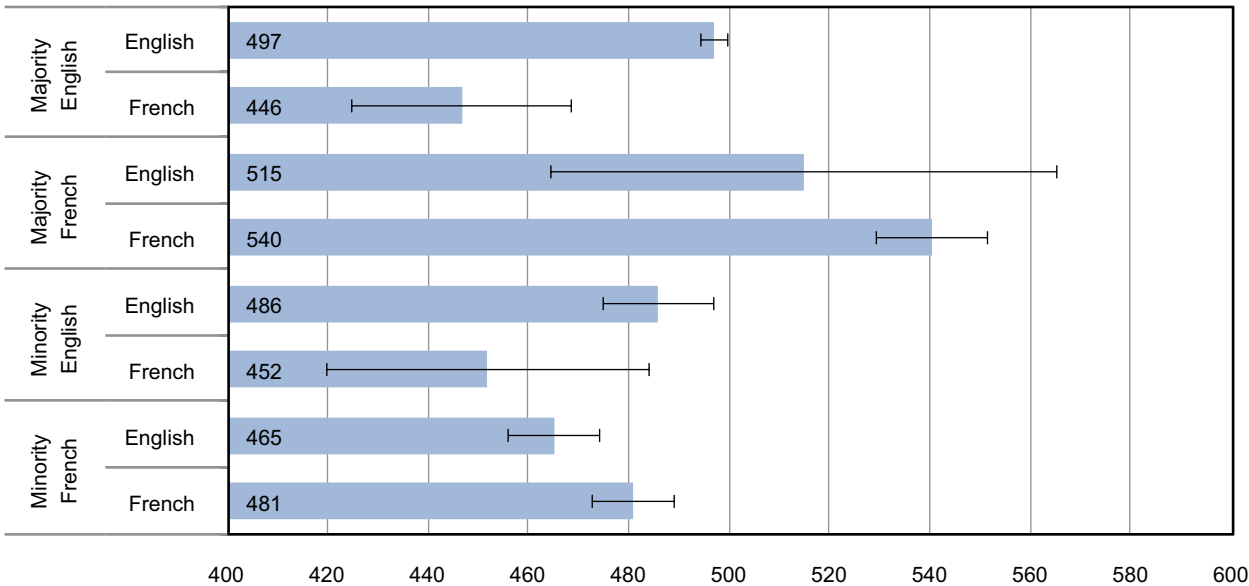


Chart 3.12 Mean reading scores by majority and minority language and language spoken at home



Student socioeconomic status

Two indicators of student socioeconomic status — mother’s education and the number of books in the home — were included on the questionnaire. Charts 3.13 to 3.16 give results on these two indicators by jurisdiction and language. Differences between jurisdictions are not large. Interestingly, Minority French populations in the western provinces and in

Nova Scotia show slightly higher levels of mother’s education than the Majority English populations in the same jurisdictions, while francophone populations in Quebec and New Brunswick show slightly lower levels of mother’s education than their anglophone counterparts.

Chart 3.13 Mother’s education by jurisdiction

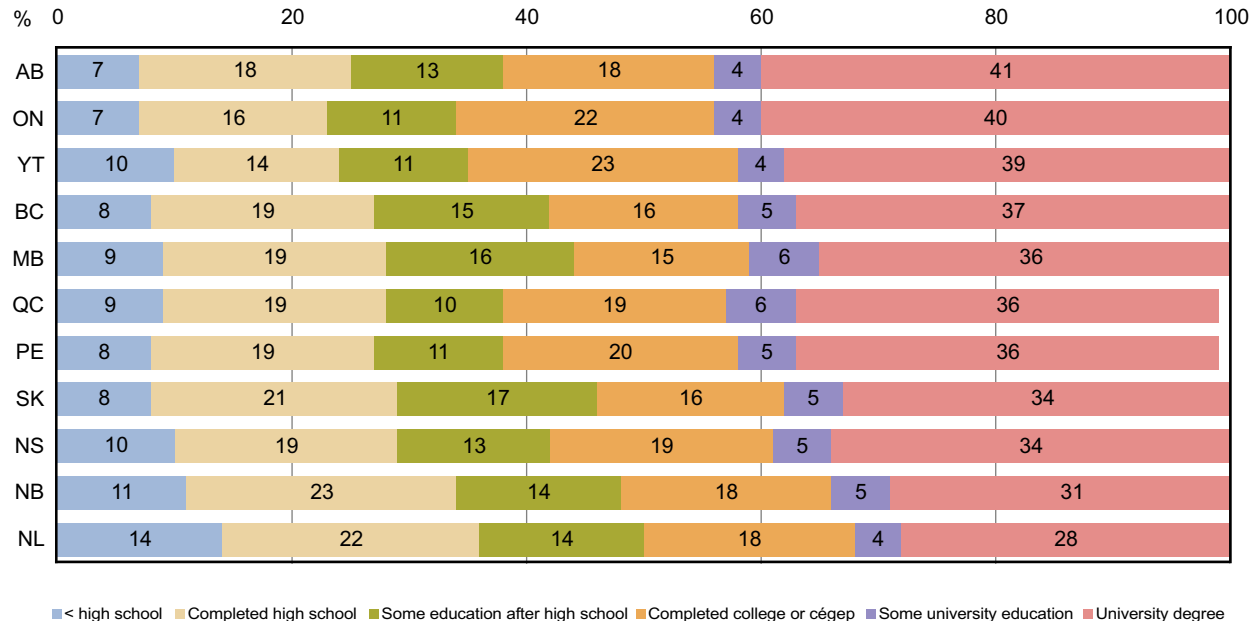


Chart 3.14 Mother's education by jurisdiction and language

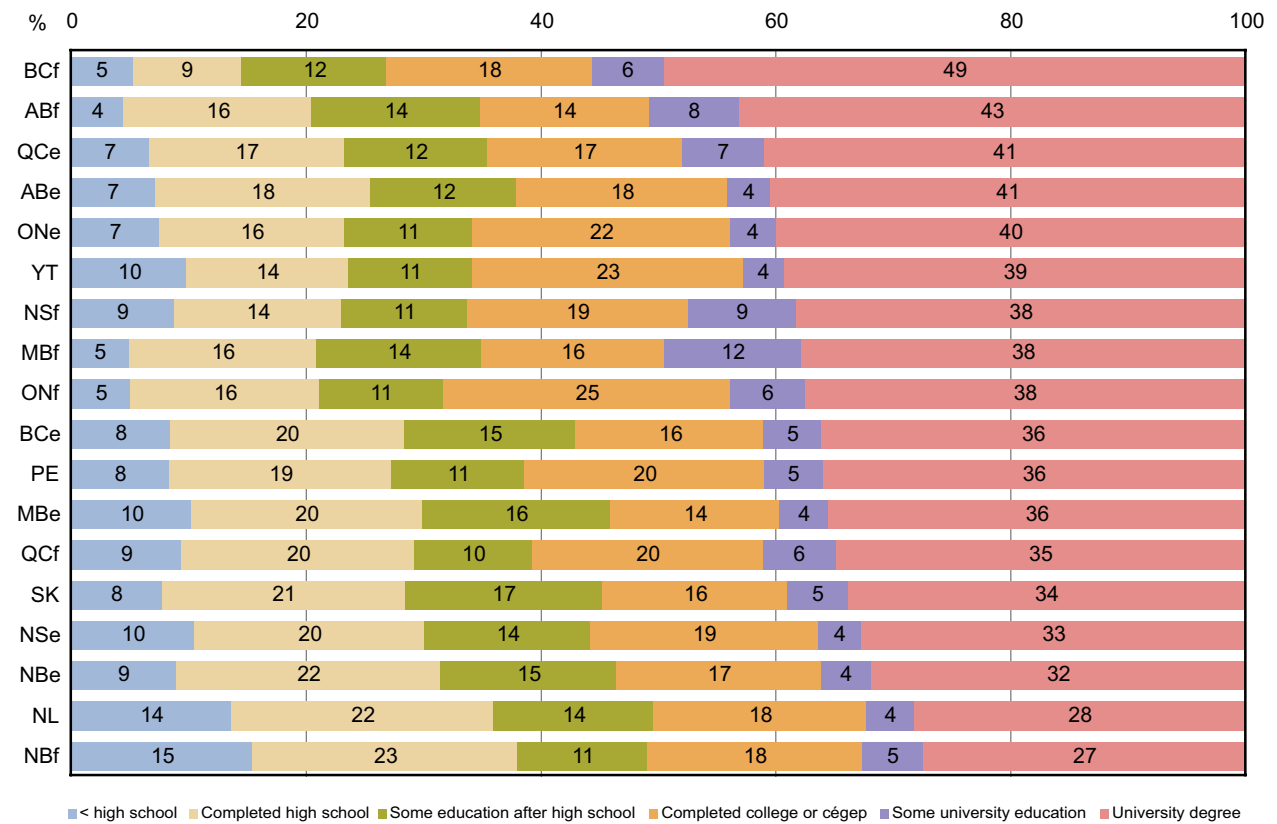


Chart 3.15 Books in the home by jurisdiction

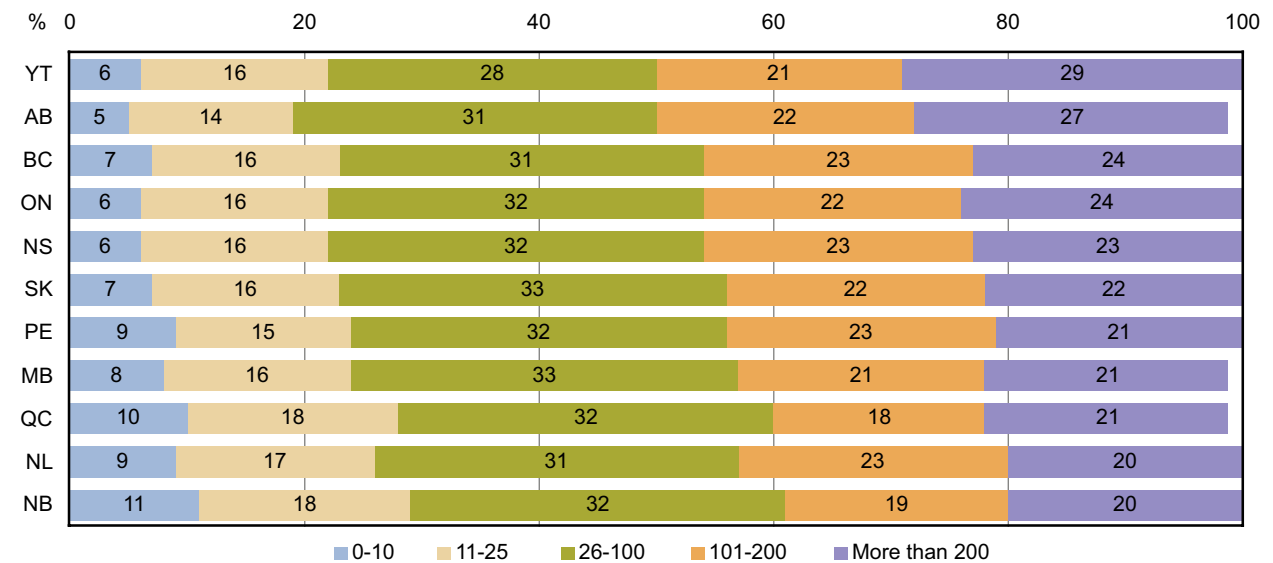
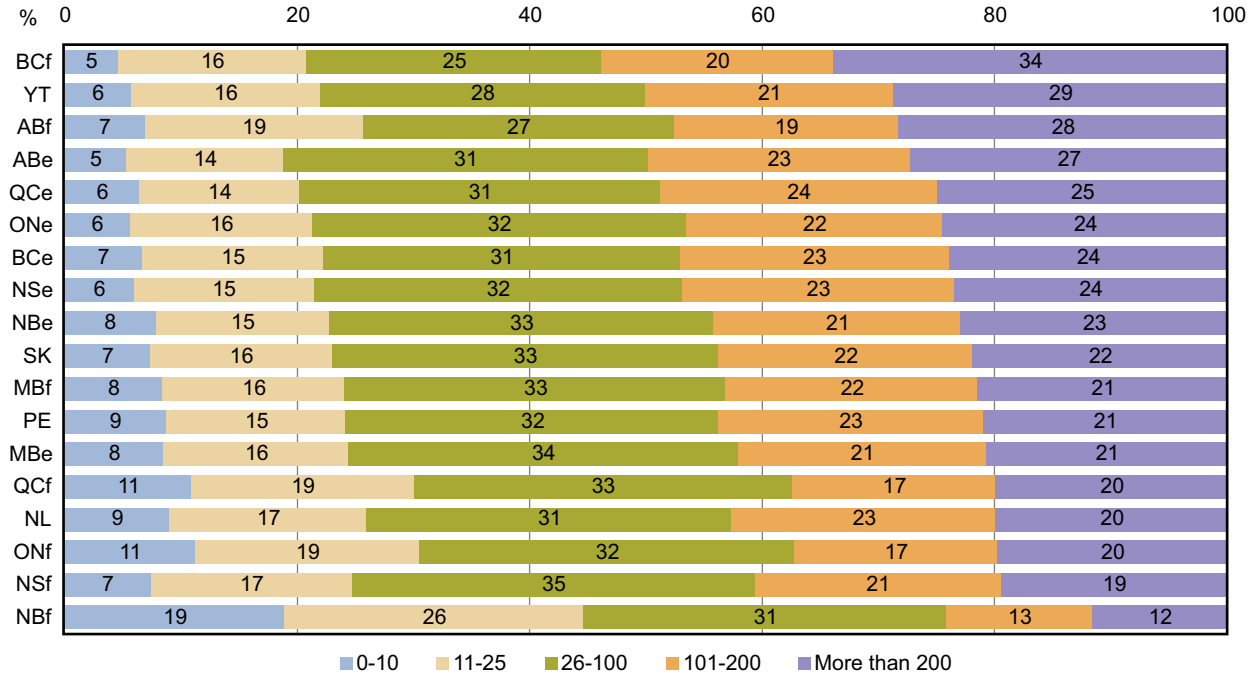


Chart 3.16 Books in the home by jurisdiction and language



The relationships between these two variables and reading proficiency levels are given in Charts 3.17 and 3.18. Mean score comparisons by these variables appear in Charts 3.19 and 3.20. The pattern is quite

clear here. Having a mother with a higher level of education and having more books at home are both associated with higher performance.

Chart 3.17 Reading proficiency levels by mother's education

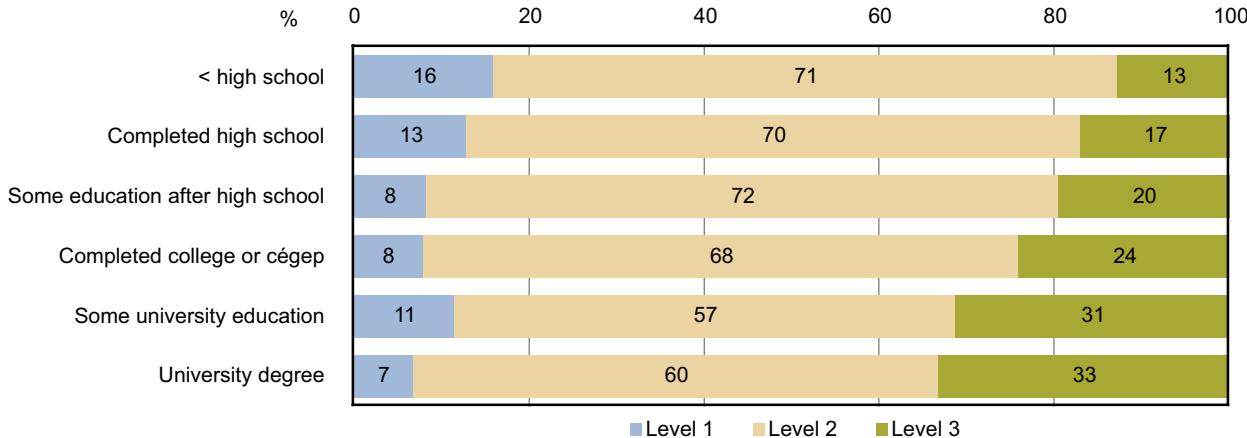


Chart 3.18 Reading proficiency levels by books in the home

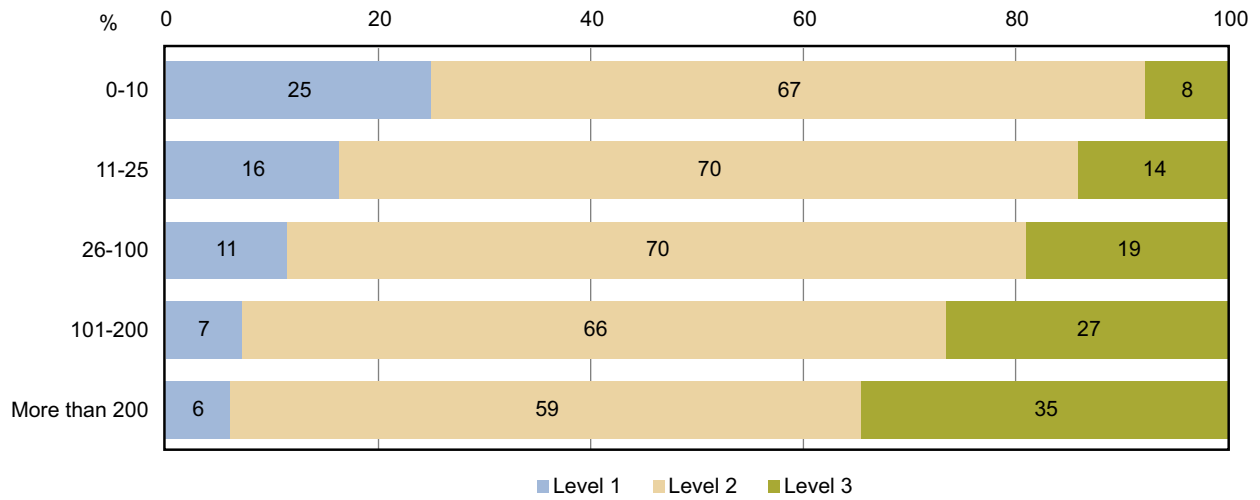


Chart 3.19 Mean reading scores by mother's education

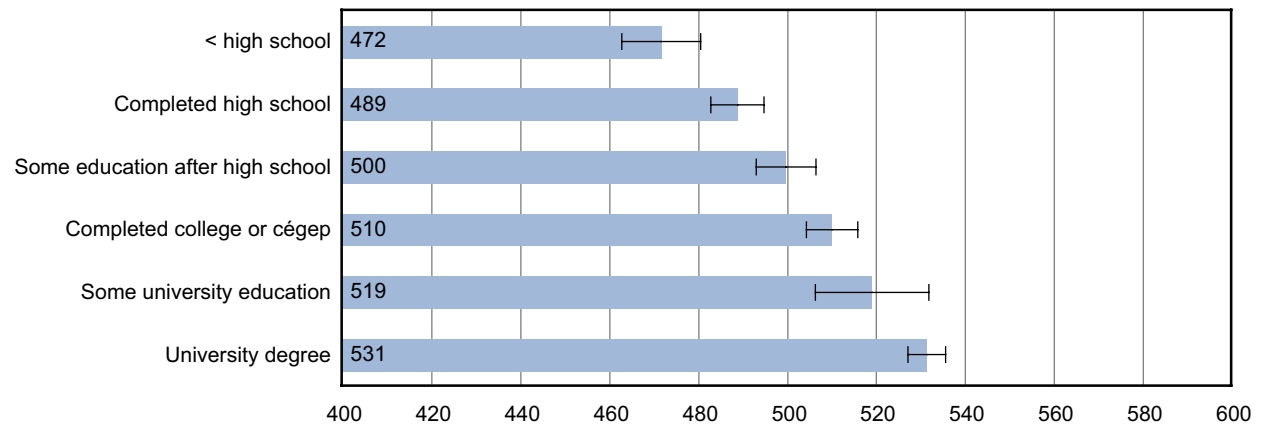
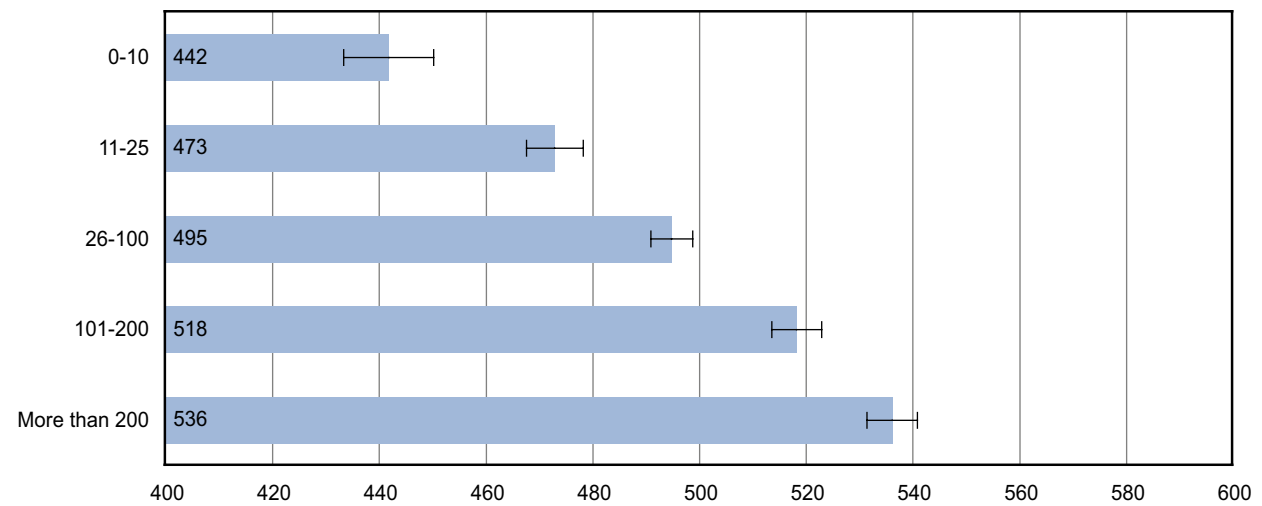


Chart 3.20 Mean reading scores by number of books in the home



Immigration status

Charts 3.21 and 3.22 show that most students in all jurisdictions were born in Canada. The percentage of students born outside of Canada are quite variable across jurisdictions, ranging from 14% to 16% in

British Columbia (both languages) and Ontario (English) down to 2% or less in Manitoba (French), New Brunswick (French), Nova Scotia (French), and Newfoundland and Labrador.

Chart 3.21 Percentage of students born in Canada, and not born in Canada, by jurisdiction

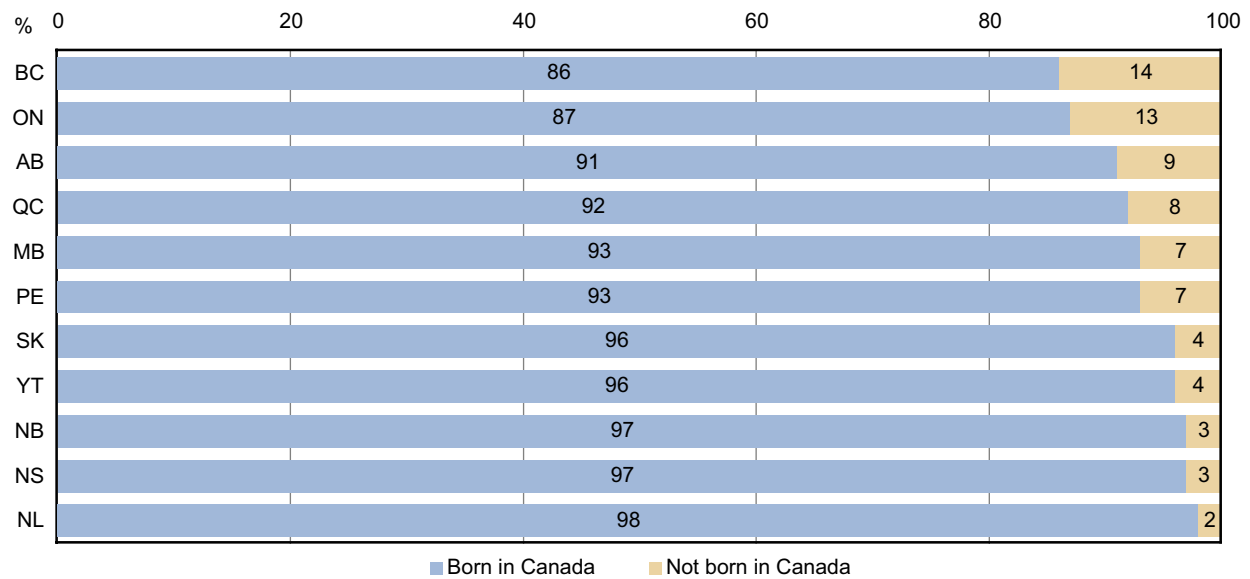
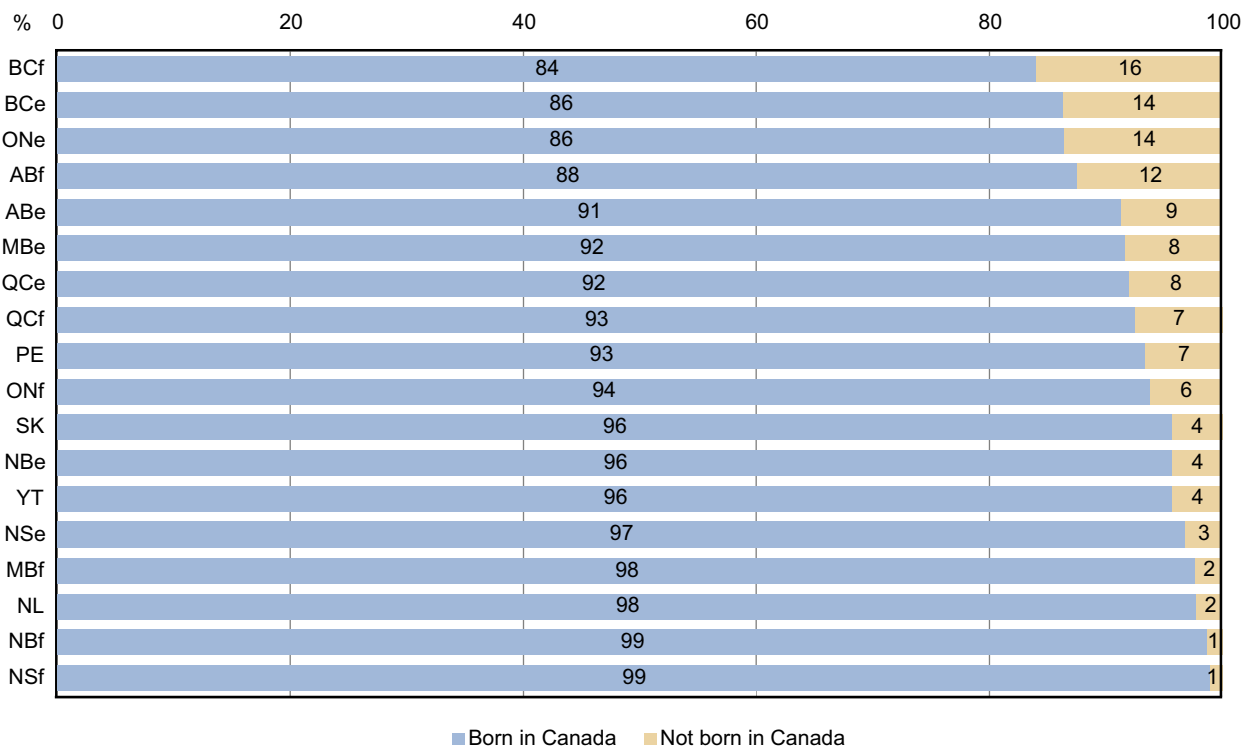


Chart 3.22 Percentage of students born in Canada, and not born in Canada, by jurisdiction and language



The impact of immigration status on reading proficiency levels is given in Chart 3.23 and the effect on mean reading scores is given in Chart 3.24.

These differences are small but statistically significant, with those born in Canada performing at higher levels.

Chart 3.23 Reading proficiency levels by place of birth (born in Canada, not born in Canada)

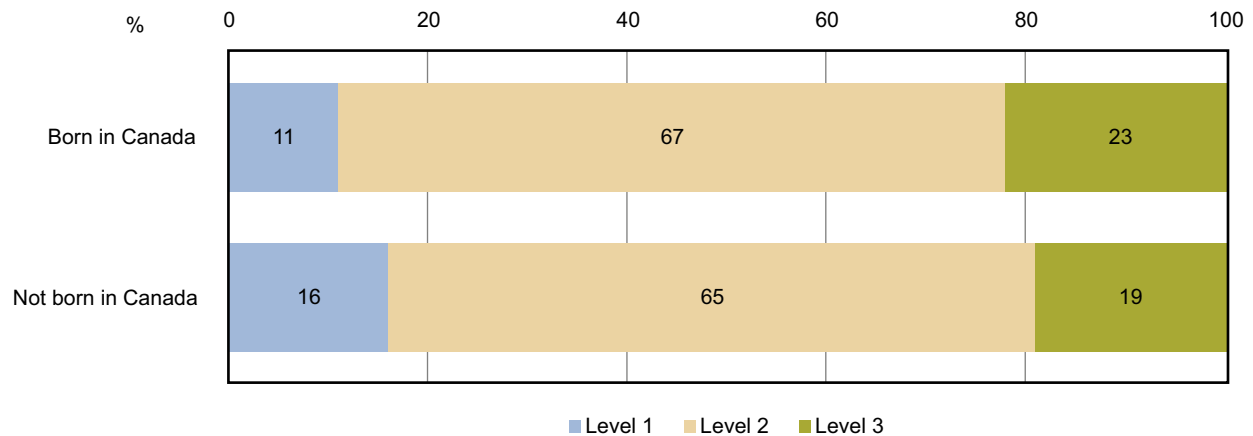
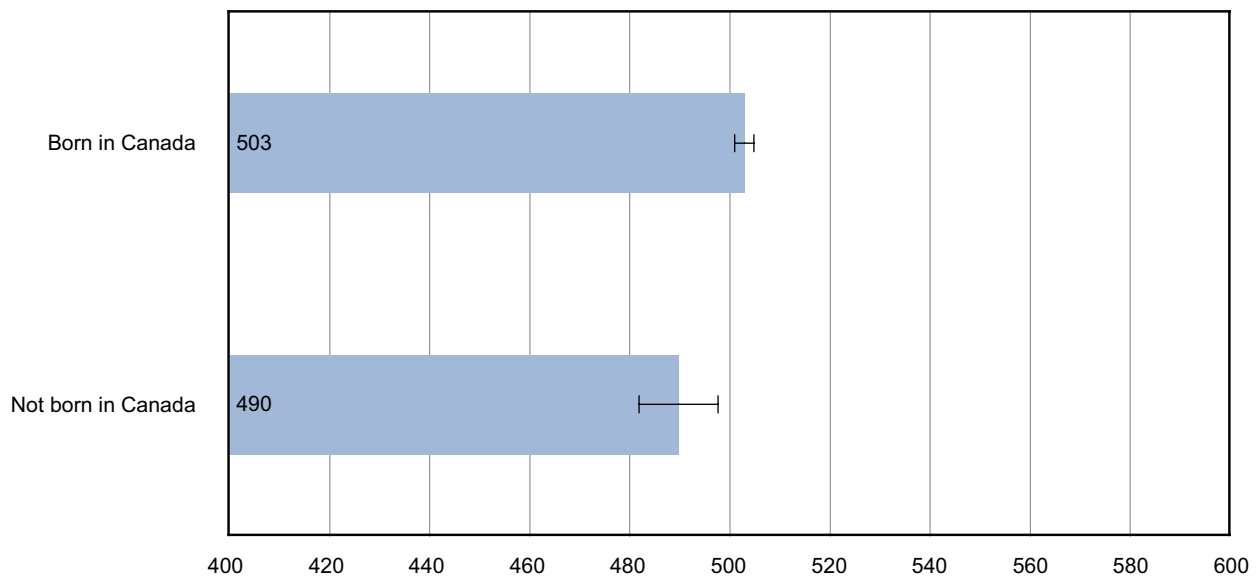


Chart 3.24 Mean reading scores by place of birth (born in Canada, not born in Canada)



Teacher characteristics

Teacher gender

As Chart 3.25 shows, most teachers are female in all jurisdictions except the Yukon. The proportions of male teachers are particularly low in Alberta, Quebec (French), and New Brunswick (French).

Chart 3.25 Male and female teachers by jurisdiction and language

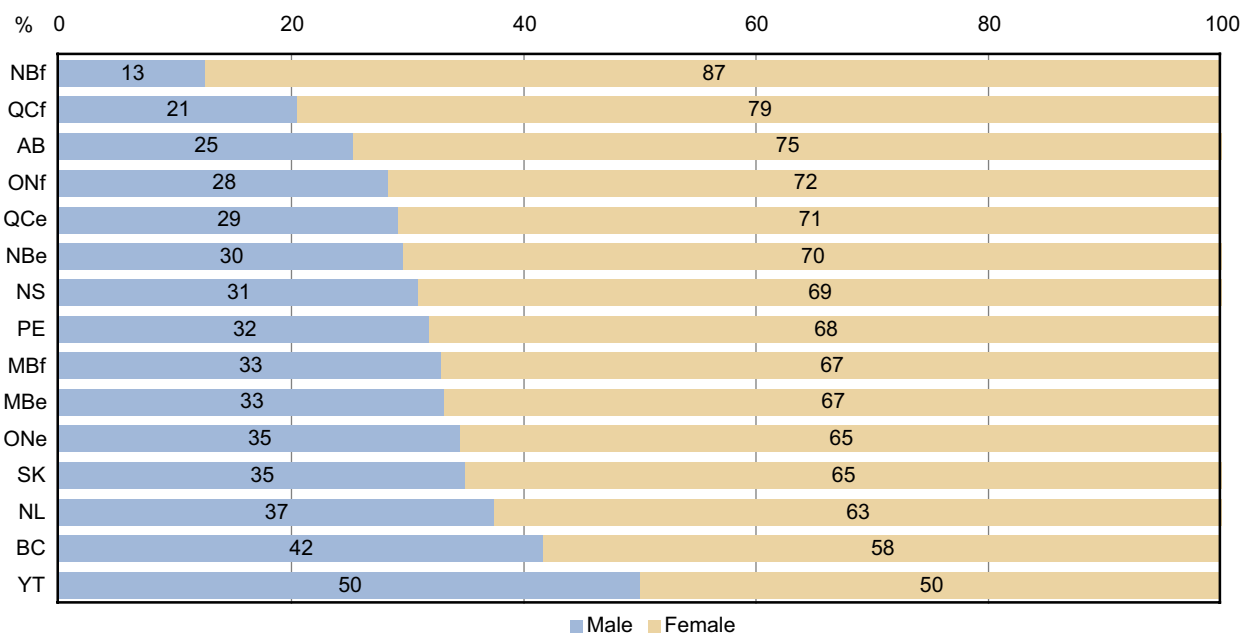
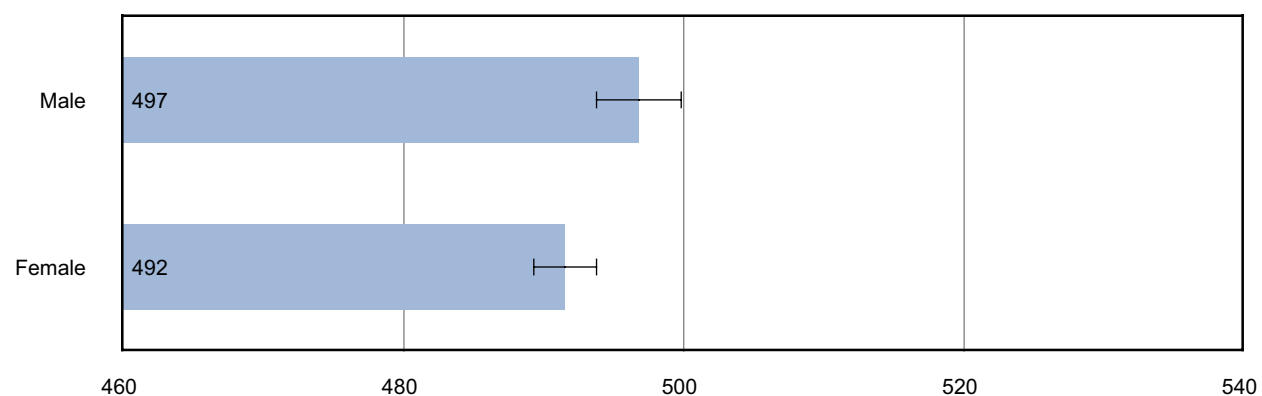


Chart 3.26 reveals that the difference between mean reading scores of students taught by male, rather than female, teachers is not statistically significant.

Chart 3.26 Mean teacher reading scores by teacher gender¹⁰



¹⁰ The reference to “Mean Teacher Reading Scores” reflects the fact that these are “means of means.” The basic unit used to compute each mean in teacher-level charts is the mean over all students taught by a teacher. These are different from the means computed over all students because the number of students taught by a teacher differs across teachers. For school-level charts, the basic unit is the mean of all students in a school.

Teaching experience

Chart 3.27 shows a wide range of teacher experience in all jurisdictions. The charts for most jurisdictions suggest that a trend toward an aging teaching force experienced over the past decade may be reversing itself, with the proportion of teachers with less than

five years' and five to ten years' experience now being generally higher than the proportions of teachers in older age groups, particularly those with more than 20 years' experience — even though this last group represents a wider range of years.

Chart 3.27 Range of teaching experience by jurisdiction and language

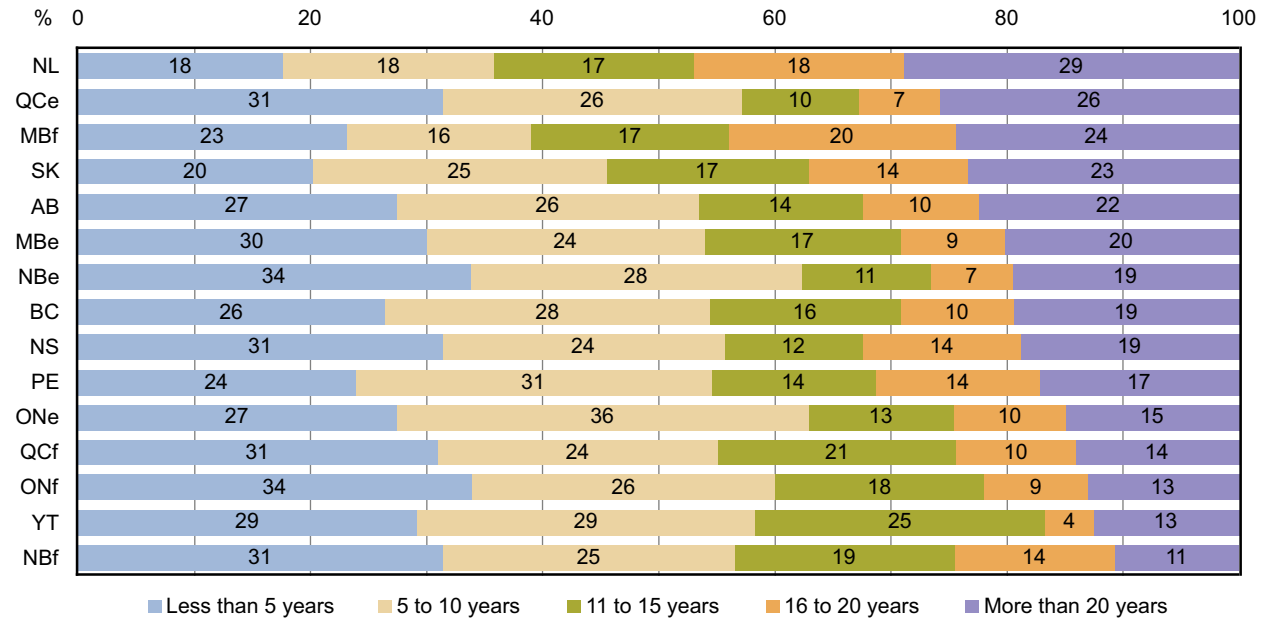
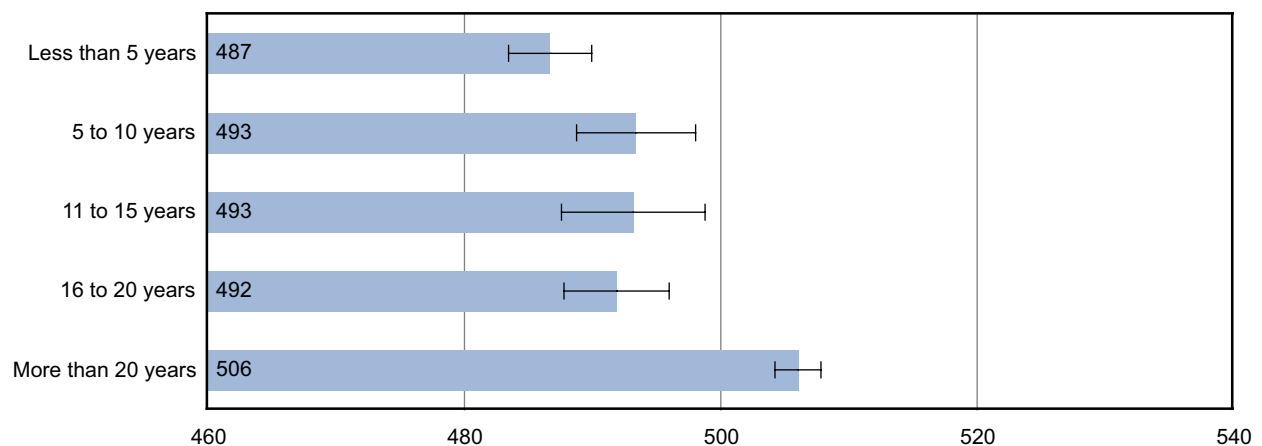


Chart 3.28 indicates that higher reading scores are attained by students taught by the most highly experienced teachers (those with more than 20 years'

experience). The mean reading scores of students of teachers in the other experience ranges are not significantly different from each other.

Chart 3.28 Mean teacher reading scores by teacher experience

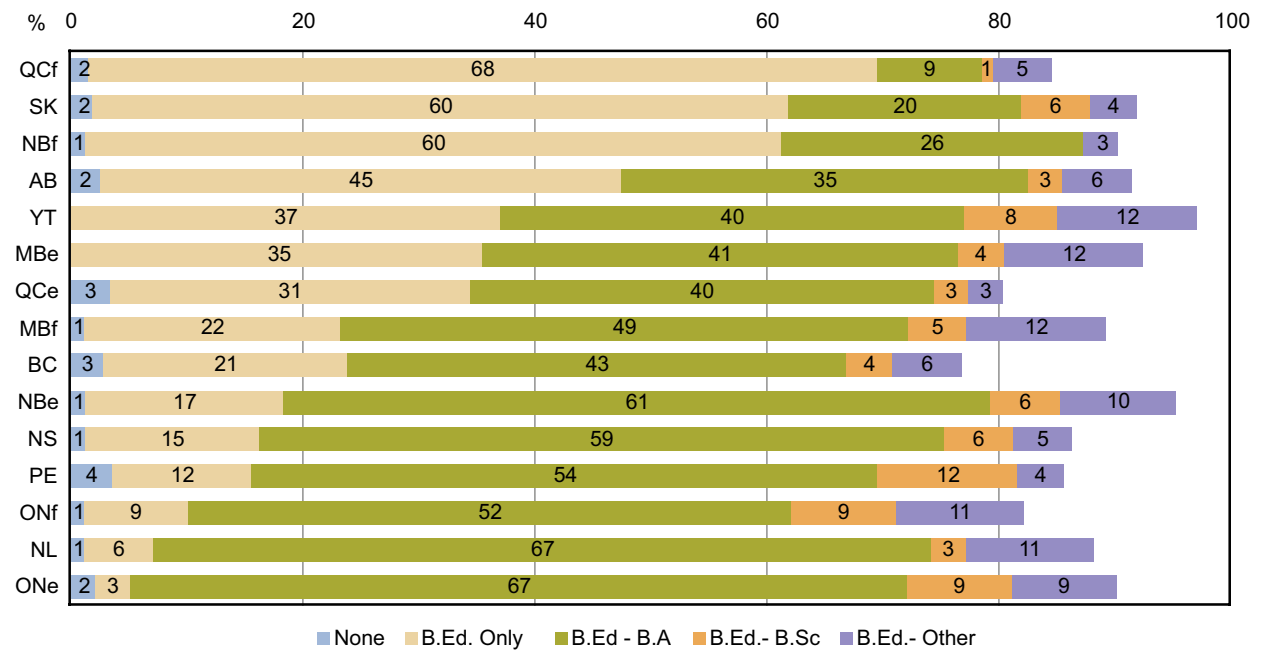


Teacher qualifications and specialization in language arts

In most jurisdictions, there are strong incentives for teachers to improve their qualifications, particularly through acquiring additional university degree credentials. Chart 3.29 shows a wide variation in the degree combinations held. While most teachers hold the B.Ed. degree, the proportion holding the B.Ed. as the only degree varies widely across jurisdictions.

In three jurisdictions — Saskatchewan, Quebec (French), and New Brunswick (French) — more than half of all teachers hold the B.Ed. only. In other jurisdictions, a majority of teachers holds two degrees. The most common combination is the B.Ed. and B.A. However, this is also widely variable.

Chart 3.29 Teacher undergraduate university degrees by jurisdiction and language



Note: Because of missing data, numbers do not sum to 100%.

Chart 3.30 gives the percentages of teachers holding advanced degrees (master's or higher). In most jurisdictions, the percentage is 20 or less. The largest

percentages are found in Newfoundland and Labrador, Nova Scotia, Prince Edward Island, and Quebec (English).

Chart 3.30 Percentage of teachers holding graduate degrees by jurisdiction and language

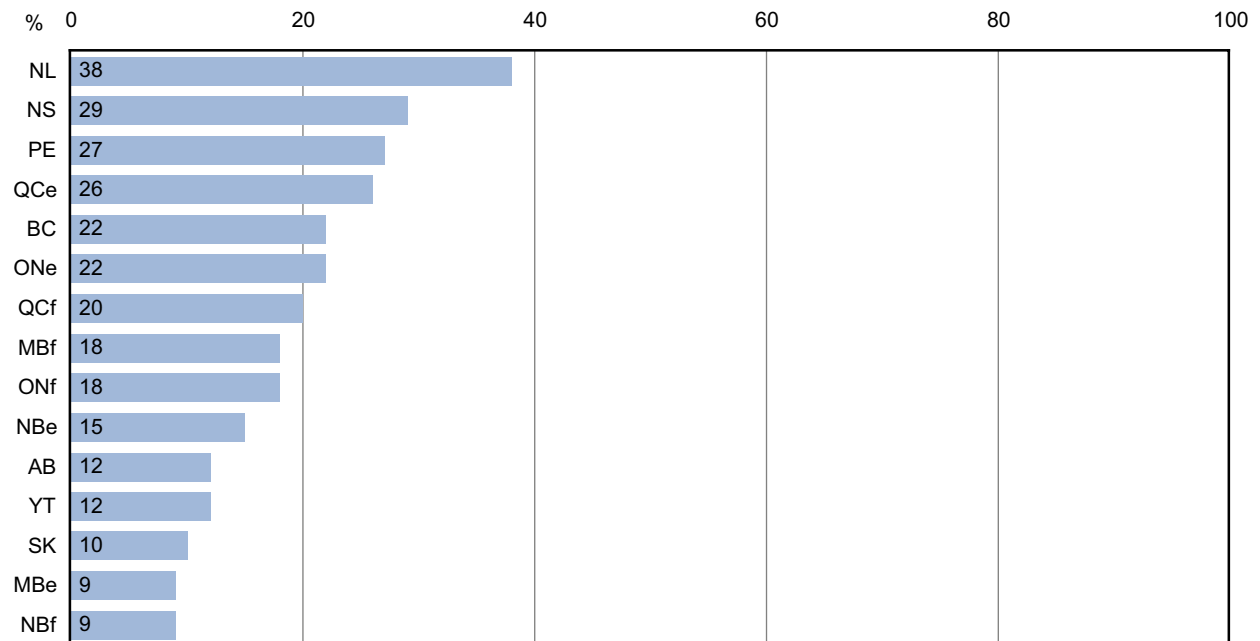


Chart 3.31 shows that there are only small differences in mean reading scores achievement across various teacher degree combinations. The exception

is the “B.Ed. – Other undergrad.” combination, for which achievement is significantly higher than for any of the other combinations.

Chart 3.31 Mean teacher reading scores by teacher university degrees

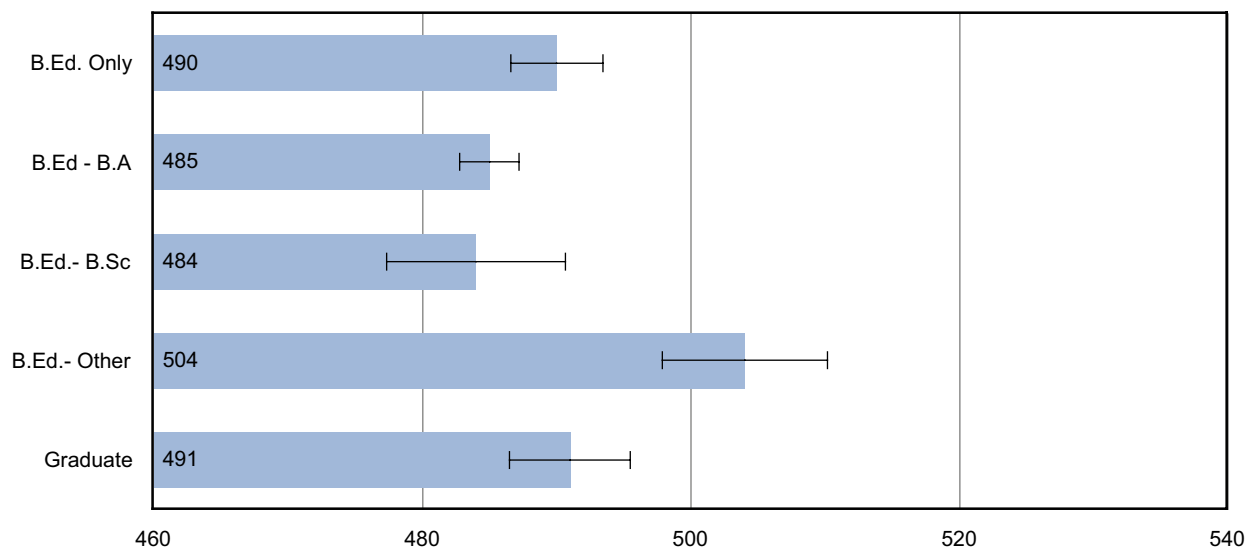
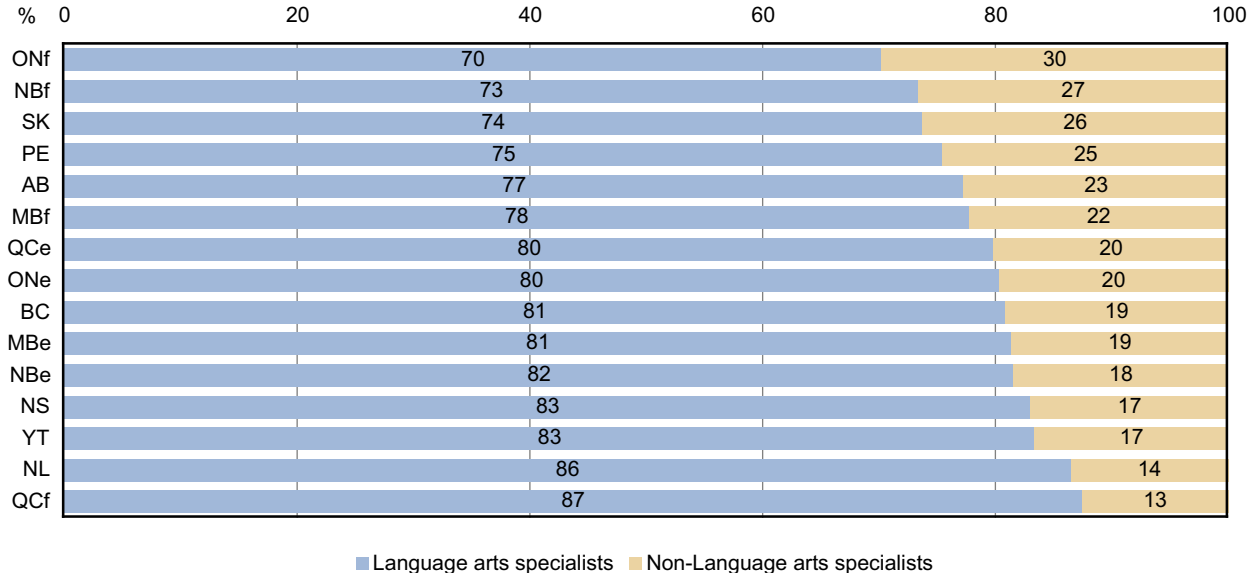


Chart 3.32 gives the percentages of teachers who indicated that they had focused on a subject related to the teaching of language arts as part of their teacher education. Similar proportions identified

themselves as language arts specialists in their teaching assignment. These results clearly indicate that most teachers involved in language arts at this level may be considered specialists in this area.

Chart 3.32 Percentage of teachers specializing in language arts by jurisdiction and language



A third question in this sequence asked teachers to report the number of days of professional development in language arts they had participated in over the previous five years. These results are shown in

Chart 3.33, with the pattern indicating wide variation in participation both within and across jurisdictions.

Chart 3.33 Days of language arts professional development in the past five years by jurisdiction and language

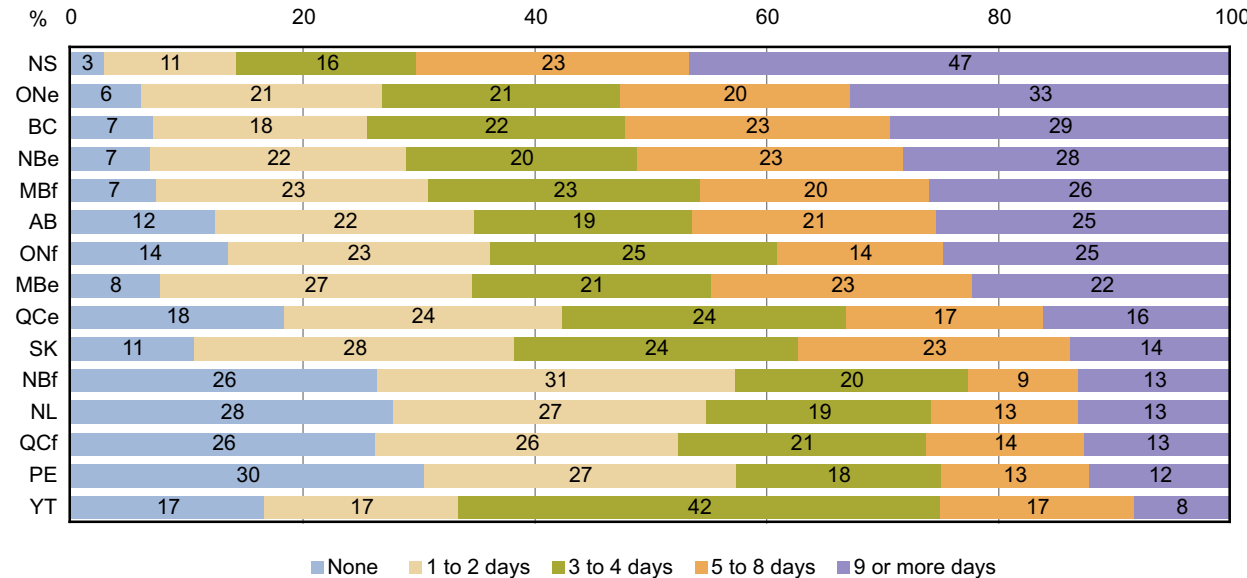
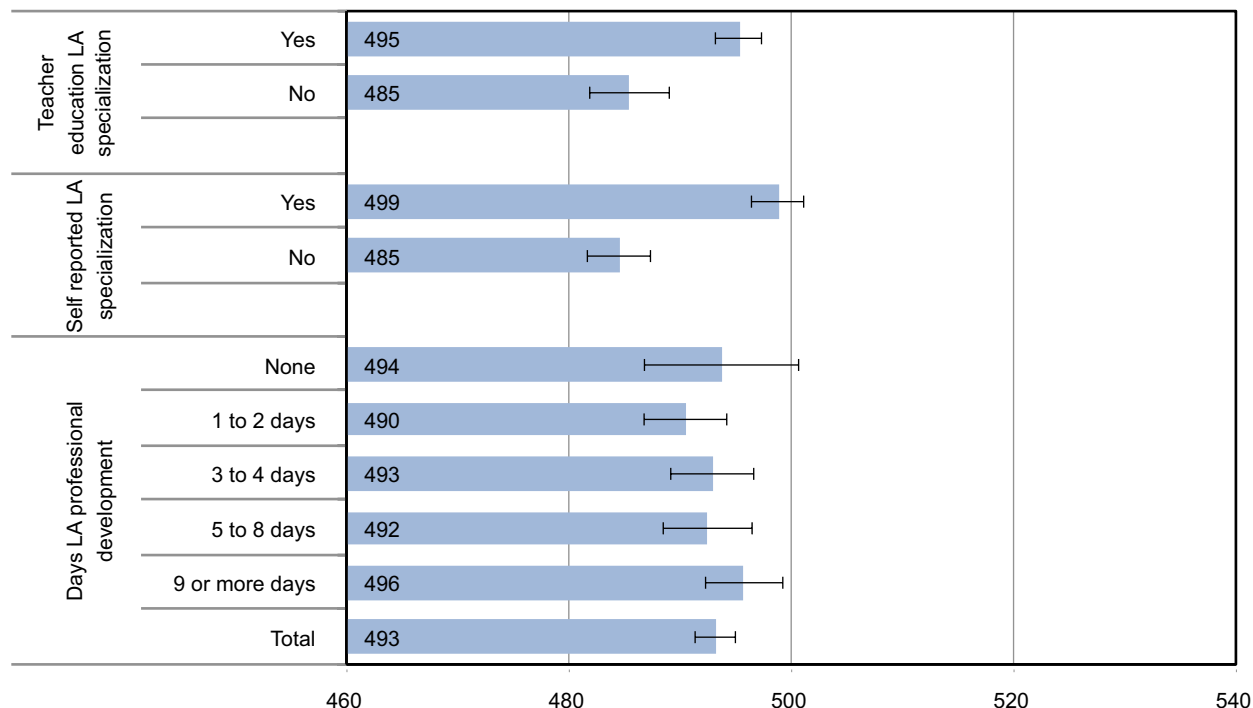


Chart 3.34 indicates that both actual and perceived specialization in language arts is significantly associated with achievement but that the number of

days of professional development in language arts has no effect.

Chart 3.34 Mean teacher reading scores by teacher language arts specialization and professional development



School characteristics

School size

Two measures of school size were used in PCAP: total enrolment and enrolment in grade 8 (secondary 2), the most common grade level for 13-year-olds. Charts 3.35 and 3.36 show the distributions of these two measures. It is clear from these charts that school size varies widely both within and

across jurisdictions. Quebec (French) has the largest proportion of schools with total enrolment greater than 1,000. British Columbia and Quebec (French) have the most schools with grade 8 (secondary 2) enrolments greater than 100. These differences likely reflect differences in the way in which grades are configured in the schools.

Chart 3.35 Total school enrolment by jurisdiction and language

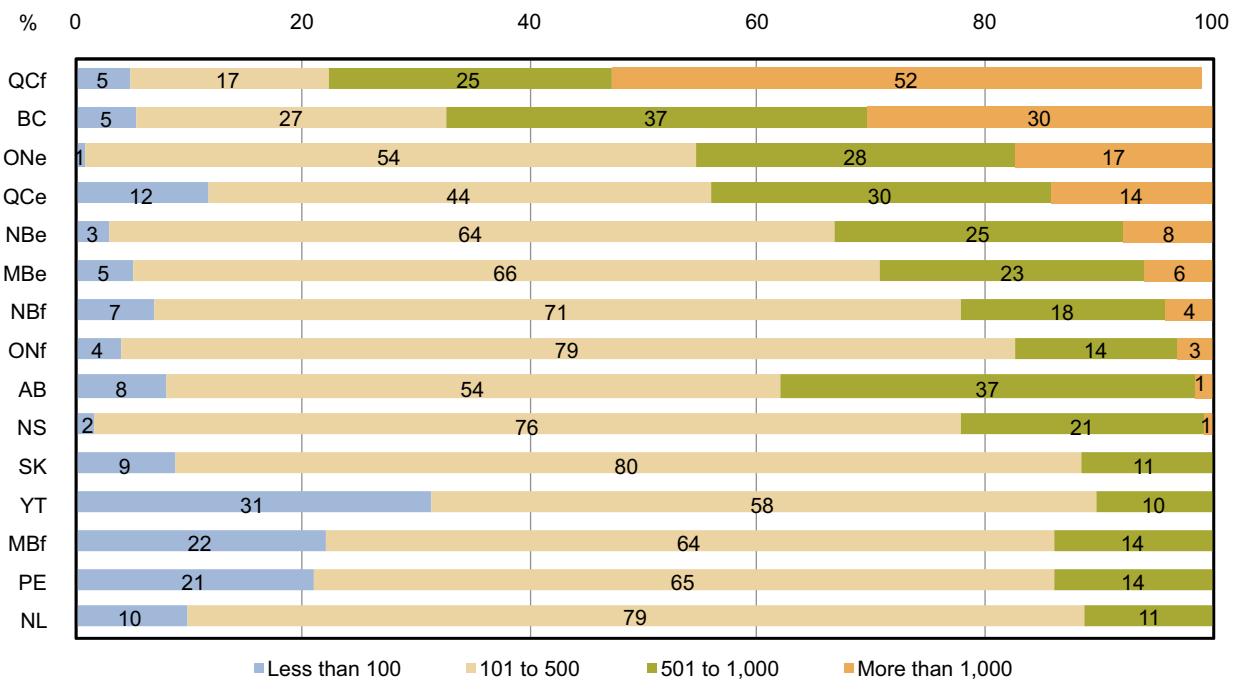


Chart 3.36 Grade 8 (secondary 2) enrolment by jurisdiction and language

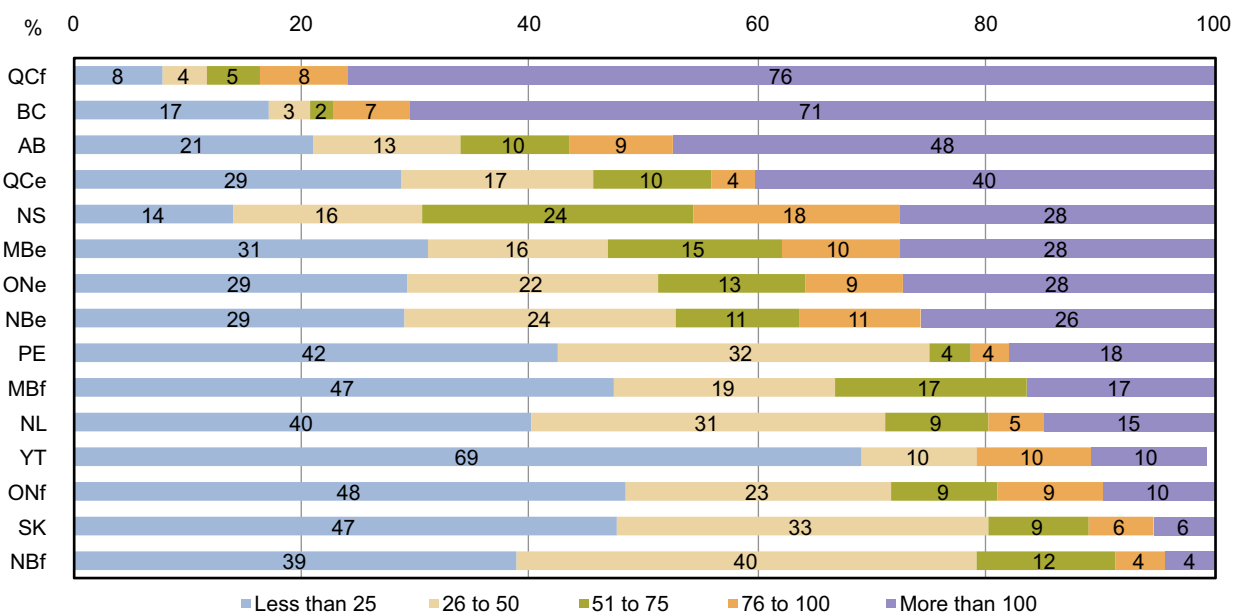
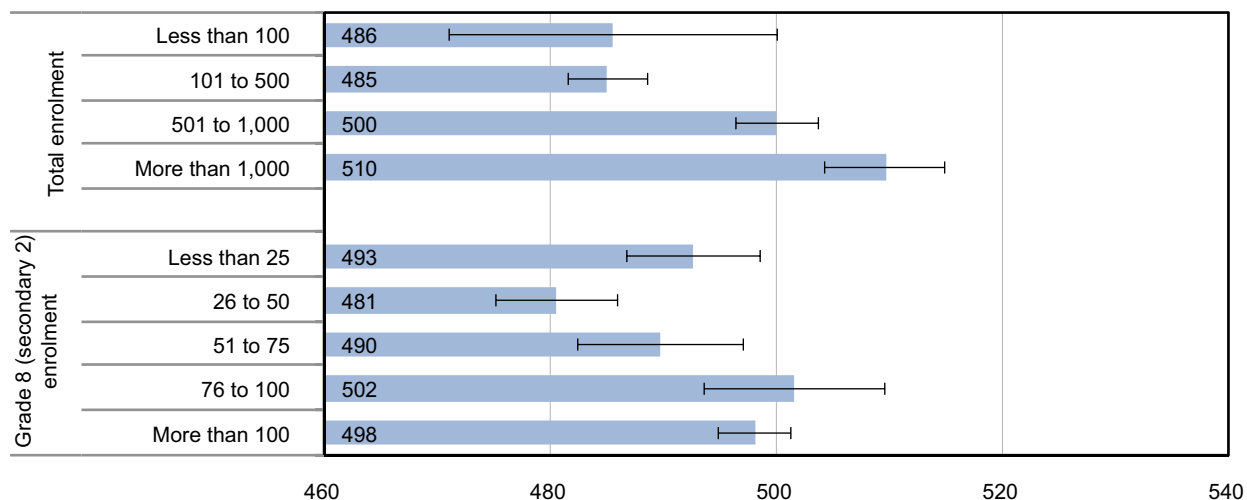


Chart 3.37 shows the effect of enrolment on mean reading scores. The general trend for overall enrolment is in the direction of higher achievement in larger schools. The pattern for grade 8 (secondary 2)

enrolment is more mixed, with the two categories with more than 75 grade 8s outperforming those with enrolment in the 26-50 range.

Chart 3.37 Mean school reading scores by school enrolment

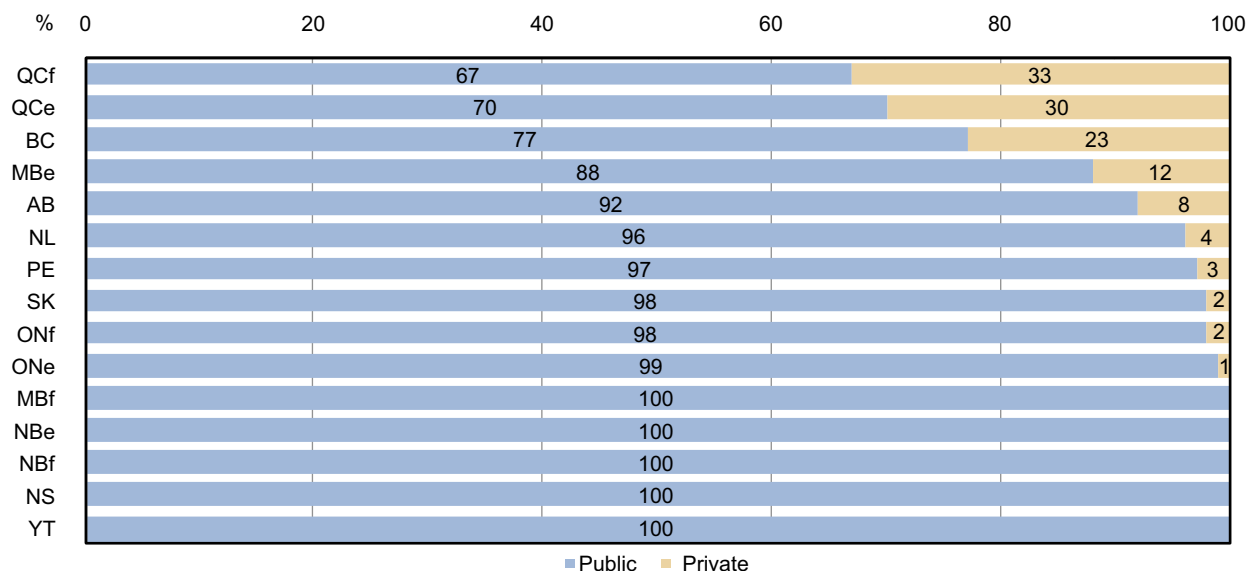


School governance

Chart 3.38 shows the percentages of schools identified by their principals as public or private. It is evident that the number of private schools is very small in most jurisdictions, with the notable

exceptions of Quebec, where both language groups show close to one-third private schools, and British Columbia, where the proportion exceeds 20%.

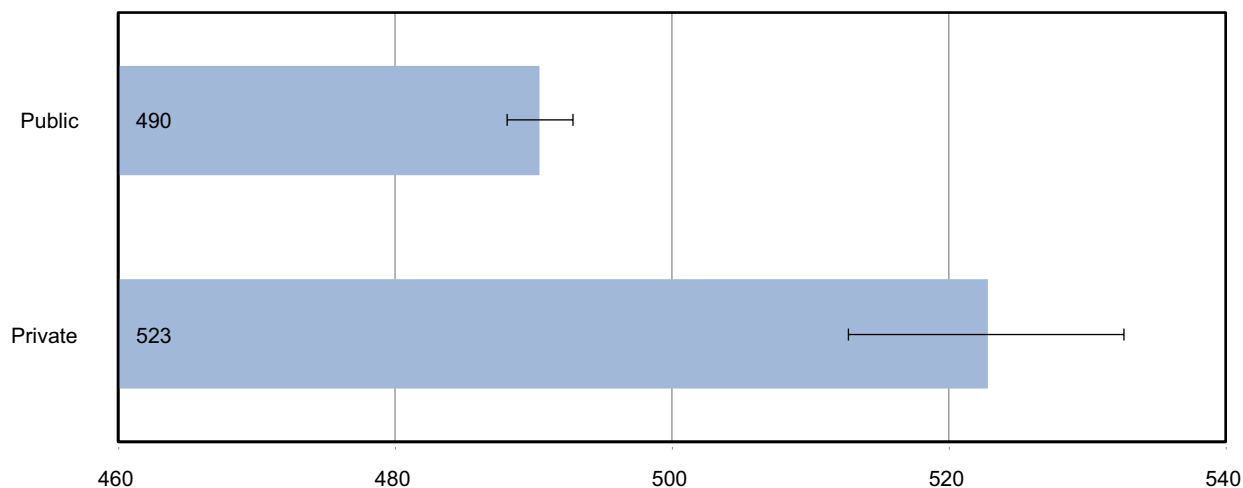
Chart 3.38 School governance by jurisdiction and language



Mean reading scores by school governing structure is shown in Chart 3.39. It is clear that students in private schools significantly outperform those in public schools. This finding is of interest because the proportion of private schools is high enough in a few jurisdictions to influence the overall results for the jurisdiction. To shed further light on this, compari-

sons of student mean scores achieved in public and private schools were made for jurisdictions in which the proportion of private schools exceeded 10%. Specifically, this was the case for British Columbia (English), Manitoba (English), and the two language groups in Quebec.

Chart 3.39 Mean school reading scores by school governance

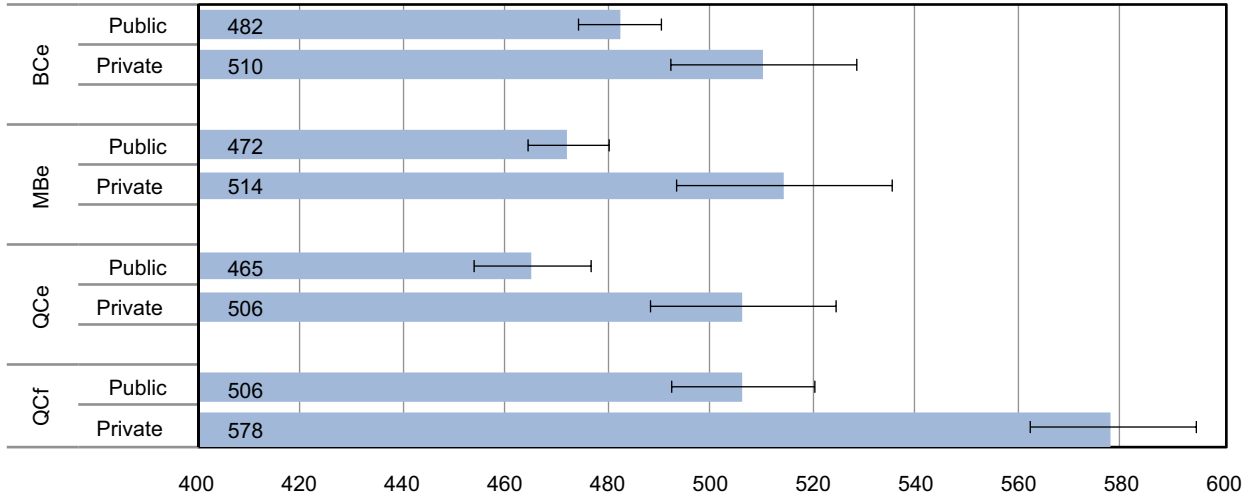


The mean reading scores by school governance for the selected populations results are shown in Chart 3.40. The mean scores for students in private schools are significantly higher than those for public school students in all of these jurisdictions. However, the difference is much larger for Quebec francophone students than for any other comparison. Francophone public school students in Quebec performed at a level close to the Canadian average. However, the performance of students in Quebec private schools is higher by a large margin than that of any other group identified in the comparisons

thus far, including those in private schools in other jurisdictions. It appears as if the combination of the high proportion of private schools in Quebec and the high performance of students in these schools is a significant contributor to the Quebec results.

A common argument for high performance on the part of private school students is that many of these students come from families of higher socioeconomic status. It is therefore possible that the observed results would change if socioeconomic status were controlled. The models to be developed later in this chapter will shed some light on this issue.

Chart 3.40 Mean student reading scores by school governance, selected populations

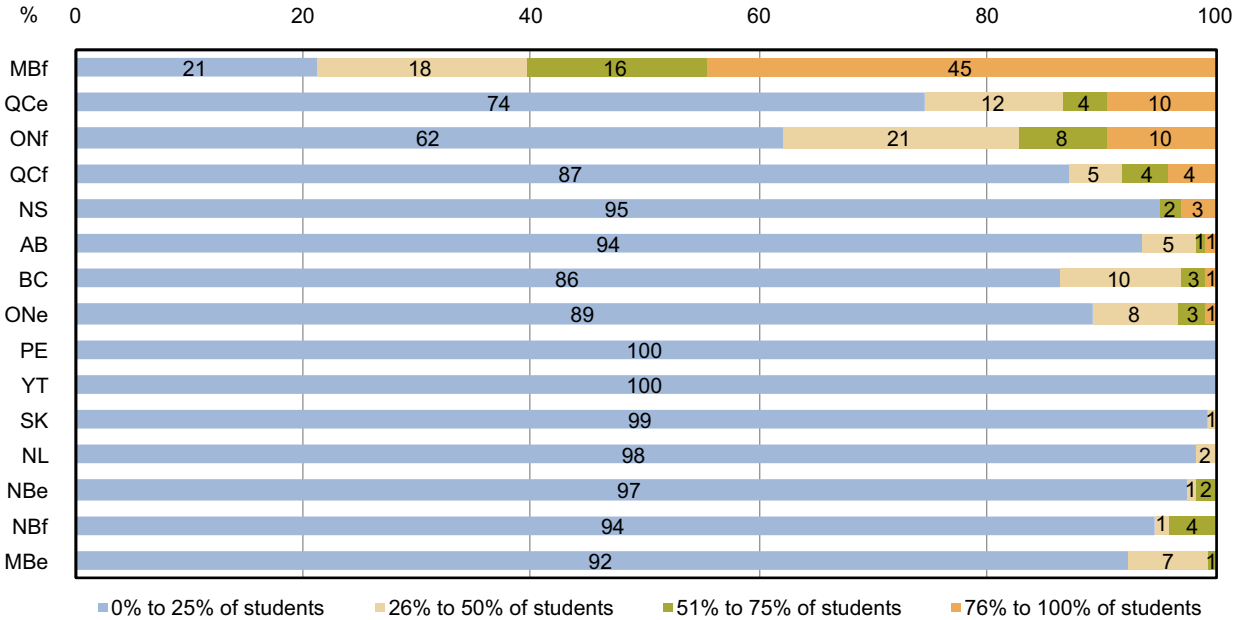


Diversity of student populations

Two indicators of the diversity of school populations, the proportion of students in English or French as a second language (ESL/FSL)¹¹ programs and the proportion of students of Aboriginal ancestry in the school were included in the school questionnaire. The percentage of schools for these two variables are given in Charts 3.41 and 3.42. Manitoba (French)

stands out as having by far the most schools with high proportions of ESL/FSL students. This is likely a function of the inclusion of French immersion students in the French population for that province. Again, note that Manitoba is the only jurisdiction where French immersion students are reported with the French population.

Chart 3.41 Percentages of schools with ESL/FSL students by jurisdiction and language

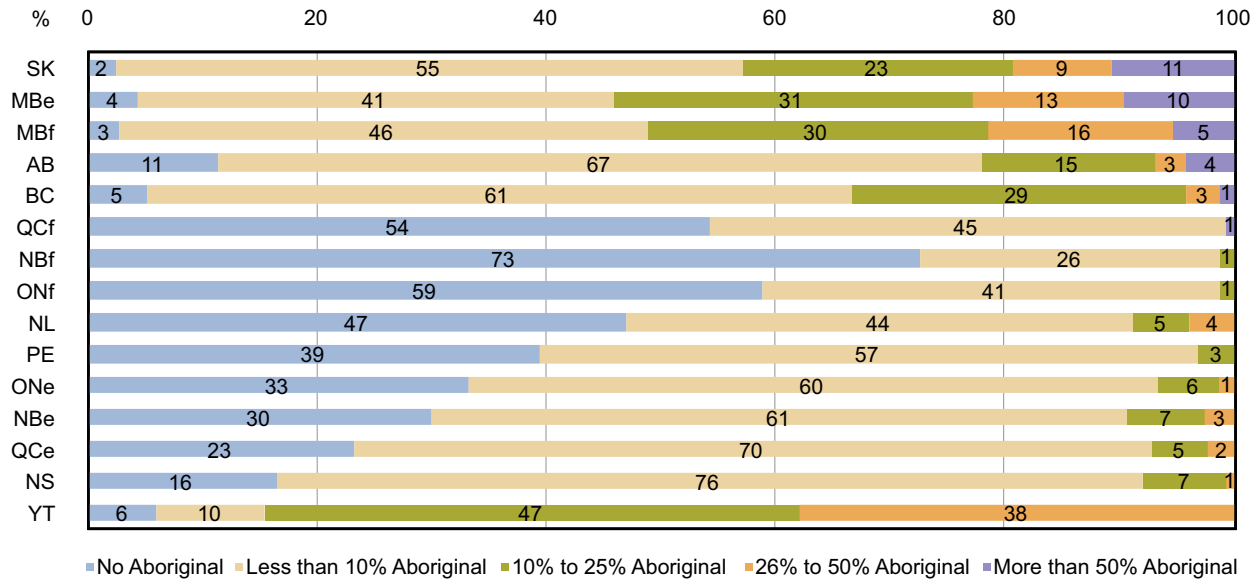


¹¹ The terms ESL and FSL refer to students whose first language is different from the language of the school. Many ESL/FSL students are from immigrant families, but some are from Canadian families who send their children to schools that function in the official language other than their home language.

The proportions of students of Aboriginal ancestry in the schools of most jurisdictions are relatively small. The largest proportions of schools with more

than 25% of such students are found in Saskatchewan, Manitoba, and Yukon.

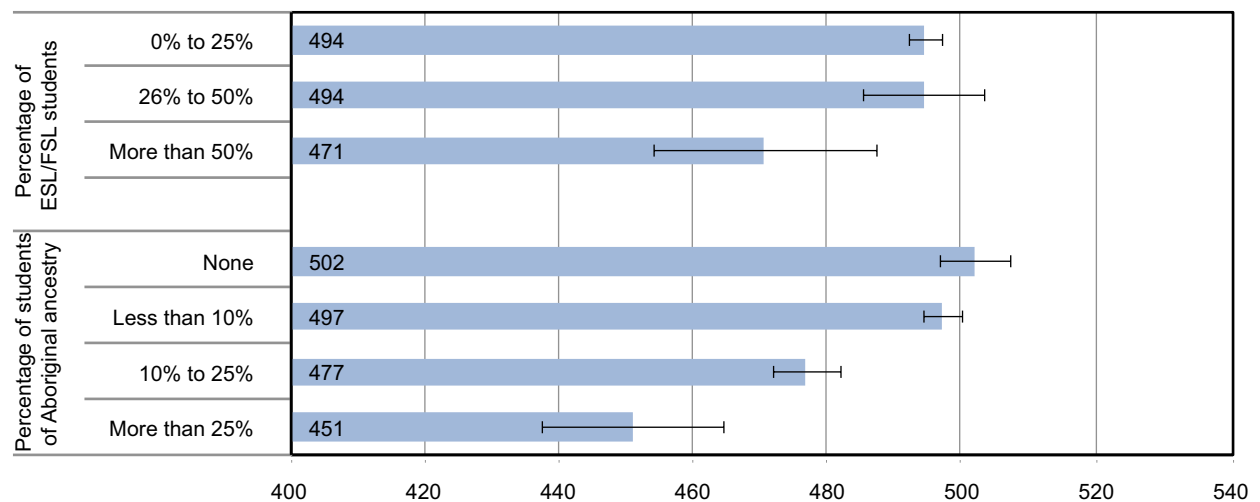
Chart 3.42 Percentages of schools with students of Aboriginal ancestry by jurisdiction and language



Mean reading scores for students in schools with various percentages of students in the ESL/FSL and Aboriginal ancestry categories are given in Chart 3.43. For ESL/FSL, there is little difference between schools in the two smaller ranges. However, schools with more than 50% of students in this category

have significantly lower reading achievement than those with 25% or fewer. The pattern for proportions of students of Aboriginal ancestry is clearer, with higher proportions of such students generally being associated with lower reading achievement.

Chart 3.43 Mean school reading scores by percentages of ESL/FSL students and students of Aboriginal ancestry

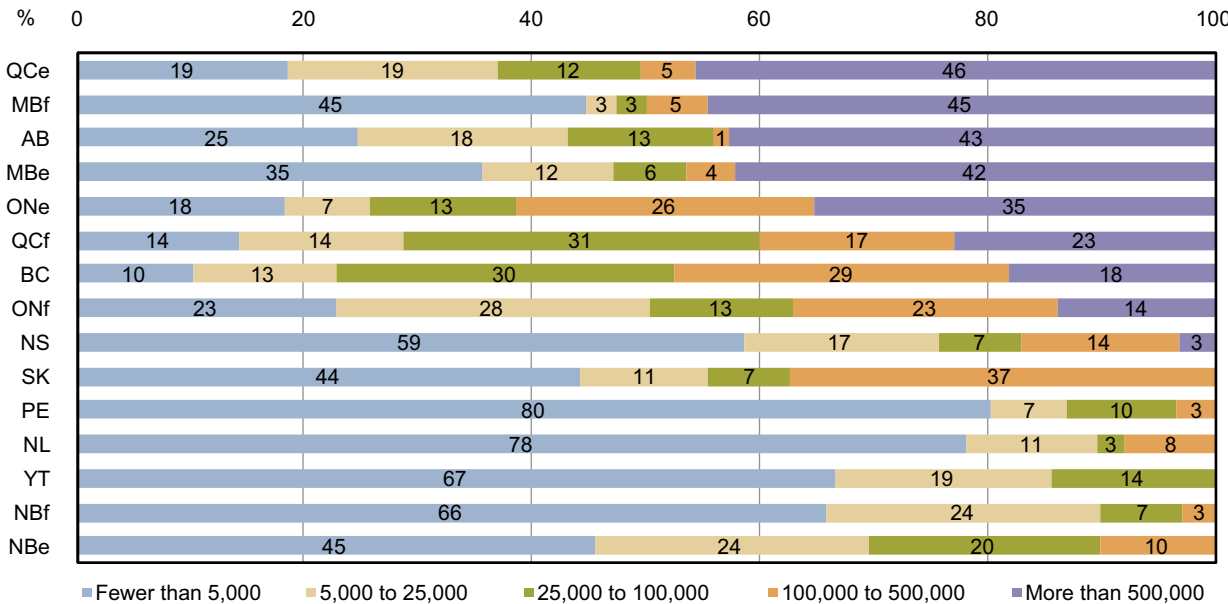


School locations by community size

Chart 3.44 shows the percentages of schools in communities of various sizes by jurisdiction and language. This distribution reflects the overall proportion of the populations in various jurisdictions that are located in large urban versus small rural locations and is not directly linked to overall population size for the jurisdiction. The position of Manitoba (both language groups) best illustrates

this, as the distribution is clearly related to the high proportion of the Manitoba population located in the city of Winnipeg. The same comment is true for Quebec (English), which relates to the relatively large percentage of the Quebec anglophone population located in Montreal. By contrast, the Ontario francophone population is much more widely dispersed across various community sizes.

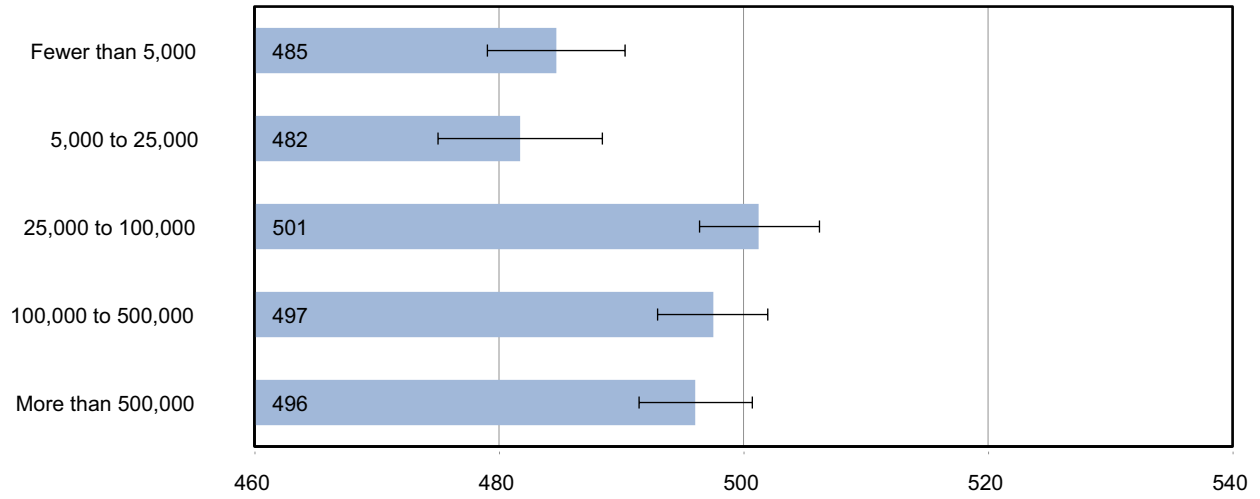
Chart 3.44 Percentage of schools by community size by jurisdiction and language



Mean school reading scores by community size are given in Chart 3.45. This shows that schools located in communities with populations greater than 25,000 perform better than those in the two

smaller community-size categories but that there are no significant differences among the “larger than 25,000” categories.

Chart 3.45 Mean school reading scores by community size



Statistical note

Multiple regression analysis. Achievement is influenced by a large number of factors, which may act independently or in combination to affect the outcome. For example, results already presented indicate that both mother's education and the number of books in the home influence reading achievement. However, these two factors themselves are correlated. If taken together, one may be more prominent than the other or one may have no effect once the other is accounted for. In survey research, the standard statistical technique for isolating effects is known as **multiple regression analysis or regression modelling**. This technique is based on an equation in which the outcome (or dependent variable) is seen as a linear combination of a series of factors (predictors or independent variables). The contribution of any one predictor to the outcome is represented by a regression coefficient, the value of which depends on the effect of the predictor itself and of the other variables in the model. The relative sizes of the **regression coefficients** in a particular model may be used to indicate the relative contributions of the factors of interest. Models that include or exclude a particular variable may also be used to identify the unique contribution of that variable while controlling for others.

Multilevel modelling. The PCAP sampling model is a two-stage one, with schools sampled at a first stage and students within schools at a second. Students are thus said to be "nested" within schools. This is multilevel modelling, which is a variation on the regression analysis used in situations where the samples exhibit such a hierarchical structure. Models are developed at each level (i.e., the school level and the students-within-school level) and the models are then combined to yield regression coefficients that represent effects at both the student level and the school level. Both student- and school-level variables can be included as predictors in the model, and the relative amount of variation in student achievement contributed by differences between students and differences between schools can be computed. Most of the regression models used in this report are of this nature. For the most part, the results may be interpreted in the same way as for single-level models. However, the confidence intervals are different in the two cases because of the way the errors are computed.

Interpreting regression coefficients. Many of the results in this report are presented in the form of regression coefficients. In general, a regression coefficient may be interpreted as representing the change in the outcome (in this case, reading achievement) that would be expected from one unit change in the predictor (contextual factor of interest). **Bivariate coefficients** (sometimes called "absolute effects") are those for the relationship between a single predictor and the outcome, without controlling for other variables. **Multivariate coefficients** (sometimes called "relative effects" or "unique effects") refer to the effects of a particular predictor while controlling for all other predictors in the equation.

The statistical significance of regression coefficients is determined from the confidence interval in the same way as described earlier. The specific reference point is a coefficient of zero, which would indicate that the factor has no correlation with the outcome variable (reading achievement in this case). A coefficient may thus be said to be statistically greater than (or less than) zero if the error bar does not overlap the zero point. The absolute values of the coefficients for different variables cannot be compared directly in all cases because these depend on the scales used. We can say that one variable has a larger or smaller effect than another only if the two scales are the same.

Chart 3.46 shows the bivariate and multivariate effects of student-level and school-level demographic variables.¹² The models used are two-level models (student and school), as described in the statistical note.

It is important to note that the coefficients reported in Chart 3.44 are not directly comparable across variables because the variables are on different scales.¹³ Effects for dichotomous variables (gender, language spoken at home, born in Canada, public school/private school) are comparable because each simply represents values of zero or one. In other cases, the size of the effect depends on the number of categories on the scale. For example, mother's education and books in the home consist of several categories, as shown in Charts 3.13 and 3.15.

The models used are two-level models (student and school), as described in the statistical note.

For any one variable, effects are comparable across the bivariate and multivariate models. It is also appropriate to interpret the confidence intervals in terms of whether they are significantly different from zero and to compare confidence intervals for the bivariate and multivariate models for a single variable.

For dichotomous variables, the regression coefficient may be interpreted as the average difference in reading score between those possessing the characteristic and those not possessing it. For example, in reading, being female conveys a 21-point advantage over being male when the gender variable is taken alone. This

advantage changes slightly (but not in a statistically significant way) to 19 points, when all other variables in the model are controlled.

For variables with more than two values, the coefficient represents the effect of a change of one point on the scale used. For example, an increase of one unit on the “books in the home” scale conveys an advantage of 11 points in reading when “books in the home” is taken alone. This advantage increases to 18 points (a statistically significant difference) after controlling for other variables in the model. In this case, we can say that the effect of books in the home is masked by other variables in the bivariate case, so that the full effect is not clear until the other variables are controlled.

At the student level, being female, being in a higher grade, speaking English or French at home, having been born in Canada, having more books in the home, and having a mother with a higher level of education all have positive bivariate effects on achievement. The effect of speaking any other language at home is not statistically significant.

At the school level, larger school size, private schools, and larger community size have positive bivariate effects on reading achievement. The effect of grade 8 (secondary 2) enrolment is not statistically significant.

For most variables at both levels, the multivariate effects are not significantly different from the bivariate ones, indicating that the effect of each demographic variable is largely independent of any of the other variables in the model. The effect of grade level is suppressed slightly in the presence of other student-level variables. The effect of books in the home increases, while that for mother's education diminishes slightly in the full model compared to the bivariate models. This suggests that books in the home may be a more useful indicator of socioeconomic status (SES) than mother's education,

¹² Teacher variables are not included in the models because the average number of students taught by a teacher was not sufficient to meet the requirements for multilevel modelling. In a few cases throughout the report, teacher variables have been aggregated to the school and examined as school-level variables.

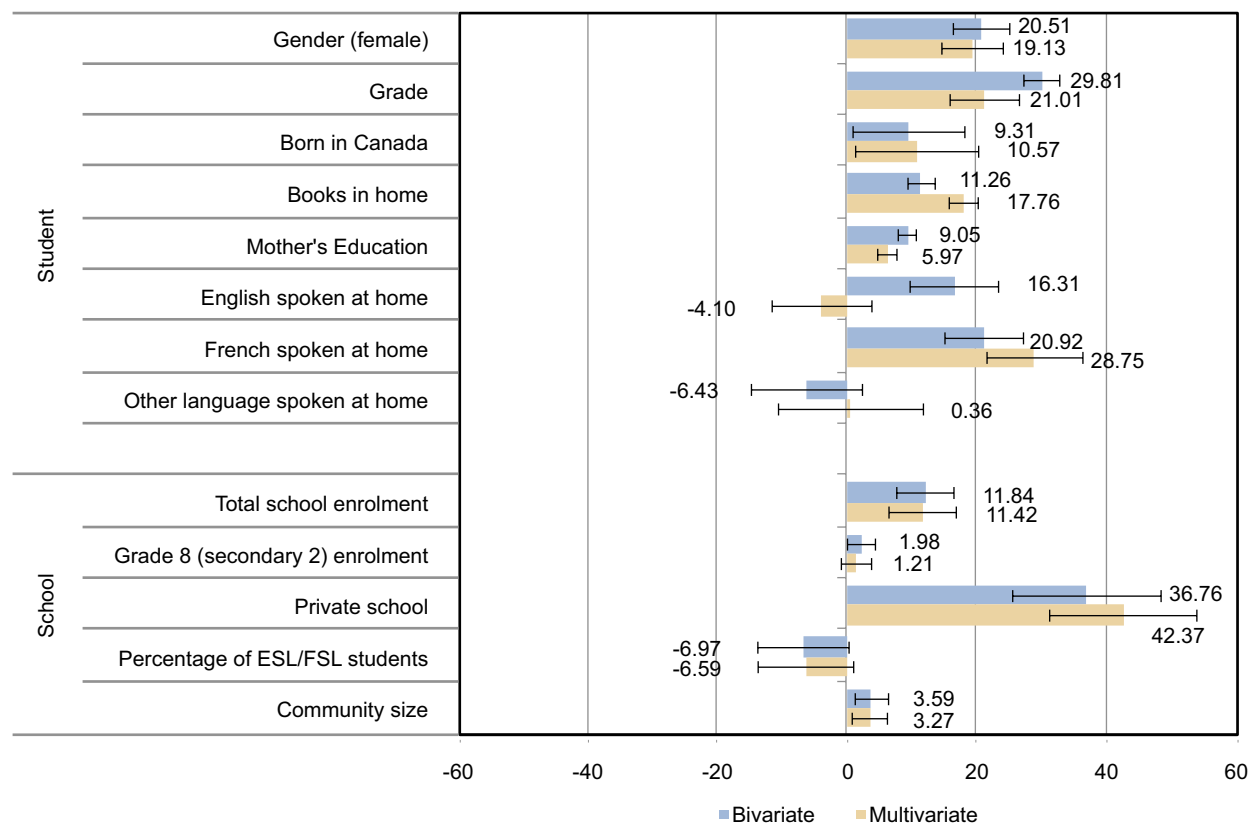
¹³ This lack of comparability is sometimes adjusted by reporting all coefficients in standard score terms. This allows the coefficient to be interpreted as corresponding to the change in the outcome variable for one standard deviation change in the predictor. However, the concept of standard deviation is, itself, difficult to interpret for categorical variables. It was therefore considered simpler to use the original scales instead of converting to standard scores.

especially since many students were unable to answer the latter question. The effects of speaking English in the home shifts from positive to nonsignificant once other variables are accounted for.

The effect of private schools deserves further attention because of the large effects for Quebec francophone students reported above. There is a general perception that private schools are attended mainly by students from relatively affluent families. While there was no direct measure of “affluence” in PCAP, two measures of socioeconomic status — mother’s education and books in the home — were available. Cross-tabulating these with public school/private school attendance revealed that more private

than public school students had mothers who had completed a university degree (54% compared to 35%). In addition, more private school than public school students (32% compared to 22%) reported having more than 200 books in the home. However, the model used here shows approximately the same effect (close to 40 points at the Canadian level) in both the bivariate and multivariate models. Hence, controlling for the two available SES variables, along with other demographic characteristics, makes little difference to the size of the public school/private school difference. Nevertheless, it is possible that introducing other variables into the model, as will be done in subsequent chapters, may change this interpretation.

Chart 3.46 Regression coefficients for student and school demographic variables¹⁴



¹⁴ It is important to note that the coefficients reported in the chart are not directly comparable across variables because the variables are on different scales. Effects for dichotomous variables (gender, language spoken at home, born in Canada, public school/private school) are comparable because each simply represents values of zero or one. In other cases, the size of the effect depends on the number of categories on the scale. For any one variable, effects are comparable across the bivariate and multivariate models.

4. STUDENT ATTITUDES

Statistical note

Factor analysis

In order to reduce the complexity of the analysis and to obtain more stable measures of attitude, groups of questions were subjected to factor analysis, a technique designed to determine whether item responses cluster together in some psychologically meaningful way. If meaningful groupings can be found, factor analysis permits the construction of a smaller number of “derived variables” or “factors.” For example, a set of 18 questions on student attitudes toward school was reduced to two broader constructs, which we have called “enjoyment of school” and “sense of belonging to school.”

Assuming that the factor analysis produces meaningful clusters, this approach facilitates later analysis because fewer variables need to be examined and because the measurement properties of the “factor scores” that can be assigned to individuals lend themselves better to their inclusion in models of achievement.

Applying factor analysis to the student attitude questions yielded a set of seven attitude factors, reduced from 30 individual questionnaire items. This illustrates the efficiency of this technique.

A “score” for each student on each factor was derived from the factor analysis, in much the same way as a scaled reading score was derived from analysis of the reading test items. Factor scores are typically computed in standard score form, with a mean of zero and a standard deviation of one. For convenience in presentation, and to avoid negative values on charts, the scores were transformed to a mean of 50 and a standard deviation of 10 for Canada as a whole. This is analogous to the transformation of reading scores to a mean of 500 and a standard deviation of 100. Mean factor scores for groups such as jurisdictions should be examined in relation to the Canada mean of 50 and standard deviation of 10. For example, a mean score of 52 for a group implies that the group is .20 standard deviation units above the mean for that factor. It is particularly important to stress that factor scores should not be interpreted as percentages.

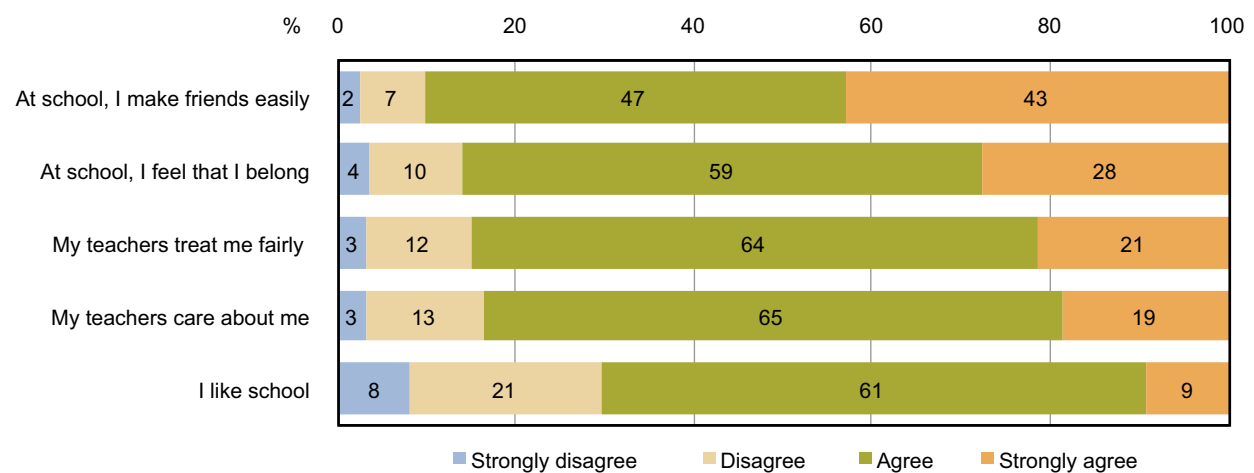
It is noted that factor names are somewhat arbitrary but are intended to capture an underlying idea represented by the items that load heavily on that factor. Sometimes this is conveyed by a name similar to that of an item, and in other cases, the underlying idea is more generic. Tables appearing throughout the report identify questionnaire items with factors and are intended to convey a sense of how the factors have been labelled.

A number of questions presented to students were designed to obtain data about their attitudes toward school and toward reading. Questions were also asked about student attributions of success and failure, specifically about whether responsibility for success or failure was attributed to their own efforts (internal) or to those of others (external). This chapter examines the impact of student attitudes on reading scores and further develops the multivariate models to account for attitudes while at the same time controlling for some of the demographic variables modelled in the last chapter.

Attitudes toward school

Five questions about how well students like school were included on the student questionnaire, using a conventional four-point scale, from “strongly disagree” to “strongly agree.” Response percentages for each category on these five questions are shown in Chart 4.1. Responses to all of these questions were quite positive, with only small percentages in the “strongly disagree” and “disagree” categories. Responses to the two questions on feeling of belonging to school and making friends easily were more positive than those for the remaining three questions.

Chart 4.1 Response percentages for attitudes toward school



The factor analysis yielded two factors from these five questions. The first two resulted in a factor labelled “sense of belonging to school” and the last three, a factor labelled “enjoyment of school.”

Mean scores on each of these factors by jurisdiction and language are given in Charts 4.2 and 4.3. Differences across jurisdictional groups are small and generally not statistically significant.

Chart 4.2 Mean factor scores for enjoyment of school by jurisdiction and language¹⁵

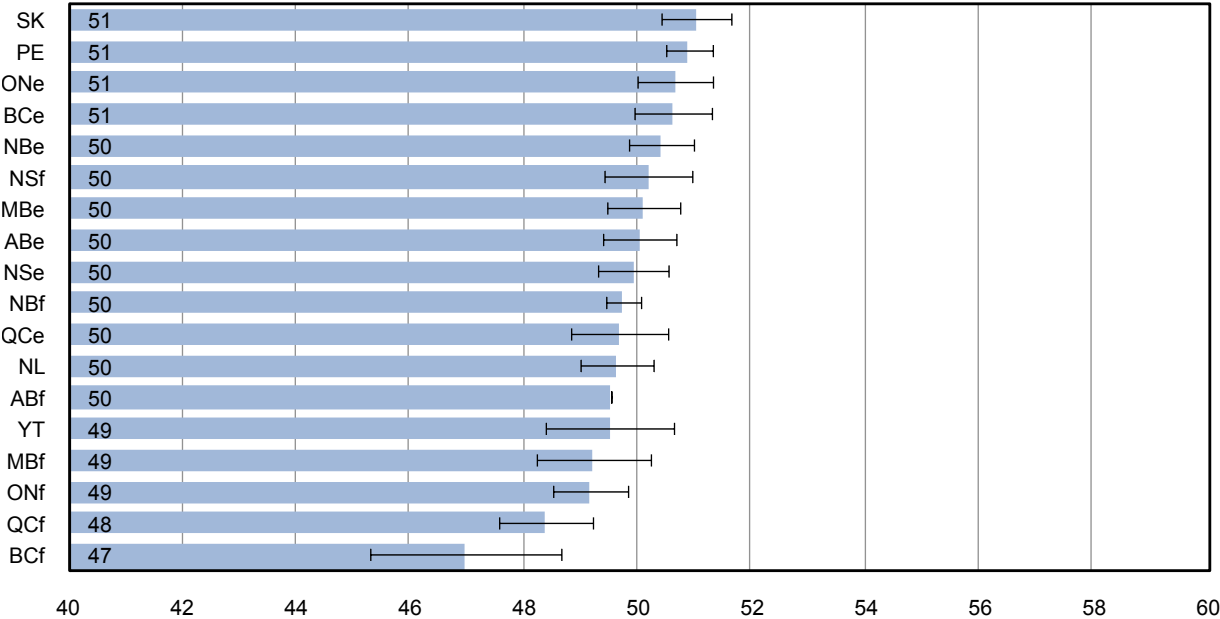
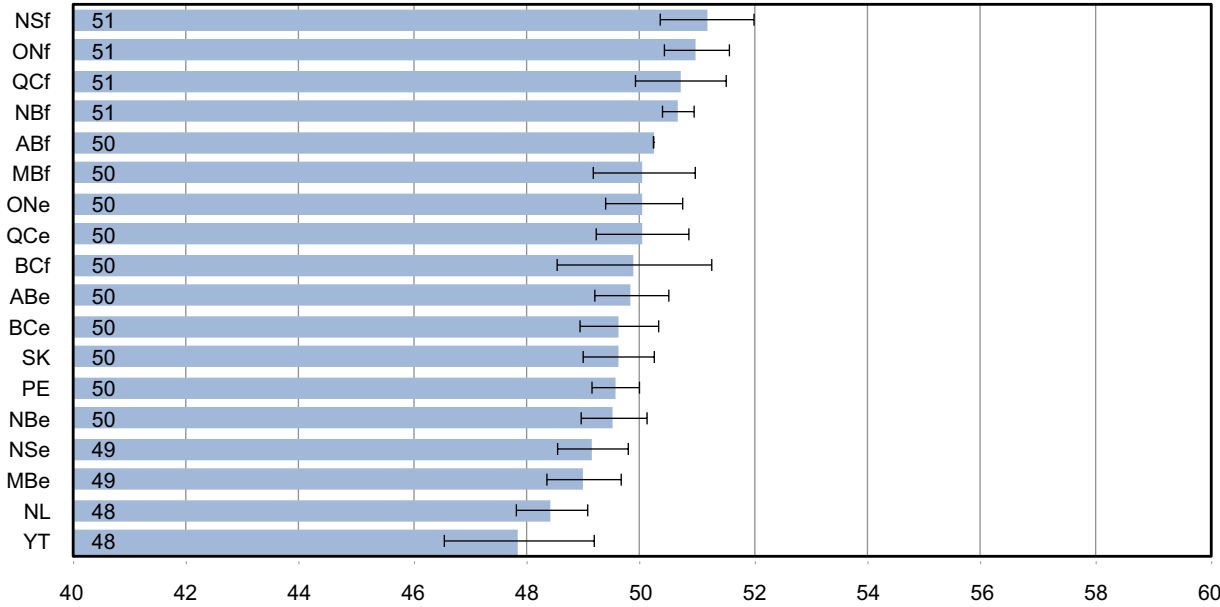


Chart 4.3 Mean factor scores for sense of belonging to school by jurisdiction and language



¹⁵ It is noted that the error bar for Alberta (French) is too small to be detected on this and subsequent charts. This is because the Alberta francophone sample was close to a census, resulting in a weight close to 1.00 and a finite population adjustment factor close to zero.

In order to examine the effects of these variables on reading achievement, students were divided into five approximately equal groups (quintiles) based on their attitude factor scores. Thus students in the lowest quintile had the least positive attitudes and those in the highest quintile the most positive ones. The percentages in each quintile group at each of the three reading proficiency levels were then computed, as were the mean reading scores for each group.

These results are presented in Charts 4.4 and 4.5. Again it is noted that the proficiency levels are presented descriptively, without error estimates. Statements about statistical significance are made on the basis of the means. In this case, although not all contrasts between group means are statistically significant, a general pattern can be seen of reading performance increasing with more positive attitudes toward school.

Chart 4.4 Reading proficiency levels by attitude-toward-school quintiles

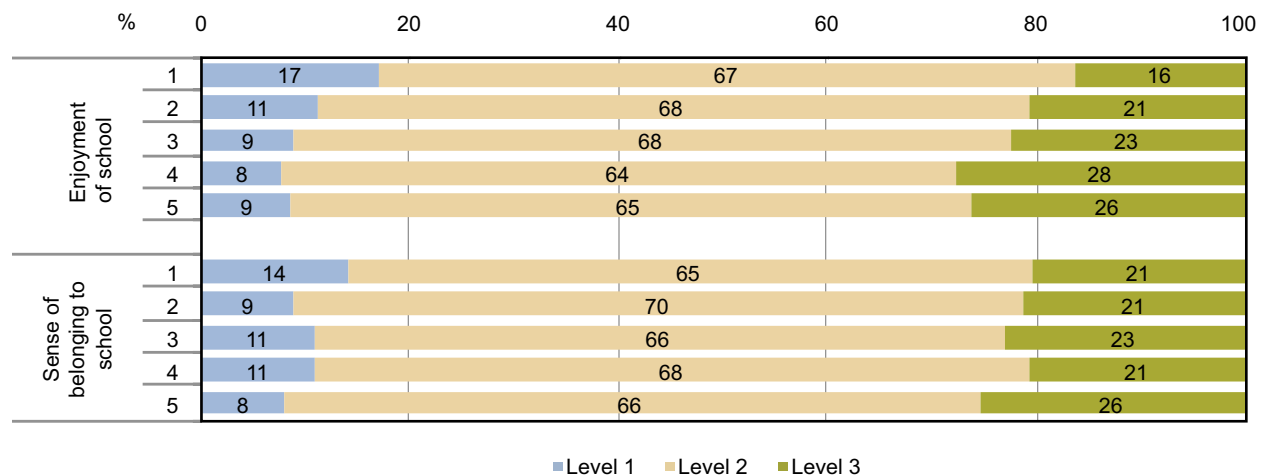
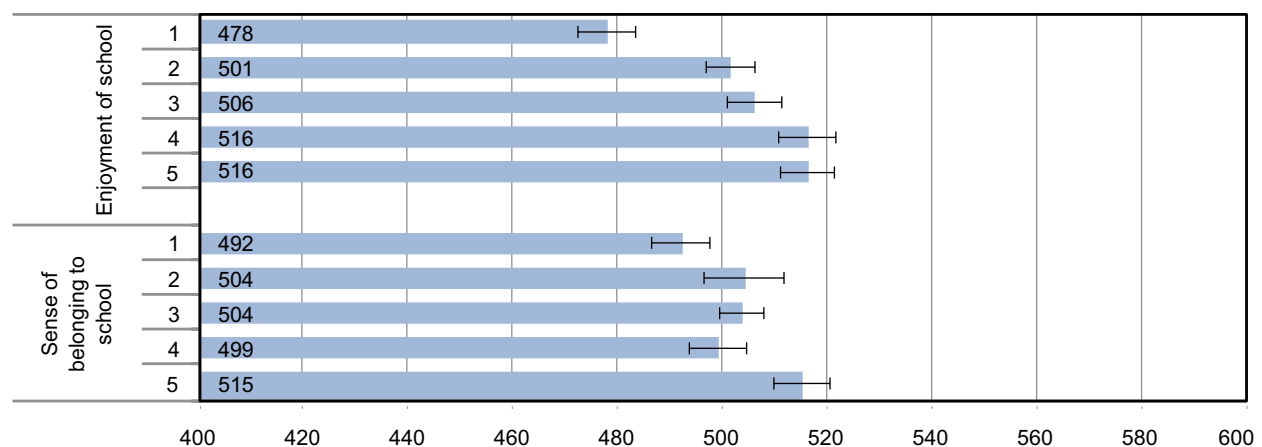


Chart 4.5 Mean reading scores by attitude-toward-school quintiles

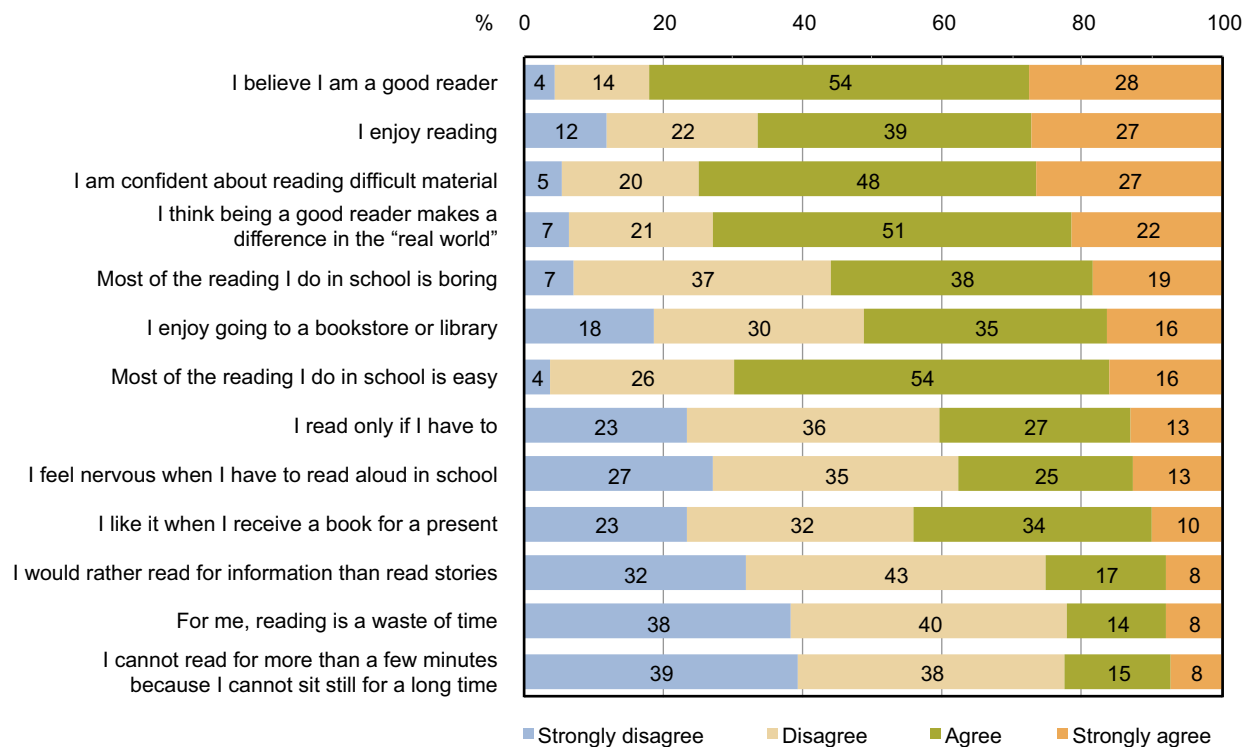


Attitudes toward reading

Students were asked to respond to 13 items concerning attitudes toward reading. Response percentages to each of these items are given in Chart 4.6. Again, the response pattern is generally positive, indicating

that most students feel good about reading. (The items with high percentages for the “disagree” categories are negatively worded so the response pattern is interpreted to be positive.)

Chart 4.6 Response percentages for attitudes toward reading



Factor analysis of this item set yielded three factors, labelled as shown in Table 4.1. Enjoyment of reading was the most prominent, with seven items contributing to that factor. The second factor was labelled “good reader” because the items loading on this factor relate to student perceptions of their reading

ability. The third factor, called “reading for information,” includes the two items related to the external value of reading and the type of material students prefer to read. Higher scores on this factor may be interpreted as an indicator that reading is seen in a utilitarian manner.

Table 4.1 Questionnaire items and factors for attitudes toward reading

Factor	Item
Enjoyment of reading	<p>I enjoy reading.</p> <p>I read only if I have to.</p> <p>I like it when I receive a book for a present.</p> <p>For me, reading is a waste of time.</p> <p>I cannot read for more than a few minutes because I cannot sit still for a long time.</p> <p>Most of the reading I do in school is boring.</p> <p>I enjoy going to a bookstore or library.</p>
Good reader	<p>I believe I am a good reader.</p> <p>I am confident about reading difficult material.</p> <p>Most of the reading I do in school is easy.</p> <p>I feel nervous when I have to read aloud in school.</p>
Reading for information	<p>I think being a good reader makes a difference in the “real world.”</p> <p>I would rather read for information than read stories.</p>
<p>Note: Negatively worded items, such as “For me, reading is a waste of time” have negative loadings on their respective factors, which is consistent with the positive label attached to the factor.</p>	

Mean scores by jurisdiction and language for these three factors are given in Charts 4.7 to 4.9. On the “enjoyment of reading” scale, New Brunswick francophone students and students in Newfoundland and Labrador gave slightly but significantly lower ratings than those in most other jurisdictions. On the “good reader” scale, francophone students

in Manitoba, New Brunswick, and Nova Scotia rated themselves significantly lower than anglophone students in the same jurisdictions. In most jurisdictions, differences on the “reading for information” scale were not statistically significant across jurisdictions and language groups.

Chart 4.7 Mean factor scores for enjoyment of reading by jurisdiction and language

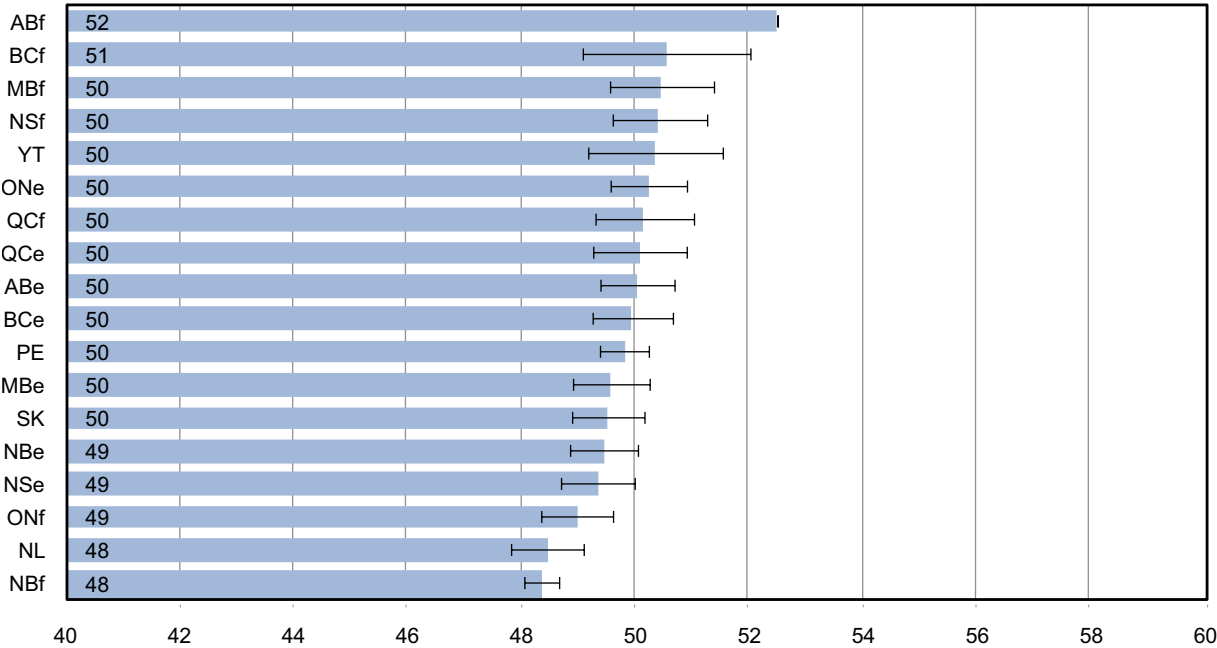


Chart 4.8 Mean factor scores for good reader by jurisdiction and language

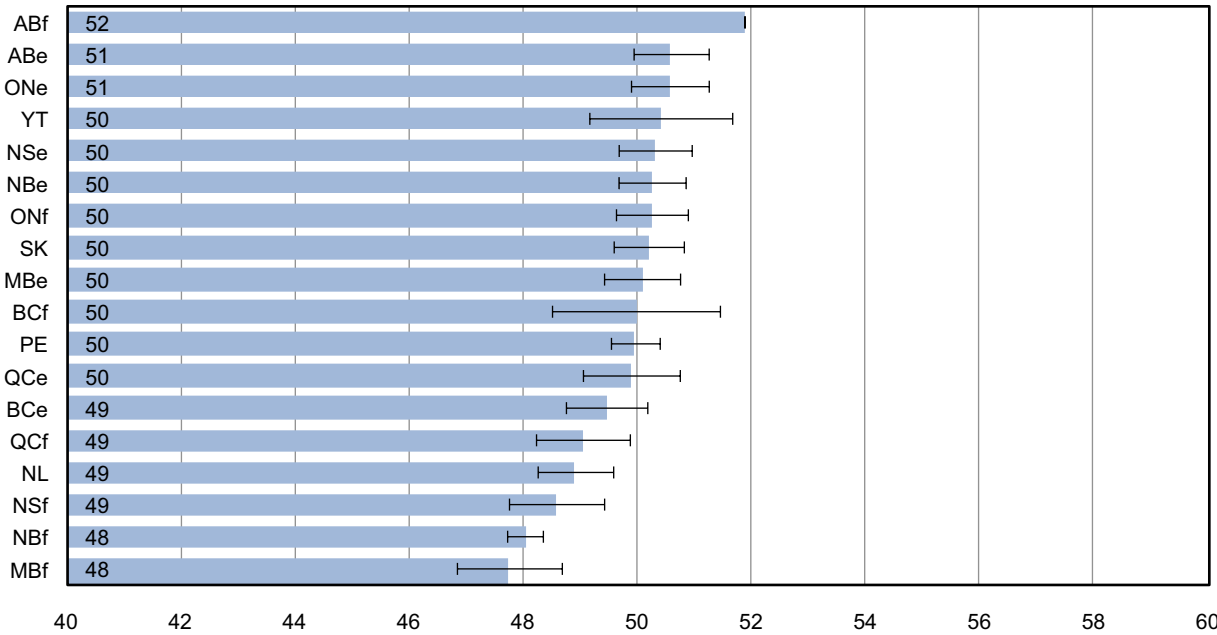
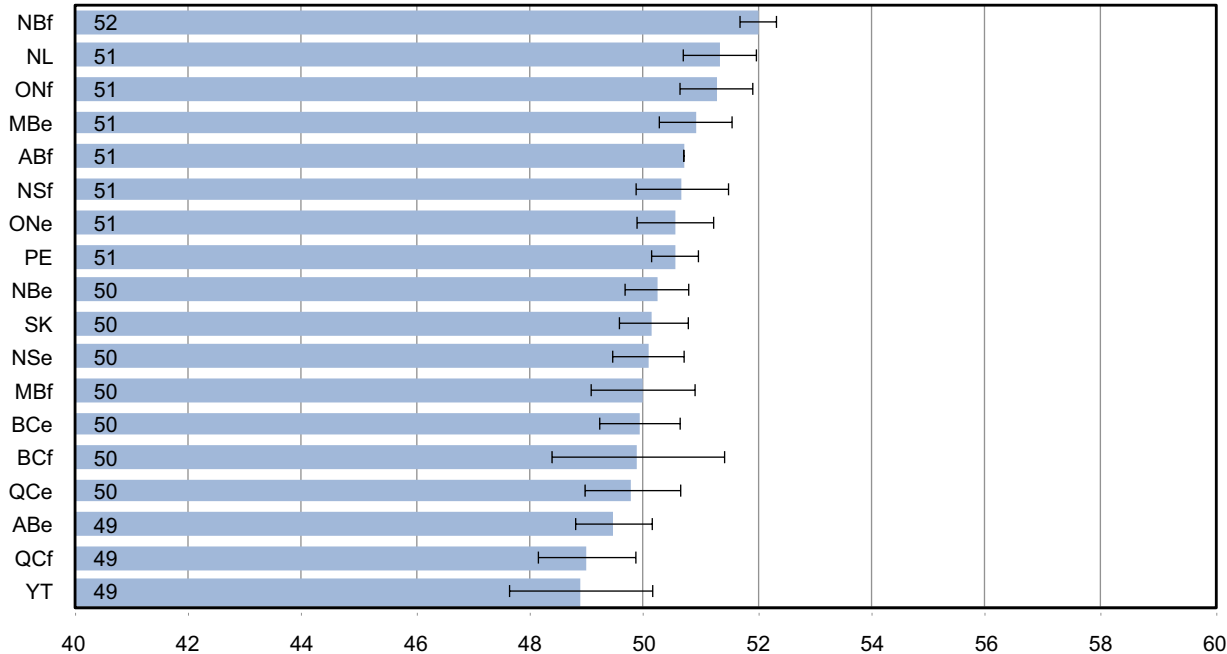


Chart 4.9 Mean factor scores for reading for information by jurisdiction and language



Reading proficiency levels and mean reading scores for the quintile groups on these three factors are shown in Charts 4.10 and 4.11. The pattern for the first two factors is quite clear. Greater enjoyment of reading and more positive perception of being a good reader are both strongly related to reading

performance. The results for “reading for information” show that students with the strongest view of reading as a utilitarian activity (those at the fourth and especially the fifth quintiles) do not perform as well on the reading scale.

Chart 4.10 Reading proficiency levels by attitude-toward-reading quintiles

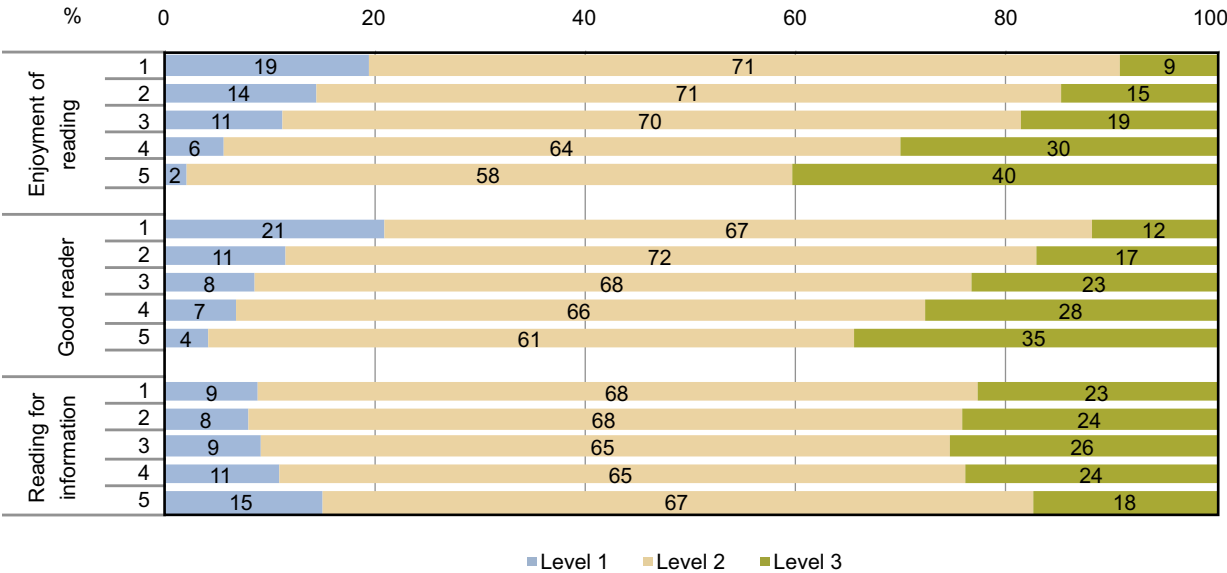
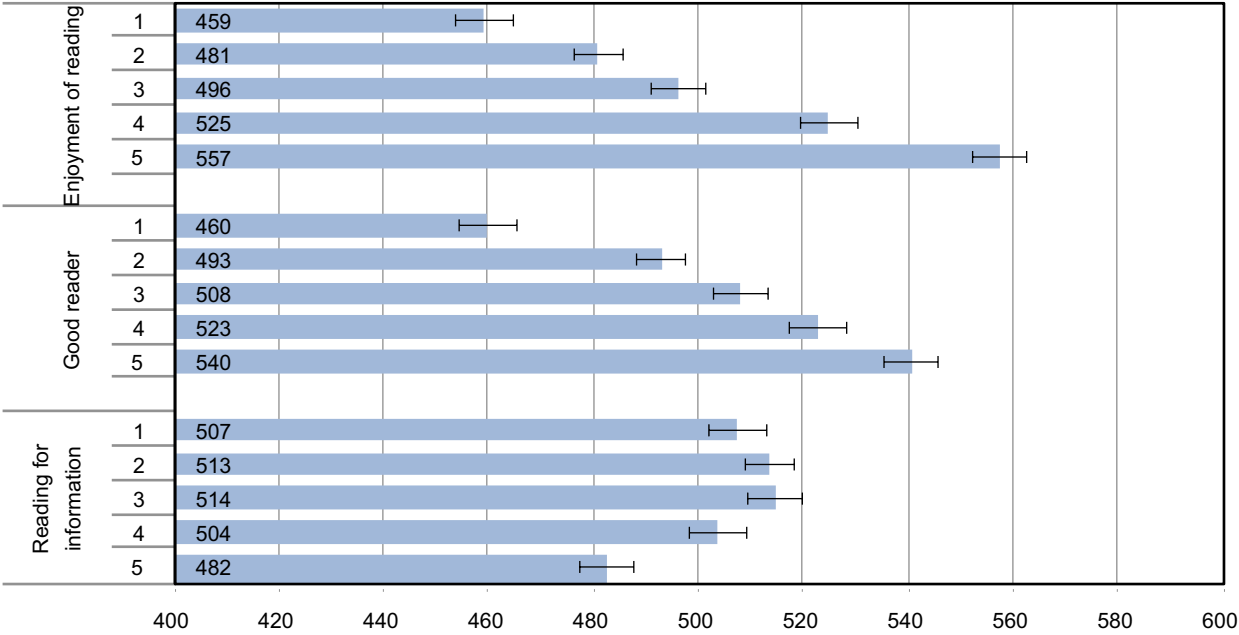


Chart 4.11 Mean reading scores by attitude-toward-reading quintiles

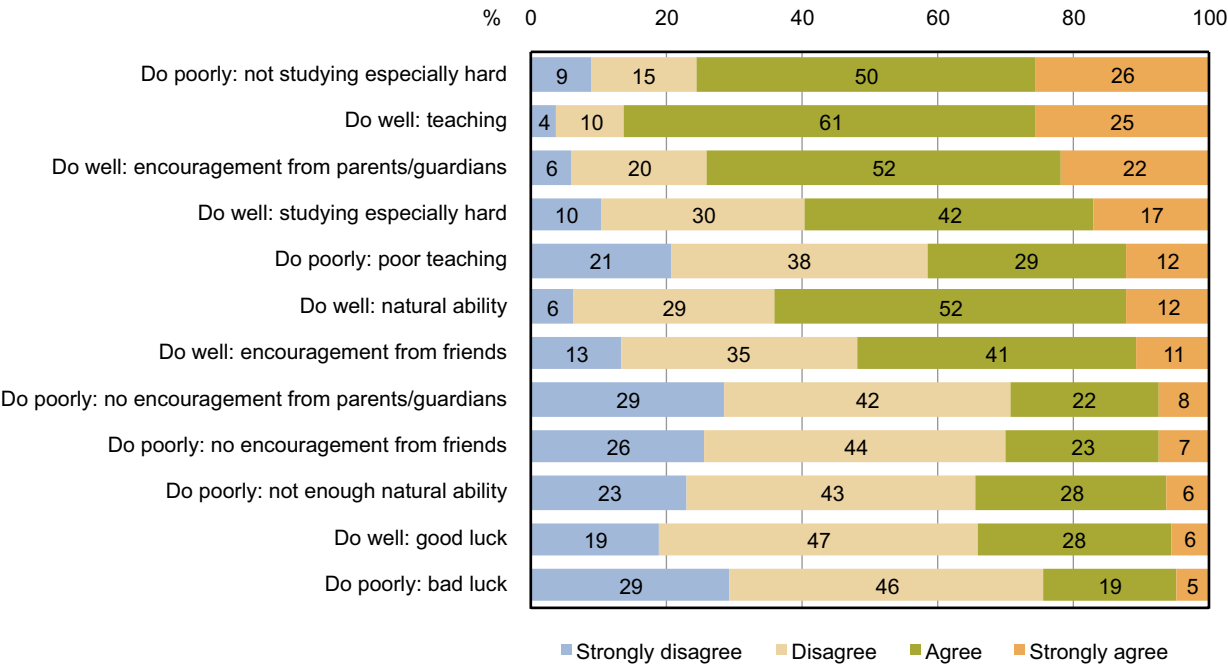


Attributions of success and failure

The final set of student attitude items had to do with their attributions of success and failure in their language arts school work. Scale distributions on the 12 attribution items are given in Chart 4.12. These results show a stronger tendency for students to attribute success in language arts to studying

hard, teaching, and encouragement from parents/guardians than from sources such as natural ability or luck. The pattern for doing poorly in language arts is similar but with much stronger attribution to not studying hard than to other reasons.

Chart 4.12 Response percentages for attributions of success and failure



Factor analysis of these items yielded four factors, as described in Table 4.2. Two factors were derived for external attributions: one for success and one for failure. Although these may be seen as opposite attributes, this was not revealed by the factor analysis. A third factor, labelled “fatalism,” is related

to attributing success or failure to luck, rather than ability. Finally, the fourth factor is labelled “internal attributions of success and failure to ability/work” because the reference points are ability and hard work.

Table 4.2 Questionnaire items for attribution factors

Factor	Item
External attributions of failure	<p>If I do especially poorly, it is because of poor teaching.</p> <p>If I do especially poorly, it is because of no encouragement from parents/guardians.</p> <p>If I do especially poorly, it is because of no encouragement from friends.</p>
External attributions of success	<p>If I do especially well, it is because of good teaching.</p> <p>If I do especially well, it is because of encouragement from parents/guardians.</p> <p>If I do especially well, it is because of encouragement from friends.</p>
Fatalism	<p>If I do especially well, it is because of good luck.</p> <p>If I do especially poorly, it is because of not enough natural ability.</p> <p>If I do especially poorly, it is because of bad luck.</p>
Internal attributions of success and failure to ability/work	<p>If I do especially well, it is because of natural ability.</p> <p>If I do especially well, it is because of studying especially hard.</p> <p>If I do especially poorly, it is because of not studying especially hard (negative loading).</p>

Mean scores on these factors by jurisdiction and language are given in Charts 4.13 to 4.16. The most notable feature of these results is that students in francophone populations tend to exhibit lower scores than anglophone students within the same jurisdiction on two of the scales: external attributions of failure (Chart 4.13) and internal attributions of success and failure to ability/work (Chart 4.16).

The two Quebec populations show particularly large differences in the latter case. The fatalism scale (Chart 4.15) shows opposite effects, with francophones in several jurisdictions exhibiting a higher level of fatalism than anglophones. There were only small differences across jurisdictions on the external attribution of success scale (Chart 4.14).

Chart 4.13 Mean factor scores for external attributions of failure by jurisdiction and language

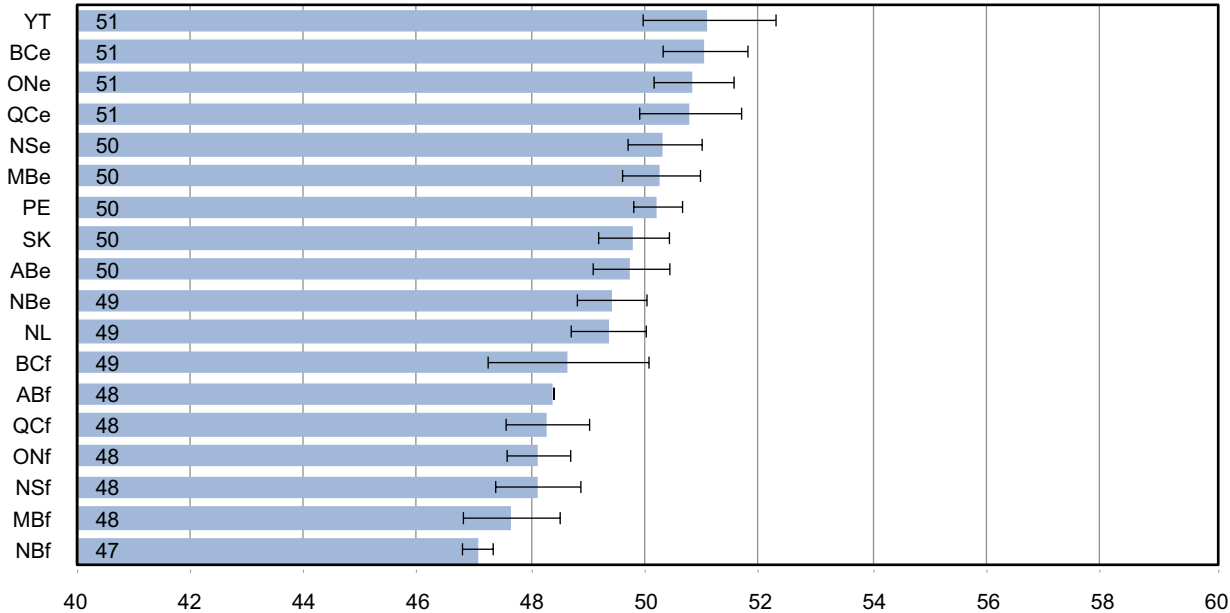


Chart 4.14 Mean factor scores for external attributions of success by jurisdiction and language

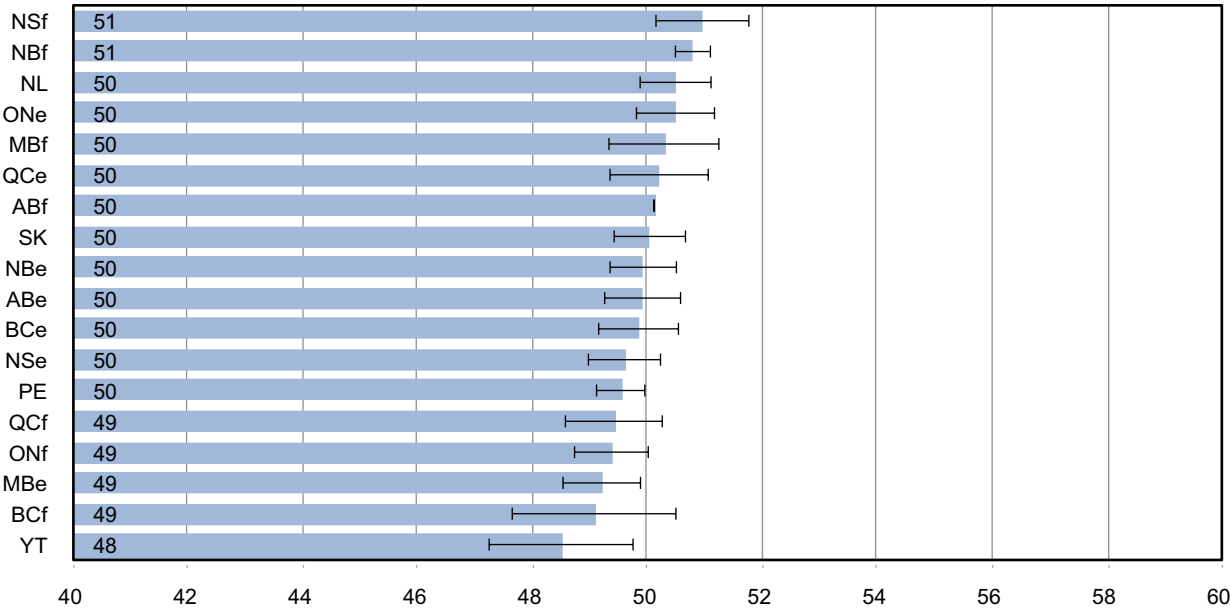


Chart 4.15 Mean factor scores for fatalism by jurisdiction and language

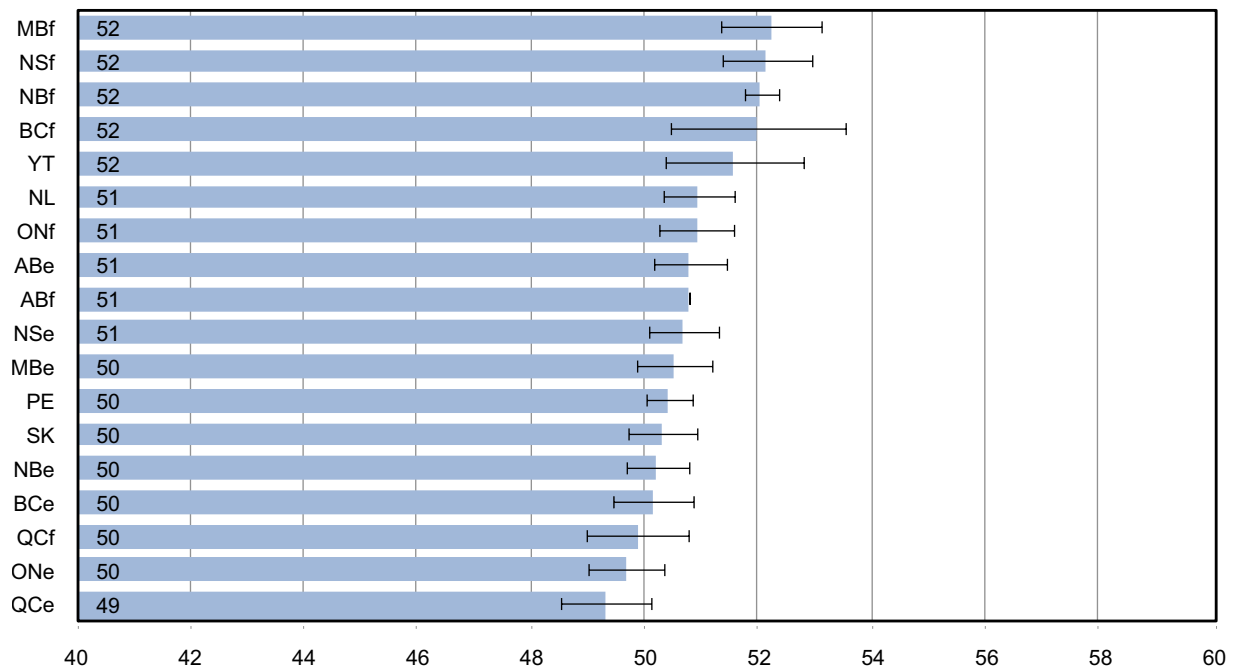
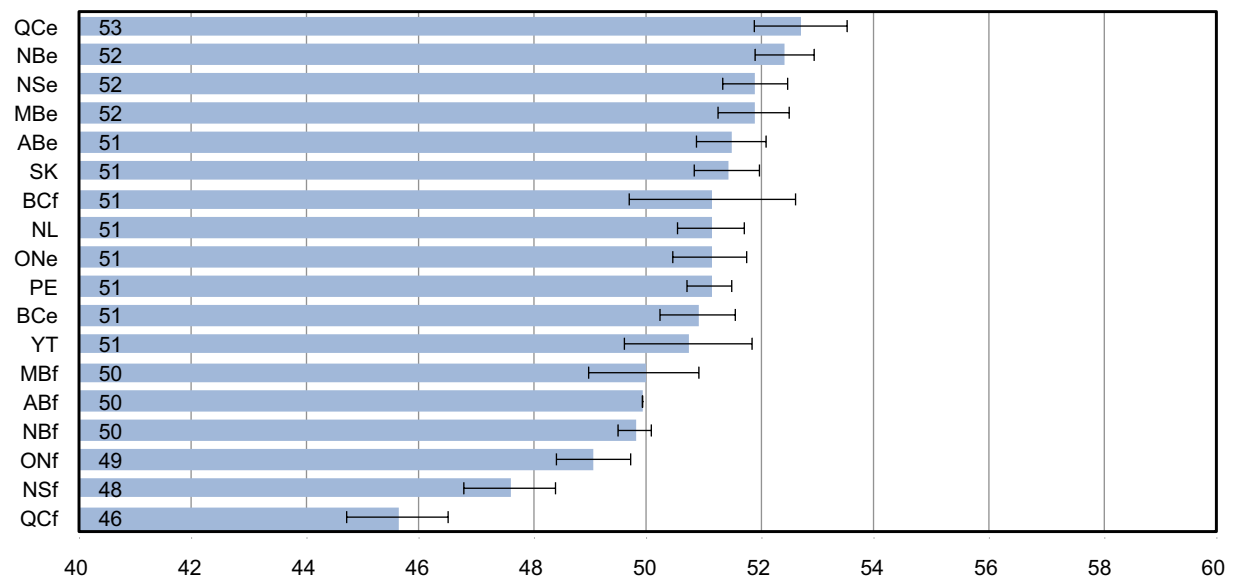


Chart 4.16 Mean factor scores for internal attributions of success and failure to ability/work by jurisdiction and language



Charts 4.17 and 4.18 give the reading proficiency levels and mean reading scores. The pattern for fatalism is quite clear, with higher levels of fatalism being associated with lower mean reading scores. The remaining factors present more complex, nonlinear patterns. Those at the fourth quintile on external attributions for failure have significantly higher reading scores than those in the other quintile

ranges. The pattern for external attributions of success is less pronounced, but proficiency decreases as scores for external attributions of success increase. Finally, the pattern for internal attributions is nonlinear, with those at the lowest and highest quintiles performing better in reading than those in the middle range.

Chart 4.17 Reading proficiency levels by attributions of success-and-failure quintiles

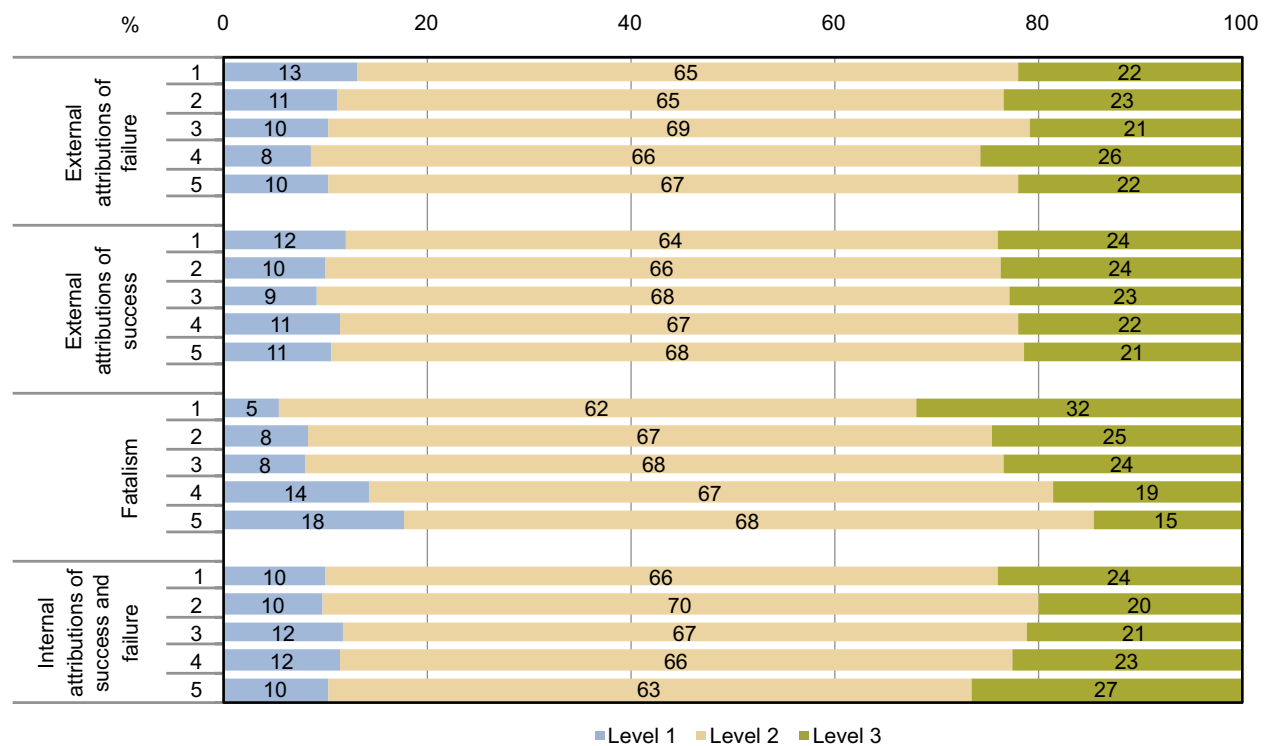
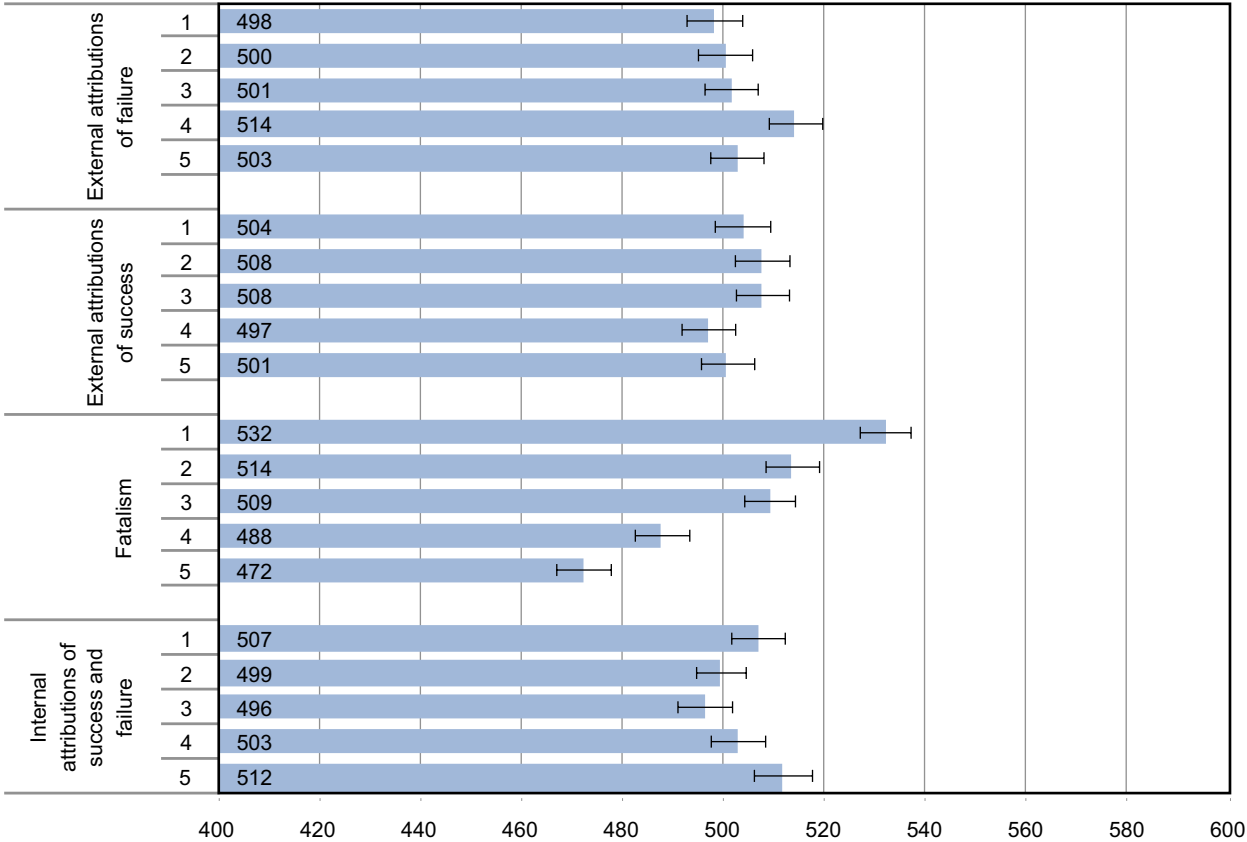


Chart 4.18 Mean reading scores by attributions of success-and-failure quintiles



Multivariate effects

The effects of attitudes on reading achievement were modelled by examining bivariate and multivariate regression coefficients based on a two-level (student, school) model as in the previous chapter. Again, the bivariate coefficients represent the change in reading score of a one-point change in one of the attitude variables. The multivariate coefficients represent the change in reading score of a particular attitude variable, controlling for selected demographic variables and for all of the attitude variables. The demographic variables used were those having the largest effects in the multivariate models presented in Chapter 3 (specifically, gender, grade, born in Canada, French spoken at home, Aboriginal language spoken at home, and books in the home [at the student level] and total school enrolment and public school /private school governance [at the school level]).

These coefficients are shown in Chart 4.19. To place these numbers in context, it should be recognized that a one-point change in attitude represents one-tenth of a standard deviation of change and is hence a very small unit. For example, the bivariate coefficient of 1.40 for the factor “enjoyment of school” means that reading scores change, on average, by 1.40 points for each unit change in the factor score. Large changes in reading scores for such a small change in attitude are thus not to be expected. The important point is to examine these changes relative to each other and relative to the width of the error bars. In most cases, a change in reading score of less than one point per unit on the attitude scale is statistically significant.

As an alternative way of looking at this, coefficients of this nature are sometimes interpreted in terms of

the change in outcome represented by a change of one standard deviation in the predictor. In this situation, the effects of one standard deviation change may be found by multiplying each of the observed effects by a factor of 10. This means, for example, that a student who is one standard deviation (10 points) above the mean in enjoyment of reading would be expected to score about 32 points higher on the reading scale. Viewed this way, the reading score changes for some of the attitude variables are relatively large.

In general, the bivariate effects show the same pattern as revealed by the previous comparison of mean scores by quintiles. All of the bivariate effects, except for external attributions of success, are statistically significant, with reading for information and fatalism being negative. However, differences in the relative sizes of the various effects are more apparent here. Enjoyment of reading and perception of being a good reader have by far the largest positive effects. Enjoyment of school is also relatively highly positive compared to others. Fatalism (essentially attribution of success or failure to luck) has a strongly negative effect.

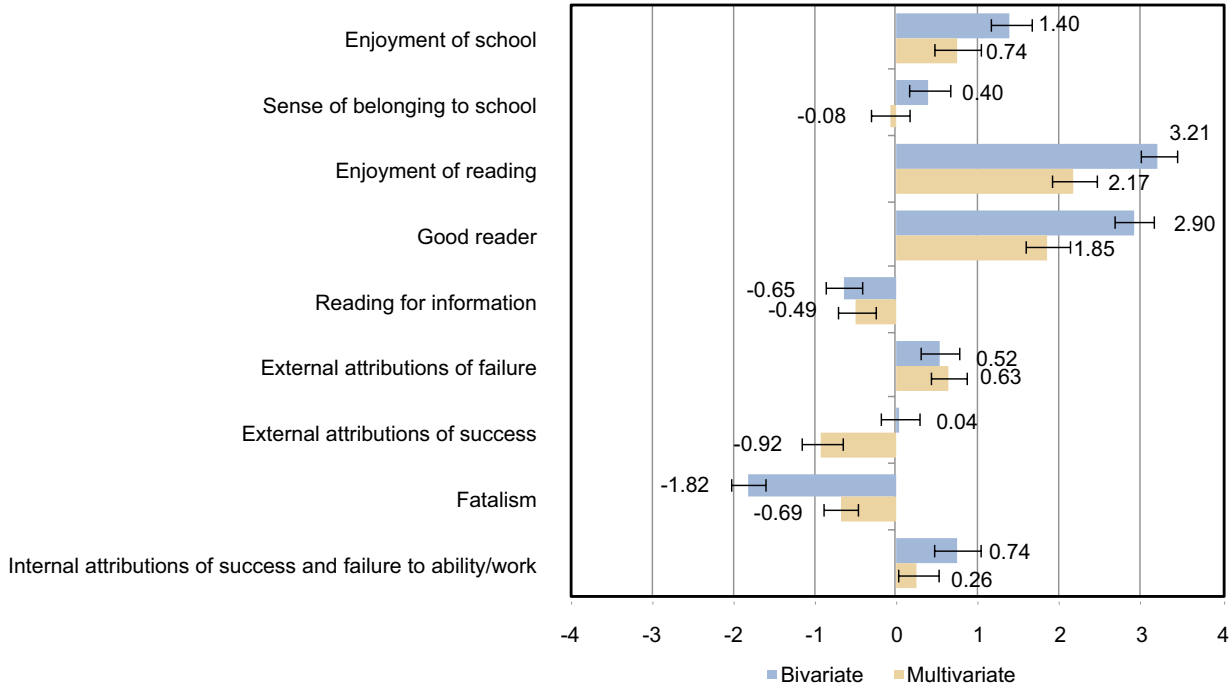
Almost all of the effects are attenuated in the multivariate model relative to those in the bivariate model. This indicates that the effect for any one variable is related in some way to the effects of the other variables in the model. The positive effects of enjoying school, enjoying reading and being a good reader, along with the negative effect of fatalism are diminished significantly, suggesting that these effects are not independent of each other or of demographic factors. Nevertheless, these effects remain statistically significant, even when the other variables are controlled. The effect of external attributions of success changes from close to zero in the bivariate model to significantly negative in the multivariate model, indicating that this effect is suppressed when other variables are not controlled.

Since these effects sizes are directly comparable, it can be said that the largest single effects are for enjoyment of reading and the student's perception of being a good reader. The multivariate coefficients of 2.17 and 1.85, respectively, when translated into standard deviation units, indicate that a student who is one standard deviation above the average on either of these variables would have, on average, a 20-point (or .20 standard deviation) advantage in reading performance, compared to an average student on the same variable. Since these effects are independent of each other, a student at one standard deviation above the mean on both of these variables would enjoy about a 40-point advantage in reading performance.

The important point is to examine these changes relative to each other and relative to the width of the error bars.

It is important to note that although the model controls for a number of relevant variables, it should not be inferred that improved attitudes are the actual "cause" of improved reading achievement. Better attitudes may indeed be a consequence, rather than a cause, of improved reading or the two may bear a reciprocal relationship, with improvements in either having positive effects on the other. Nevertheless, since the outcome of interest here is reading achievement, it is appropriate to take any action that might improve attitudes toward reading in the expectation that this can have a positive effect on achievement.

Chart 4.19 Regression coefficients for attitude variables¹⁶



¹⁶ It is noted that direct comparisons across factors, as well as between bivariate and multivariate effects within a factor, are possible in this case because all factors have the same scale. Again, the small coefficients are a function of the scale used for the factors, with each coefficient representing the effect on reading performance of a one-tenth standard deviation change in the factor score.

5. STUDENT READING BEHAVIOURS AND STRATEGIES

Reading in school is all-pervasive in the sense that almost everything that is done requires reading. Students are explicitly taught to read in the earliest grades, but organized reading activities continue throughout schooling. Reading strategies acquired earlier might be expected to have some impact on the reading performance of 13-year-olds. Students were therefore asked a number of questions about their reading strategies and behaviours.

At the same time, reading is a universal activity, not confined to schools. Students were asked a series of questions about their reading and reading-related activities outside-of-school hours. Some questions were also asked about activities that might be seen as competing for the student's time, thus distracting from reading. Finally, students were asked to recall how they first learned to read and how much others have helped them learn to read.

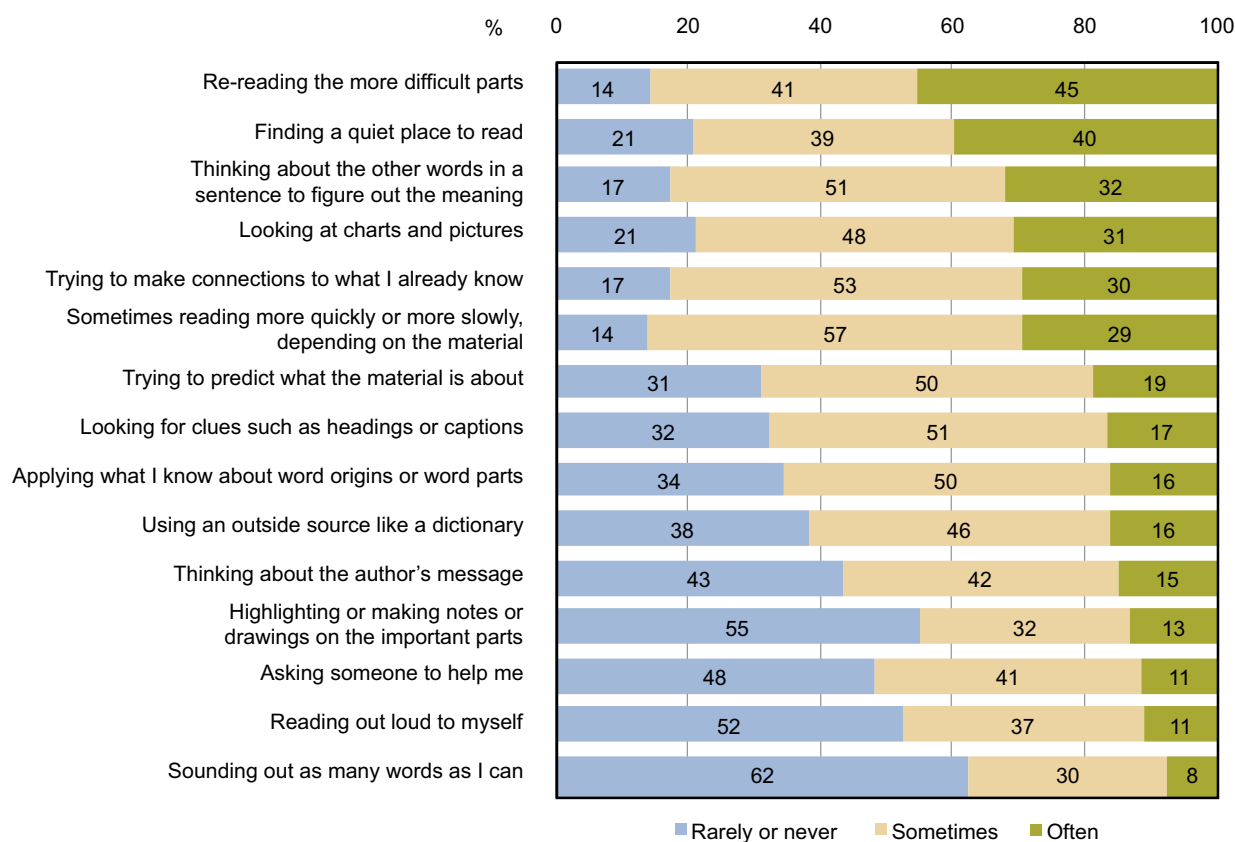
This chapter examines the impact of reading-related activities and strategies on reading scores.

Following the established pattern, questions in this area were factor analyzed, and several meaningful factors were found. Performance was examined in relation to these factors, and reading scores were modelled by including these factors in the two-level regression equations, controlling for selected variables from the previous models.

Reading strategies

A set of 15 questions was developed to capture student reading strategies. These questions used a three-point frequency scale (rarely or never, sometimes, often). The response pattern for each of these questions is given in Chart 5.1, sorted from most to least for the "often" category. The most frequently used strategies seem to be related to routines such as re-reading difficult parts or finding a quiet place to read and seeking clues and connections. On the other hand, other routines such as making notes and sounding out words are among the least-often-used strategies.

Chart 5.1 Response percentages for reading strategies



Factor analysis of these items yielded four factors, as identified in Table 5.1. A couple of items loaded on more than one factor, which is not uncommon.

For example, “asking someone to help me” had a positive loading on the “reading routines” factor and a negative loading on the “external sources” factor.

Table 5.1 Questionnaire items and factors for reading strategies

Factor	Item
Reading for meaning	Looking for clues such as headings or captions
	Trying to make connections to what I already know
	Thinking about the author’s message
	Applying what I know about word origins or word parts
	Thinking about the other words in a sentence to figure out the meaning
	Trying to predict what the material is about
Decoding	Reading out loud to myself
	Sounding out as many words as I can
Reading routines	Thinking about the other words in a sentence to figure out the meaning
	Finding a quiet place to read
	Re-reading the more difficult parts
	Sometimes reading more quickly or more slowly, depending on the material
	Asking someone to help me
External sources	Looking at charts and pictures
	Asking someone to help me
	Using an outside source like a dictionary
	Highlighting or making notes or drawings on the important parts

Mean factor scores by jurisdiction and language for these factors are given in Charts 5.2 to 5.5. The differences between populations for reading for meaning are fairly small, though there are statistically significant differences between the highest and the lowest scoring populations on this factor. Differences for the decoding factor are much larger, with anglophone students using this strategy significantly more than francophone students. The scores for

decoding are strikingly lower for Quebec (French) and New Brunswick (French) than for any other populations. Differences for use of reading routines are relatively small. However, Quebec (French) is significantly higher than most other populations. The use of external sources in reading is higher for anglophone than for francophone populations. Quebec francophone students use this strategy significantly less than those in any other jurisdiction.

Chart 5.2 Mean factor scores for reading for meaning by jurisdiction and language

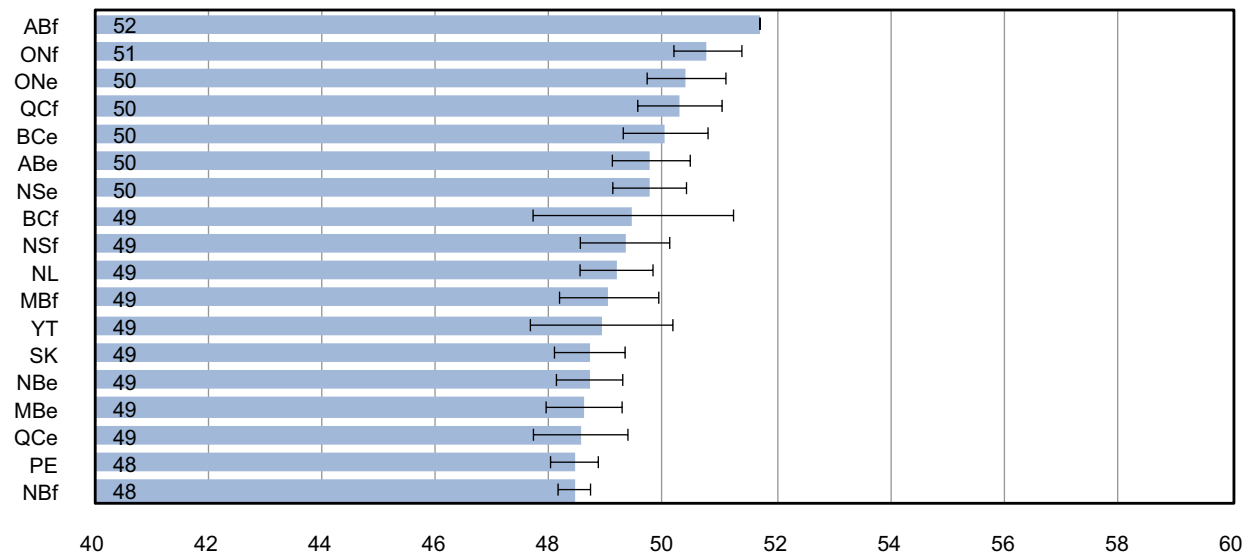


Chart 5.3 Mean factor scores for decoding by jurisdiction and language

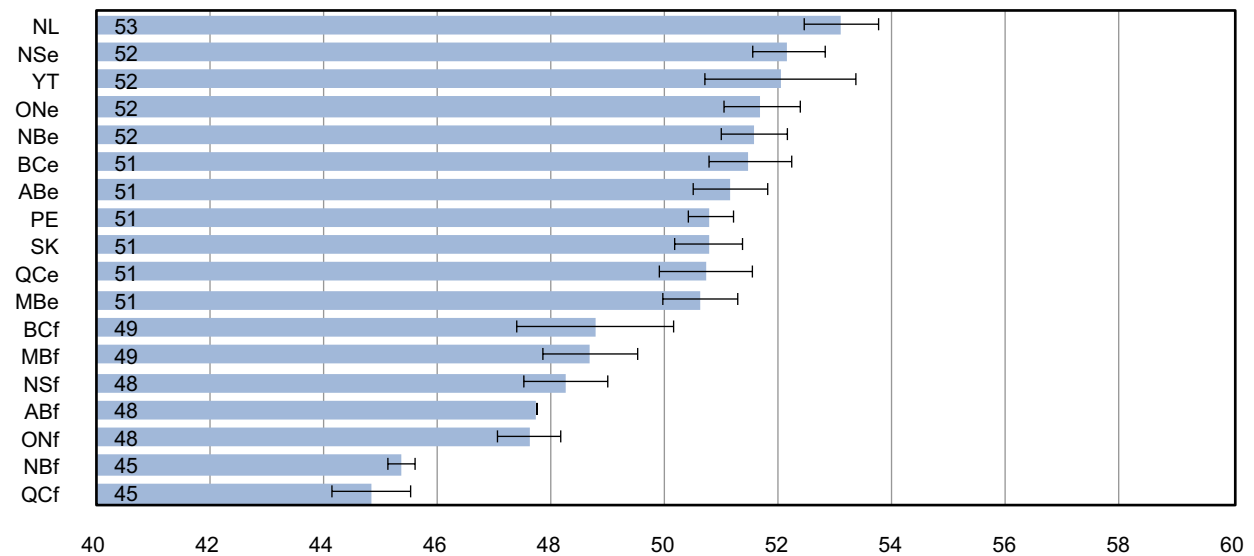


Chart 5.4 Mean factor scores for reading routines by jurisdiction and language

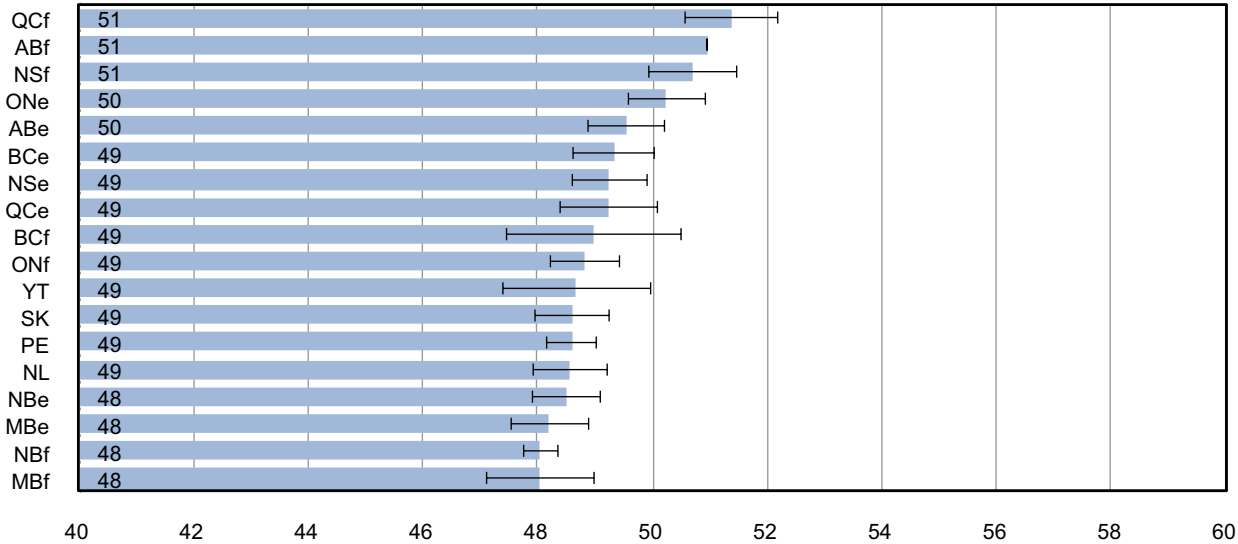


Chart 5.5 Mean factor scores for use of external sources in reading by jurisdiction and language

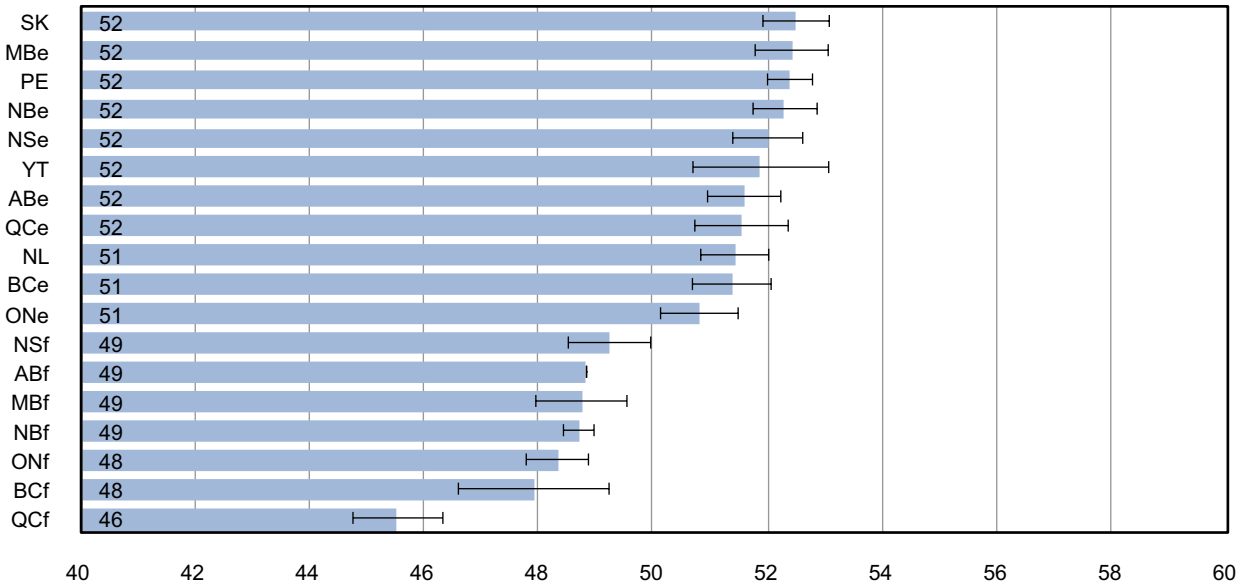
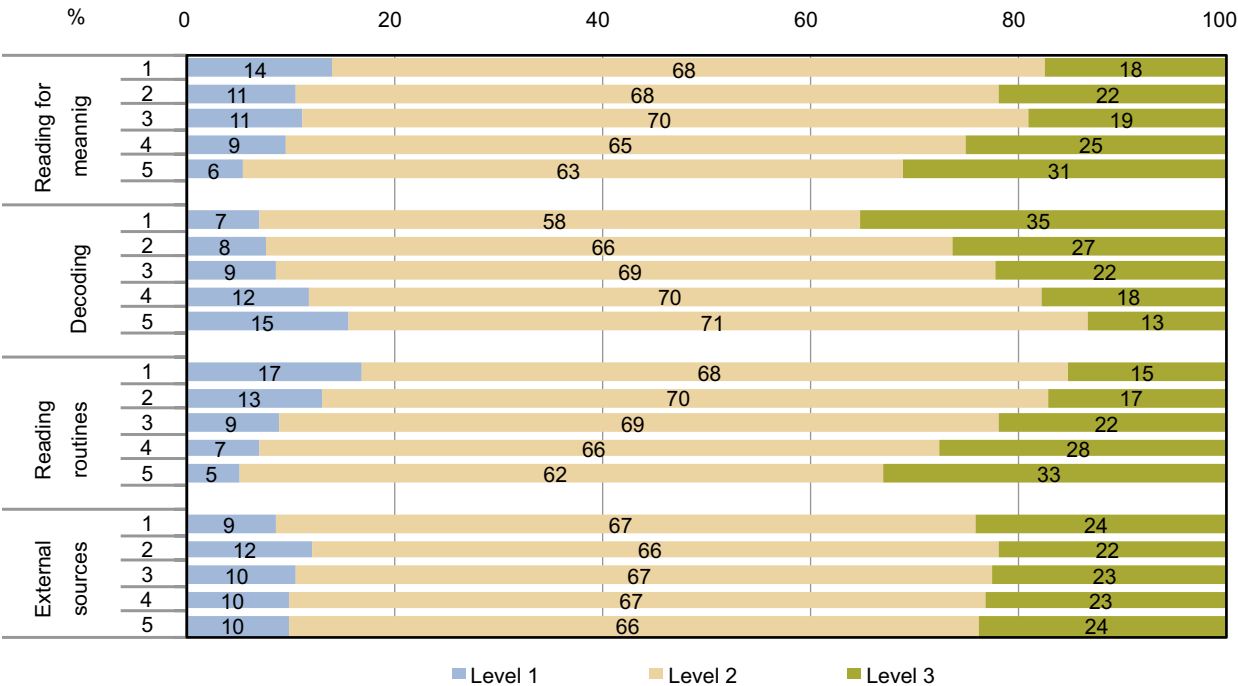


Chart 5.6 shows the distribution of proficiency levels by quintile groups for the four reading strategy factors. A clear pattern is evident for three of these factors. Students with higher factor scores in reading for meaning and the use of reading routines have

higher reading proficiency than those with lower factor scores in these strategies. The opposite is true for decoding. Use of external sources appears to have no effect.

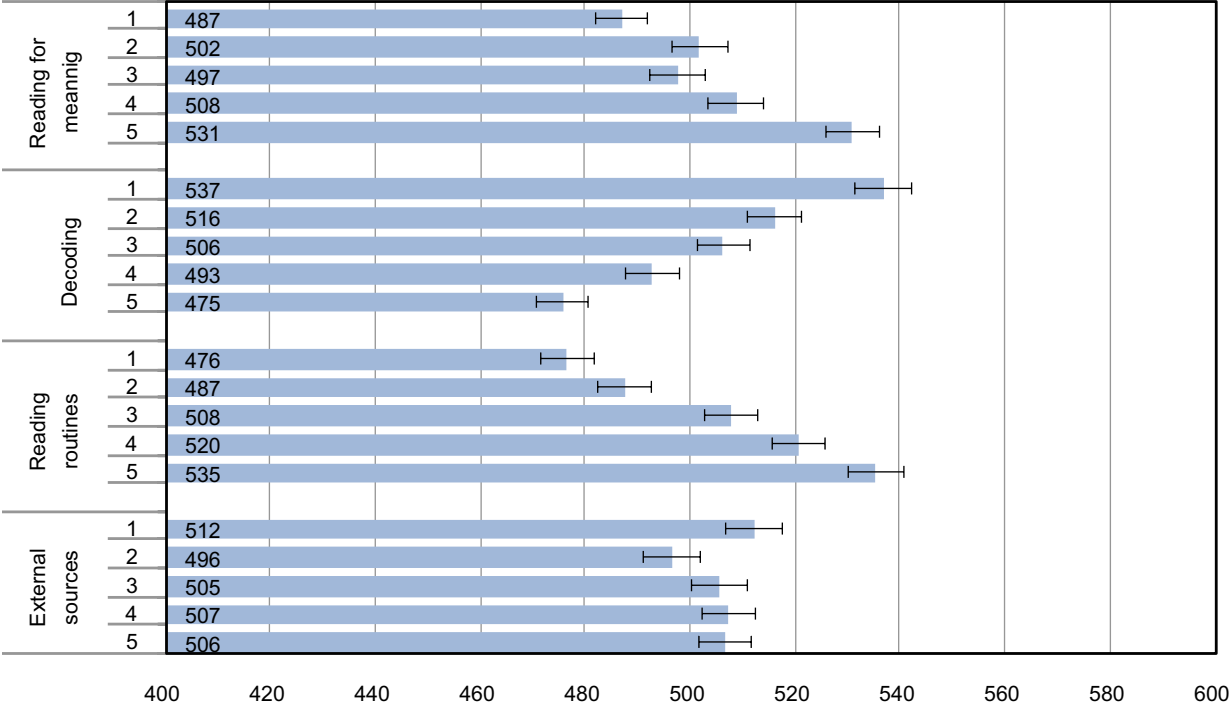
Chart 5.6 Reading proficiency levels by reading-strategy quintiles



A similar pattern is apparent from the comparison of mean reading scores given in Chart 5.7. For reading for meaning, the differences between the first and fifth quintiles compared to the middle three quintiles are statistically significant. The reading routines factor shows statistically significant differences

between most of the adjacent quintiles. The effect is even stronger, in a negative direction, for reading by decoding. Finally, there are only small differences in achievement between the quintile groups on use of external sources.

Chart 5.7 Mean reading scores by reading-strategy quintiles

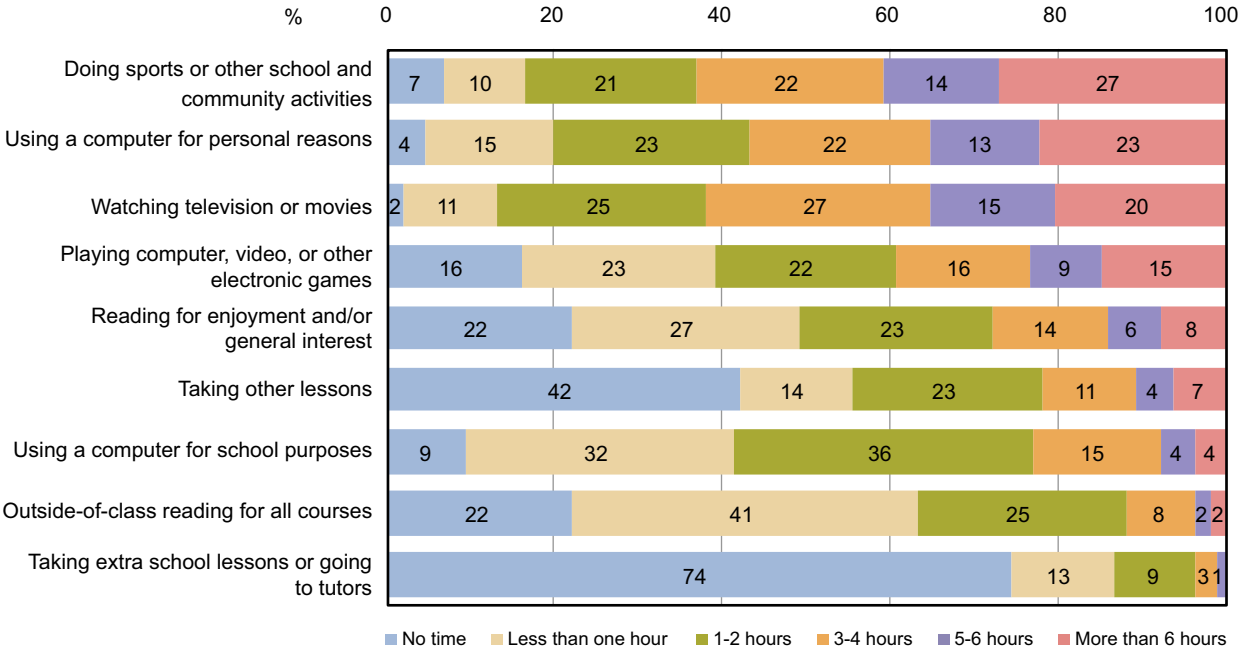


Activities outside-of-school hours

A nine-item question set on activities outside-of-school hours that might relate to reading was used. These items were on a six-point time scale, from no time to more than six hours per week. Responses to these questions are shown in Chart 5.8. In general, the most frequent activities are sports or other school/community activities; watching television or movies; playing computer, video, or other electronic

games; and using a computer for personal reasons. Taking extra school lessons or going to tutors, taking other lessons (such as music or swimming) and using a computer for school purposes are the least frequent activities. More than 60% of all students engage in outside-of-class reading, and about half read for enjoyment for less than one hour per week.

Chart 5.8 Response percentages for outside-of-school hours activities



This set of items yielded three factors, as shown in Table 5.2. Mean factor scores are given in Charts 5.9 to 5.11.

Table 5.2 Questionnaire items and factors for activities outside-of-school hours

Factor	Item
Outside-of-school reading/research	Outside-of-class reading for all courses
	Reading for enjoyment and/or general interest
	Using a computer for school purposes (e.g., research, writing)
Entertainment	Watching television or movies
	Playing computer, video, or other electronic games
	Using a computer for personal reasons (e.g., Internet, e-mail)
Academic/cultural activities	Doing sports or other school and community activities
	Taking extra school lessons or going to tutors
	Taking other lessons (e.g., music, swimming)

For the outside-of-school reading/research factor, most of the francophone populations had factor scores at the higher end of this scale. The notable exception is New Brunswick (French), which is significantly lower than most other populations. There

are only small differences on the entertainment factor. A language division is again apparent for the academic/cultural activities factor, with francophone populations generally having higher scores.

Chart 5.9 Mean factor scores for outside-of-school reading/research by jurisdiction and language

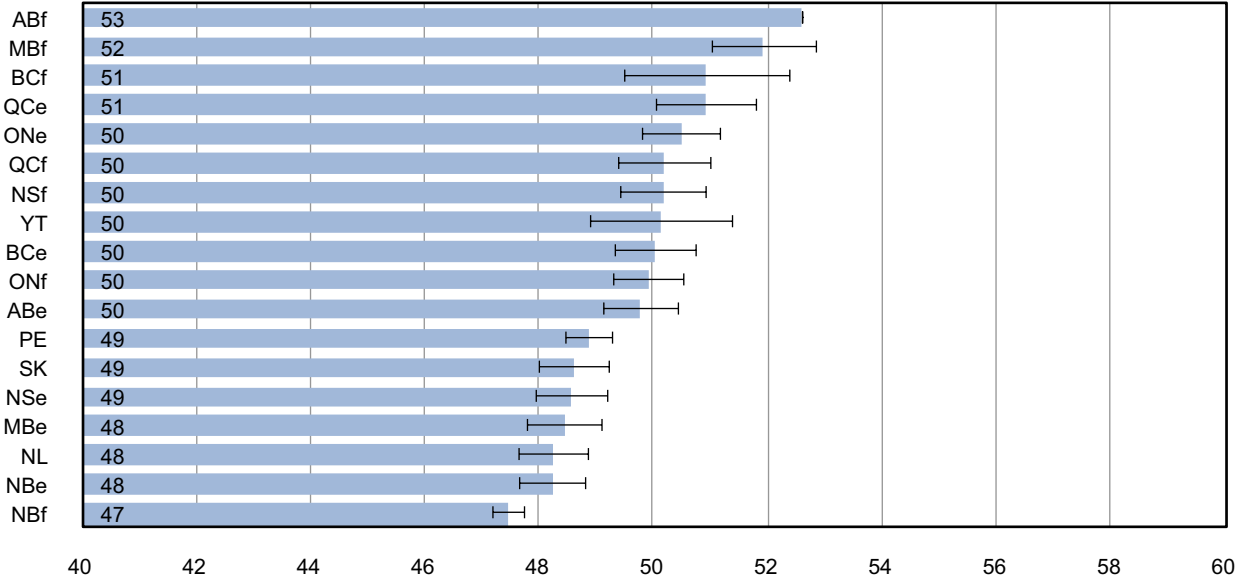


Chart 5.10 Mean factor scores for entertainment by jurisdiction and language

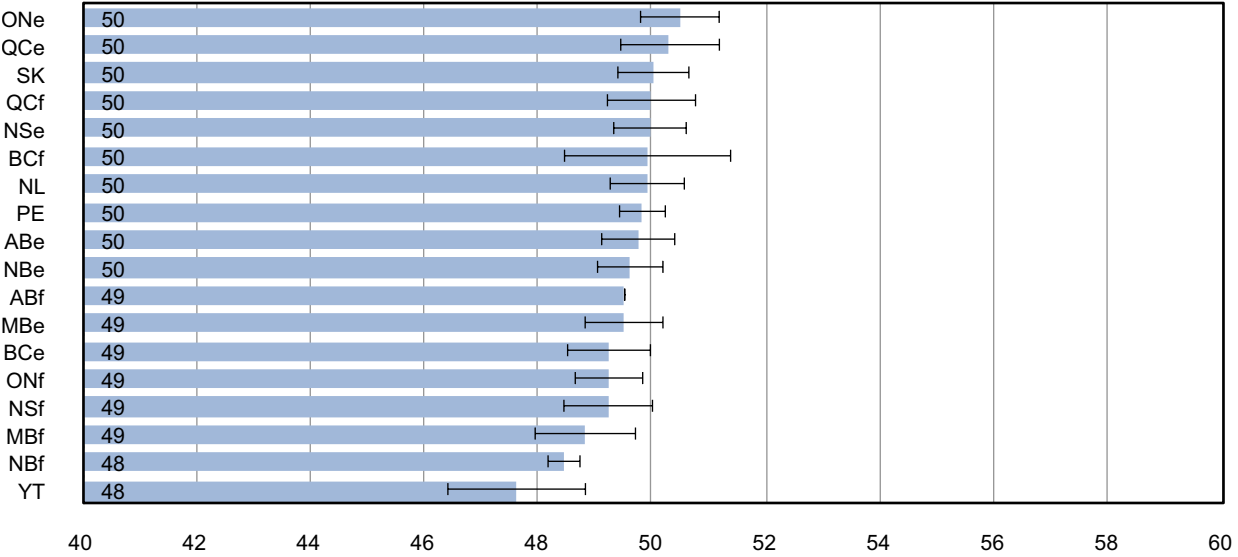


Chart 5.11 Mean factor scores for academic/cultural activities by jurisdiction and language

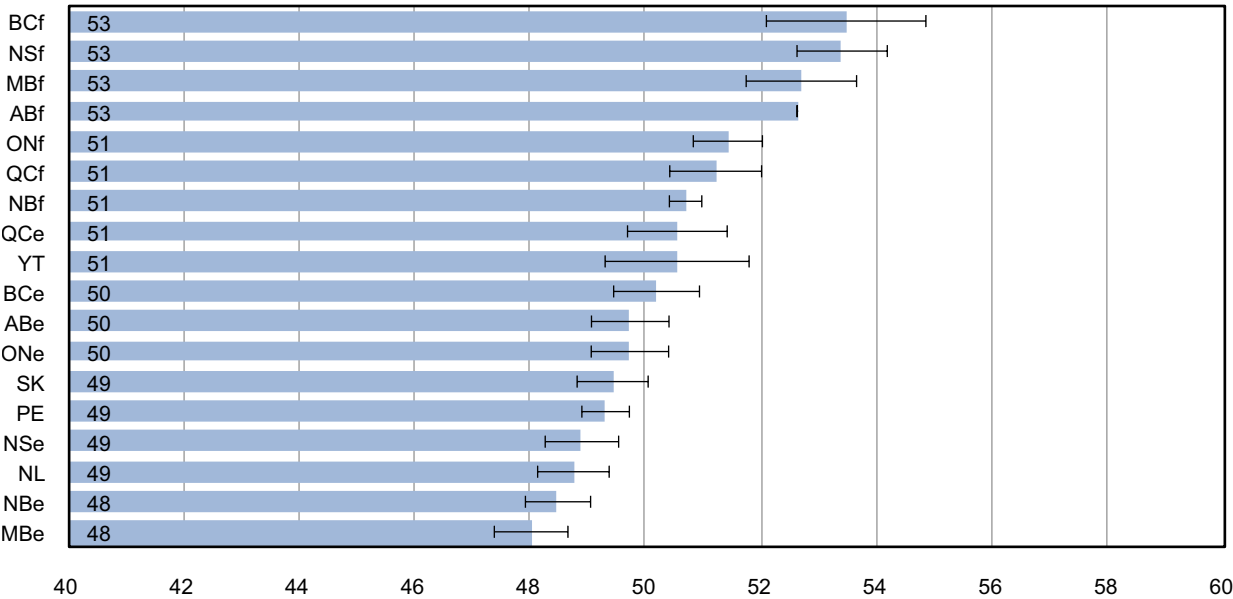


Chart 5.12 gives reading proficiency levels by quintile groups for outside-of-school reading/research, entertainment, and academic/cultural activities. The mean reading score comparisons are given in Chart 5.13. The pattern for outside-of-school reading/research is clear. Students who do more of these activities have higher reading performance. The trend for entertainment activities is nonlinear,

with increased levels of such activities associated with higher reading scores up to the mid level and a levelling off after that. The effect for academic/cultural activities is slightly positive, with those in the highest quintile having higher performance than those in the lowest and no significant differences in the mid range.

Chart 5.12 Reading proficiency levels by outside-of-school activities quintiles

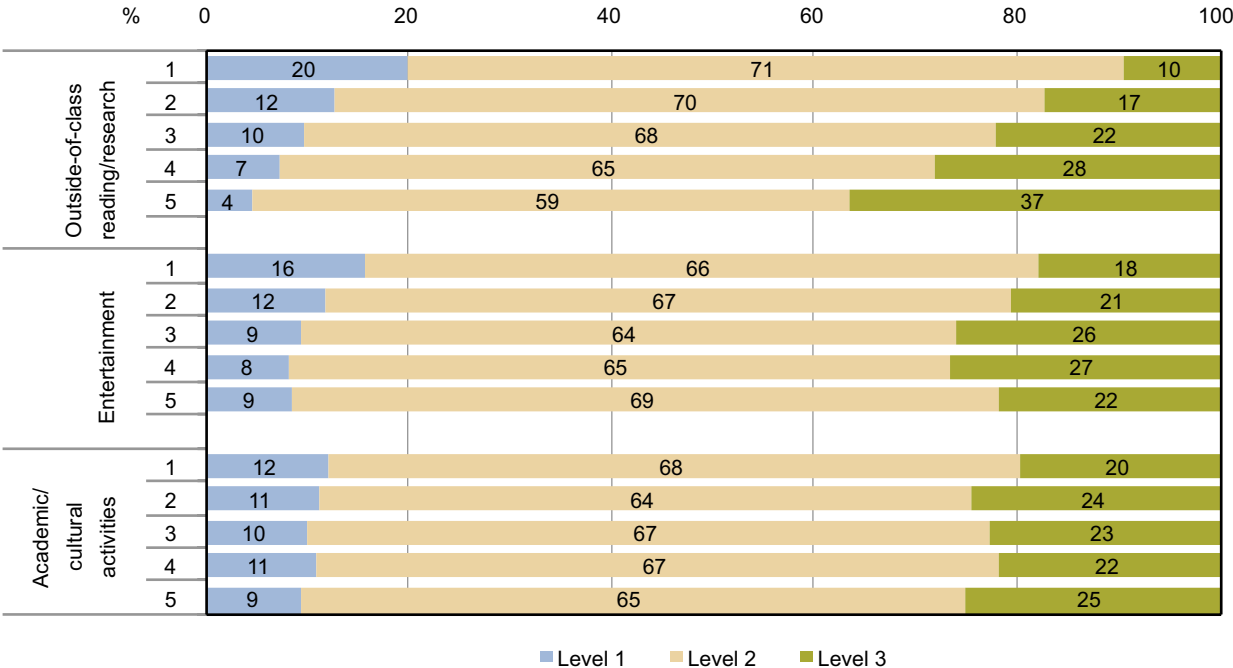
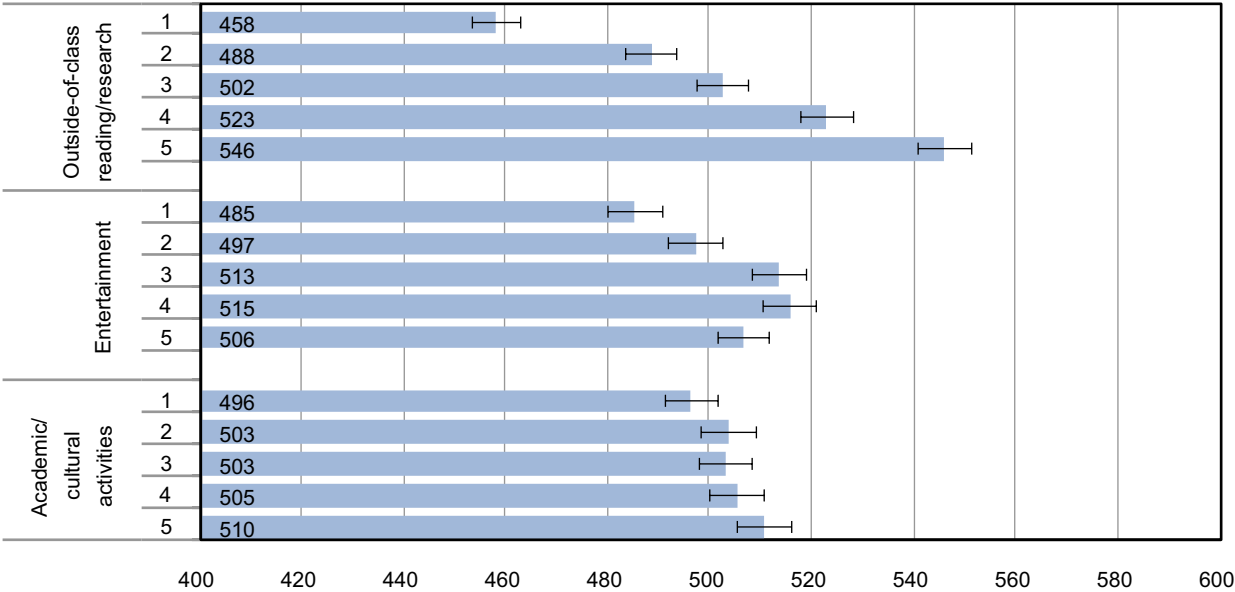


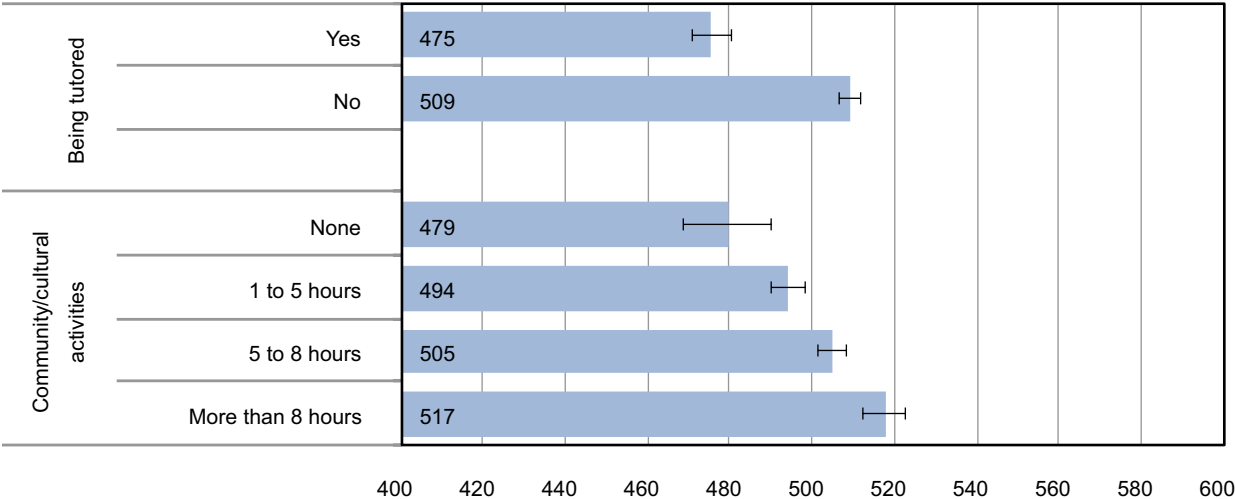
Chart 5.13 Mean reading scores by outside-of-school-activities quintiles



The academic/cultural activities factor included the question on tutoring. In other studies, being tutored had tended to have negative correlations with achievement. This item thus seemed anomalous within the factor and, in fact, had a considerably smaller loading than the two items on school/community activities and other types of lessons. Indeed, these latter items have tended to correlate positively with achievement in other studies. It was therefore decided to examine tutoring as an individual item. Taking part in sports or other school/community

activities and taking other lessons were combined to give a new variable called “community/cultural activities.” Mean reading scores were then computed for these two variables, as shown in Chart 5.14. It is now clear that these two components of the original factor show opposite effects. Students who are being tutored have significantly lower reading scores than those who are not. On the other hand, spending more time on community/cultural activities shows a positive relationship with achievement.

Chart 5.14 Mean reading scores by being tutored and time on community/cultural activities



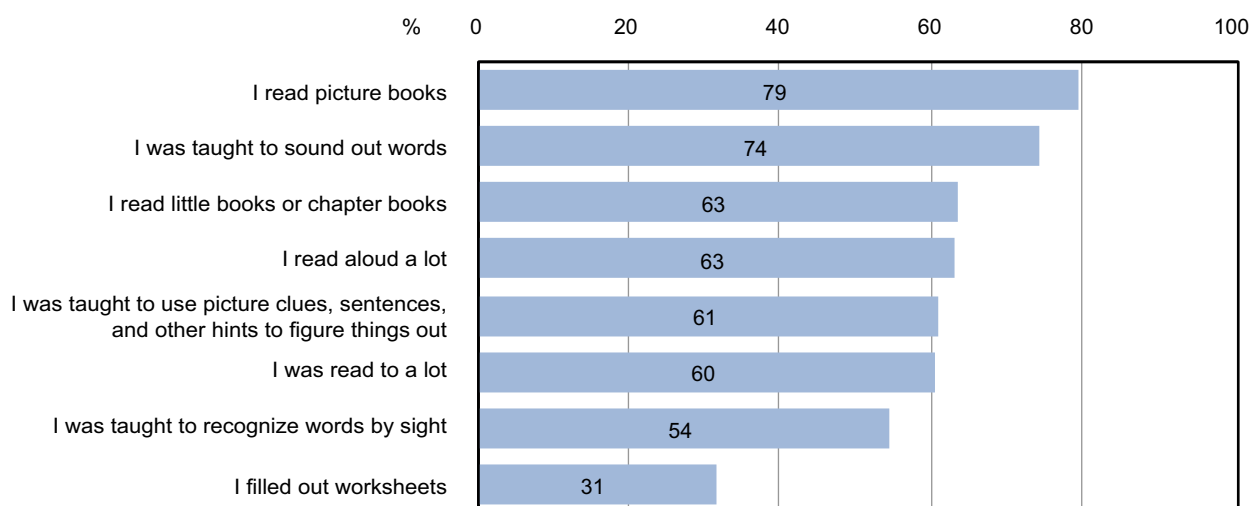
Early reading activities

One of the difficulties in examining reading performance in students in the PCAP age range is that most formal instruction in reading occurs at a much earlier age. While students were not expected to recall much of the detail about reading instruction in the early grades, an attempt was made to capture what students could recall about how they first learned to read and how others have helped them and how often they were helped when they first learned to read. Three sets of items were used. The first asked students if they recalled certain specific strategies in early reading (yes/no response categories). The second asked how much others have helped them with their reading in the early years

(a four-category scale from “not at all” to “a lot.” Finally, a third set focused on how often parents/guardians encouraged reading when the student was younger, using a three-point scale from “rarely or never” to “often.”

Response patterns for the first question set are given in Chart 5.15. A majority of students indicated that they recalled all strategies other than filling out worksheets. Being taught to sound out words and reading picture books were the most commonly recalled activities. (It is noted that 20% to 30% of students, depending on the item, indicated that they did not remember how they were taught to read, so these results should be treated with caution.)

Chart 5.15 Student recollections of early reading strategies



Because factor analysis of yes/no items is problematic, it was decided to examine the relationship of early reading activities to reading achievement on an item-by-item basis. The results for reading proficiency levels are given in Chart 5.16. Differences across strategies are generally quite small. The mean reading scores are given in Chart 5.17. This chart

reveals statistically significant differences between the two top strategies — reading little books or chapter books and being read to a lot — and most of the other strategies. Sounding out words and filling out worksheets showed lower mean scores than the other strategies, though the means were close to the national average.

Chart 5.16 Reading proficiency levels by early reading strategies

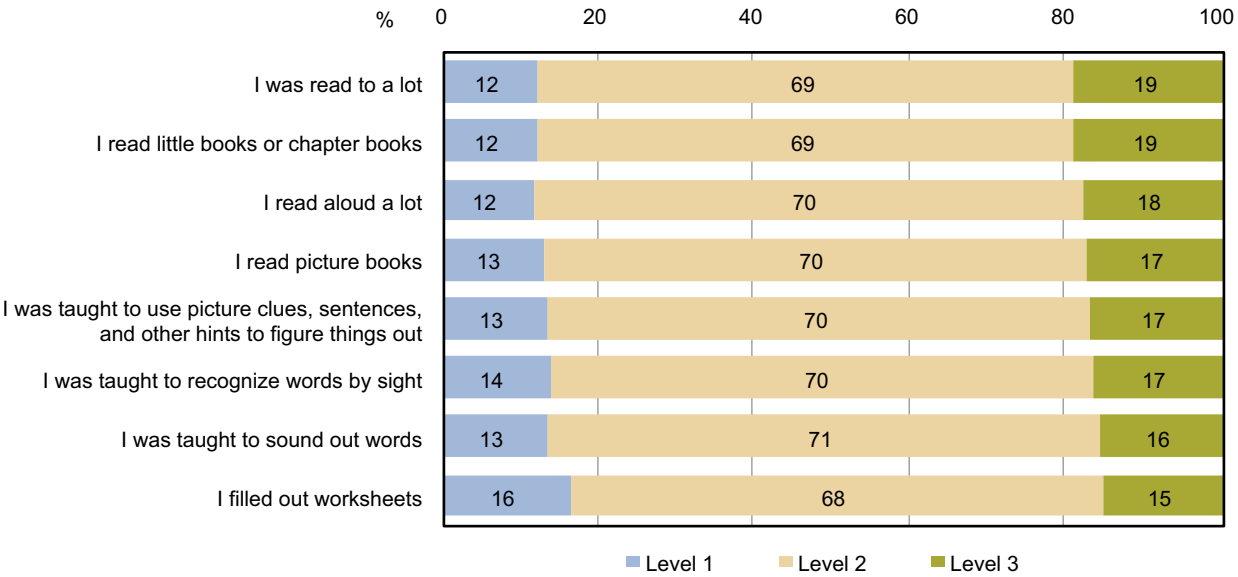
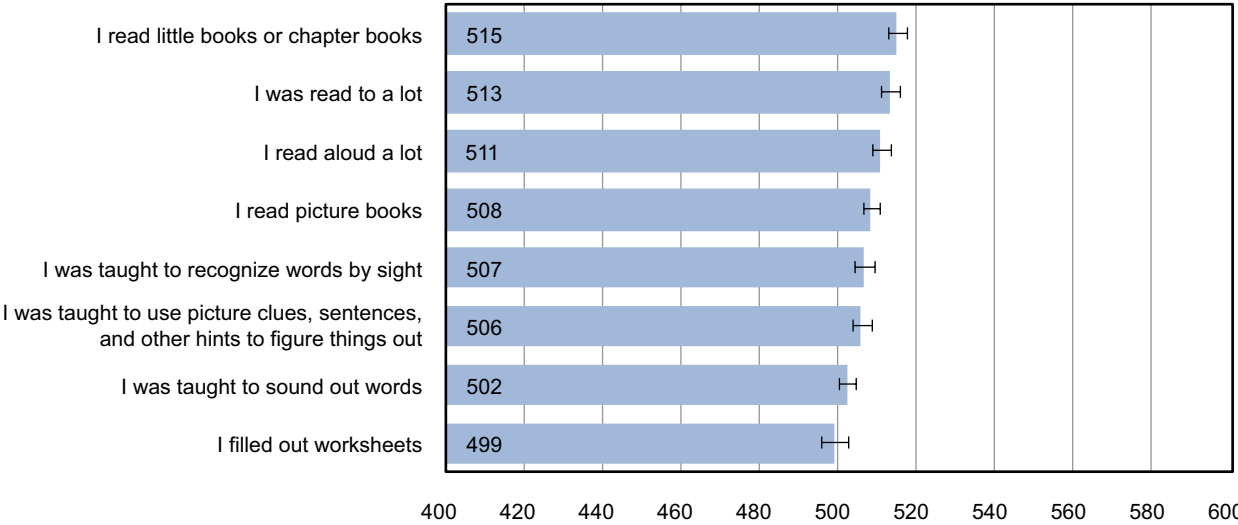


Chart 5.17 Mean reading scores by early reading strategies



Student recollections of how much others have helped them learn to read are shown in Chart 5.18. As might be expected, parents/guardians and teachers were identified as most often involved, with student seeing parents/guardians as playing a larger role than teachers. Again, the factor analysis of this item set was not particularly revealing, so it was decided to examine the two specific items of

parent/guardian and teacher help. Results for reading proficiency levels are given in Chart 5.19, and the mean reading scores are shown in Chart 5.20. Both parent/guardian and teacher effects are apparent from these charts. The mean comparisons show a particularly strong trend toward increased reading performance with increased extent of parent/guardian help.

Chart 5.18 Student recollections of how much others have helped them learn to read

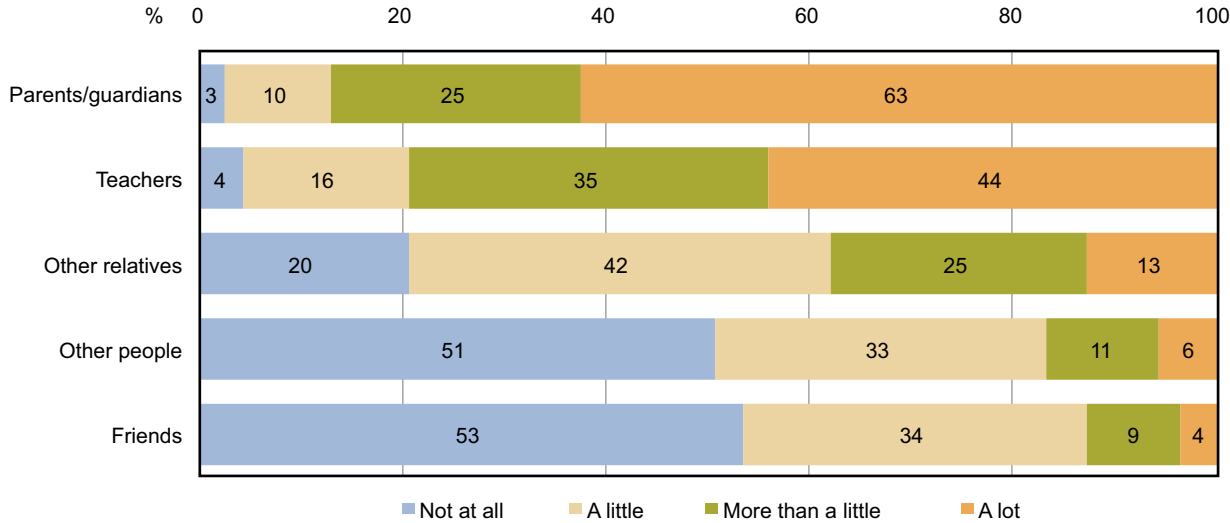


Chart 5.19 Reading proficiency levels by parent/guardian and teacher help in learning to read

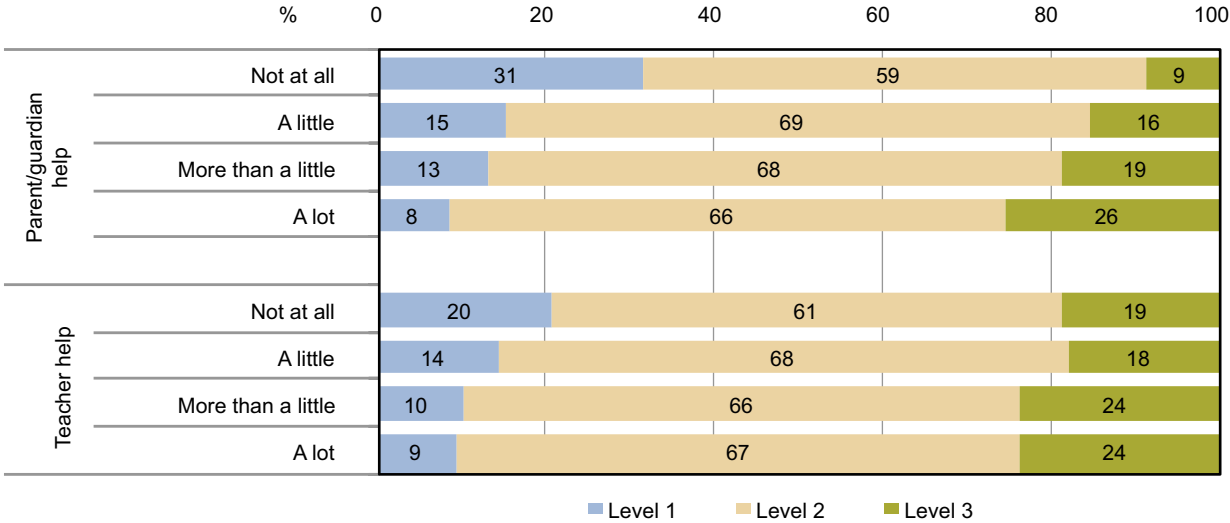
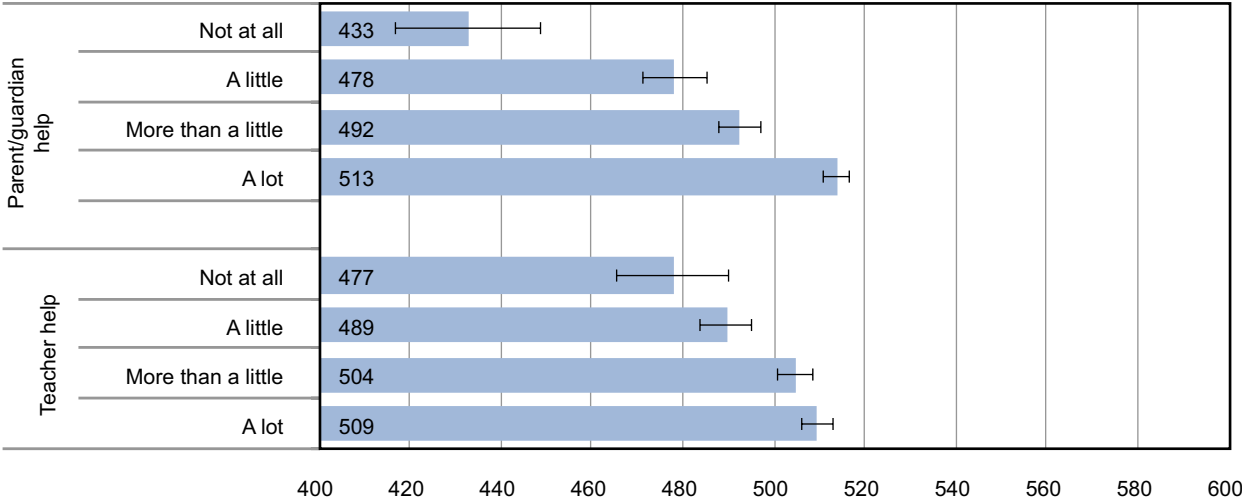
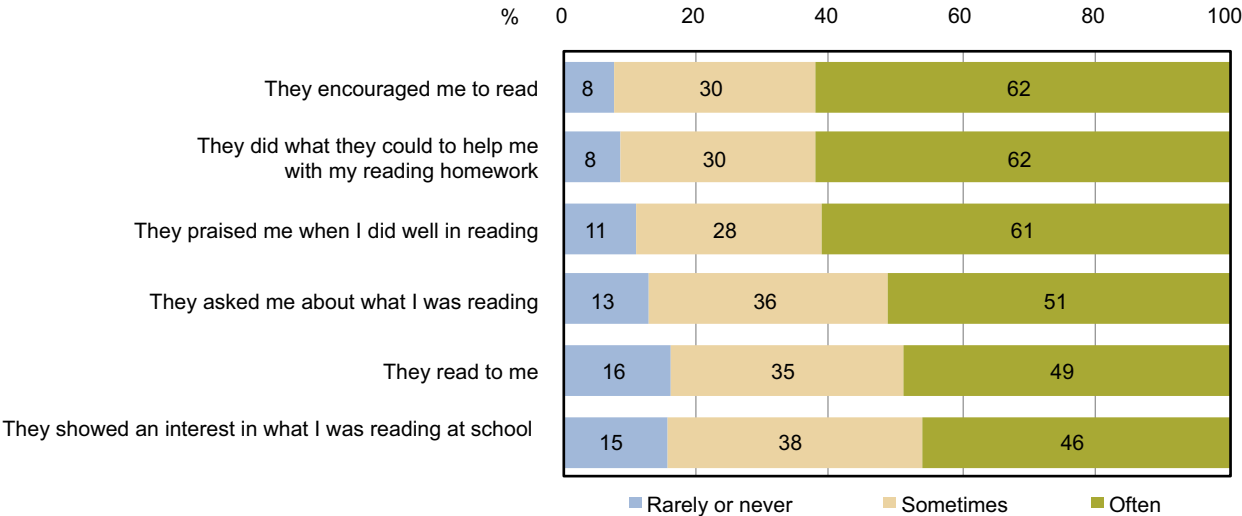


Chart 5.20 Mean reading scores by parent/guardian and teacher help in learning to read



The third set of questions on early reading activities had to do with how often parents/guardians encouraged reading. Response percentages for questions in this set are given in Chart 5.21.

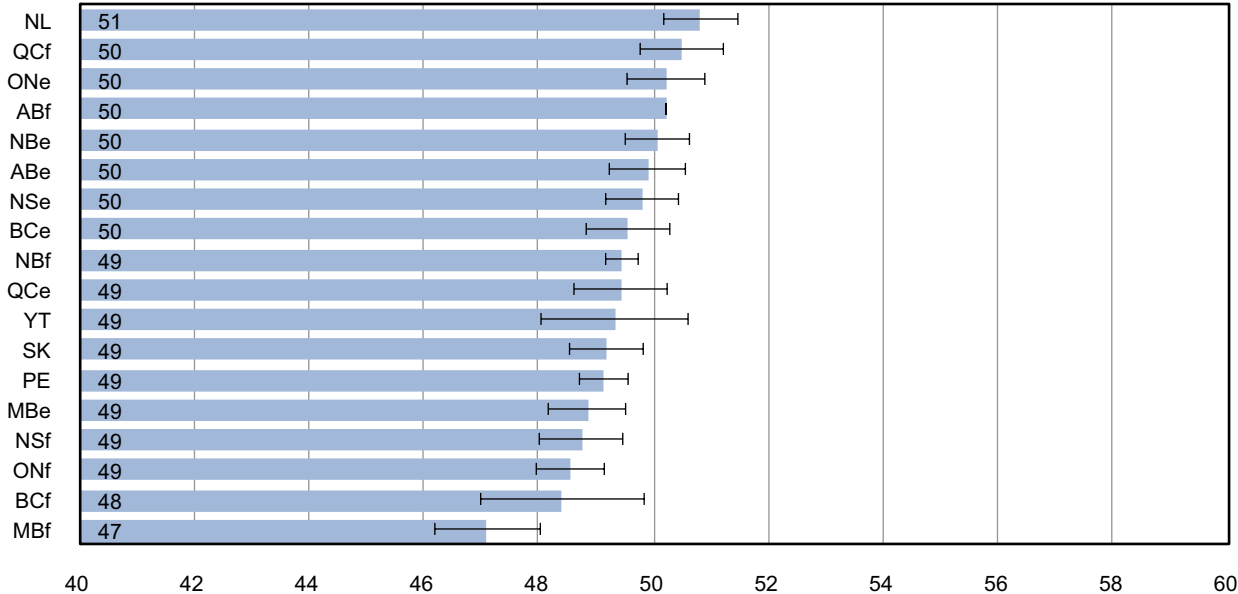
Chart 5.21 Response percentages for how often parents/guardians encouraged early reading



All of these items were highly correlated, so that the factor analysis of these items yielded a single large factor, with scores representing the extent to which parents/guardians encouraged reading in general. Chart 5.22 gives the breakdown by jurisdiction

and language of mean factor scores for this area. Most of the differences between populations are relatively small. The exception is Manitoba (French), with a mean significantly lower than for most other populations.

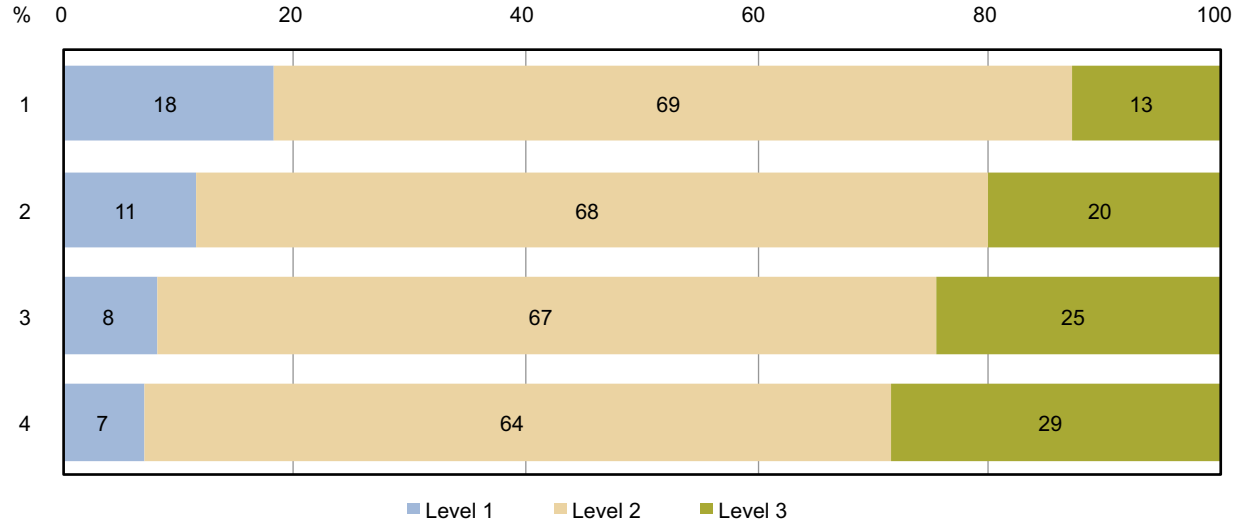
Chart 5.22 Mean factor scores for parent/guardian encouragement of early reading by jurisdiction and language



Charts 5.23 and 5.24 show the distributions of reading proficiency levels and the mean reading scores for quintile groups.¹⁷ The pattern here is that

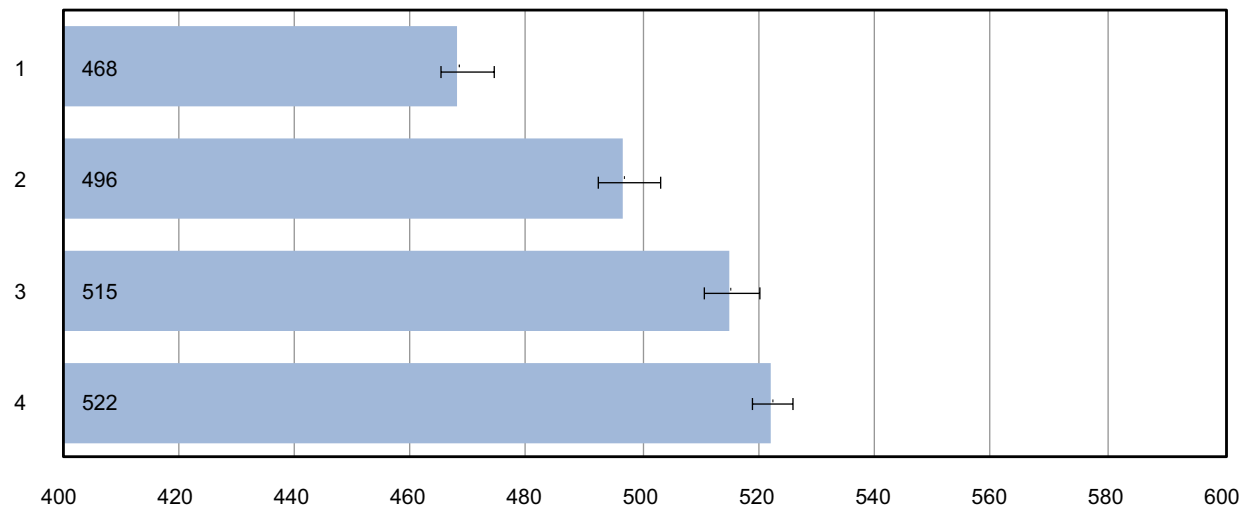
of an increase in reading performance with increased parent/guardian encouragement of reading when the student was younger.

Chart 5.23 Reading proficiency levels for parent/guardian-encouragement-of-reading quintiles



¹⁷ Only four groups are reported because the distribution did not break down into clear quintiles. The fourth and fifth quintiles are therefore combined.

Chart 5.24 Mean reading scores by parent/guardian-encouragement-of-reading quintiles



Multivariate effects

The effects of reading behaviours and strategies were modelled using two-level bivariate and multivariate regression models as before. Again, the bivariate coefficients represent absolute (uncontrolled) effects and the multivariate coefficients represent the effects of a single variable while controlling for all other variables in the model. In this case, demographic and socioeconomic variables were controlled, as in the previous chapter. In examining any one variable, all other reading behaviours and strategies were also controlled to yield a unique effect for the variable of interest. Attitude variables were not controlled because there is some question of whether attitudes should be treated as antecedent to achievement or as proxies for achievement, as pointed out in the previous chapter.

The regression results are presented in Charts 5.25 and 5.26. The charts are on different scales to allow for differences in the units used. As before, for factor score variables in Chart 5.25, a one-unit change in a factor score represents one-tenth of a standard deviation. Hence the changes in reading scores, and their confidence intervals, are relatively small. As for Chart 5.26, with the exception of community/cultural activities, which is on a three-point time scale, all other variables (labelled “observed variables” because they were taken directly from the questionnaire) are dichotomous. The change in reading scores for these variables represents the effect of the presence or absence of the variable. For example,

the effect for tutoring represents the difference for students who were tutored and those who were not.

The relative effects of factor score variables can be compared directly with each other but not directly with the effects of other variables. As usual, most of the effects are attenuated in the multivariate model compared to the bivariate model. Most of the effects of the factor score variables are positive for both the bivariate and the multivariate models. The notable exception is reading by decoding. However, significant shifts occurred in the multivariate model for outside-of-school reading/research and parent/guardian encouragement of early reading, though both of these remained positive. The effect of having reading routines shifted from significantly positive to significantly negative.

With the exception of community/cultural activities, the effects for the observed variables in Chart 5.26 can also be compared because all are dichotomous. For the observed variables, the effects of tutoring and of using worksheets are negative, with little change from the bivariate to the multivariate model. The effect of community/cultural activities is positive in both models. However, several other effects changed from positive to neutral (not significantly different from zero) in the multivariate model. These include reading aloud a lot, reading picture books, reading little books or chapter books, parent/guardian help with reading, and teacher help with reading.

The effect of being read to a lot shifted from positive to negative.

All of this suggests that reading behaviours and strategies are correlated with demographic and socioeconomic variables in such a way that controlling for the latter attenuates the absolute effects of the former. The inference is that many students who

come from positive demographic and socioeconomic circumstances are likely to engage in positive reading behaviours at an early age. The important educational policy question is whether, for other students, these positive behaviours can be engendered in schools in such a way as to offset any disadvantage in reading achievement resulting from their not being practised at home when the student was younger.

Chart 5.25 Regression coefficients for reading behaviour and strategy factors

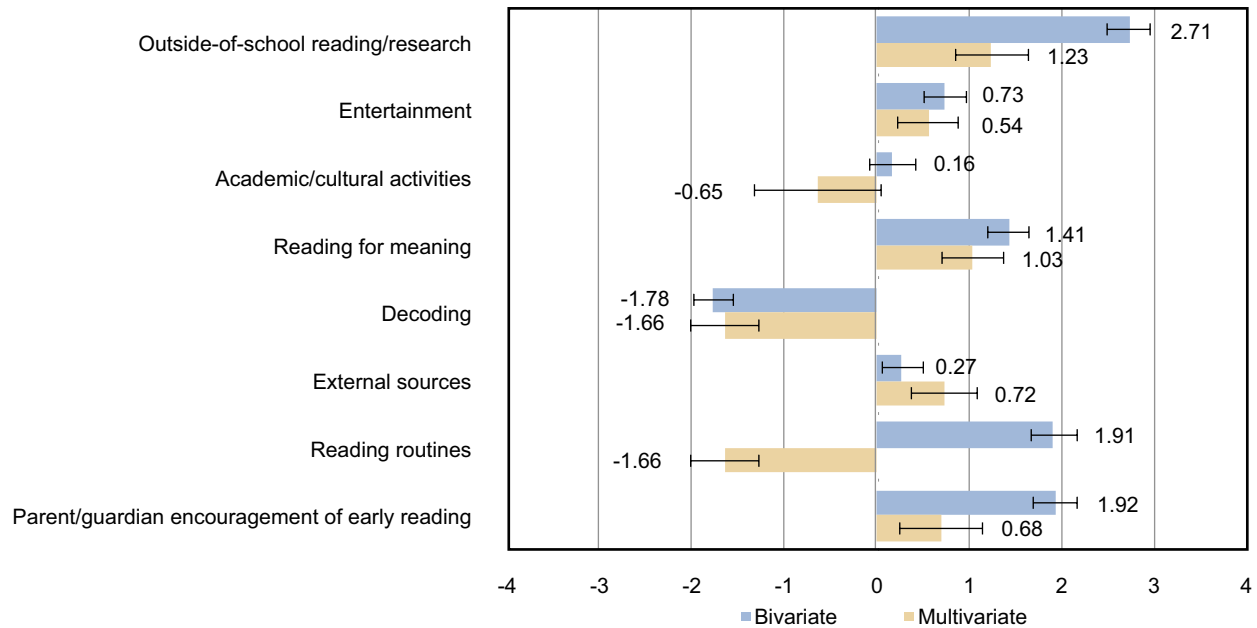
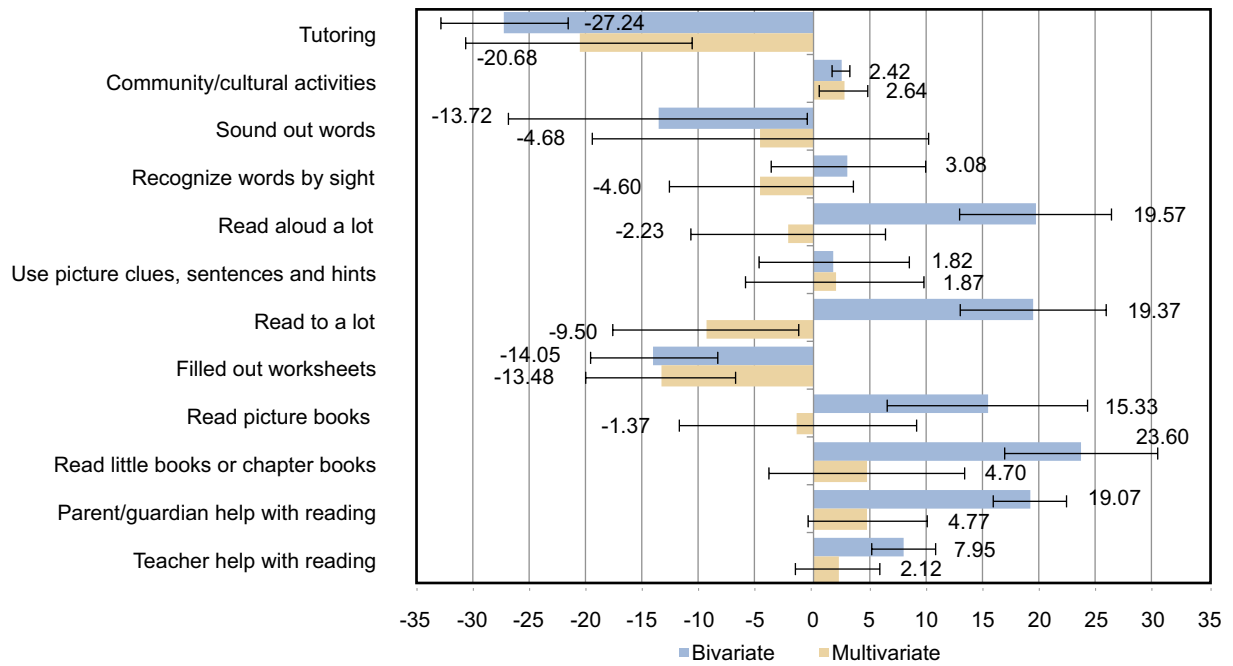


Chart 5.26 Regression coefficients for reading behaviour and strategy observed variables¹⁸



¹⁸ The apparent large difference in errors between Charts 5.25 and 5.26 is a function of differences in the scales of the two graphs.

6. INSTRUCTIONAL CLIMATE

The term “instructional climate” is defined as features of the school and classroom climate that can be expected to have a bearing on achievement. Relevant aspects include the school’s overall philosophy and areas of emphasis in language arts, class size, influences on decision making, and the presence of special-needs students. Most of the data in this area came from the teacher and school questionnaires.

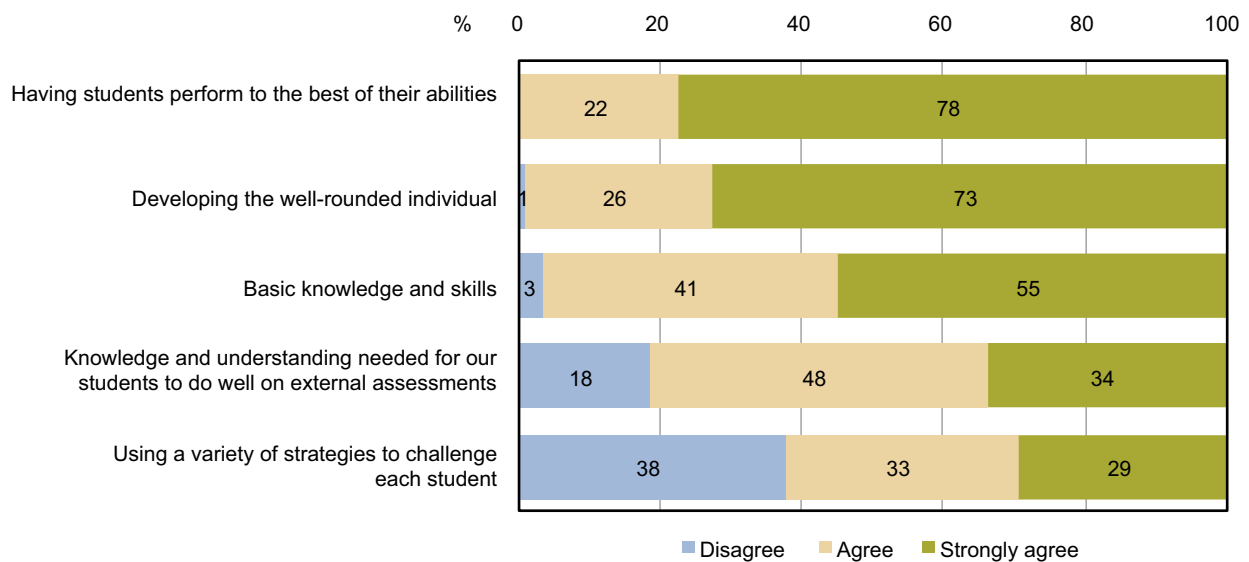
Areas of emphasis in language arts

Principals were asked to indicate the extent to which they agreed with five statements about the areas of

student development emphasized in language arts in their school, using a four-point scale from “strongly disagree” to “strongly agree.”

Responses to these items are shown in Chart 6.1. (“Strongly disagree” and “disagree” were combined because response percentages were small.) There was strong agreement on the part of principals with all of these statements. However, the statements about having students perform to the best of their abilities and developing the well-rounded individual elicited substantially higher levels of support than the others.

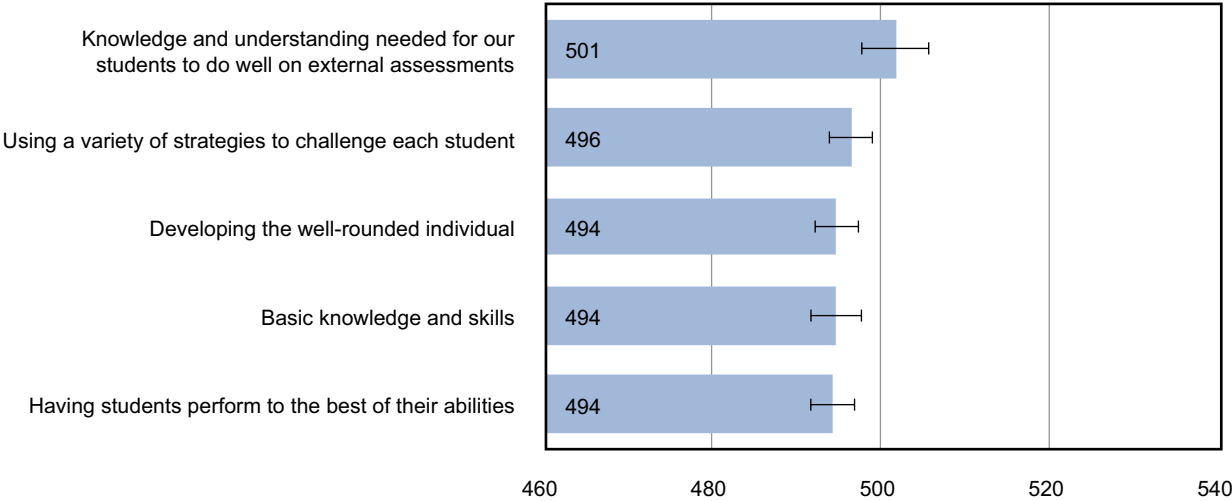
Chart 6.1 Areas of language arts emphasis in schools



Mean reading scores for schools who strongly agreed with each of these statements are given in Chart 6.2. This shows that schools most strongly emphasizing “knowledge and understanding needed for our

students to do well on external assessments” perform significantly higher on average than those emphasizing most other areas, with the exception of “using a variety of strategies to challenge each student.”

Chart 6.2 Mean reading scores for schools “strongly agreeing” with language arts emphasis statements¹⁹



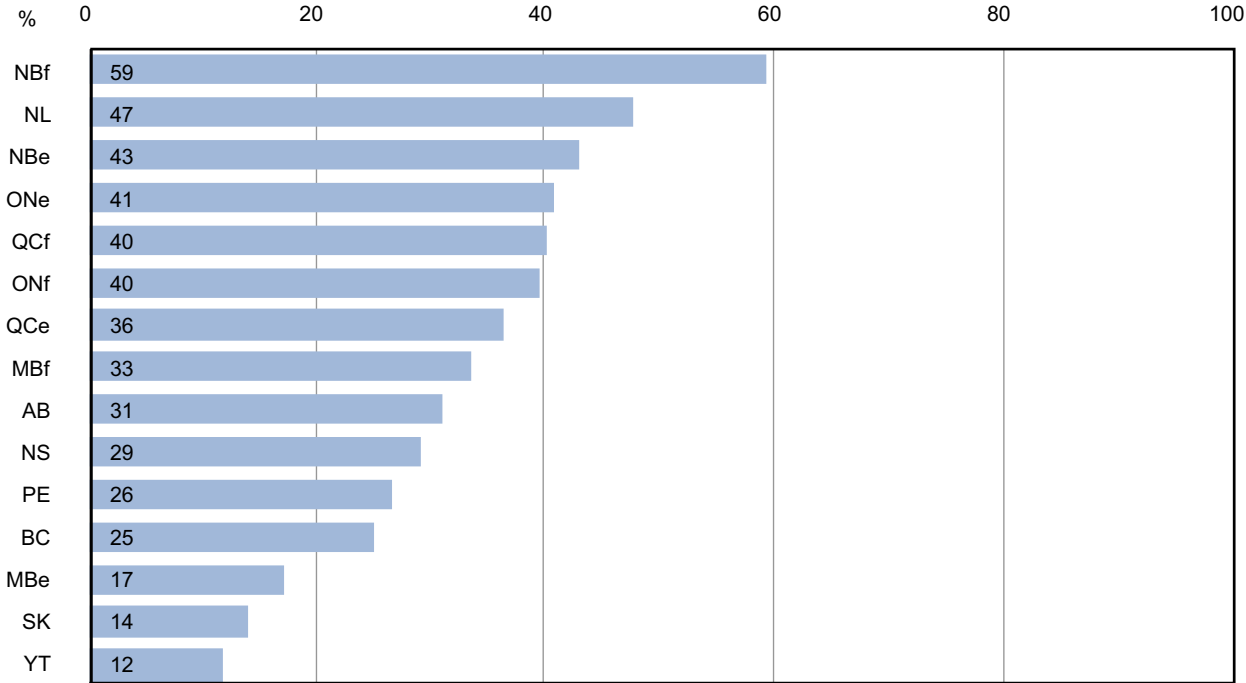
Because of its effect on reading performance, responses to the question on external assessments were broken down by jurisdiction and language. The results are shown in percentages in Chart 6.3.²⁰ This shows substantial differences across popula-

tions regarding the extent of influence of external assessments on school decisions, with the differences between the four populations showing the greatest influence and the four showing the least influence being statistically significant.

¹⁹ Readers are reminded that the mean scores shown in teacher and school charts are “means of means.” Each individual score used to compute these means is itself the mean of the scores achieved by the students taught by one teacher or the mean of all the students in a school.

²⁰ Again, the English and French school populations within most jurisdictions have been combined because the number of French schools is too small to yield stable results.

Chart 6.3 Percentage of “strongly agree” responses regarding influence of emphasis on external assessments by jurisdiction and language



Class size and number of grades per class

Class size information was obtained by asking teachers to give the average number of students in their language arts classes.²¹ Chart 6.4 shows class size ranges by jurisdiction and language. Because this picture is complex, a simpler version, which includes only the two smallest ranges (fewer than 15 and 15 to 19) and the largest (30 or more) is given in Chart 6.5. The most striking aspect of these

distributions is the extent of variation both within and between populations. The largest percentage of class sizes of 30 or more are found in Quebec, and particularly in Quebec (French). Several jurisdictions have fewer than 10% of their classes in the highest range. The highest percentages of small classes (fewer than 20) are found in Newfoundland and Labrador and Yukon.

²¹ The question referred to all language arts classes taught by the teacher and not just those for 13-year-olds because it was judged that teachers would have difficulty relating class size specifically to age. The results may therefore be slightly less precise than would be desirable.

Chart 6.4 Teacher-reported language arts class size ranges by jurisdiction and language

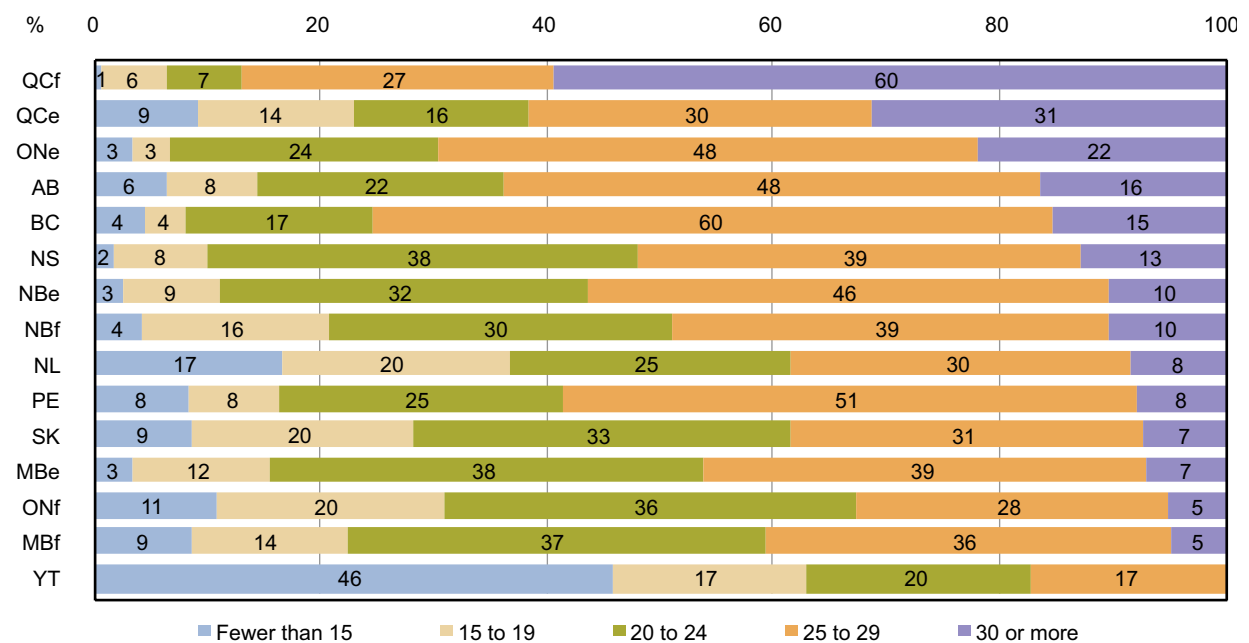
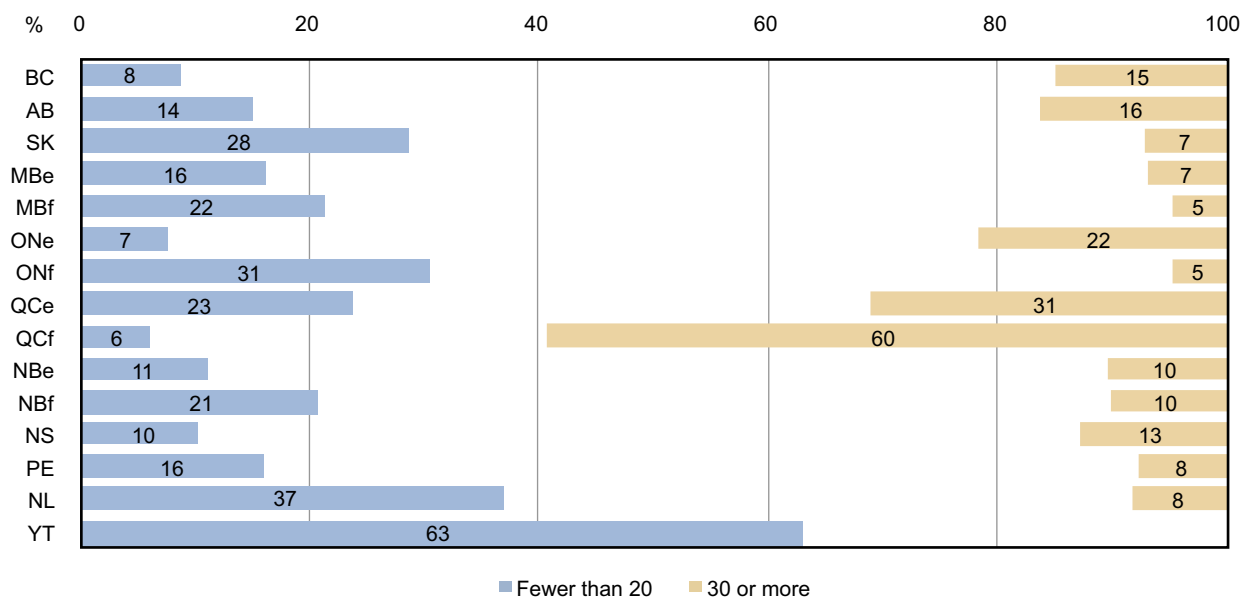


Chart 6.5 Smallest and largest language arts class size ranges by jurisdiction and language



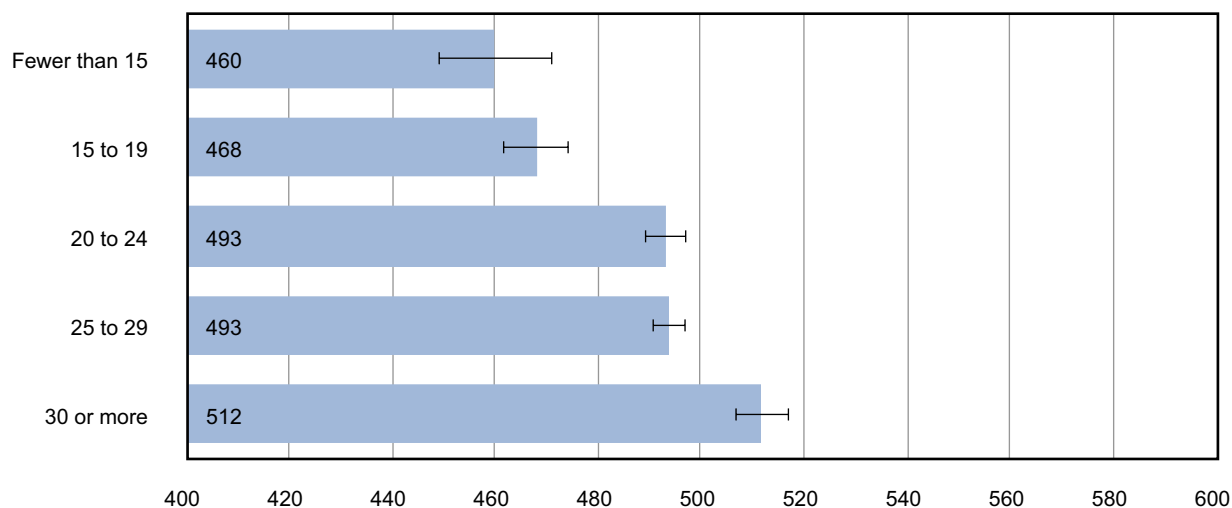
Mean reading scores for teachers with class sizes in the various ranges are given in Chart 6.6. These results show that performance is related to class size in the opposite direction from what might generally be expected. In terms of statistical significance, three groups can be seen. The lowest performance levels are found in the two groups with class size less

than 20. The two groups between 20 and 29 have an intermediate level of performance. The highest performance is found in classes of 30 or more. While this is likely related to the large proportion of such classes in Quebec, the pattern for smaller classes is not specific to a jurisdiction.

These results are counter-intuitive and are inconsistent with recent experimental studies of class size in the primary grades. However, they are consistent with what has been found previously, in SAIP and PISA studies. Because class size, like many other variables in this analysis, may be confounded with

many other factors — particularly school size and location — it is important to examine the class size effect with such variables controlled. This will be done as part of the multivariate analysis presented at the end of this chapter.

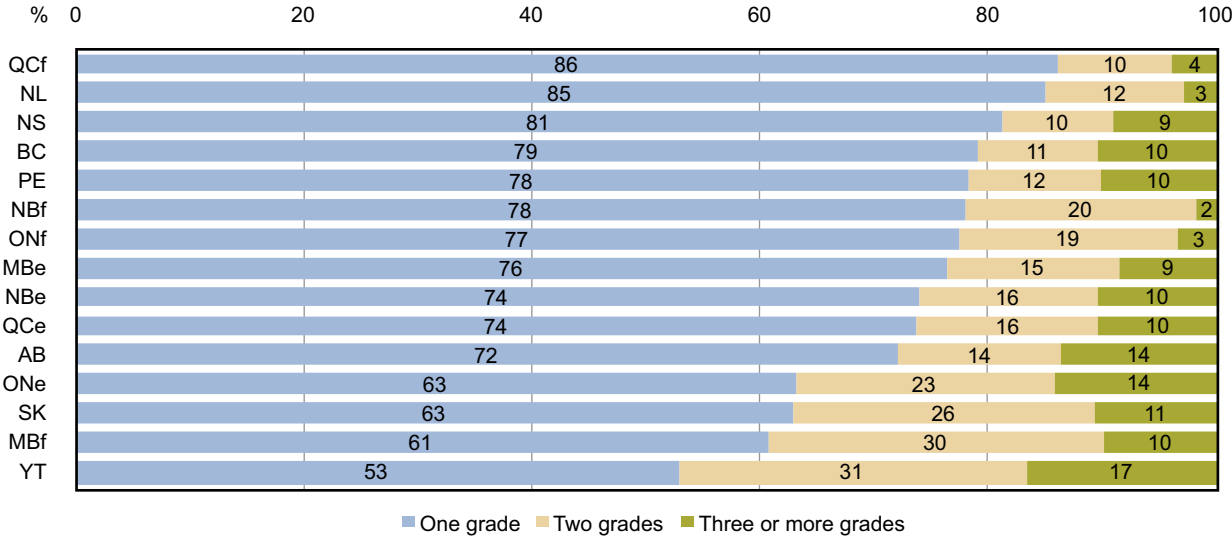
Chart 6.6 Teacher mean reading scores by class size ranges



Teachers were also asked if any of their classes had more than one grade. The percentages of teachers reporting one, two, or three or more grades in a class, by jurisdiction and language, are given in Chart 6.7. It is interesting to note that the highest percentage of teachers reporting classes with one grade only are found in Quebec (French) and Newfoundland

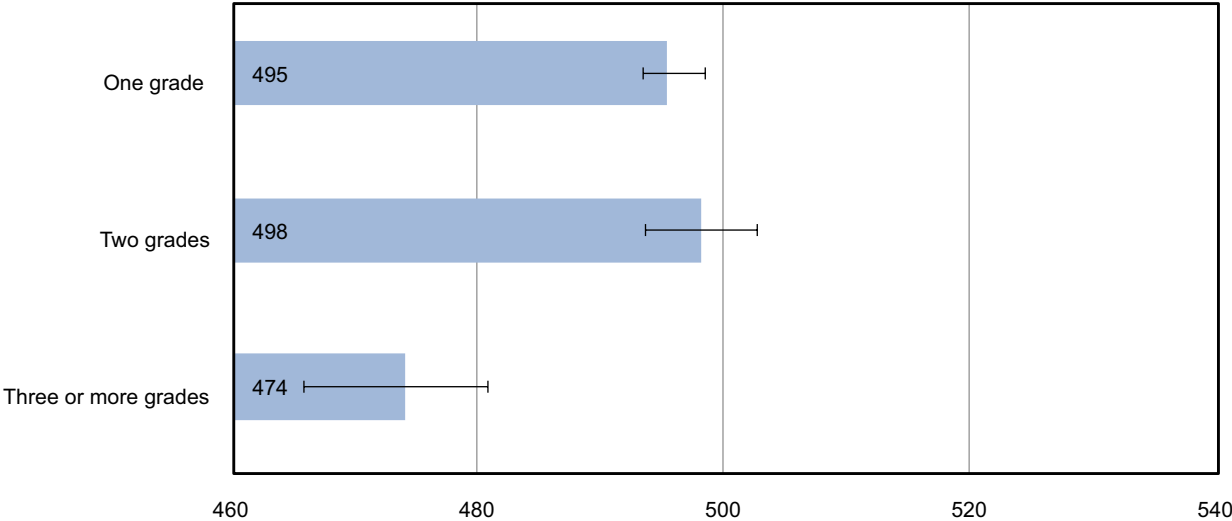
and Labrador, which have large percentages of large and small schools, respectively. On the other hand, Ontario (English), where there is a high proportion of large schools, has a relatively low percentage of single-grade classes. This suggests that the number of grades placed in a class is not strongly related to school size.

Chart 6.7 Percentage of teachers reporting single or multiple grades in the same classroom for all or some classes by jurisdiction and language



Mean reading scores for single-grade and multigrade classes are given in Chart 6.8. This indicates that there is little difference between having two compared to one grade in a class but that having three or more grades is associated with lower achievement.

Chart 6.8 Mean reading scores for single-grade and multigrade classes



Sources of influence on school programs

Principals were given a series of 15 questions about the extent to which various people or agencies influence decisions about school programs and activities. The scale was a four-point one from “not at all” to “a lot.” Factor analysis of this question set yielded four factors, as identified in Table 6.1. Two of these

factors may be considered as internal and two as external sources of influence. This may reflect a more general underlying trait called “school autonomy” that has frequently been referenced in the literature on school improvement.

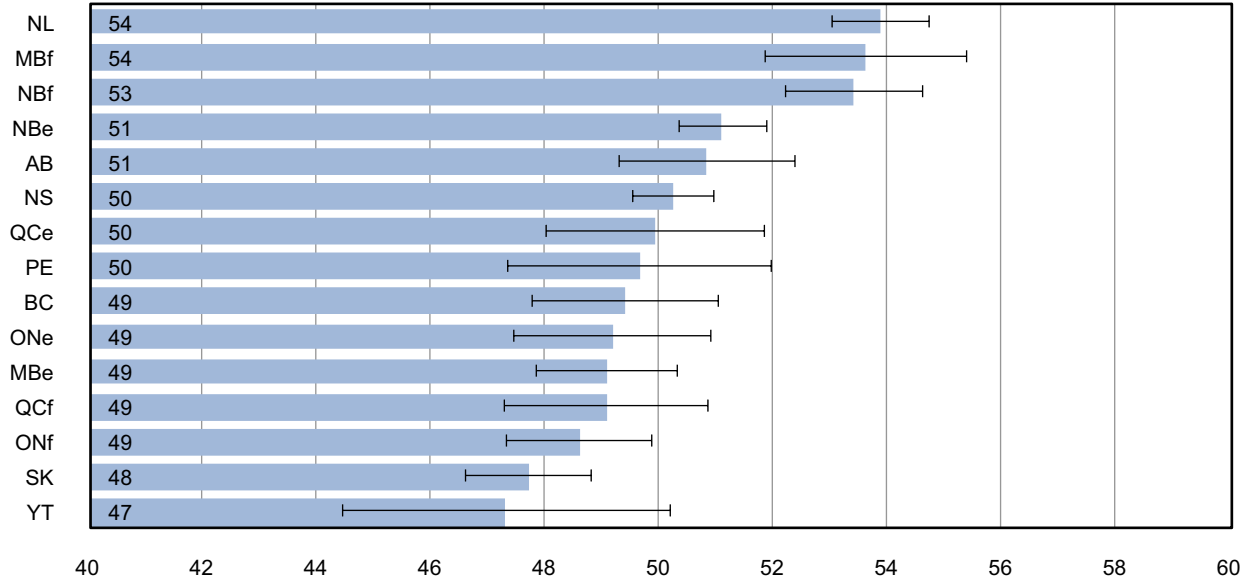
Table 6.1 Questionnaire items and factors for sources of influence on school programs

Factor	Item
Student/parent/guardian	Parent advisory committees or school councils Characteristics of the student body Student voice or representation
Internal	Results from classroom assessments Provincial/territorial curriculum Teachers within departments or subject groups Individual teachers Characteristics of the student body
External assessment	Standardized assessment results from PISA and SAIP Provincial/territorial assessment results that count toward student final marks Provincial/territorial assessment results that do not count toward student final marks
External agencies	Textbooks and textbook publishers Availability of instructional resources Teacher groups external to the school (e.g., district committees, professional associations) External agencies (e.g., business community) Church or religious groups

Mean factor scores on these four factors by jurisdiction and language are given in Charts 6.9 to 6.12, again sorted in descending order of mean scores. Student/parent/guardian influence (see Chart 6.9)

is higher in Newfoundland and Labrador, Manitoba (French), and New Brunswick (French) than in other jurisdictions, though others are generally not significantly different from each other.

Chart 6.9 Mean factor scores for student/parent/guardian influence by jurisdiction and language



On the internal influence factor (see Chart 6.10), Alberta, British Columbia, and Ontario (English) are significantly higher than six of the seven populations on the lower end of the scale, from Nova Scotia

to Quebec (French) — except for Prince Edward Island, where the error is somewhat larger. Three of the four francophone populations, with Manitoba (French) as the exception, are in this lower group.

Chart 6.10 Mean factor scores for internal influence by jurisdiction and language

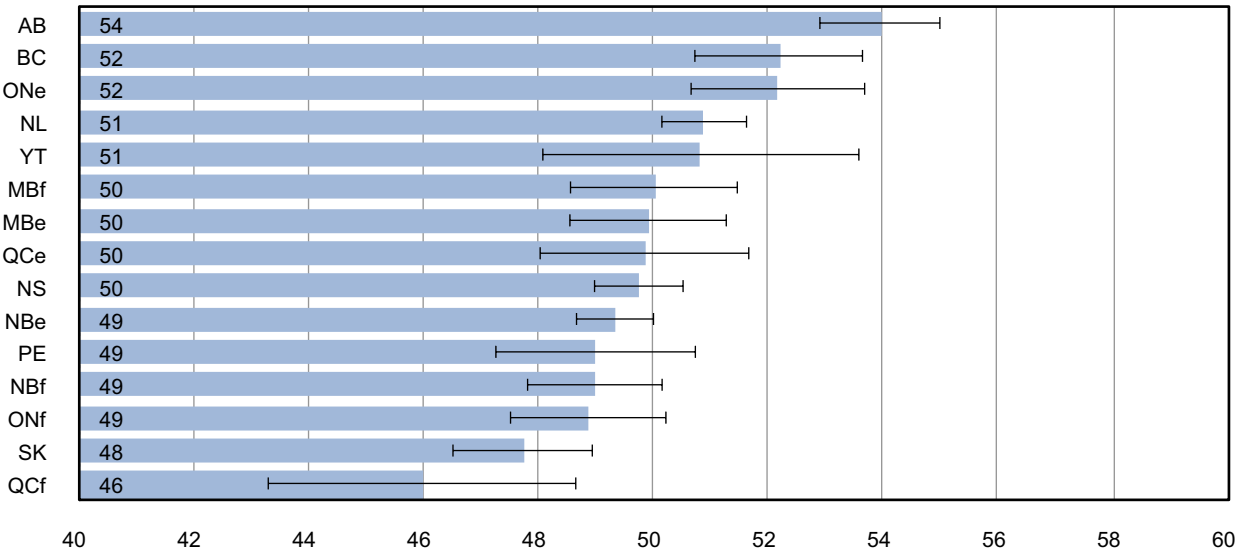
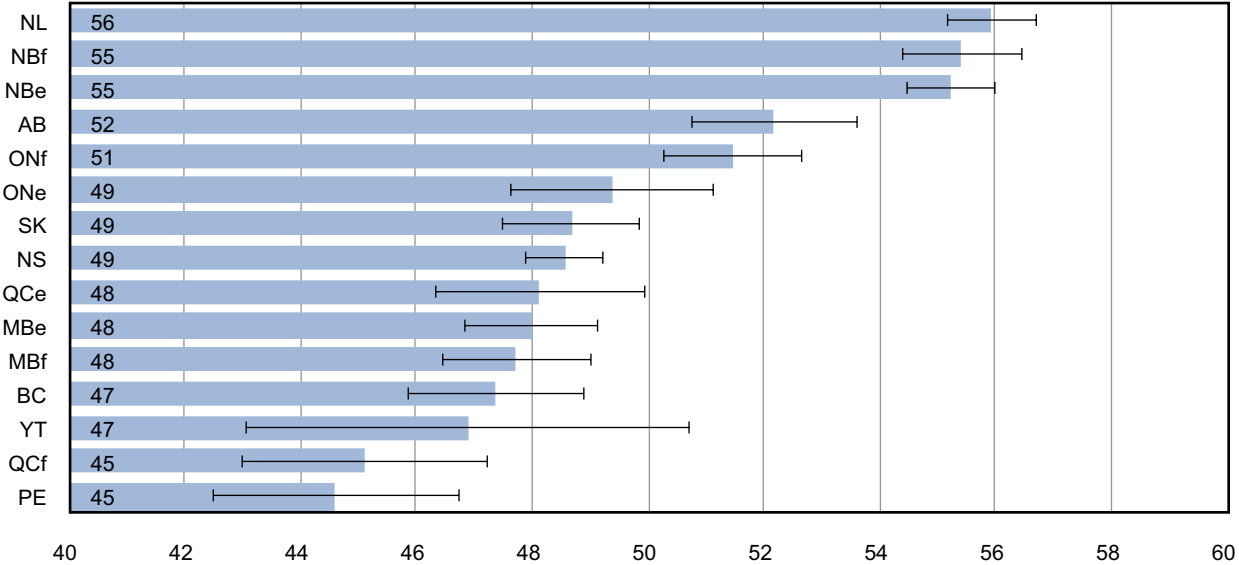


Chart 6.11 shows that Newfoundland and Labrador and both New Brunswick populations are significantly higher than any of the others regarding the influence of external assessments. Alberta and Ontario (French) are also in a group significantly

lower than the first group but higher than most others. Prince Edward Island and Quebec (French) are significantly lower than most others regarding the influence of external assessments.

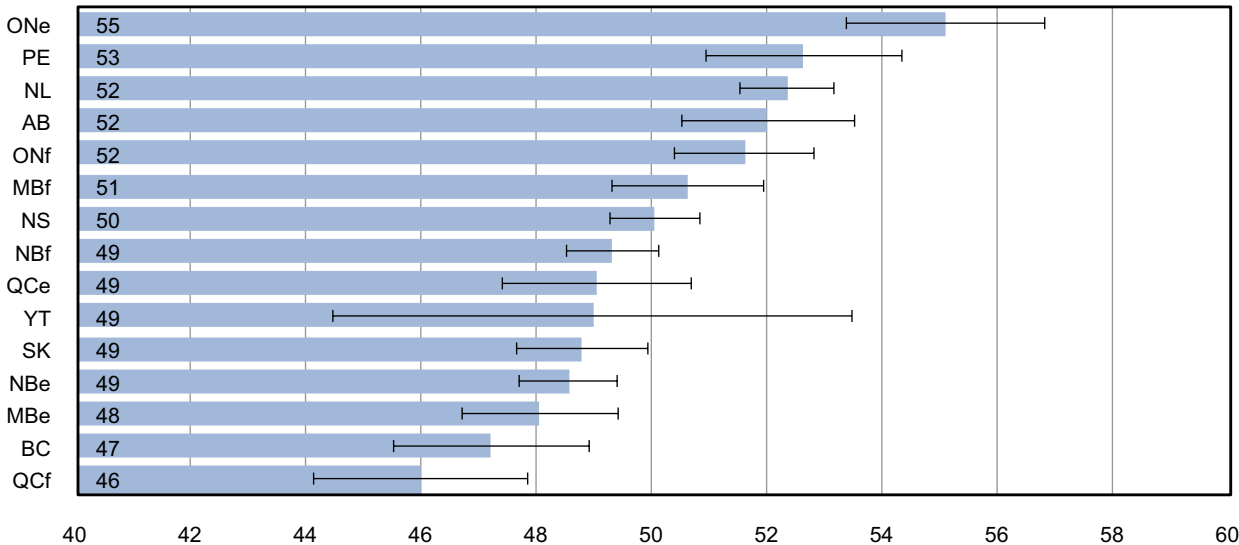
Chart 6.11 Mean factor scores for external assessment influence by jurisdiction and language



Finally, as Chart 6.12 shows, the influence of external agencies is higher for Ontario (English) than for most other populations. Quebec (French) and

British Columbia are lower regarding this factor than most other jurisdictions.

Chart 6.12 Mean factor scores for external agencies influence by jurisdiction and language

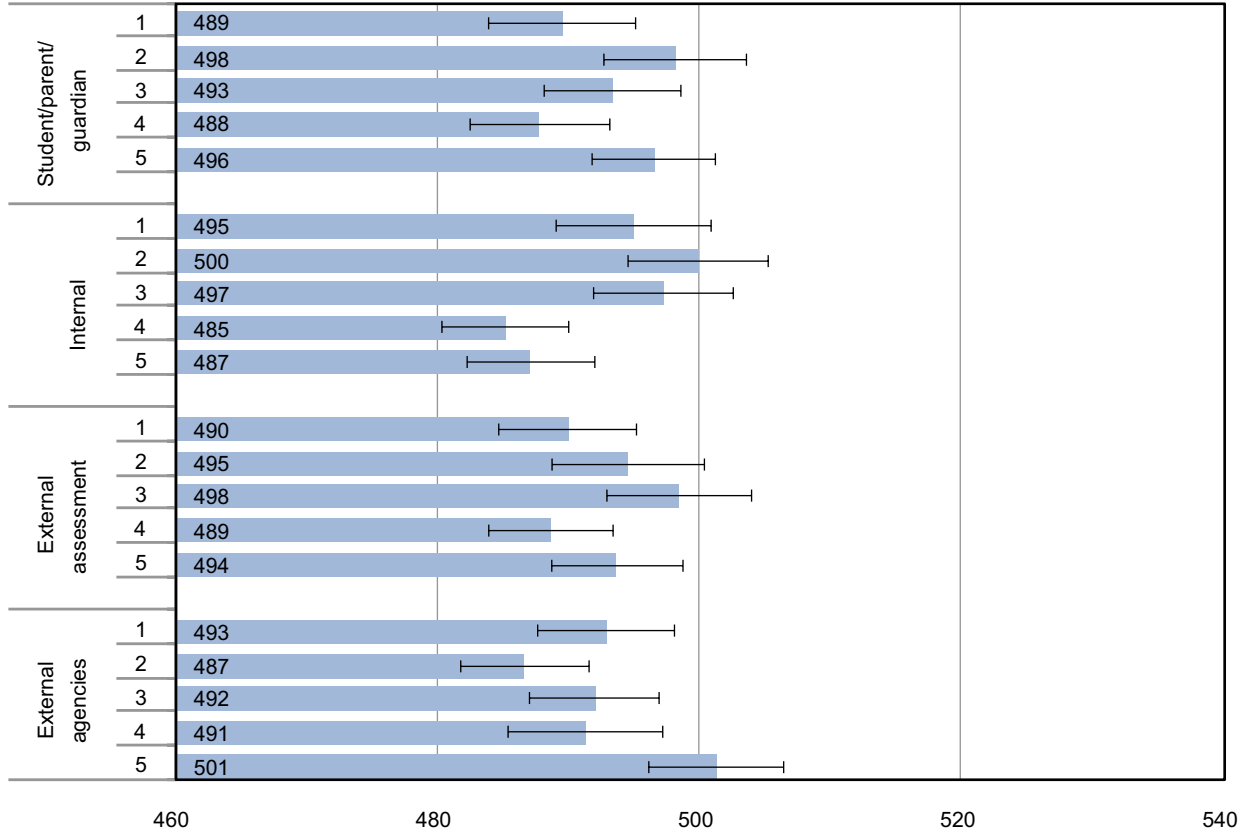


On all but student/parent/guardian influence, the differences among jurisdictions are fairly large, at close to one standard deviation (10-point) difference between the highest and lowest. Quebec French principals report relatively low influence and those in Newfoundland and Labrador relatively high influence on all of the factors. This suggests the possibility that there may be a scaling issue with these questions (a systematic tendency for principals in these jurisdictions to systematically check higher

or lower points on the scale). However, there is no way to determine this from the data.

Chart 6.13 shows mean reading scores for schools at each of the quintile ranges on each of the factors listed in Table 6.1. For the most part, the differences between quintiles are nonsignificant and no clear trend can be seen. The exception is the internal influence factor, where schools in the two highest quintiles perform at significantly lower levels than schools in the middle two quintile ranges.

Chart 6.13 Mean reading scores for sources-of-influence quintiles

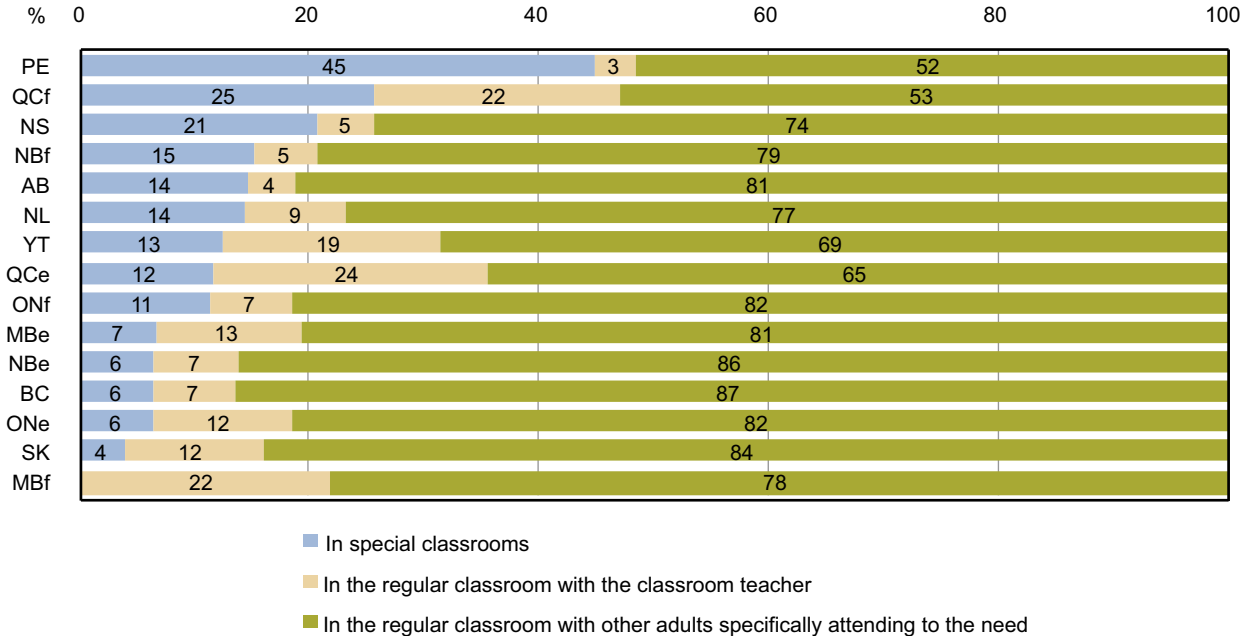


Presence and accommodation of special-needs students

The school questionnaire included two questions having to do with how special-needs students should be taught within the school and what effect the need to attend to these students has on regular classes. Chart 6.14 shows the distribution of preferences for the three placement options across jurisdictions and languages. In most jurisdictions, 75% or more of principals indicated that they preferred placement of special-needs students in a regular classroom but with adults other than the classroom teacher being

present to attend to special needs. Fewer principals in Quebec (French) and Prince Edward Island than elsewhere were of this opinion and more (compared to principals in other jurisdictions) were of the view that such students should be placed in special classrooms. At the same time, more than 20% of principals in Quebec (both languages), as well as in Manitoba (French) indicated that the placement should be in the classroom with the regular teacher.

Chart 6.14 Principal perceptions of desired placement of special-needs students by jurisdiction and language



Responses to the question on the effect of special-needs students on regular classes are shown in Chart 6.15. More than 40% of Manitoba (French),

Ontario (French), and Yukon principals reported a lot of effect, compared to less than 20% for Quebec (French) and British Columbia.

Chart 6.15 Effects of special-needs students on regular classes by jurisdiction and language

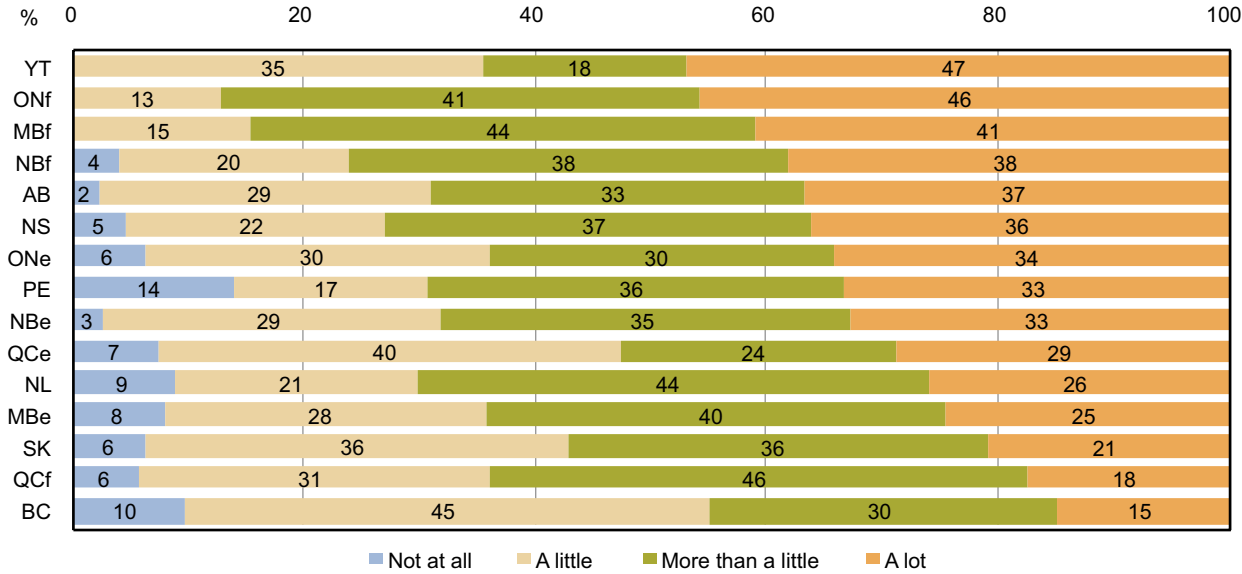
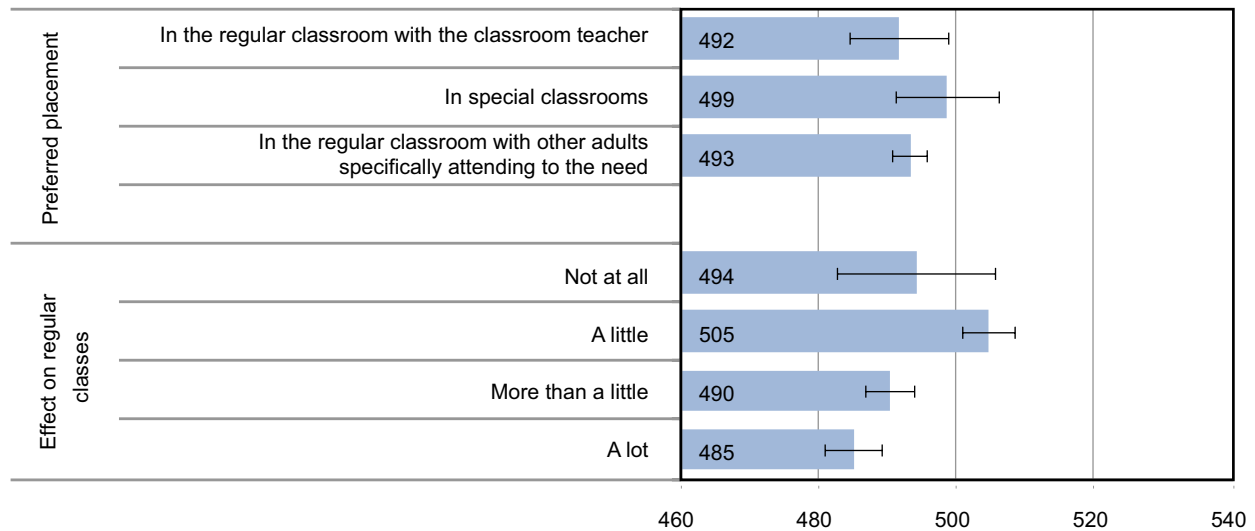


Chart 6.16 shows that there is no significant relationship between principals' preference for placement of special-needs students and mean reading scores in their schools. However, schools for which principals

reported "more than a little" or "a lot" of effect of special-needs students on regular classes showed lower reading performance than those reporting "little" effect.

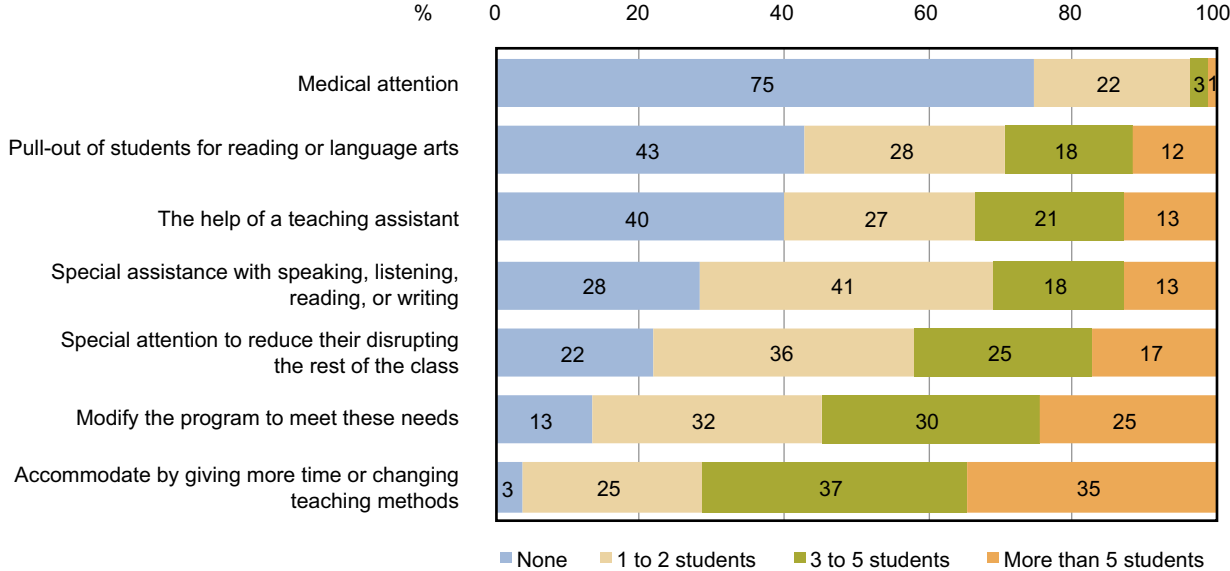
Chart 6.16 Mean reading scores for principal preferences for placement of special-needs students and effect of special-needs students on regular classes



The issue of accommodating special-needs students was examined in more detail in the teacher questionnaire. Teachers were asked a series of questions about the number of students in their language arts classes who require various types of accommodation or intervention because of special needs. Overall results for Canada are shown in Chart 6.17. Most teachers in all jurisdictions reported that their classrooms had some students of this nature, suggesting that integration of these students into regular classes is common practice. Because of the complexity of the response patterns and the similarity of responses across jurisdictions, the jurisdictional results are not reported here.

Chart 6.17 indicates that accommodation by program modification or by giving more time or changing teaching methods are required for more students than other forms of accommodation, with a majority of teachers reporting having three or more students requiring these forms of accommodation. Requiring a teaching assistant or pulling a student out of class is less common, with close to 40% of teachers reporting that they have no students in these categories. Even fewer students are reported as requiring medical attention, with 75% of teachers indicating that they have no students with this need.

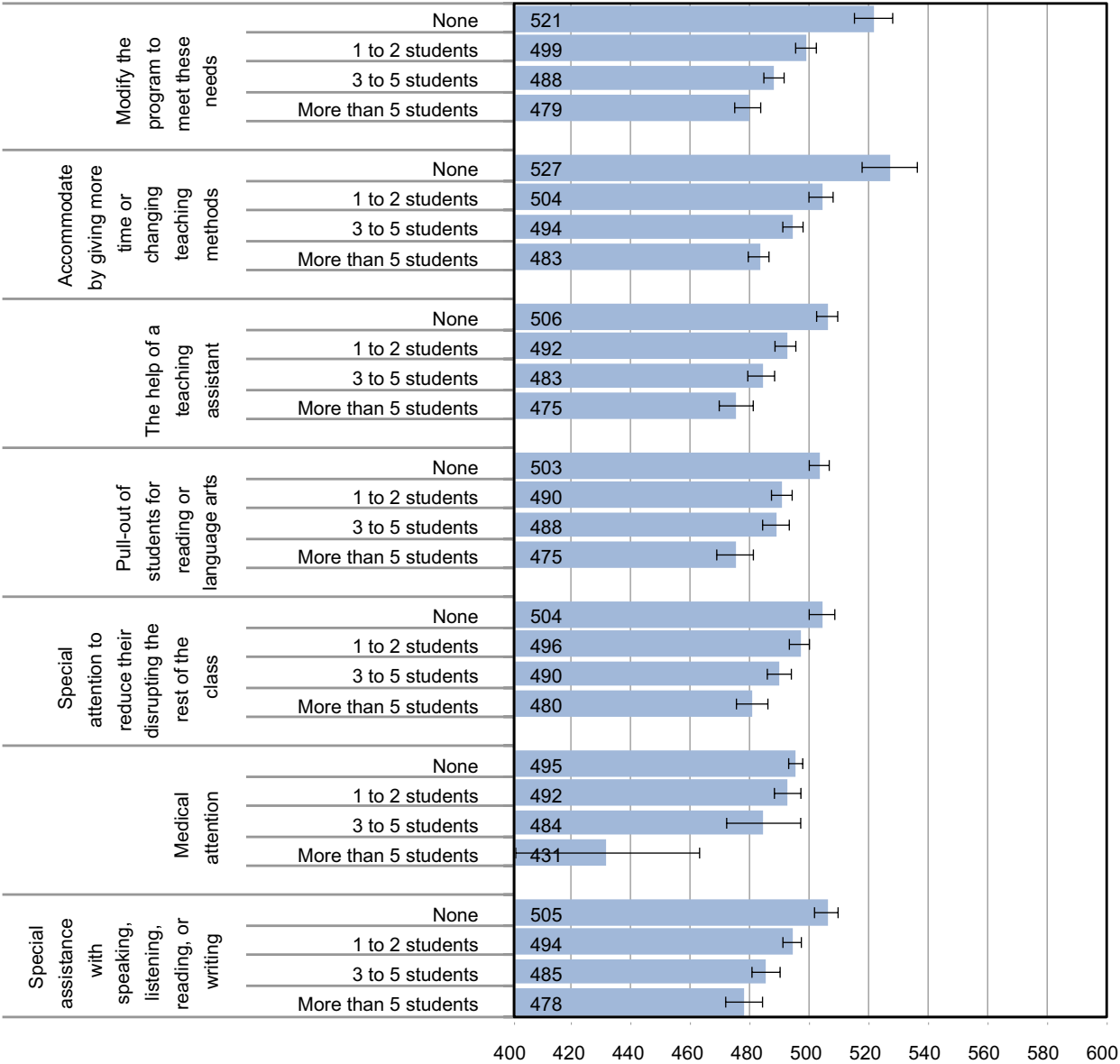
Chart 6.17 Teacher reports of number of students requiring accommodations for various special needs



Mean reading scores for classes with different numbers of students needing accommodations are given in Chart 6.18. Although the details vary, there

is a clear pattern here of lower achievement for classes with larger numbers of special-needs students.

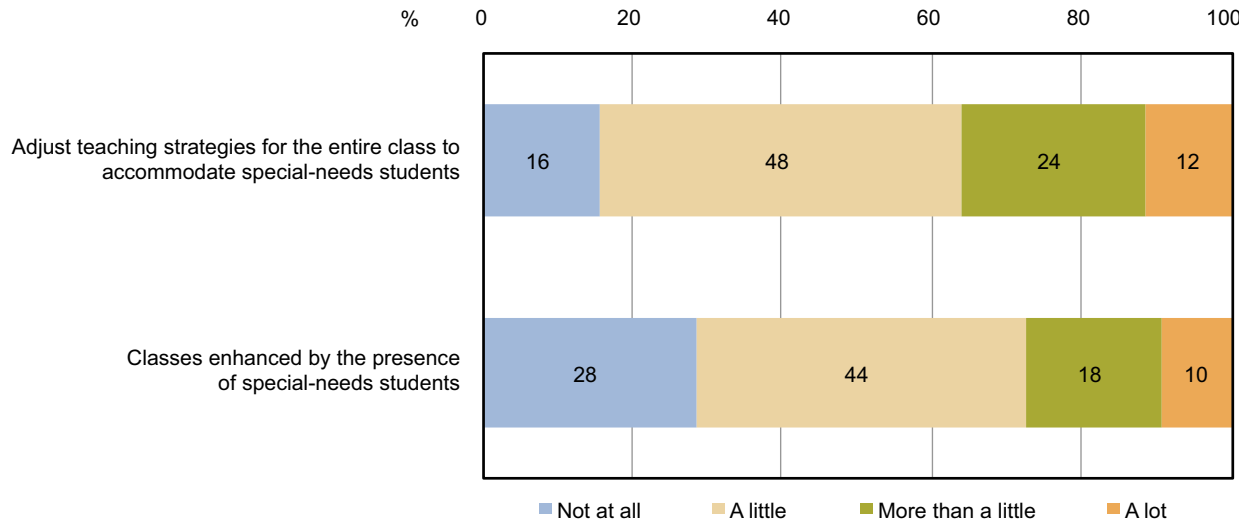
Chart 6.18 Mean reading scores for classes with different number of students requiring accommodations



As a follow-up to these questions, teachers were asked to estimate the extent to which they modify their teaching strategies for the entire class to accommodate special needs students and to give an opinion on the extent to which the presence of such students enhances the classroom experience.

Responses to these questions are given in Chart 6.19. About two-thirds of teachers reported that they do not modify their strategies at all or only a little. A slightly larger proportion indicated that the presence of special-needs students enhances their classroom not at all or a little.

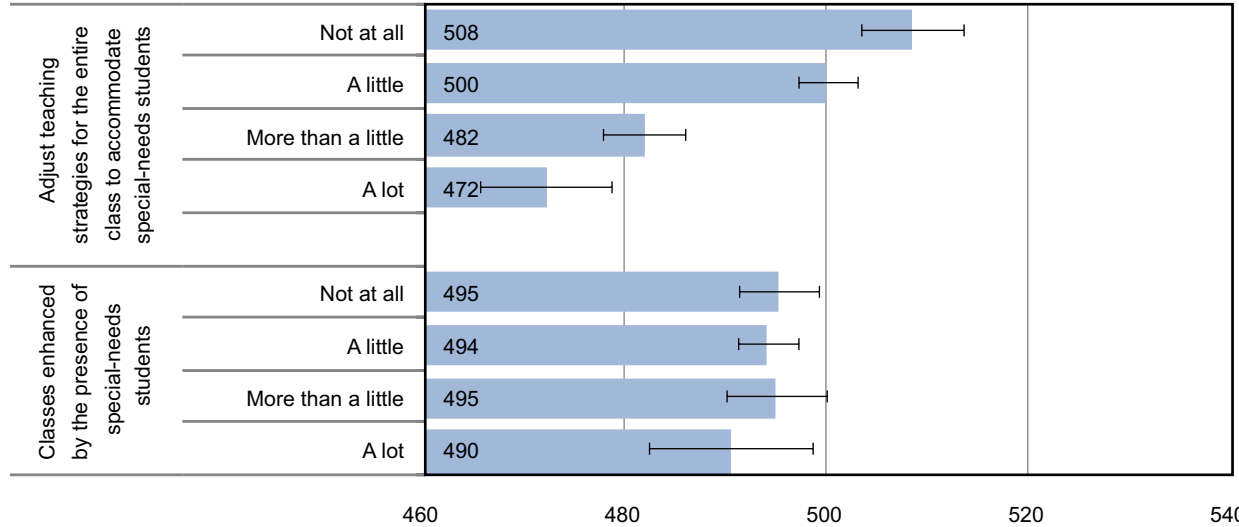
Chart 6.19 Teacher reports of the extent to which teaching strategies for all students are modified and classes enhanced by special-needs students



Mean reading scores for classes in the various categories on these two variables are given in Chart 6.20. The general pattern for modification of teaching strategies is that reading scores decline with greater degrees of modification of teaching

strategies, although not all differences between adjacent categories are statistically significant. Teacher views on whether classes are enhanced by the presence of special-needs students are unrelated to achievement.

Chart 6.20 Mean reading scores for adjustment of teaching strategies for and degree of enhancement of classes by special-needs students



Multivariate effects

In modelling the effects of instructional climate variables, demographic and socioeconomic variables were controlled at both the student and the school levels. Specifically, the student-level covariates were gender, whether or not born in Canada, French spoken in the home, mother's education, and books in the home. At the school level, total enrolment, grade 8 (secondary 2) enrolment, school governance, and community size were the covariates. As before, all other instructional climate variables were also controlled in examining the effect of any one of these variables.

In modelling the effects of instructional climate variables, demographic and socioeconomic variables were controlled at both the student and the school levels.

As indicated earlier, the teacher level could not be used directly in a multilevel model because too few students were available for each teacher. The teacher-level variables used in this chapter were therefore aggregated to the school level, and the model was run at the student and school levels as before. While this does result in some loss of variance, the teacher-level variables of interest here might reasonably be thought of as characteristic of schools. For example, although class sizes and accommodations for special-

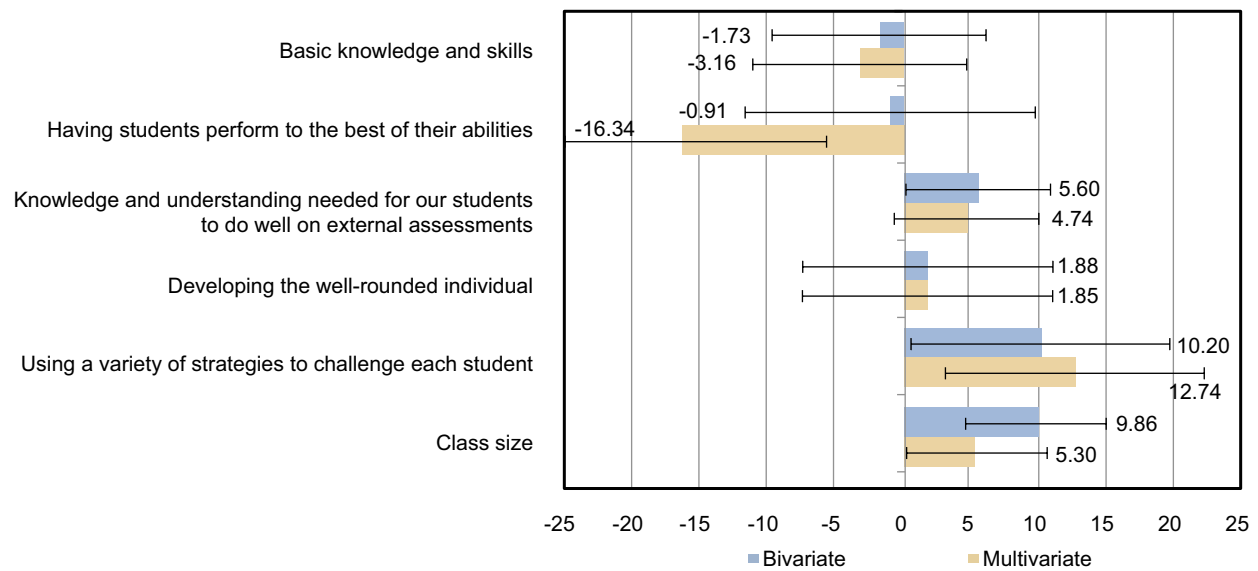
needs students were reported by teachers, it might be expected that these would be similar across teachers within a school.

Chart 6.21 gives the results for areas of emphasis and for class size. (It is noted that the factors representing sources of influence on decision making were included in the model but dropped from the charts because none of these showed any significant effects.) The effects for the five areas of emphasis are directly comparable with each other because all are on the same four-point scale. These results show that the effect of “using a variety of strategies to challenge each student” has a significantly positive effect on achievement in both models. The effect of “having students perform to the best of their abilities” changed from near zero in the bivariate model to significantly negative in the multivariate model, indicating that this effect is increased when other variables are controlled.²² “Knowledge and understanding needed for our students to do well on external assessments” changed only slightly but was statistically nonsignificant in the multivariate model. Emphasis on “basic knowledge and skills” and on “developing the well-rounded individual” was not statistically significant in either model.

As might be expected, the effect of class size is reduced in the multivariate model because other school-level variables correlated with class size — particularly school and community size, as well as the student-level socioeconomic variables — are controlled. However, the class size effect remains significantly positive, with higher mean reading scores occurring in larger classes, even after these obvious correlates of class size are controlled.

²² The usual impact of controlling for other variables on any one variable is that the effect of that variable on the outcome is reduced. This is typically because various effects are positively correlated with each other. Occasionally, however, controlling for other variables brings out an effect that is suppressed in the bivariate analysis, as is the case here.

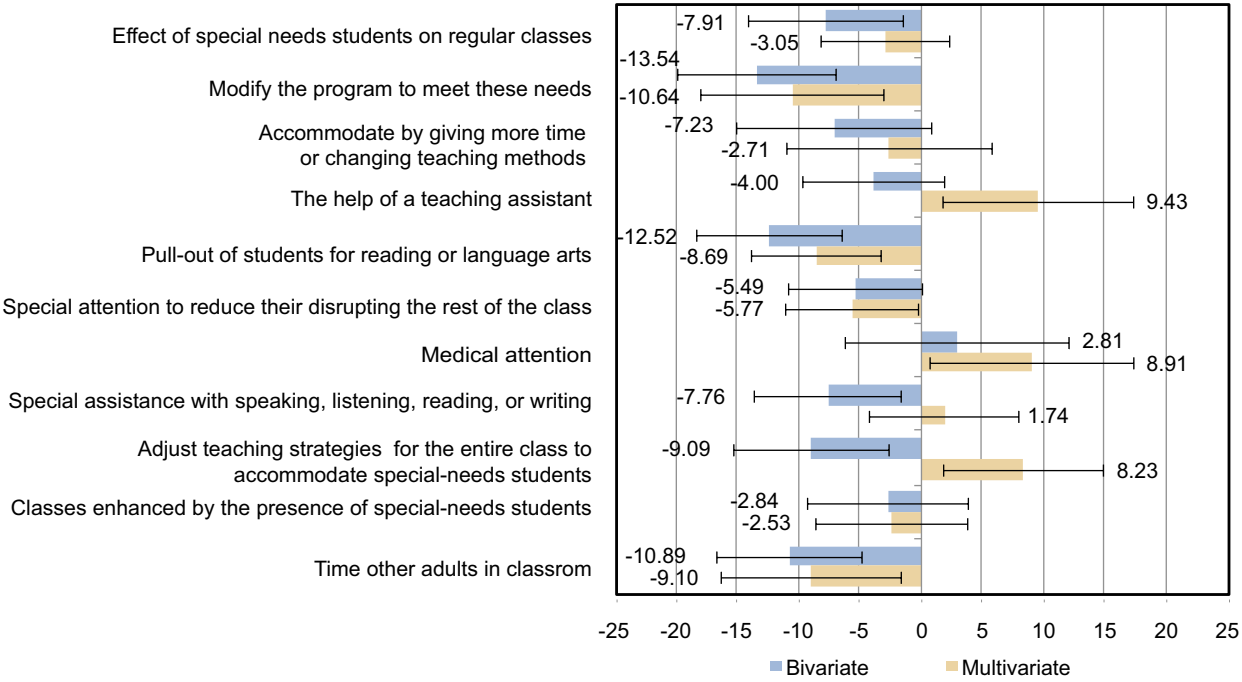
Chart 6.21 Regression coefficients for areas of emphasis in language arts and class size



The effects for accommodation of special-needs students are given in Chart 6.22. Most of these effects are in a negative direction, though not all are statistically significant. This indicates that greater need for such accommodations is associated with lower reading scores. Modifying programs to meet special needs, pulling special-needs students out of regular classes, and the amount of time that other adults are present in the classroom attending to special-needs students show significantly negative effects in both the bivariate and the multivariate models. The need to adjust teaching strategies for the whole class to accommodate special needs shifts from significantly negative in the bivariate to significantly

positive in the multivariate model. The effects for number of students requiring the help of a teaching assistant and number of students requiring medical attention change from near zero to significantly positive in the multivariable model. Again this indicates that these effects are suppressed by their correlations with other variables. The positive result for having a teaching assistant in the multivariate model seems to conflict with the negative result for the presence of other adults in the classroom in both the bivariate and the multivariate models. Unfortunately, it is not possible from the data to clearly distinguish the functions of a teaching assistant from those of other adults.

Chart 6.22 Regression coefficients for accommodation of special needs



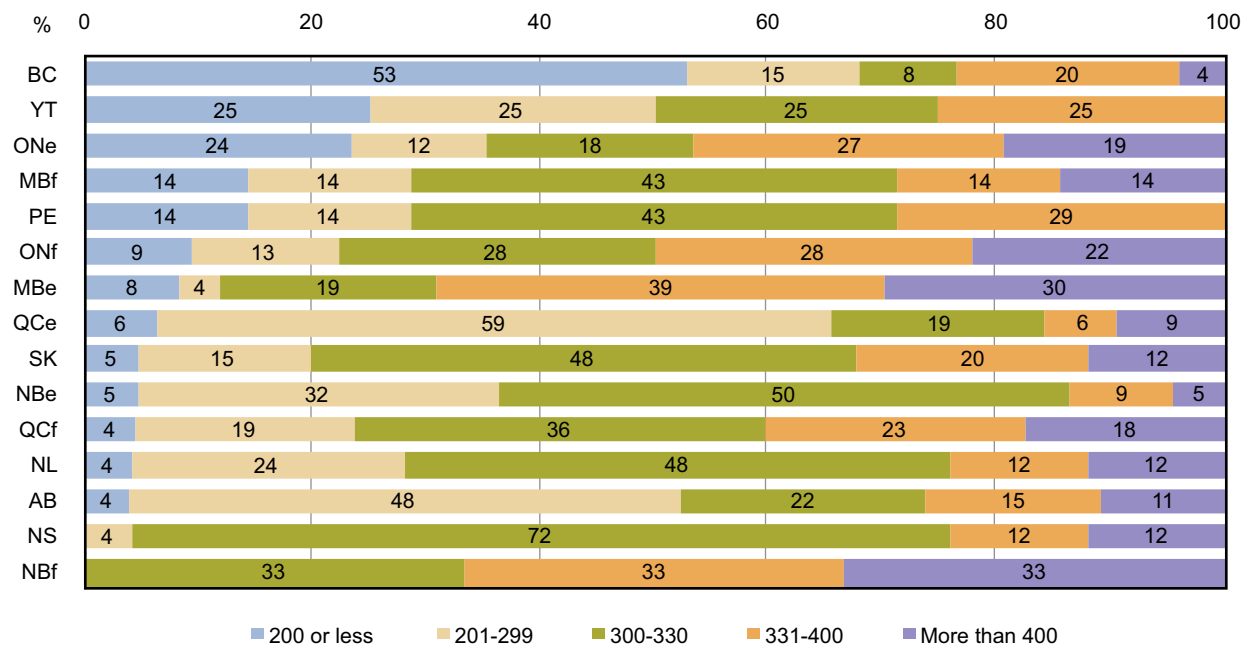
7. TIME ALLOCATION AND USE

All learning may be thought of as occurring within a time frame. At the broadest policy level, the length of school years and school days are established through legislation or collective agreements. Times spent on subjects are also sometimes determined by jurisdictions. At the school and classroom levels, many activities are part of the schedule, and tradeoffs are often necessary because total time is fixed. Individual students may spend more or less time on schoolwork both within the classroom (engagement) and outside the classroom (homework or other school-related activities). While not all of these time elements can be captured in a broad survey, questions on many aspects of time are found in all the PCAP questionnaires.

Time on language arts

Principals were asked to estimate the number of minutes per week spent on language arts in their school. Estimates were wide ranging but tended to cluster around several modal points, such as 200 or 300 minutes per week. For ease of presentation, the estimates were divided into approximate quintiles. The results by jurisdiction and language are given in Chart 7.1. This shows the wide variation across schools within jurisdictions but shows no strong pattern of differences across jurisdictions. The main exception is that more British Columbia schools than others have times in the shortest range (200 minutes or less).

Chart 7.1 Distribution of minutes per week schools spent on language arts by jurisdiction and language



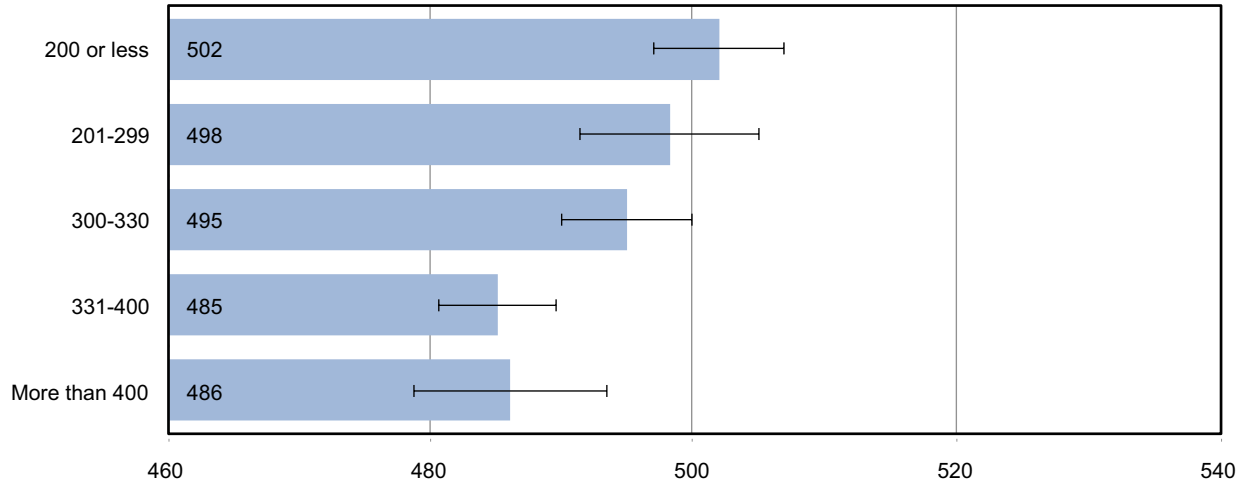
School mean reading scores by minutes per week spent on language arts are given in Chart 7.2. The general pattern shows scores declining as larger amounts of time are spent on language arts. Differences across the first three categories (up to 330 minutes) are generally nonsignificant. The main difference is found for times in the 331-400 range, where scores are significantly lower than for the lower time ranges. Schools with times longer than

400 minutes per week spent on language arts show significantly lower reading scores than those where students spend 200 minutes or less per week on language arts.

Like the class size results presented earlier, these results are counter-intuitive and inconsistent with most other results on time allocations. Again, however, it is possible that language arts time is

confounded with other variables, such as the number of special-needs students in the school. Some control of these variables will be possible through the multivariate models.

Chart 7.2 School mean reading scores by minutes per week spent on language arts

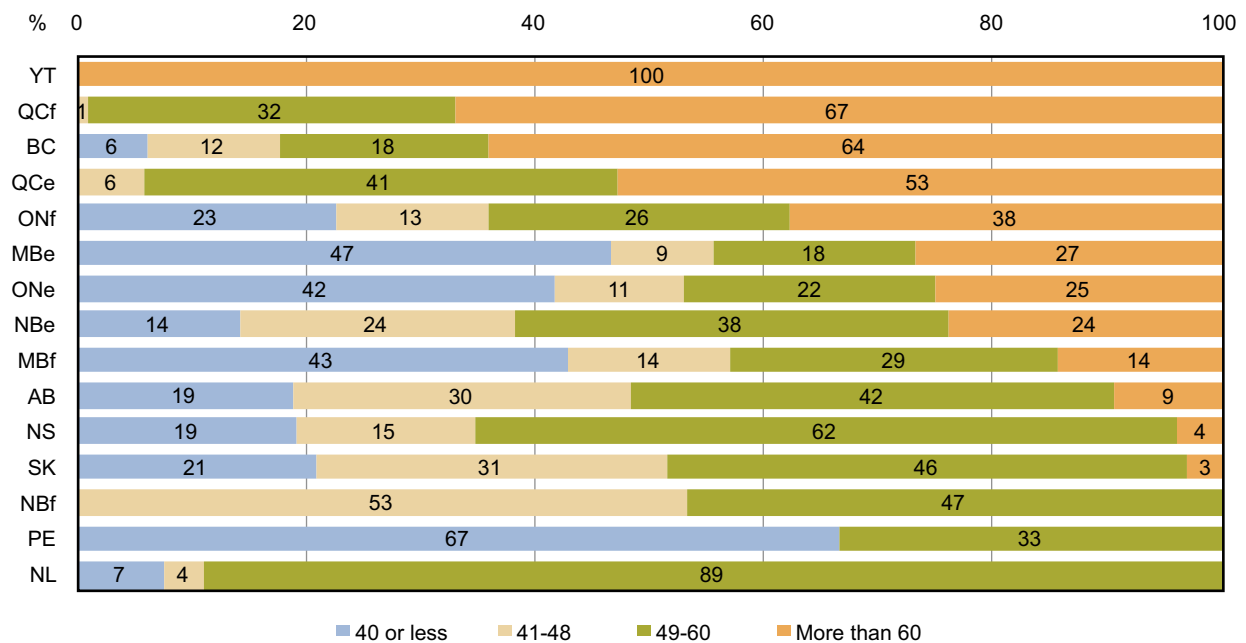


Length of class periods

Chart 7.3 shows that the length of class periods varies widely across jurisdictions but is not as variable within jurisdictions as weekly language arts time. In British Columbia, Quebec, and Yukon, a majority of schools have class periods 60 minutes or longer. Very few schools have class periods that long in Alberta, Saskatchewan, New Brunswick (French), Nova

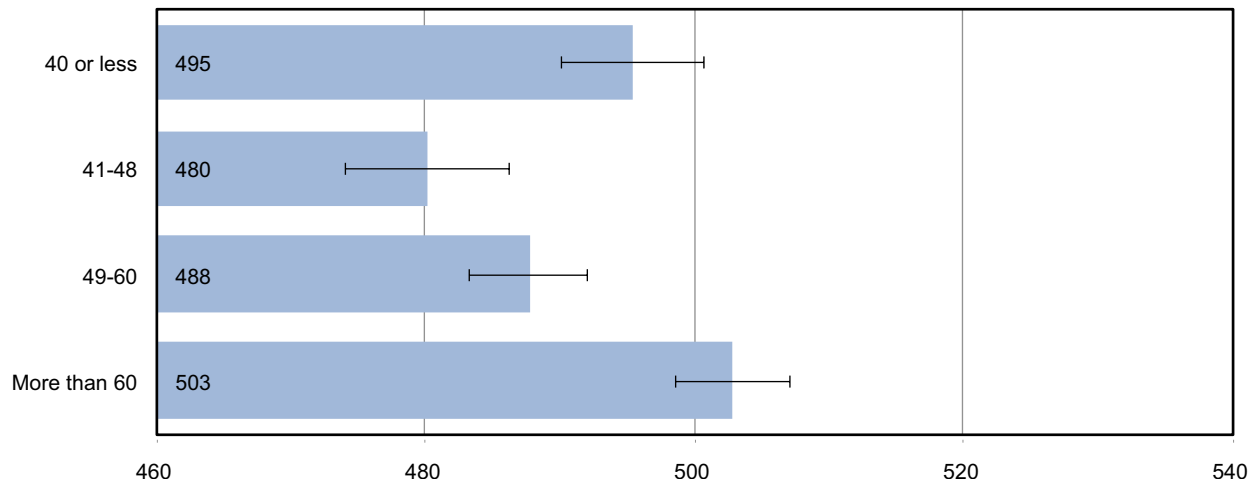
Scotia, Prince Edward Island, or Newfoundland and Labrador. More than half the schools in Prince Edward Island and close to half in Manitoba and Ontario (English), have periods 40 minutes or shorter. Almost all schools in Newfoundland and Labrador have class periods in the 49- to 60-minute-range.

Chart 7.3 Length of class periods, in minutes, by jurisdiction and language



The effect of class period length on mean reading scores is shown in Chart 7.4. The result is nonlinear, with the shortest and longest class periods being associated with higher achievement than the mid-range periods.

Chart 7.4 School mean reading scores by length of class periods in minutes



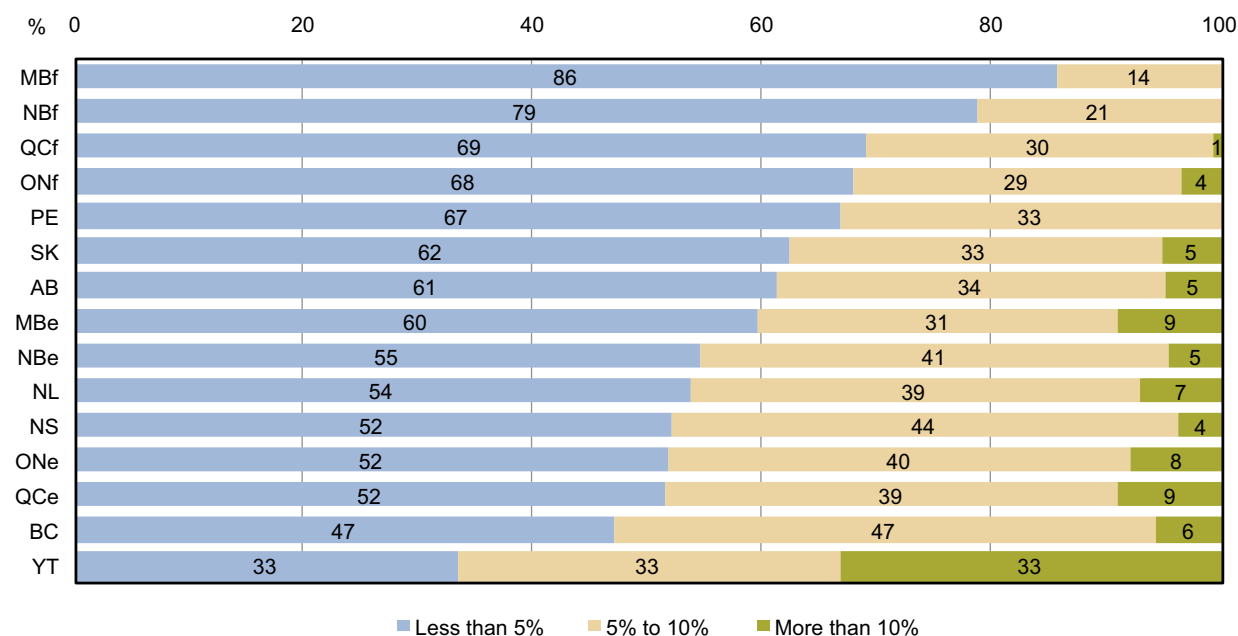
Student absence

Data on student absence were available from both the school and the student questionnaires. School absence rates, in percentages, by jurisdiction and language are shown in Chart 7.5. A majority of schools in most jurisdictions reported average absence rates of less than 5%. The exceptions are

British Columbia and Yukon. The latter, in particular, shows a larger percentage of schools than others reporting more than a 10% absence rate.²³ There is a pattern of lower absence rates in francophone than in anglophone populations.

²³ It is important to recognize that the number of reporting schools in Yukon is quite small, so the percentages can fluctuate substantially with small changes in what is reported. This is more closely related to the conversion of small numbers to percentages than of sampling error.

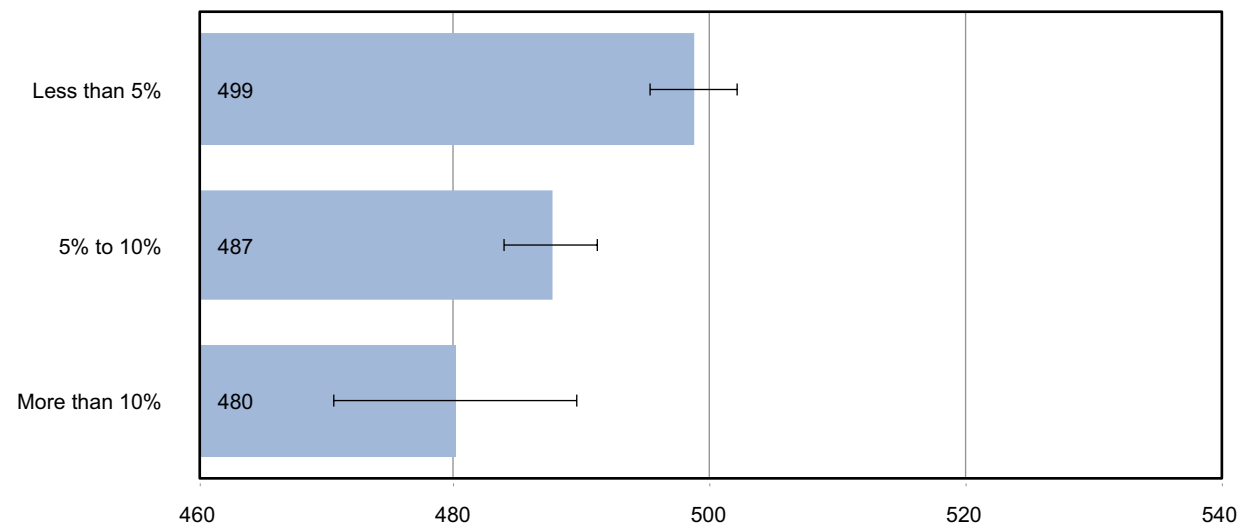
Chart 7.5 The percentage of school absenteeism by jurisdiction and language



The relationship of absence rates to school mean reading scores is shown in Chart 7.6. This indicates that schools with less than 5% absences have higher

reading performance than schools with higher absence rates.

Chart 7.6 School mean reading scores by school absence rates



Students were asked to report the number of days they had been absent during the current school year. Breakdowns by jurisdiction and language are given in Chart 7.7. The pattern here is not directly comparable with that for schools because more categories were used for students and students are weighted differently than schools. Differences across populations are not as distinct here as for schools. In almost all cases, 50% to 60% of students reported being

absent between 3 and 10 days. However, it is notable that the four populations with the most students reporting the fewest days absent (0–2) are francophone: British Columbia (French), Alberta (French), Quebec (French), and New Brunswick (French). Indeed, if the first two categories are combined, all francophone populations show lower absence rates than any of the anglophone populations. This is consistent with the pattern seen for schools.

Chart 7.7 Student absence rates, by number of days, by jurisdiction and language

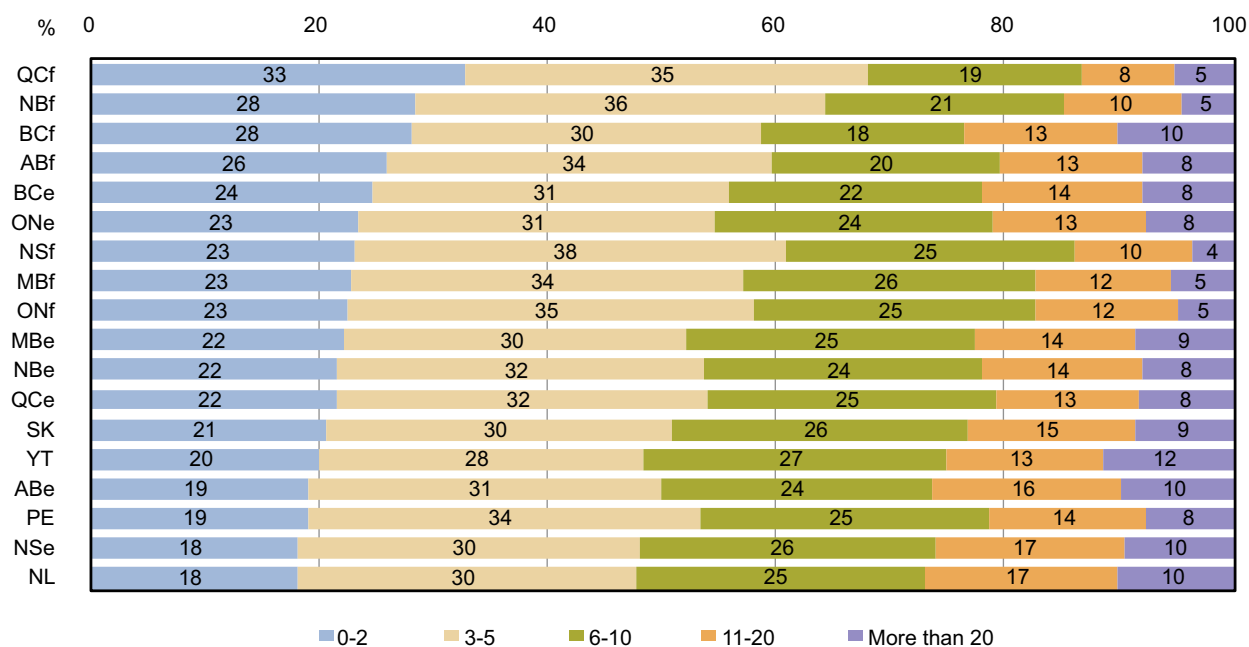


Chart 7.8 gives the reading proficiency levels and Chart 7.9 the mean reading scores by student absence rates. Except for the lowest category (0–2 days), the general pattern is one of lower achievement with higher rates of absence. In particular, those with

3 to 5 days’ absence show significantly higher reading scores than those in any of the higher absence categories, and those with 20 or more days’ absence show lower scores than any other group.

Chart 7.8 Reading proficiency levels by student absence rates, by number of days

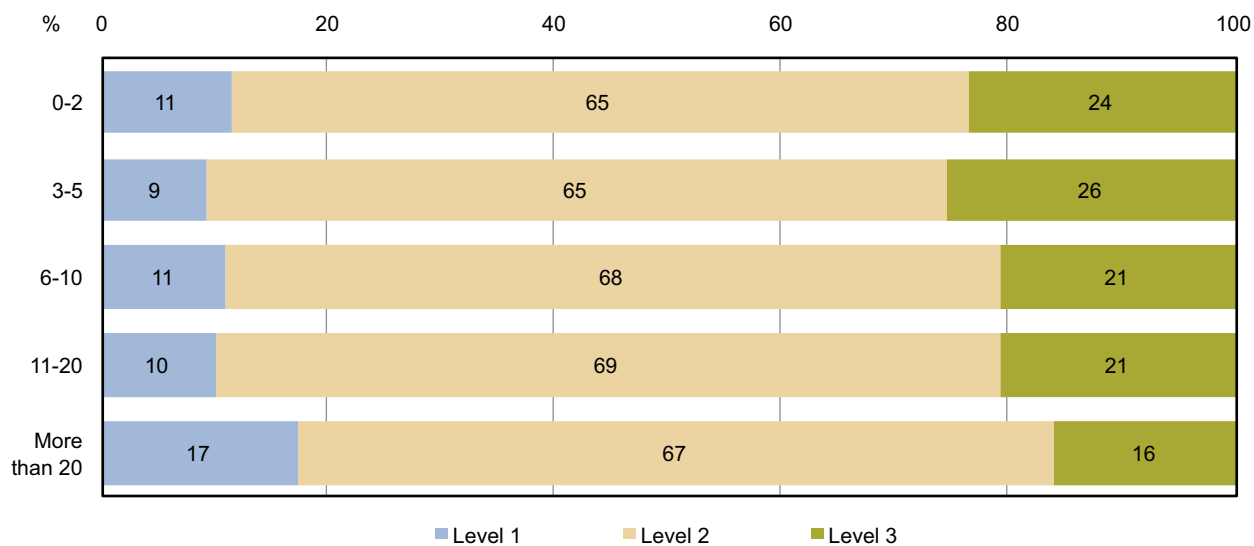
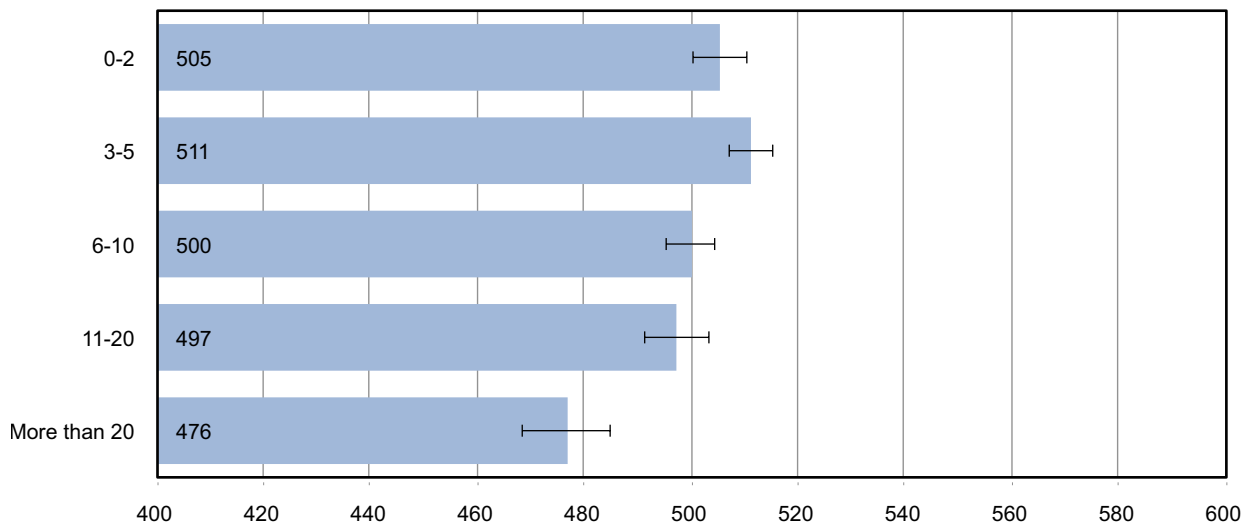


Chart 7.9 Mean reading scores by student absence rates, by number of days



Time lost during school year

Teachers were asked to estimate the number of instructional days lost during a year to activities or circumstances such as weather, maintenance problems, sports activities, and so on. These were added to give the total number of instructional days lost. A similar question was asked for total number of hours other than full days lost because of interruptions to instruction. Responses were scaled into approximate quintiles and the results given by jurisdiction and

language in Charts 7.10 and 7.11. These results are notable for their wide variation among teachers both within and across populations. In all jurisdictions, some schools clearly lose much more time than others. However, it is also the case that more schools in some jurisdictions than in others lose relatively large numbers of days. The pattern for hours lost is somewhat less variable across jurisdictions than that for days lost.

Chart 7.10 Teacher reports of instructional days lost by jurisdiction and language

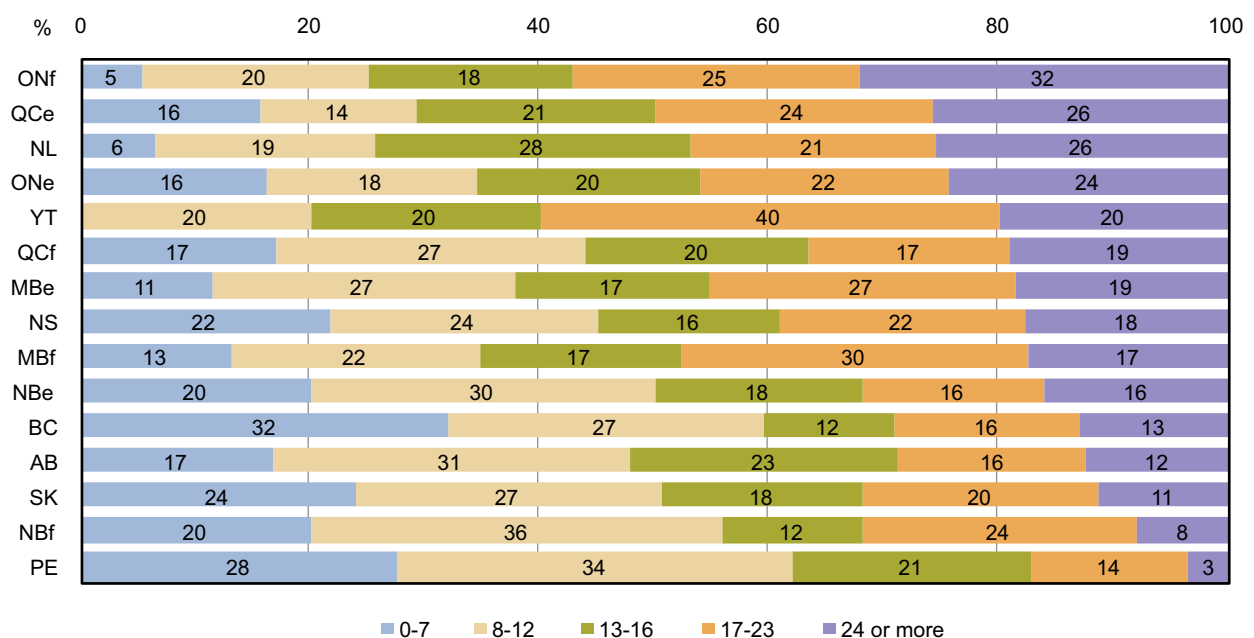
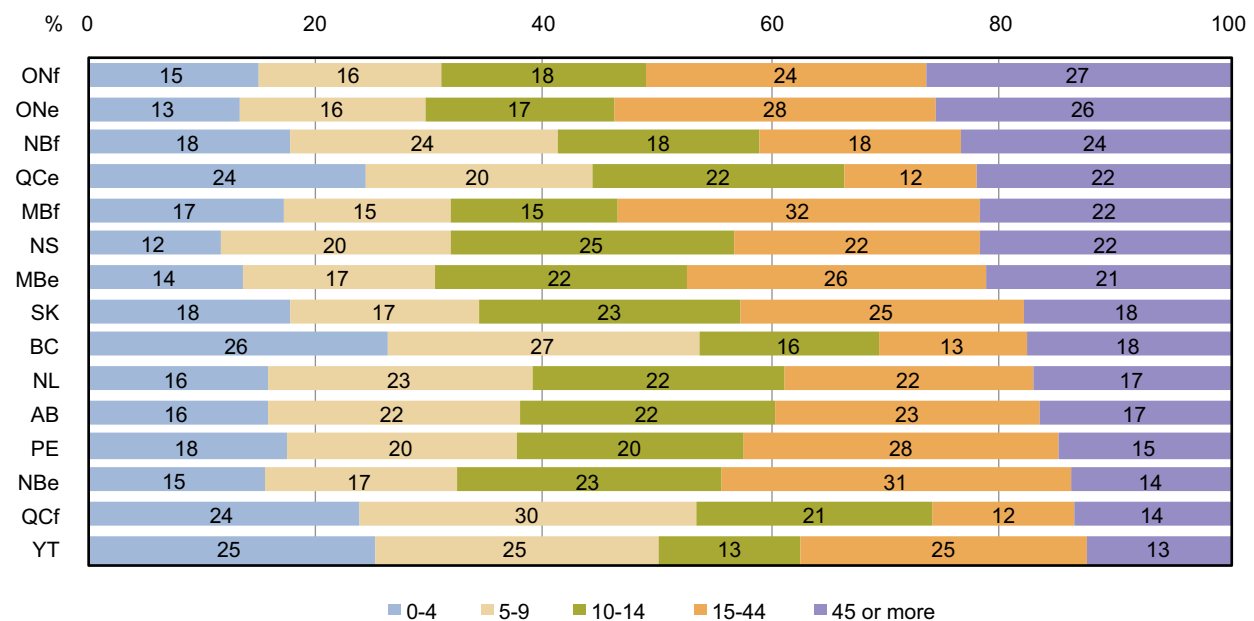


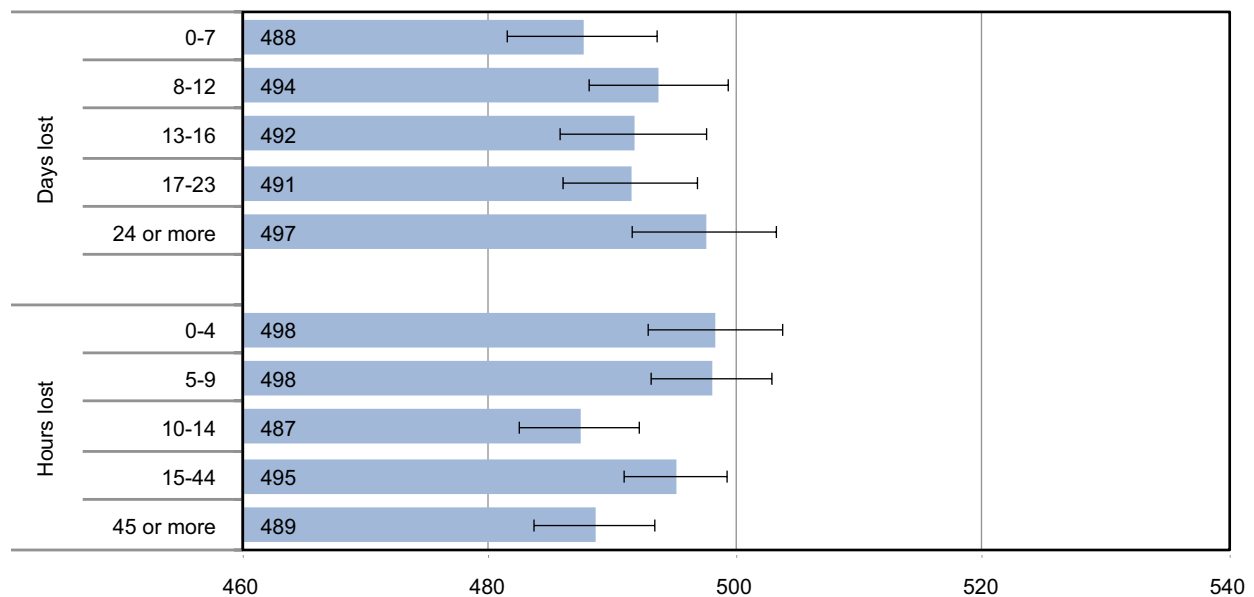
Chart 7.11 Teacher reports of instructional hours lost by jurisdiction and language



Mean reading scores for teachers reporting various amounts of time lost are given in Chart 7.12. In general, no significant pattern of differences in

reading performance is found across the ranges of time lost.

Chart 7.12 Teacher mean reading scores by time lost



Homework

Information on homework was gathered from both teachers and students. Teachers were asked about how often they assign homework in language arts, how much time they expect students to spend on

homework, and how they handle completed homework. Students were asked to report the amount of time they spend on homework in all subjects and in language arts.

Teacher reports of frequency of language arts homework assignments and expected time spent per week on language arts homework are given in Charts 7.13 and 7.14. In almost all jurisdictions, more than 60% of teachers assign homework at least a few times a week. Expectations for time to be spent on

homework are quite variable across teachers within jurisdictions. There is also substantial variation among jurisdictions, especially in the percentage of teachers assigning homework in every or almost every class.

Chart 7.13 Teacher reports of frequency of homework assignments in language arts by jurisdiction and language

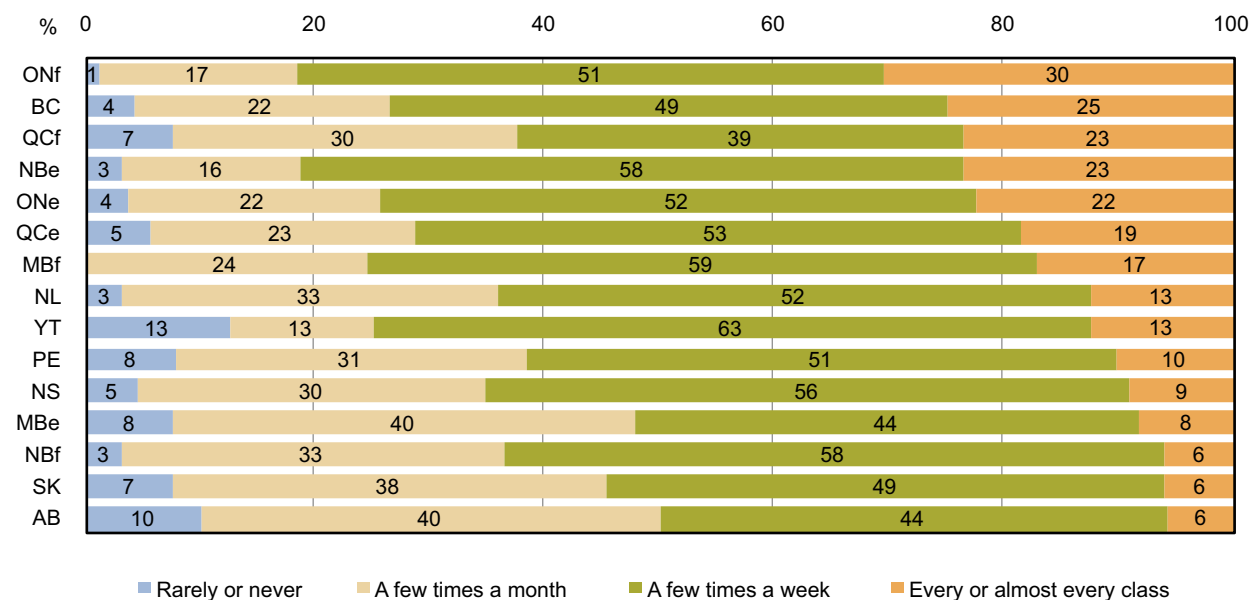
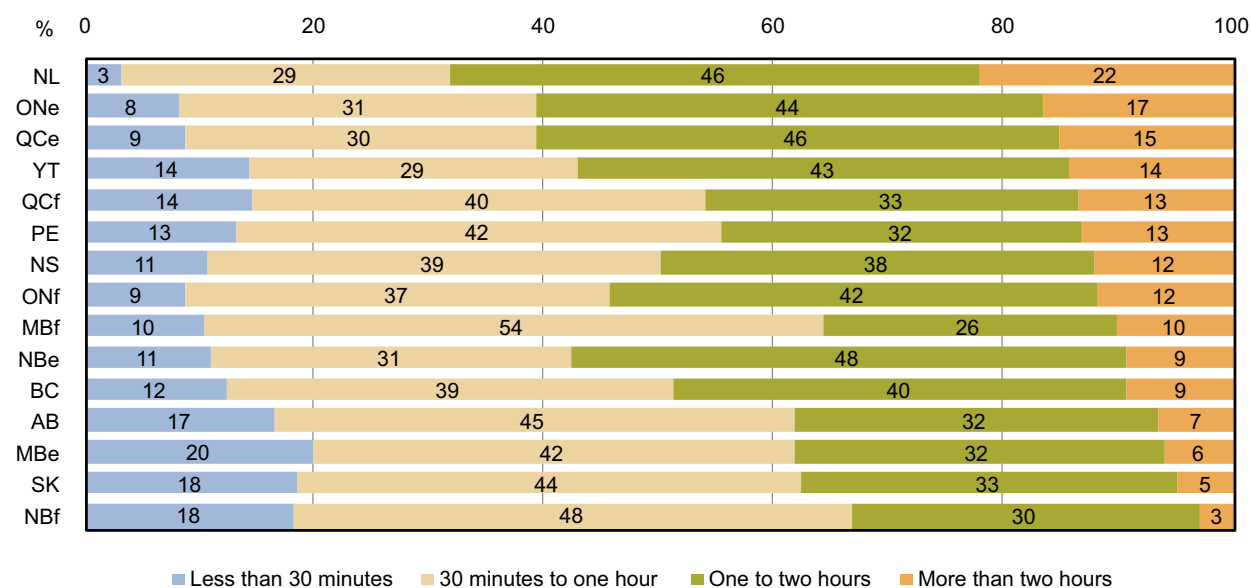


Chart 7.14 Teacher reports of expected time spent per week on homework in language arts by jurisdiction and language

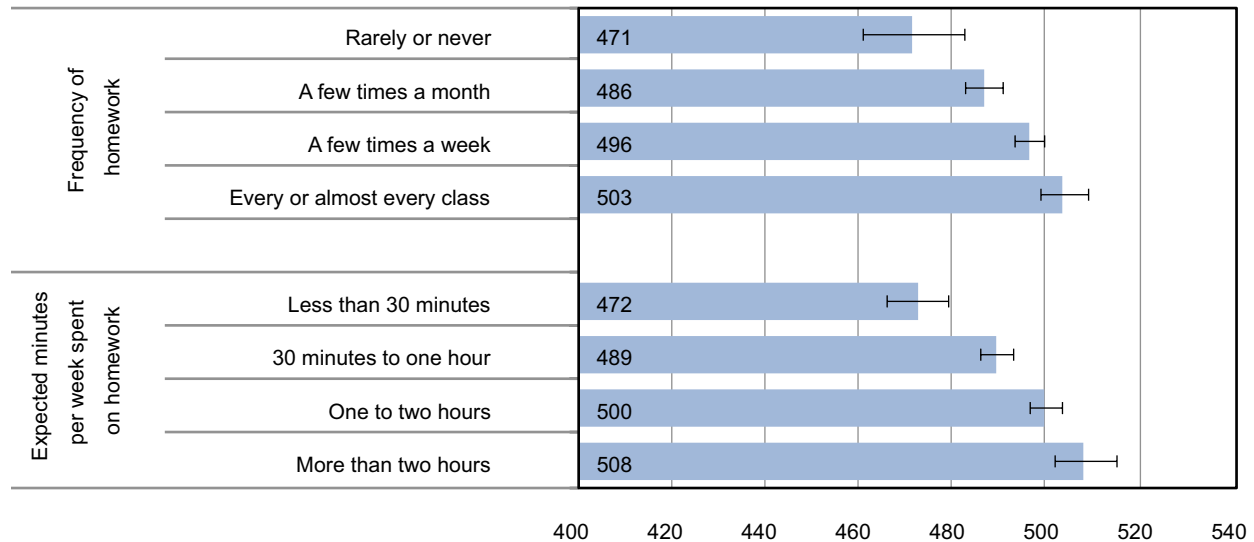


Mean reading scores for teachers reporting the frequency of and expected time spent on homework are given in Chart 7.15. A clear pattern is evident here

of higher reading performance in classes where more frequent homework is assigned and more homework time is expected. It is noted that homework in all

subjects includes language arts homework as well, so the effects of the two homework variables on reading scores are not independent of each other. This point will be examined in the multivariate model.

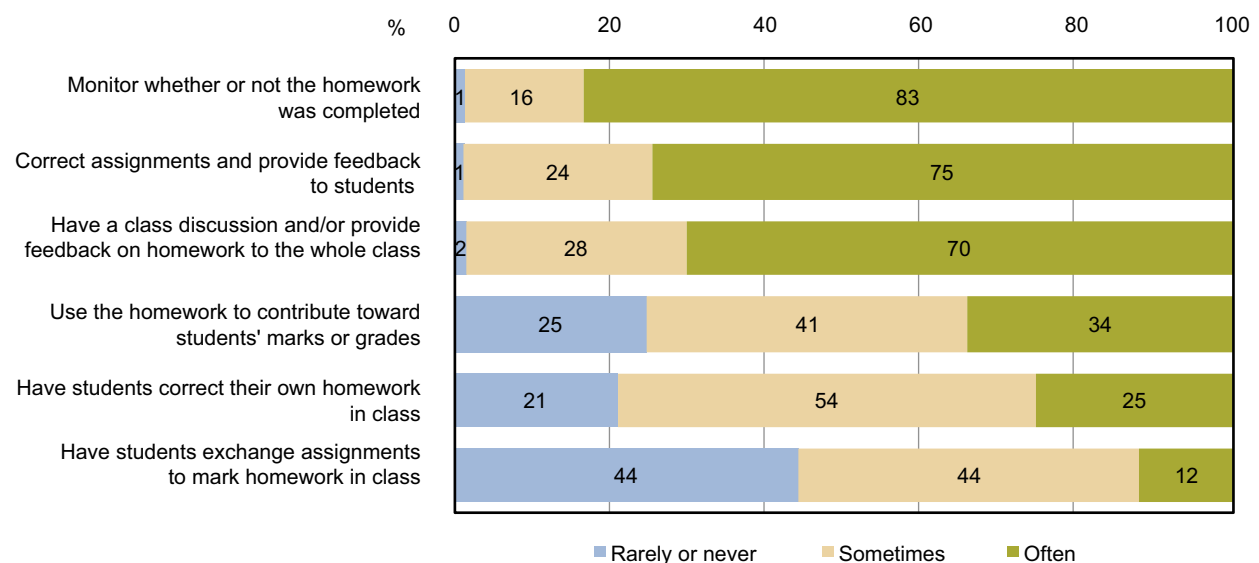
Chart 7.15 Teacher mean reading scores by frequency of assignments and time expected in language arts homework²⁴



Teachers were also asked a number of questions about the frequency with which they use various methods of monitoring and correcting homework. Responses for all teachers are shown in Chart 7.16. This indicates that three techniques—monitoring for completion, correcting and providing feedback on individual assignments, and having class

discussions—are often used by most teachers. Having students correct their own homework or having them exchange and correct assignments are less frequently used. Teachers vary in the extent to which they use homework as a contribution toward student marks or grades.

Chart 7.16 Teacher reports of frequency of monitoring and correcting homework

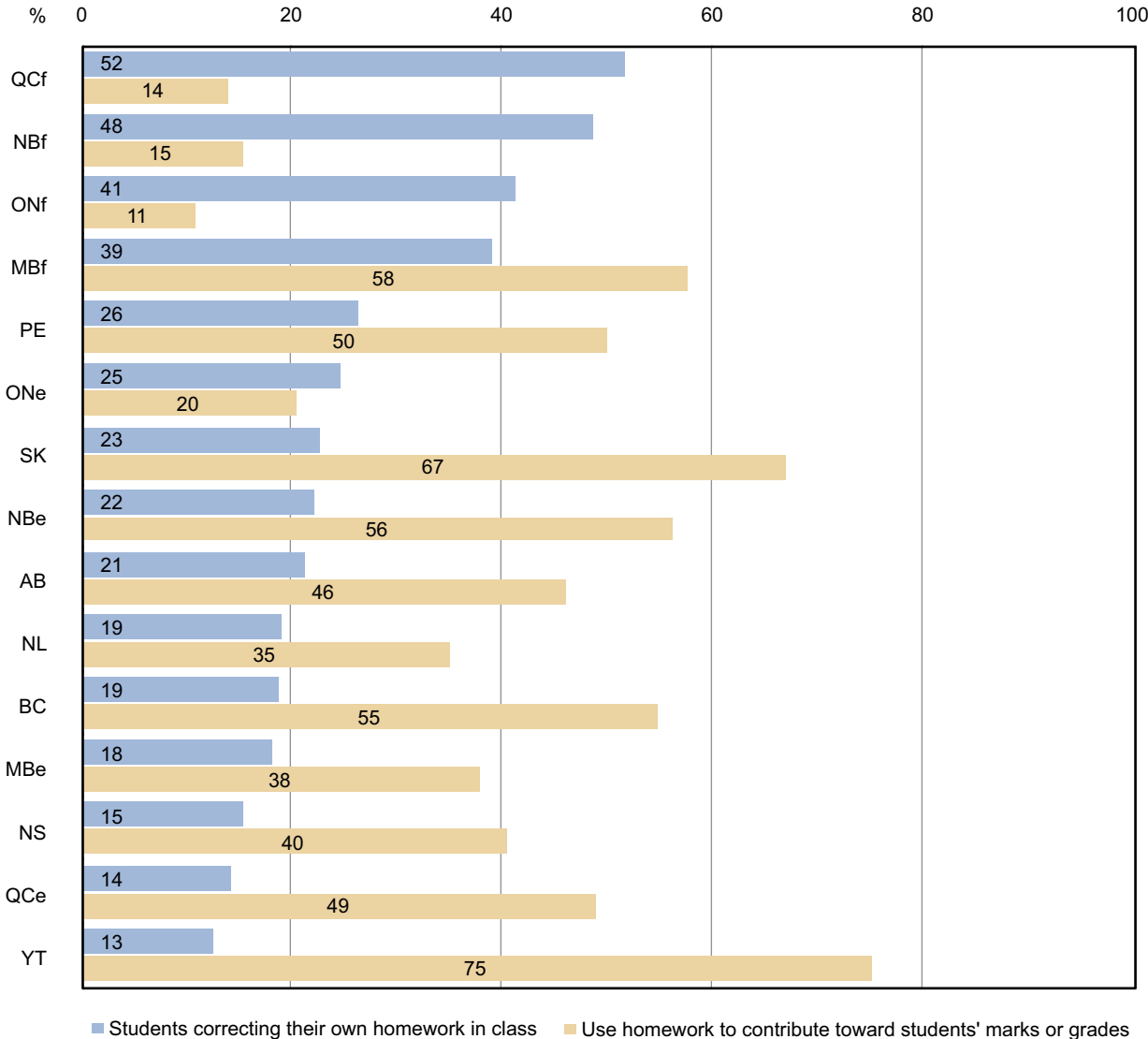


²⁴As in previous chapters, a teacher reading score is the mean score attained by students taught by a teacher. The results reported are the means of these means, over all teachers within a particular category.

Responses to most of these questions show little variation across populations, so the charts are not shown. However, there is evidence of a division between francophone and anglophone populations on two questions: students correcting their own homework and use of homework to contribute to marks or grades. The population breakdown of the “often” category for these two items is shown in Chart 7.17.

These results show that more teachers in franco-
phone populations often have students correct
their own homework in class. Three of these
populations—the exception being Manitoba
(French)—along with Ontario (English), have low
levels of use of homework as a contribution toward
student marks or grades.

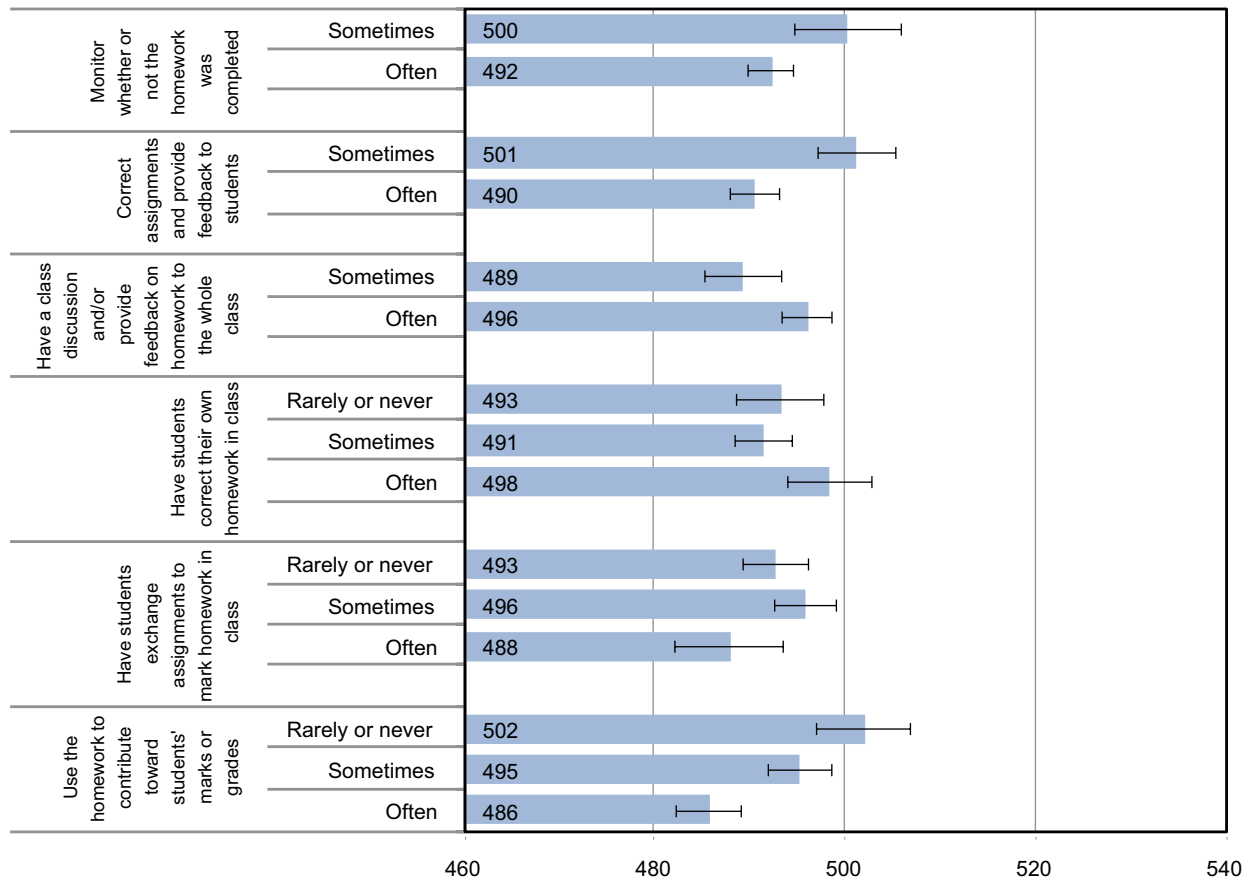
Chart 7.17 Teacher reports on how often students correct their own homework in class and the use of homework toward marks or grades by jurisdiction and language



Teacher mean reading scores by frequency of use of methods for dealing with homework are given in Chart 7.18. This shows that more frequent use of three of the methods (monitoring completion, correcting and providing feedback, and counting

homework toward marks or grades) are significantly associated with lower reading scores. More frequently having a class discussion about homework is associated with higher reading scores.

Chart 7.18 Teacher mean reading scores by frequency of use of methods



Student responses to the questions on time per week spent on homework in all subjects and in language arts are shown in Charts 7.19 and 7.20. Again, these charts show wide variations among students but no particular pattern in the variation across populations.

Combining the categories shows that close to 60% of students in most populations reported doing 2 hours or less of homework in all subjects per week. Close to 75% reported doing one hour or less of language arts homework.

Chart 7.19 Student weekly time spent on homework in all subjects by jurisdiction and language

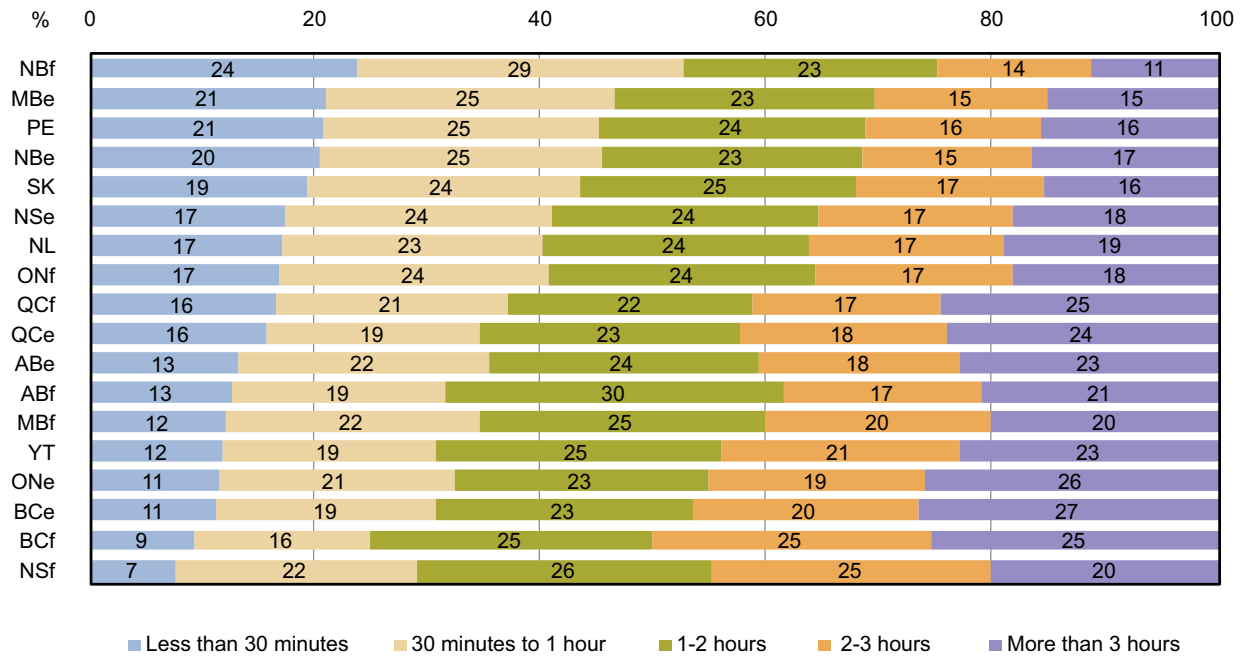


Chart 7.20 Student weekly time spent on language arts homework by jurisdiction and language

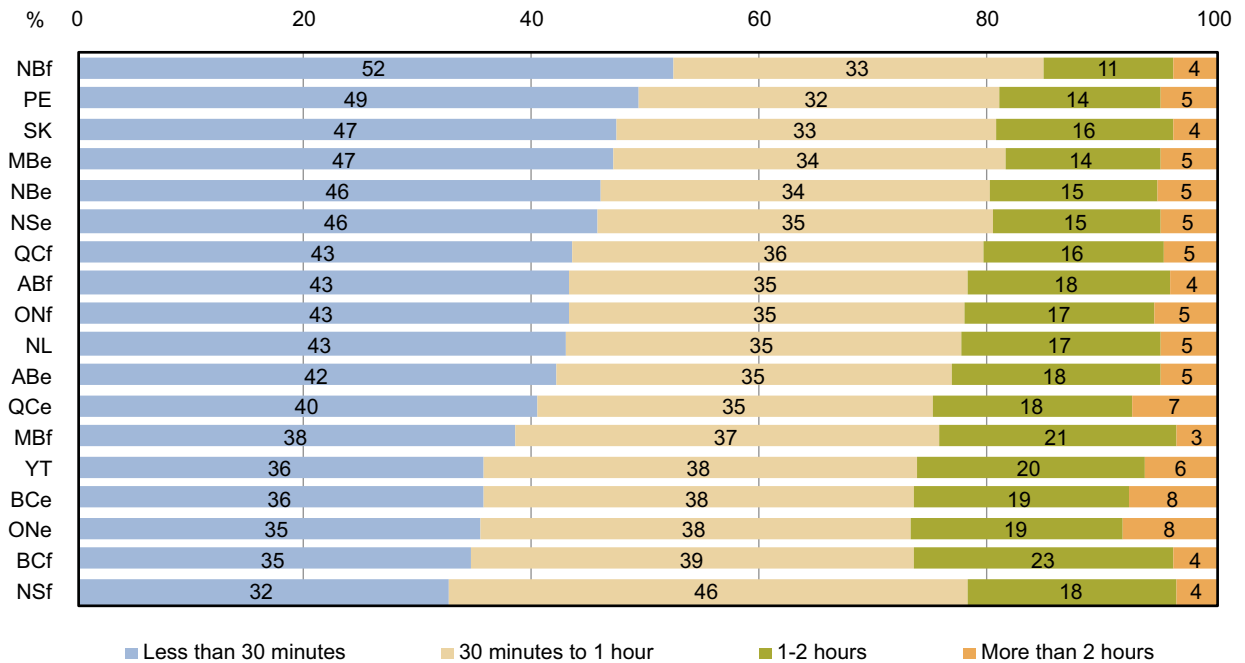


Chart 7.21 gives reading proficiency levels and Chart 7.22 mean reading scores for students at different weekly amounts of homework. The pattern for homework in all subjects is clearly in the direction of more homework being associated with higher reading

performance. The trend for language arts homework is in the same direction but is less clear. In particular, there are no significant differences in performance for students doing homework for 30 minutes to 1 hour, 1-2 hours, or 2-3 hours.

Chart 7.21 Reading proficiency levels by weekly homework amounts

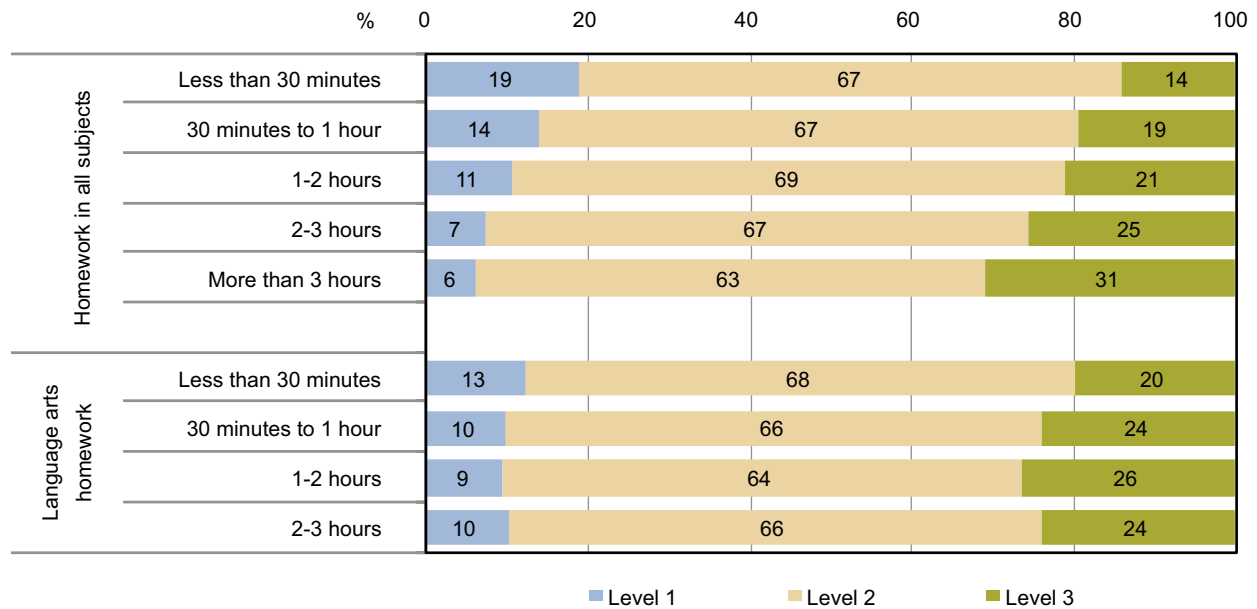
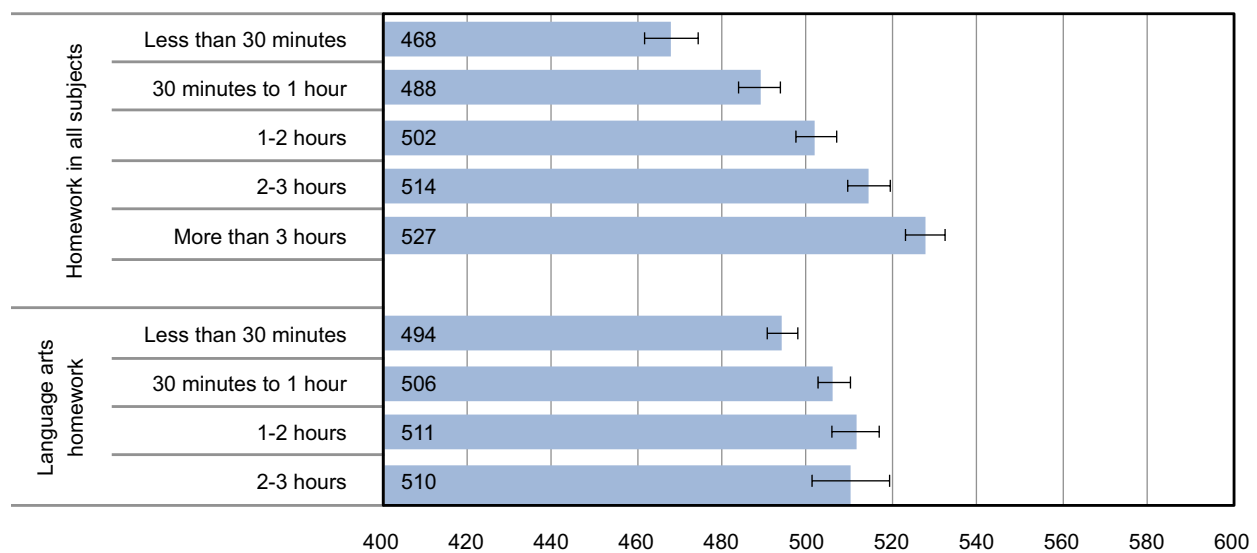


Chart 7.22 Mean reading scores by weekly homework amounts



Multivariate effects

As before, each of the time variables was first entered into the model independently and the bivariate effect computed. All of these variables were then entered into a model with demographic variables as covariates. This model provided the multivariate effects.

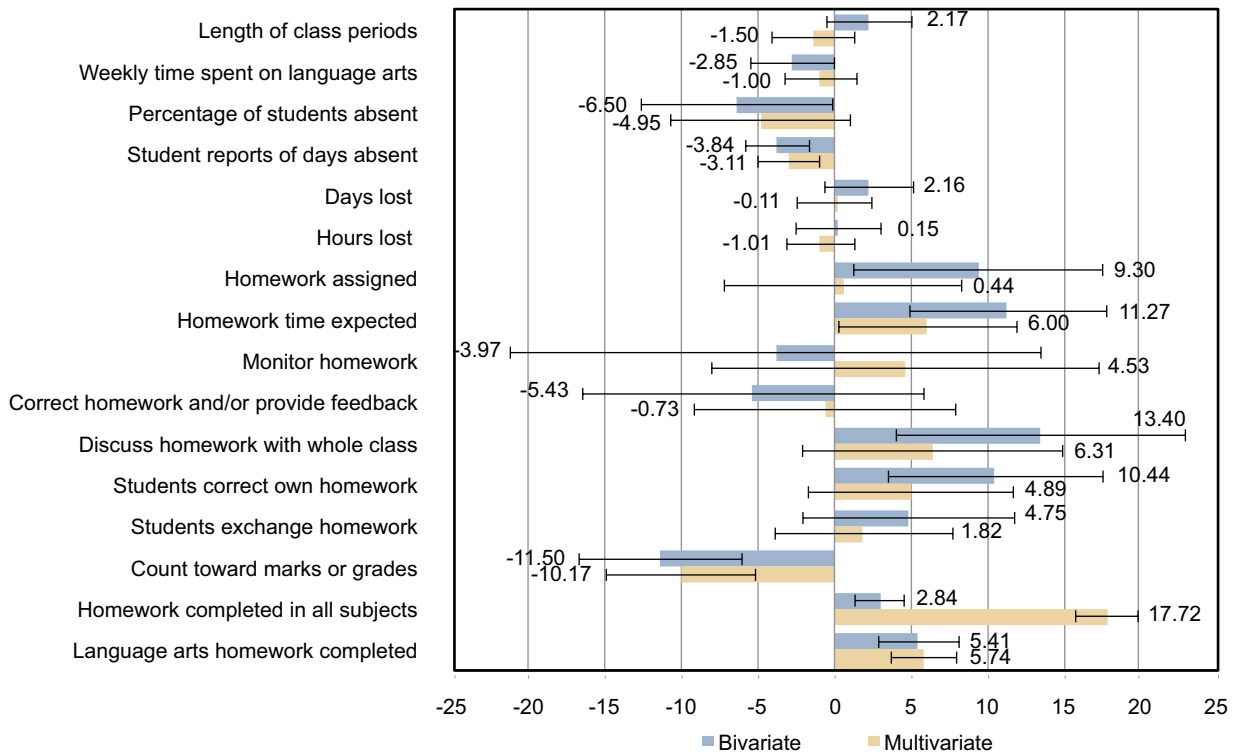
The bivariate and multivariate effects are shown in Chart 7.23. In most cases, the confidence intervals are wide relative to the size of the effects so that many effects are not significantly different from zero. A general pattern of effect sizes diminishing from the bivariate to the multivariate model is observed, with several variables moving from significant to non-significant. In such situations, the original bivariate effects of a particular variable are attenuated by the inter-correlations of that variable with other variables in the model.

The percentage of students absent at the school level shows a significantly negative effect in the bivariate model but is nonsignificant in the multivariate model. This implies that the effect of absence is offset once other variables related to absence are controlled. On the other hand, student reports of their

own days absent shows a consistent negative effect. Together, these two results suggest that individual student absence is more important to student reading performance than the overall school-level absence rate is to school reading performance.

The weekly amount of homework assigned by teachers shows a significantly positive effect in the bivariate model but is near zero in the multivariate model, whereas the effect of the amount of time the teacher expects students to engage in homework is significantly positive in both models. A consistent positive effect is also found for both homework in all subjects and language arts homework completed by the student, indicating that these effects are more independent than might be expected. Indeed, the effect of homework in all subjects is one of the few that significantly increases in the multivariate, as compared to the bivariate model. Finally, most of the ways of monitoring and correcting homework have large standard errors and show nonsignificant or inconsistent effects. The exception is the use of homework as a contribution to student marks or grades, where the effect is negative in both models.

Chart 7.23 Regression coefficients for time allocation and use



8. TEACHING STRATEGIES IN READING

Although the teaching of reading as a formal activity takes place mainly in the early grades, it is reasonable to expect that students would continue to improve their reading abilities throughout the intermediate and high school grades and that teachers need to continue to reinforce good student reading skills and habits in the intermediate grades. Therefore, a large set of questions on the teacher questionnaire was devoted to ways in which this can be done. Some student questions were also related to teaching strategies. This chapter summarizes the findings in this area.

Before, during, and after reading strategies

Reading experts involved in developing the questionnaires identified a number of strategies that may be used prior to reading, during reading, and after reading to help students understand what is being read. Teachers were asked to respond to the strategies they use at these three stages on a scale representing extent of use (not at all, a little, more than a little, a lot). The three stages and questionnaire items within each are given in Table 8.1.

Responses to the questions concerning each of these three stages were subjected to separate factor analyses. In this case, however, the analysis revealed only one factor for each of the three sets of questionnaire items. Indeed, within each set, responses to all questions were highly correlated, indicating that teachers differ in the extent to which they use all of these strategies but that they do not differentiate among the strategies within each set. In some survey

situations, this simply reflects what is known as a “halo” effect, in which respondents tend to give the same response to all questions that look similar. However, this may also be a genuine indicator of differences in the extent of use of all these strategies. On the assumption that the latter was the case, it was decided to compute, for each stage (pre-reading,

Indeed, within each set, responses to all questions were highly correlated, indicating that teachers differ in the extent to which they use all of these strategies but that they do not differentiate among the strategies within each set.

during reading, and after reading), an average response for each teacher and to examine differences among teachers in the extent to which they use strategies within each stage. For purposes of analysis, each stage may be considered as representing a single factor, with values scaled to the original item response scale by averaging over all questions and rounding the averages.

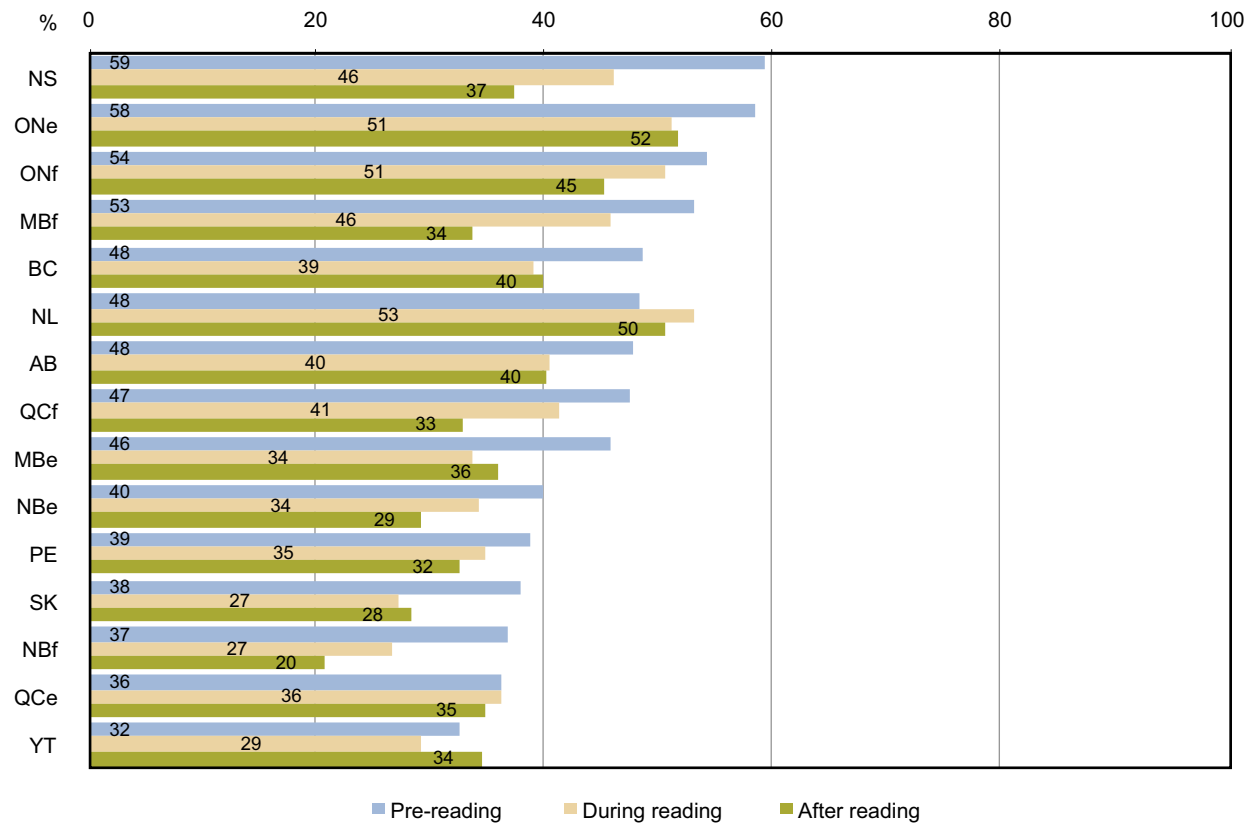
Table 8.1 Questionnaire items and stages for teaching strategies used by teachers

Pre-reading strategies	<ul style="list-style-type: none"> Predicting Determining the purpose for reading Activating prior knowledge Previewing aspects of text
During reading strategies	<ul style="list-style-type: none"> Monitoring for understanding Making connections Determining author's intention Visualizing Skimming and scanning Locating main/key ideas Making valid inferences Asking questions Analyzing text structures
After reading strategies	<ul style="list-style-type: none"> Summarizing Analyzing critically Determining author's message Distinguishing fact from opinion Determining bias in text Re-reading and reflecting

The percentages of teachers reporting that they use strategies “a lot” within each of the pre-reading, during reading, and after reading stages are given by jurisdiction and language in Chart 8.1. The chart is sorted in descending order on pre-reading strategies to clarify the pattern. In most populations, the proportion using pre-reading strategies is slightly larger than the percentage using either during or

after reading strategies. There is considerable variation across jurisdictions in the use of these strategies, particularly the pre-reading strategies. In several populations, particularly Nova Scotia, Manitoba (French), Quebec (French), and New Brunswick (French), there seems to be considerable variation in use of strategies across the three stages.

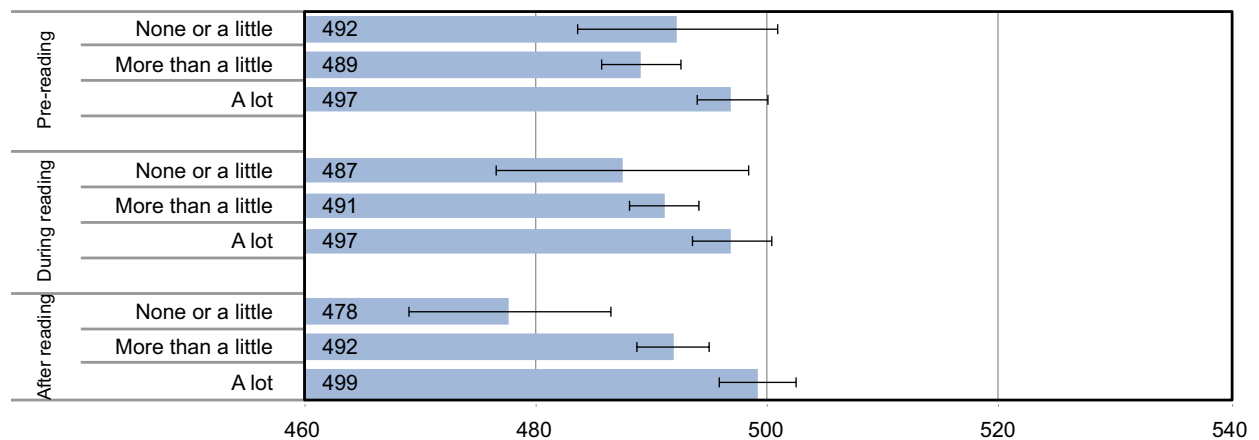
Chart 8.1 Percentage of teachers using “a lot” of pre-reading, during reading, and after reading strategies by jurisdiction and language



Mean reading scores by extent of teacher use of these strategies are given in Chart 8.2.²⁵ Because relatively few teachers characterize their use of these strategies as “none or a little,” the errors for this category are relatively large. However, the general trend is in the

direction of higher reading performance for teachers who make the most extensive use of these strategies. This is especially so for “after reading strategies,” which are generally used somewhat less often than the other strategies.

Chart 8.2 Teacher mean reading scores by extent of teacher use of pre-reading, during reading, and after reading strategies



²⁵Again, readers are reminded that the reference point for teacher mean reading scores is the mean of all students taught by a teacher.

Instructional strategies in reading

Factor analysis of a set of teacher questions on specific instructional strategies in reading yielded a four-factor solution. The labels given to these factors

and the items represented by the factors are given in Table 8.2.

Table 8.2 Questionnaire items and factors for instructional strategies

Factor	Item
Direct reading	Teaching reading strategies
	Teaching basic rules of language
	Teaching language in context
	Using text research tools (e.g., dictionaries, encyclopedias, Internet)
	Student notetaking
Reading aloud	Reading aloud to students
	Students reading aloud to the whole class or in groups
Indirect reading	Discussion in small groups or the whole class
	Graphic organizers
Silent reading	Silent reading of teacher-selected material
	Silent reading of student-selected material

Mean factor scores for each of these factors by jurisdiction and language are given in Charts 8.3 to 8.6. There are some strong contrasts between jurisdictions on the use of these strategies. Quebec (French) teachers make greater use of direct reading strategies than those in any other jurisdiction. Other francophone jurisdictions also have high levels of use of direct reading strategies. The opposite trend is found for indirect reading

strategies, with francophone teachers generally making less extensive use of these strategies. There is no clear pattern in the use of reading aloud or silent reading strategies, although New Brunswick (French) teachers make less use of reading aloud than those in any other jurisdiction and those in Newfoundland and Labrador use silent reading less than in most other jurisdictions.

Chart 8.3 Mean factor scores for teacher use of direct reading strategies by jurisdiction and language

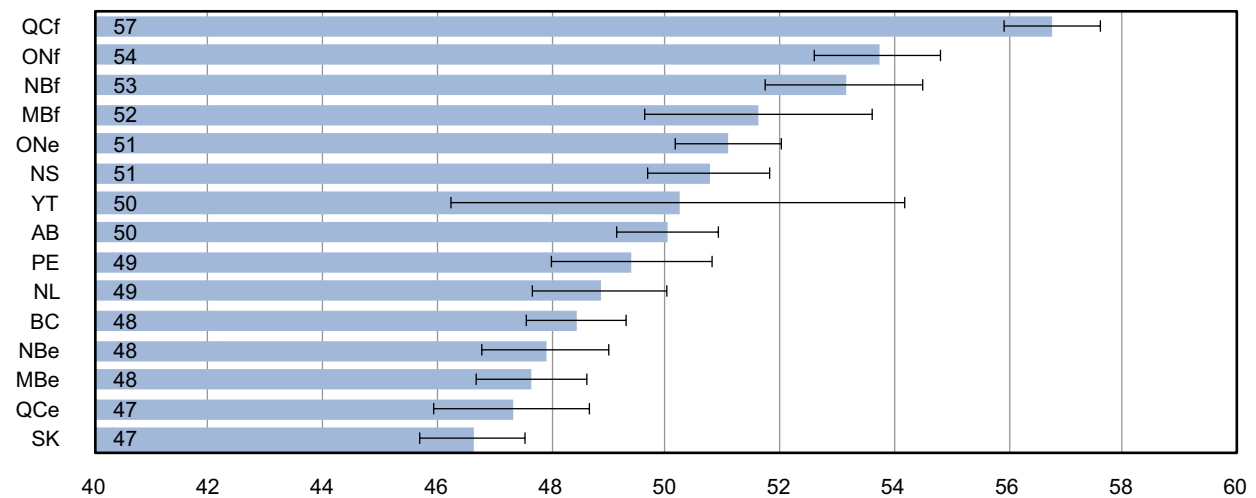


Chart 8.4 Mean factor scores for teacher use of reading aloud strategies by jurisdiction and language

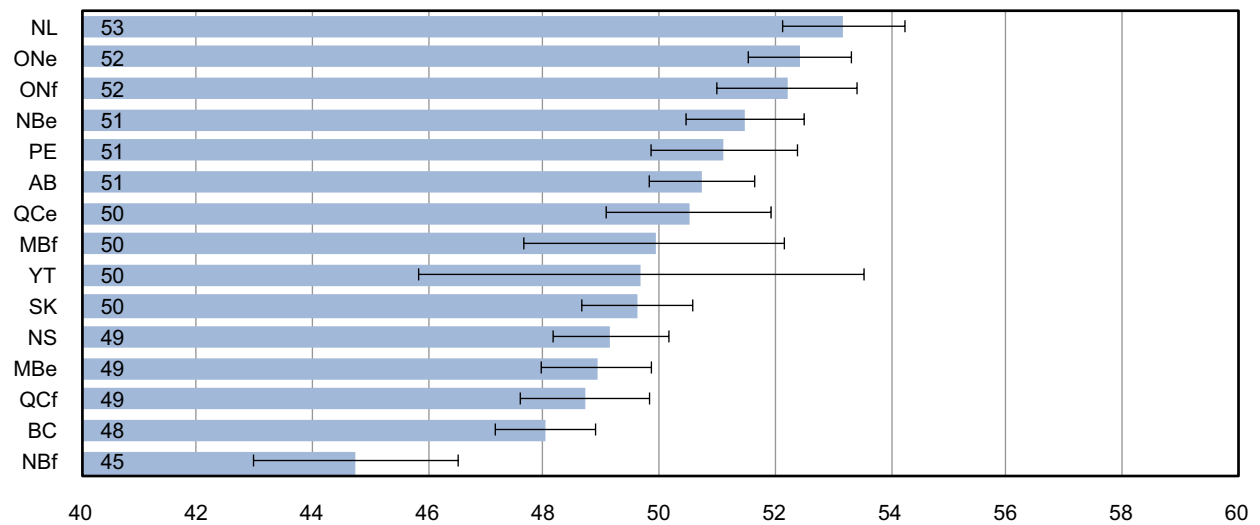


Chart 8.5 Mean factor scores for teacher use of indirect reading strategies by jurisdiction and language

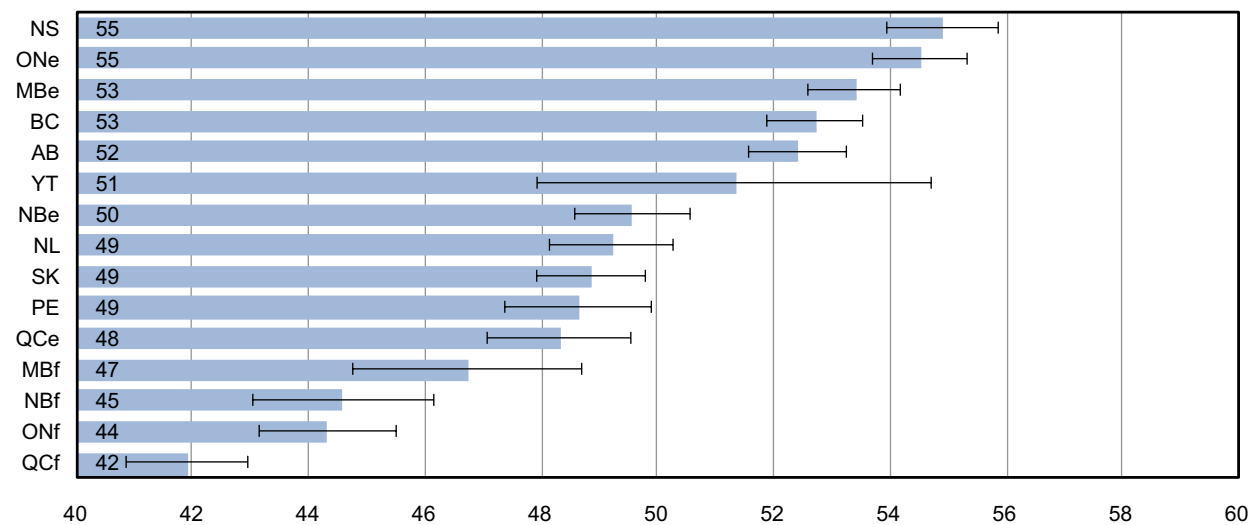
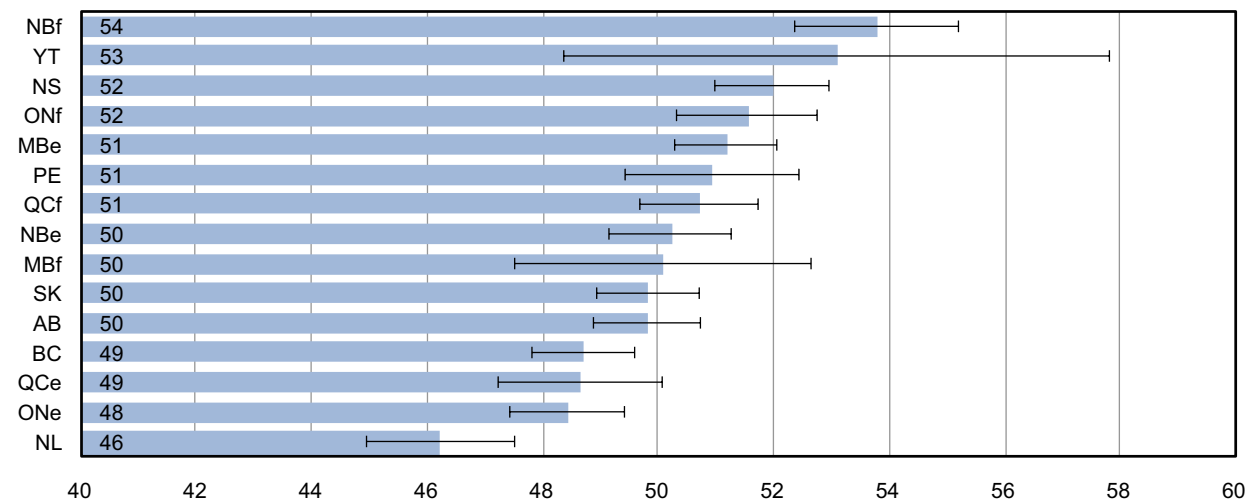


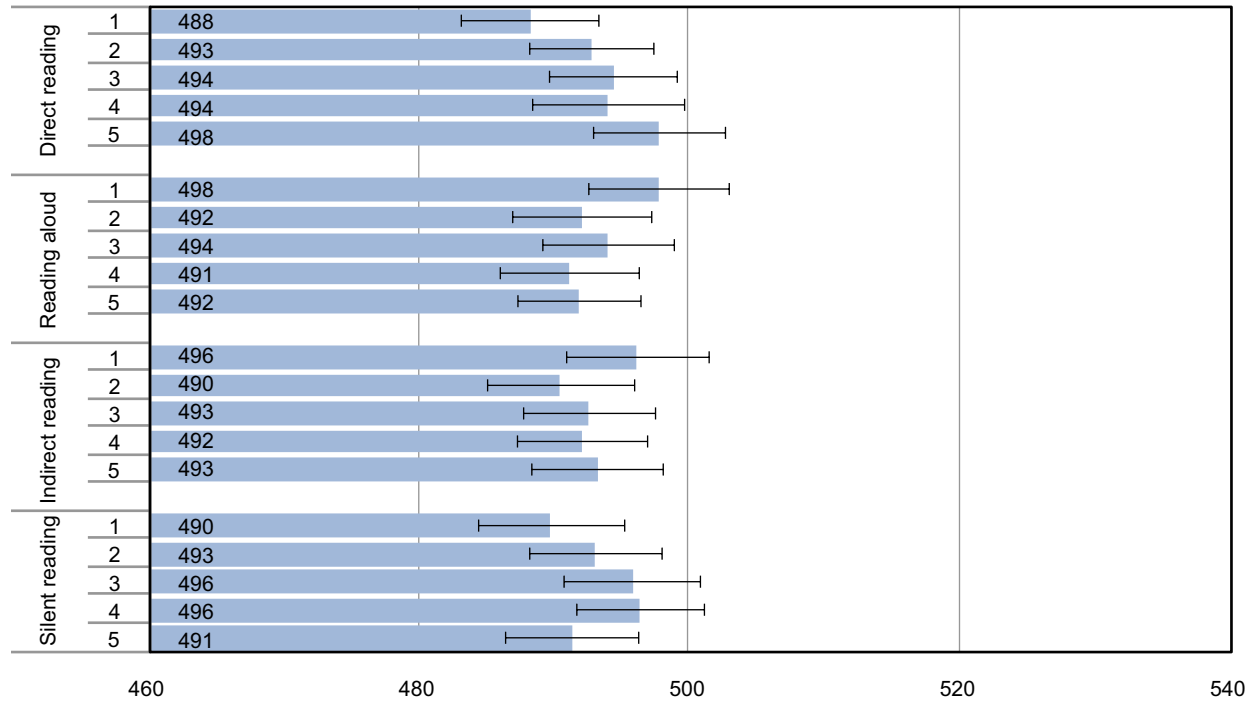
Chart 8.6 Mean factor scores for teacher use of silent reading strategies by jurisdiction and language



As before, the factor scores were divided into five equal groups (quintiles) and the mean reading scores for teachers at these five levels for the four strategies were computed. The results are shown in Chart 8.7. With only one exception, none of these contrasts is statistically significant. The exception is that those

making most use of direct reading strategies have significantly higher mean reading scores than those making least use of these strategies. However, there is no clear trend among the intermediate ranges on this strategy.

Chart 8.7 Teacher mean reading scores for instructional-strategy quintiles



Reading materials used by teachers

Teachers were given a selection of six types of reading material that might be used in language arts classes and asked to indicate how often they use each of these types (rarely or never, sometimes, often).

As indicated in Table 8.3, these questions were resolved into two factors, labelled informational and creative, with “persuasive” reading material appearing in both factors.

Table 8.3 Questionnaire items and factors for types of reading material used by teachers

Factor	Item
Informational	Procedural
	Informational
	Persuasive
Creative	Persuasive
	Narrative
	Poetry
	Drama

Charts 8.8 and 8.9 give the mean factor scores for these two factors by jurisdiction and language. Teachers in four populations—Ontario (French), Manitoba (French), Newfoundland and Labrador, and Ontario (English)—use informational material more often than average, while those in two populations—Quebec (French) and British Columbia—use this type of material less often than average. Overall differences for use of creative material are larger than for informational material, and creative materials

are used more often in Newfoundland and Labrador than in any other jurisdiction (except Yukon, where the error band is wide). Teachers in four other populations—Quebec (English), Ontario (English), Alberta, and British Columbia—use this form more often than average, while those in all four francophone populations, along with Saskatchewan and Prince Edward Island, use these less often than average.

Chart 8.8 Mean factor scores for frequency of teacher use of informational reading materials by jurisdiction and language

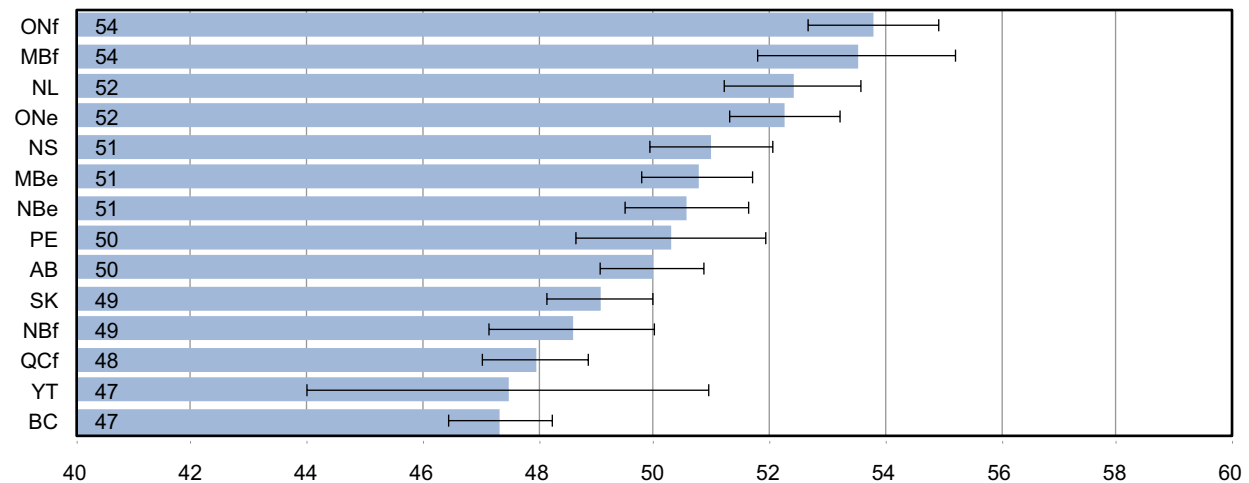
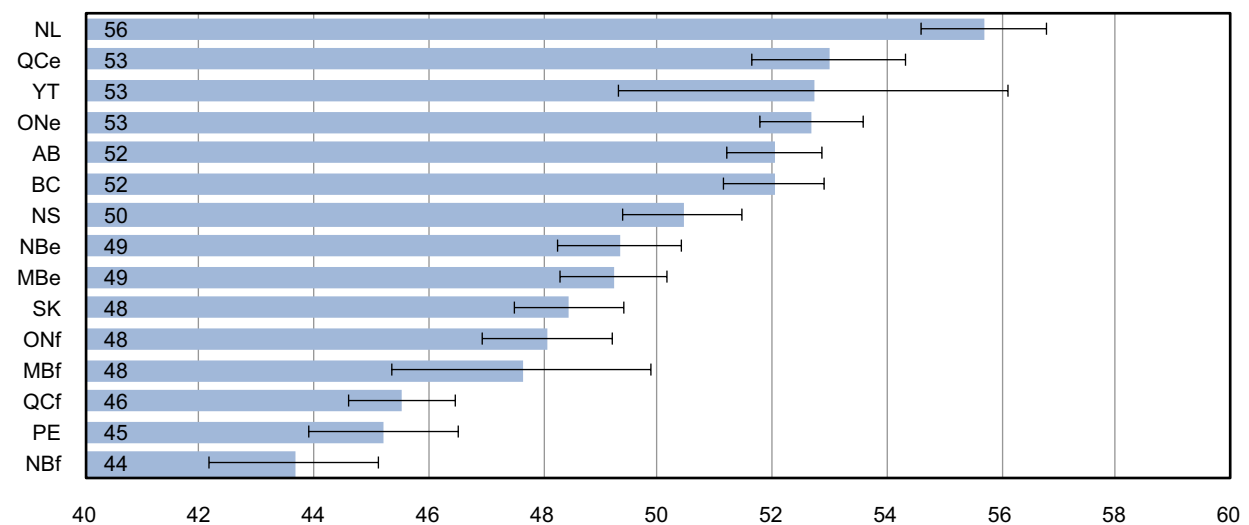


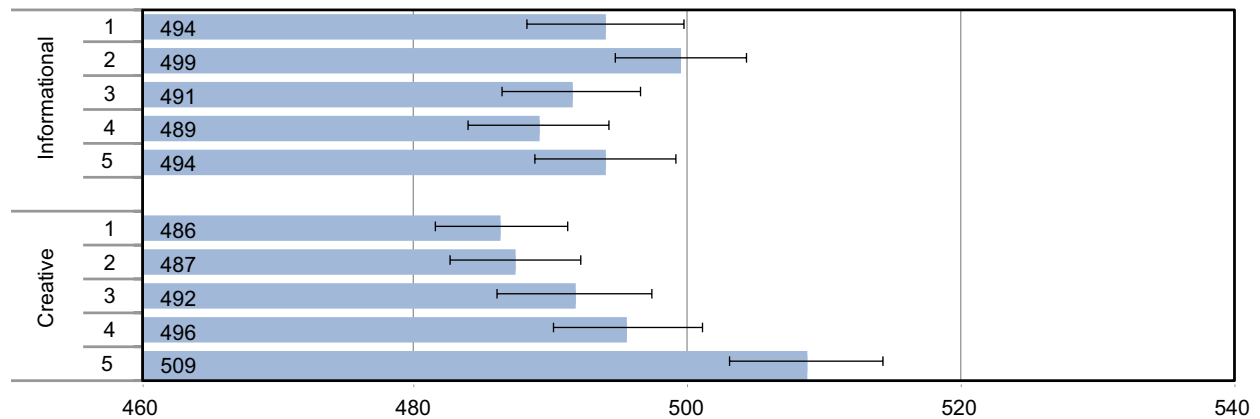
Chart 8.9 Mean factor scores for frequency of teacher use of creative reading materials by jurisdiction and language



Mean reading scores for teachers at each quintile on these factors are given in Chart 8.10. No pattern is evident for use of informational material. However, there is a trend toward increasing mean reading scores for greater use of creative material.

While differences among the lower quintiles are not statistically significant, students taught by teachers at the fifth quintile on the creative factor obtain significantly higher performance than those at the lower quintiles.

Chart 8.10 Reading scores for teacher use of informational-and-creative-reading-material quintiles

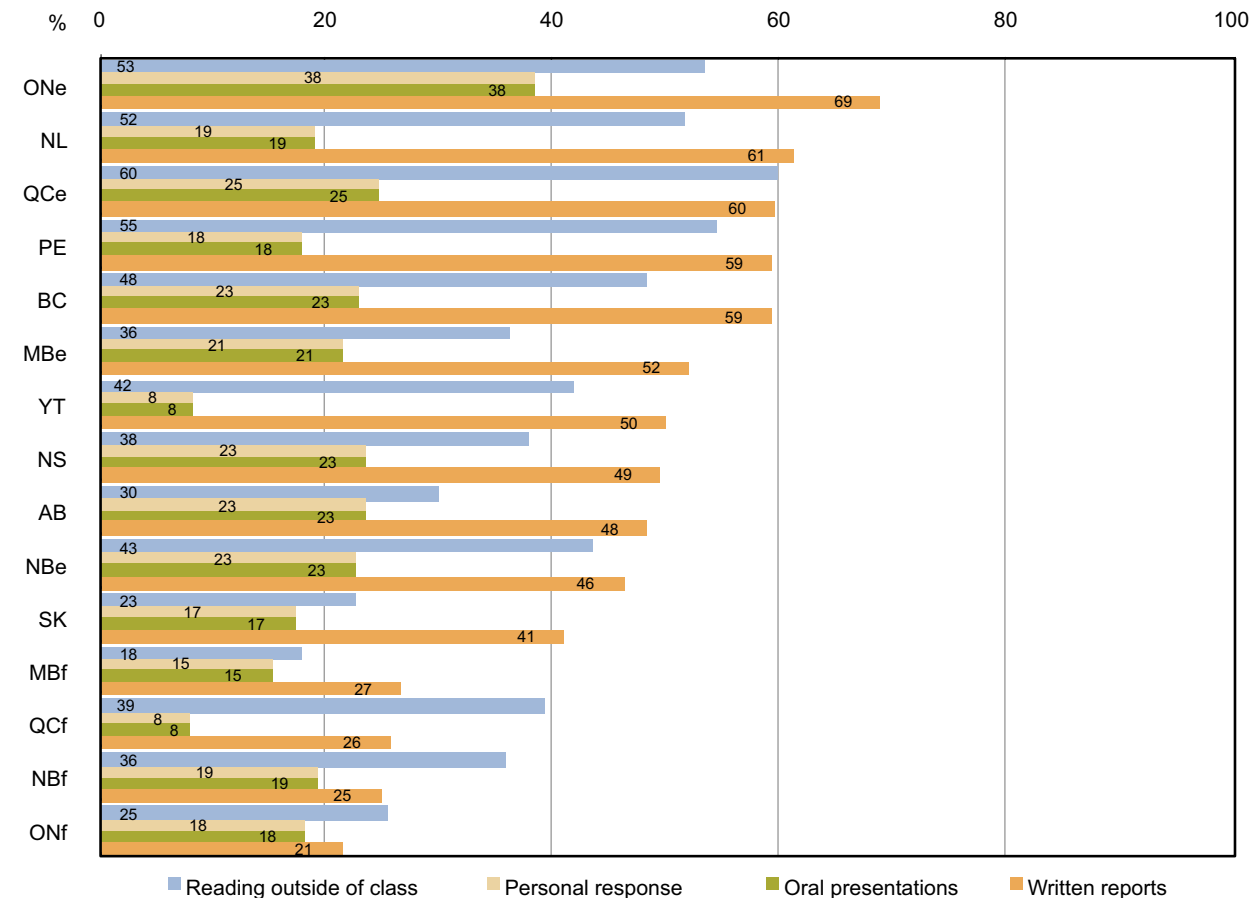


Reading assignments

Teachers were asked to indicate how often they assigned students certain tasks related to reading—specifically, reading outside of class, personal response to reading selections, oral presentations on reading selections, and written reports on reading selections. The percentage of teachers, by jurisdiction and language, responding “often” to each of these

tasks is given in Chart 8.11. It is clear from this that reading outside of class and written reports are assigned much more often than other tasks by teachers in most jurisdictions. The lowest levels of use of written reports are found in the francophone populations. These populations also make relatively low use of the other tasks.

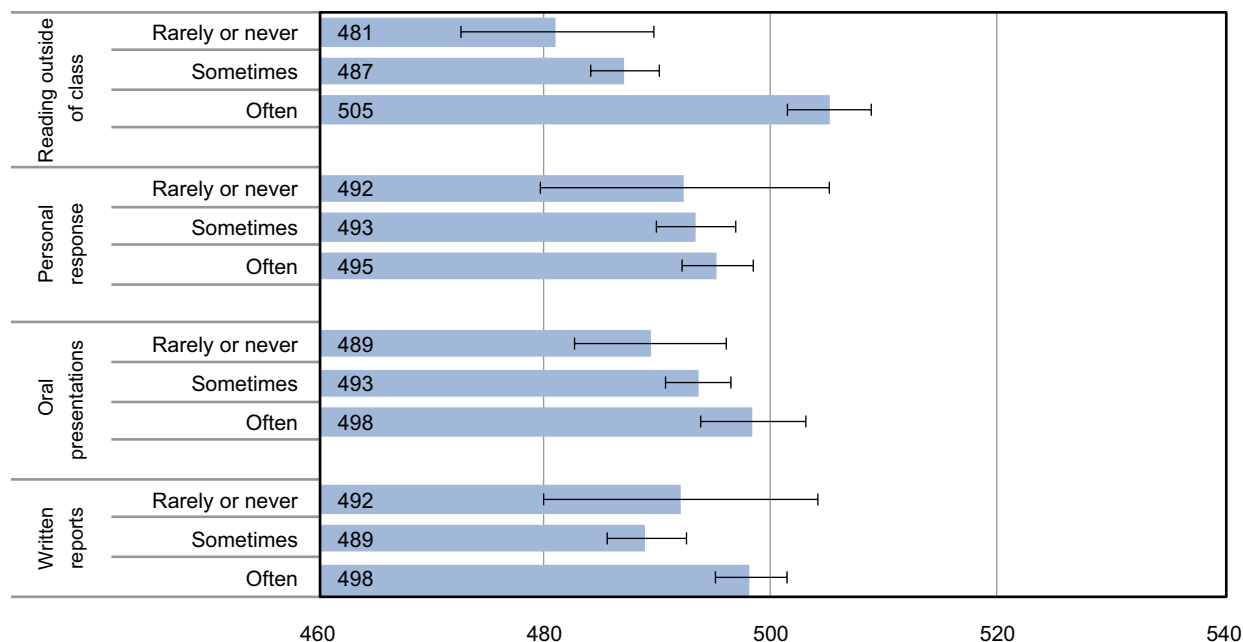
Chart 8.11 Percentage of teachers “often” assigning reading tasks by jurisdiction and language



Mean reading scores for the frequencies of teacher assignment of reading tasks are given in Chart 8.12. Error bars for the “rarely or never” category are relatively large, as few teachers reported this level of use. Significant differences in reading scores are

found between those who used the task “reading outside the class” and those who used “written reports.” As already noted, these are also the most frequently used tasks.

Chart 8.12 Teacher mean reading scores for frequency of teacher assignment of reading tasks



Accommodating diversity of student reading skills

Teachers were asked to indicate the extent to which they accommodate student diversity in reading by re-teaching basic reading skills that should have been learned in earlier grades, adapting coursework to accommodate different learning styles, or providing enrichment to advanced students. The percentages of teachers indicating that they “often” do these things are shown in Chart 8.13. It is clear from this that the most common approach to diversity is to adapt the coursework, with close to half the teachers in

all jurisdictions indicating that they use this form of accommodation. Compared to other jurisdictions, more Ontario (French) and Quebec (French) teachers reported that they re-teach basic skills. Enrichment is provided by close to 25% of teachers in most jurisdictions but by fewer than 20% in Prince Edward Island, Newfoundland and Labrador, and Saskatchewan. Saskatchewan shows close to the smallest proportion of teachers engaging in these forms of accommodation.

Chart 8.13 Percentage of teachers “often” re-teaching basic skills, adapting coursework, and providing enrichment by jurisdiction and language

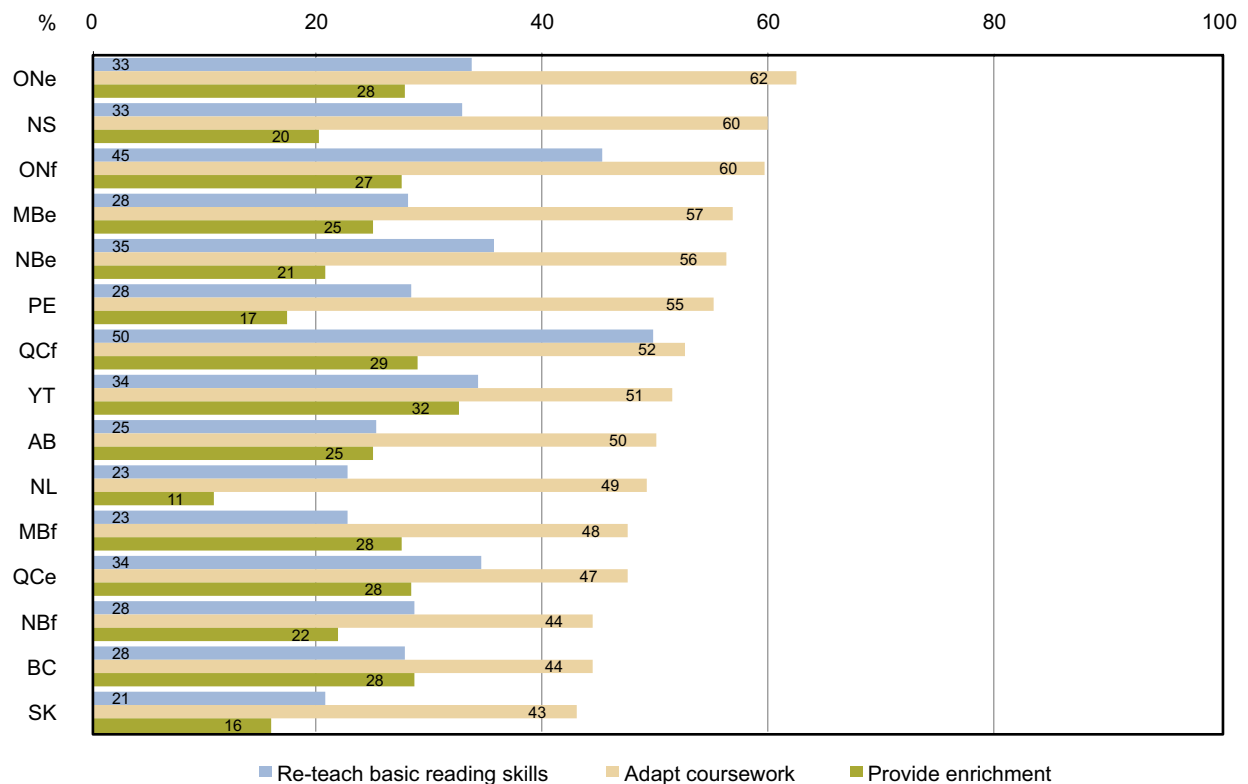
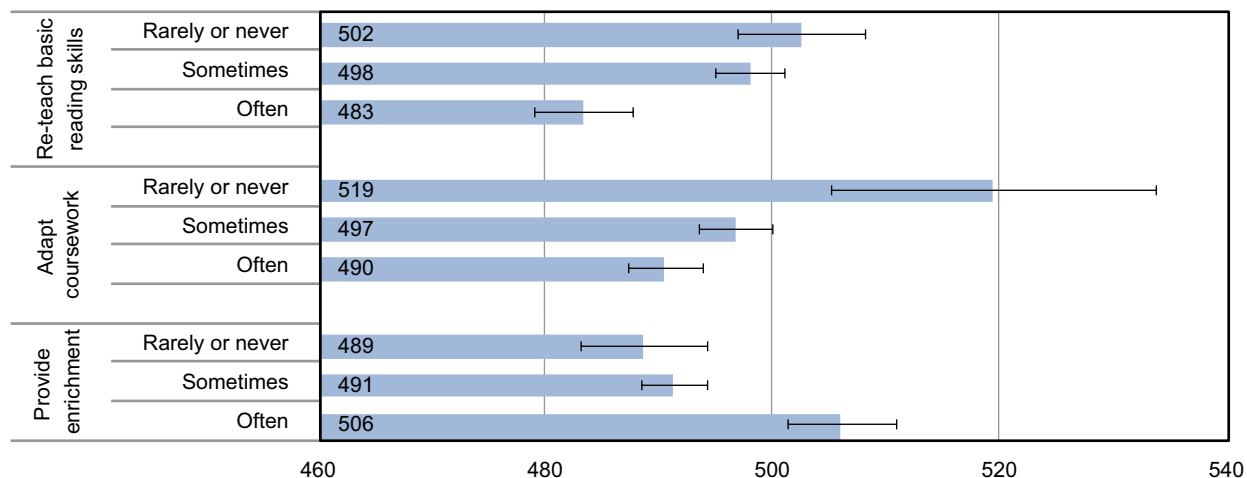


Chart 8.14 gives the mean reading scores of teachers at the three levels of frequency of use of these

Higher reading performance is also found among the students of teachers who rarely or never adapt coursework to accommodate learning styles.

accommodations. Students of teachers who often re-teach basic reading skills have lower reading performance, while students of teachers who often provide enrichment have higher reading performance than others. Higher reading performance is also found among the students of teachers who rarely or never adapt coursework to accommodate learning styles. It should be noted, of course, that the need to re-teach basic reading skills exists because teachers judge their students to have reading abilities below expectations, while the opposite is true for teachers who provide enrichment. The results may thus reflect the abilities of students in the teacher’s class, rather than the direct effects of the accommodations.

Chart 8.14 Teacher mean reading scores for frequency of re-teaching basic reading skills, adapting coursework, and providing enrichment



Student reports of reading materials and assignments

Students were asked a series of questions about the frequency of use (rarely or never, sometimes, often) of different kinds of reading materials and assignments in their language arts classes. While these overlapped to some extent with the teacher questions

about types of reading materials assigned, factor analysis yielded four factors that could be interpreted more explicitly in terms of the kinds of materials and assignments used. These factors and the associated questions are shown in Table 8.4.

Table 8.4 Questionnaire items and factors for reading materials and assignments

Factor	Item
Use of media	Read magazines or newspapers
	Read material found on the Internet
	Use on-line encyclopedias or other electronic subscriptions
	Watch videos or DVDs or go to the movies
Use of literature/ library material	Read novels or short stories (fiction)
	Read informational or other non-fiction material
	Read books or other material from the school library
	Read books or other material from the public library
Use of classroom material	Read a textbook
	Work on questions from textbooks, workbooks, or worksheets
Use of project/group work	Do group work in the classroom
	Do individual projects requiring work outside of class
	Do group projects requiring work outside of class

Charts 8.15 to 8.18 show the mean factor scores for each of these factors by jurisdiction and language. For the media factor, differences among jurisdictions are not very large, although two francophone populations stand out as having the greatest (Manitoba [French]) and least (Quebec [French]) use of media material. For the use of literature/library material, five of the seven francophone populations (the exceptions being Alberta [French] and Nova

Scotia [French]) show lower usage than any of the anglophone populations. A similar pattern of lower use by francophone populations occurs for the use of classroom material. The notable exception in this case is Quebec (French), which shows the highest level of use of classroom material. Finally, only small differences among populations are found for use of project/group work.

Chart 8.15 Mean factor scores for use of media by jurisdiction and language

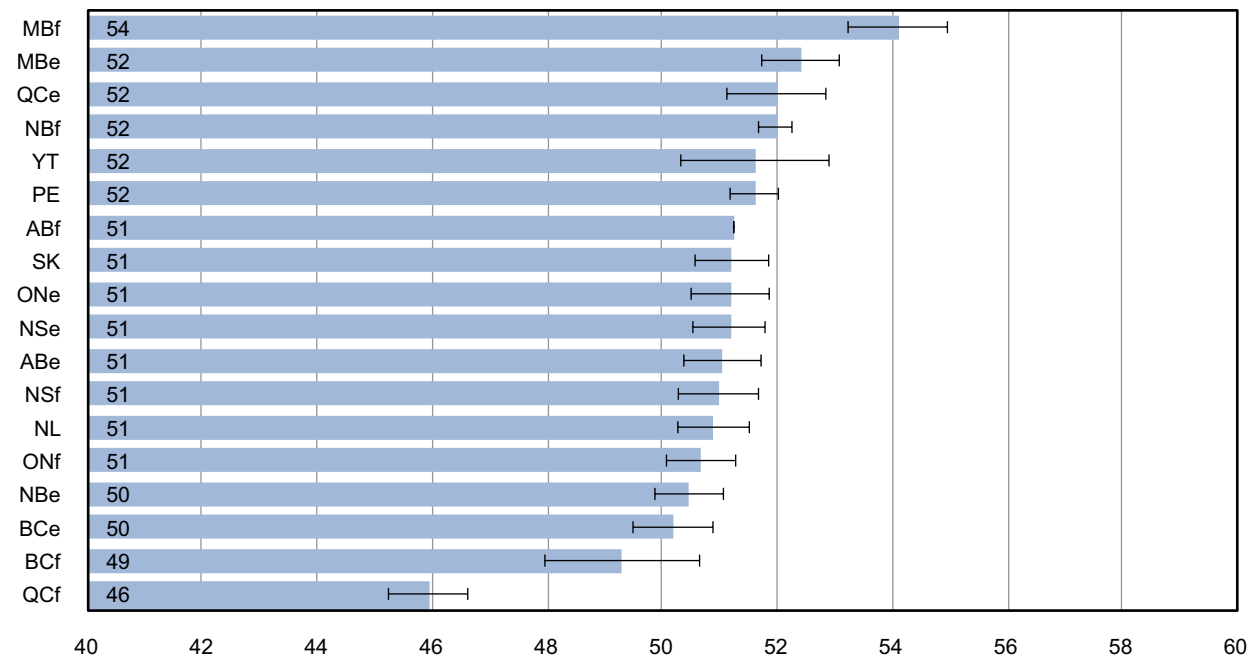


Chart 8.16 Mean factor scores for use of library/literature material by jurisdiction and language

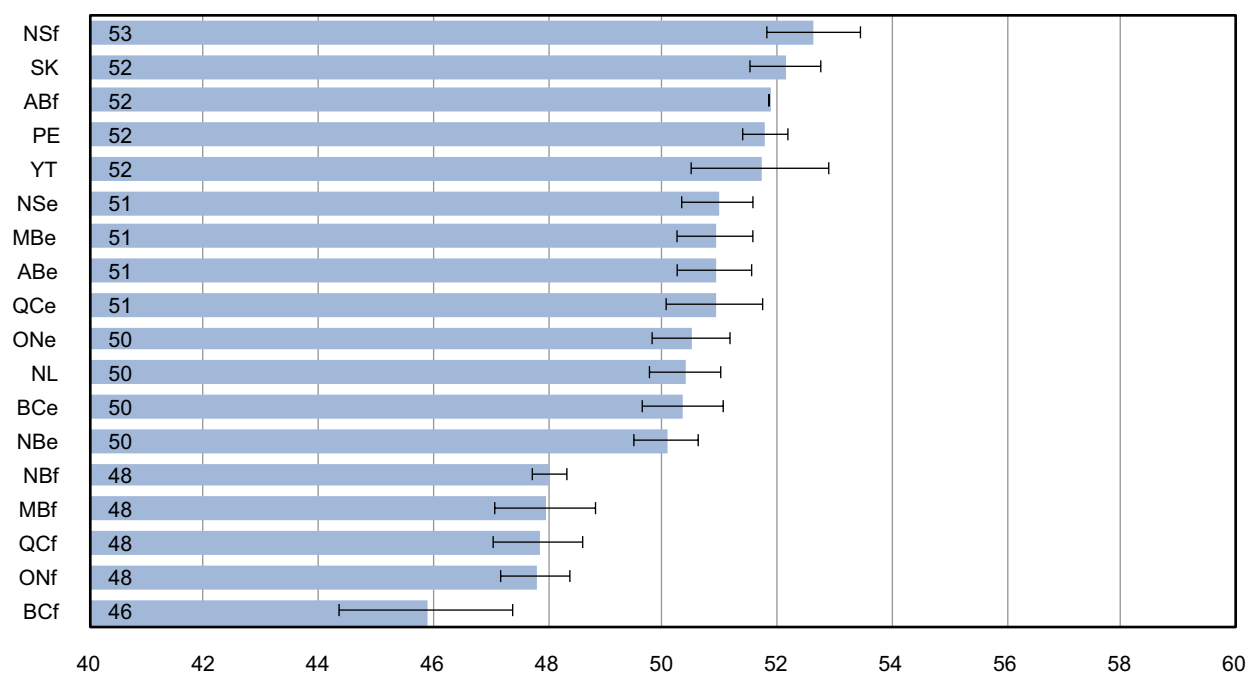


Chart 8.17 Mean factor scores for use of classroom materials by jurisdiction and language

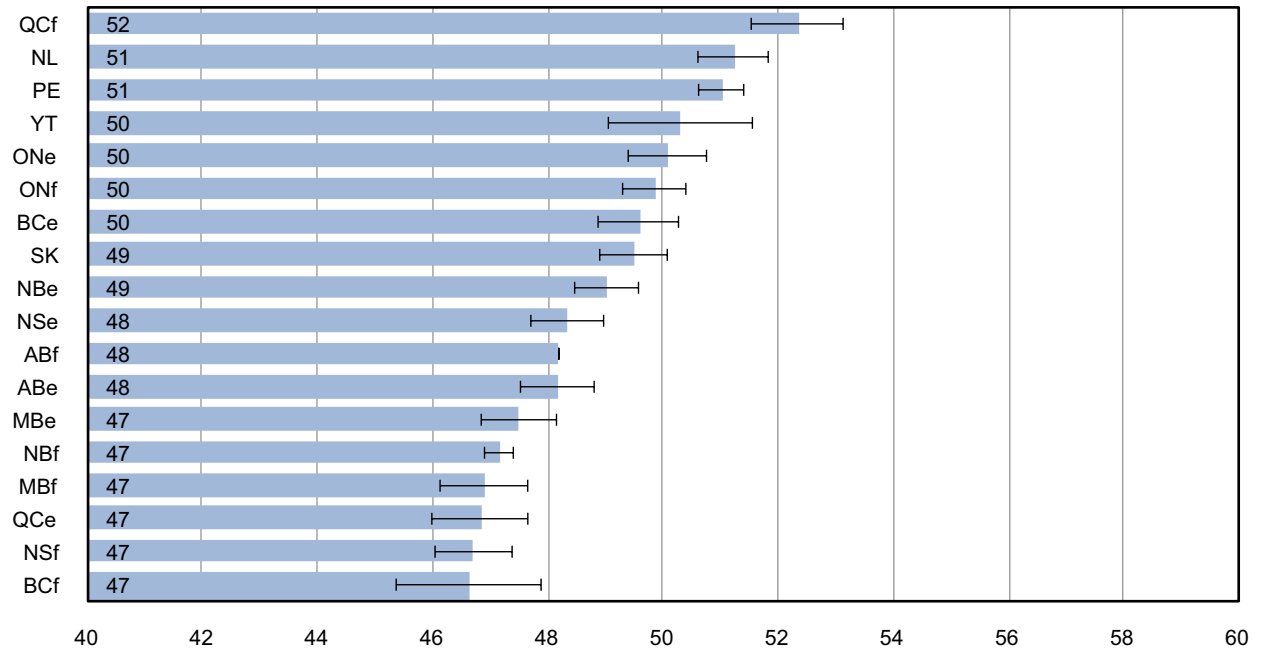
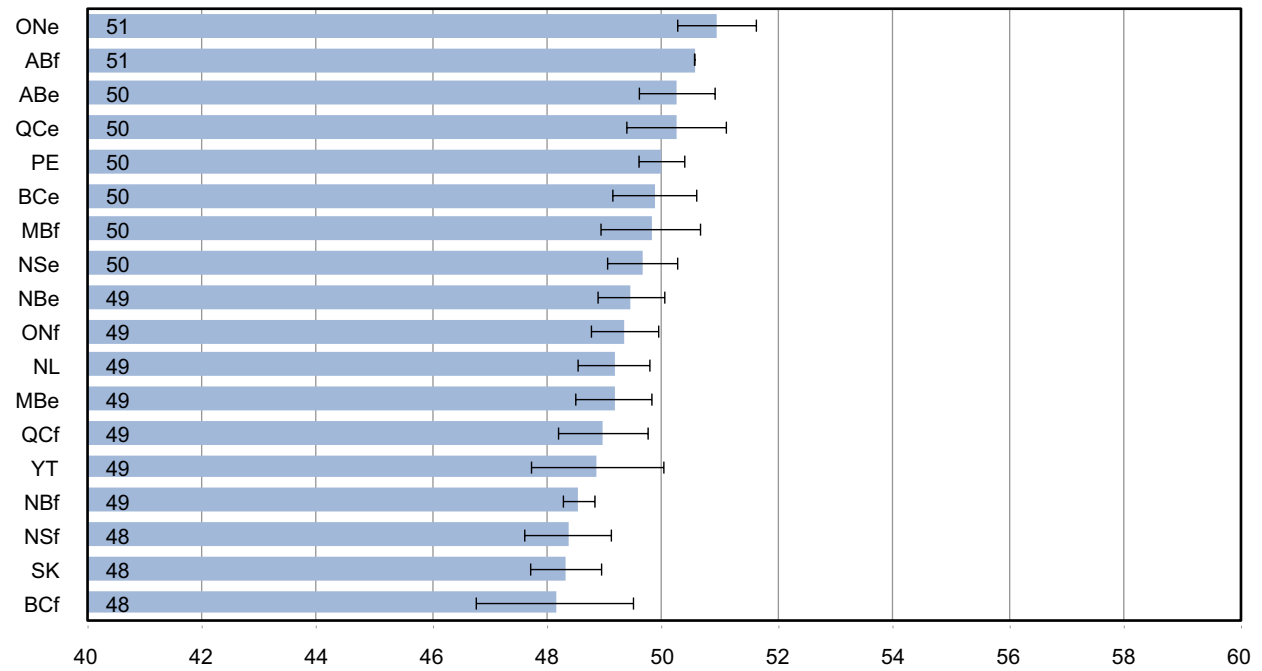


Chart 8.18 Mean factor scores for use of project/group work by jurisdiction and language



Charts 8.19 and 8.20 show the reading performance levels and mean reading scores for the quintiles of these factors. The only factor showing a consistent

pattern is the use of media, with higher levels of media use being associated with lower reading scores.

Chart 8.19 Reading proficiency levels for reading-materials-and-assignments quintiles

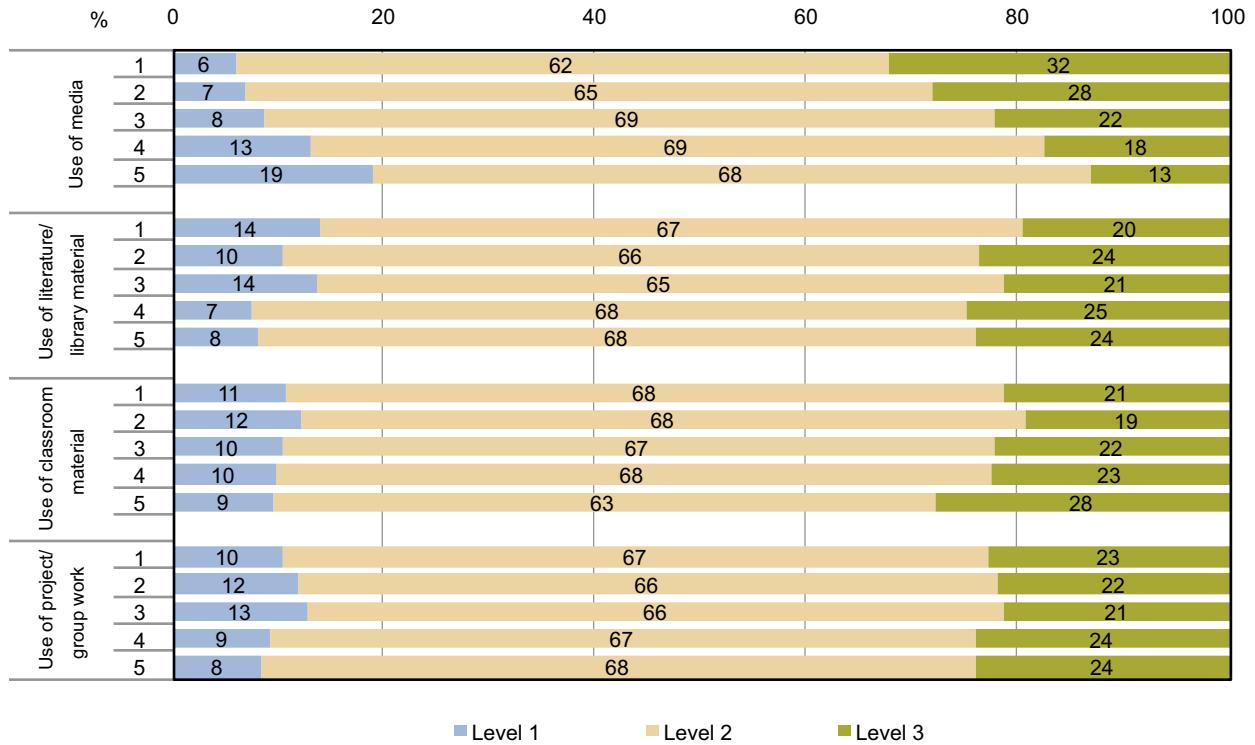
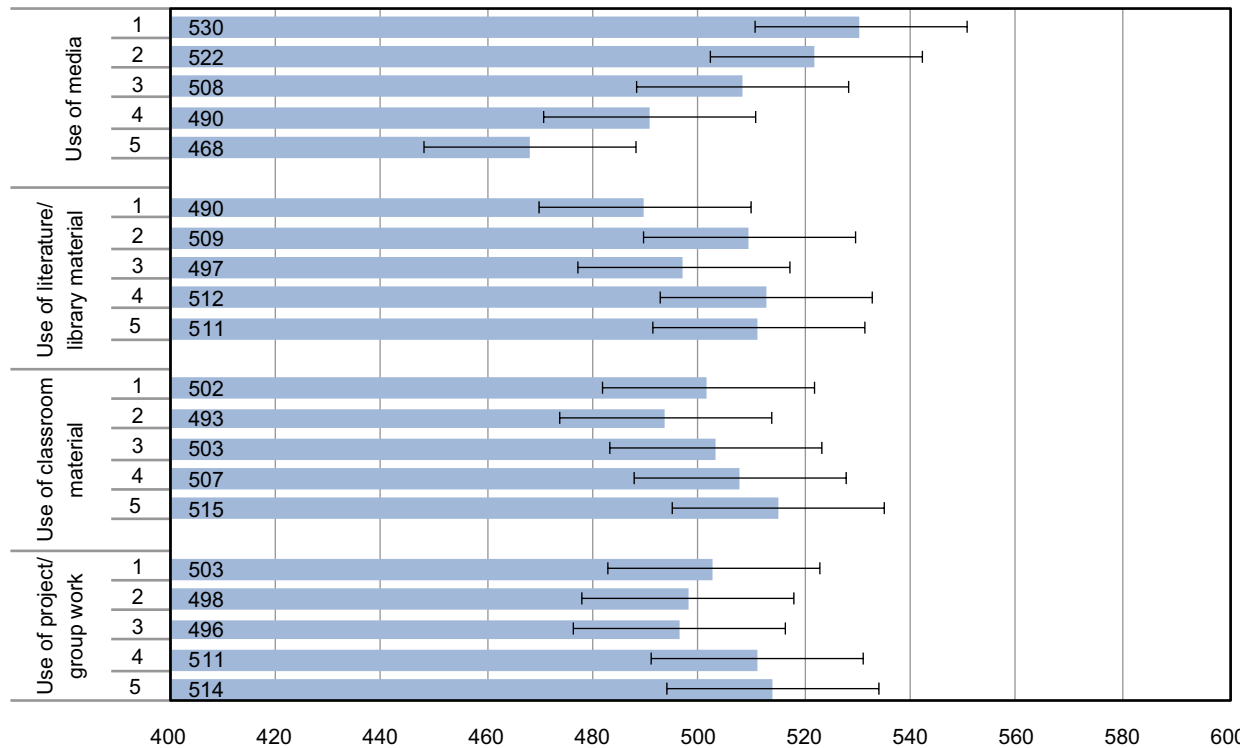


Chart 8.20 Mean reading scores for reading-materials-and-assignments quintiles



Disciplinary climate

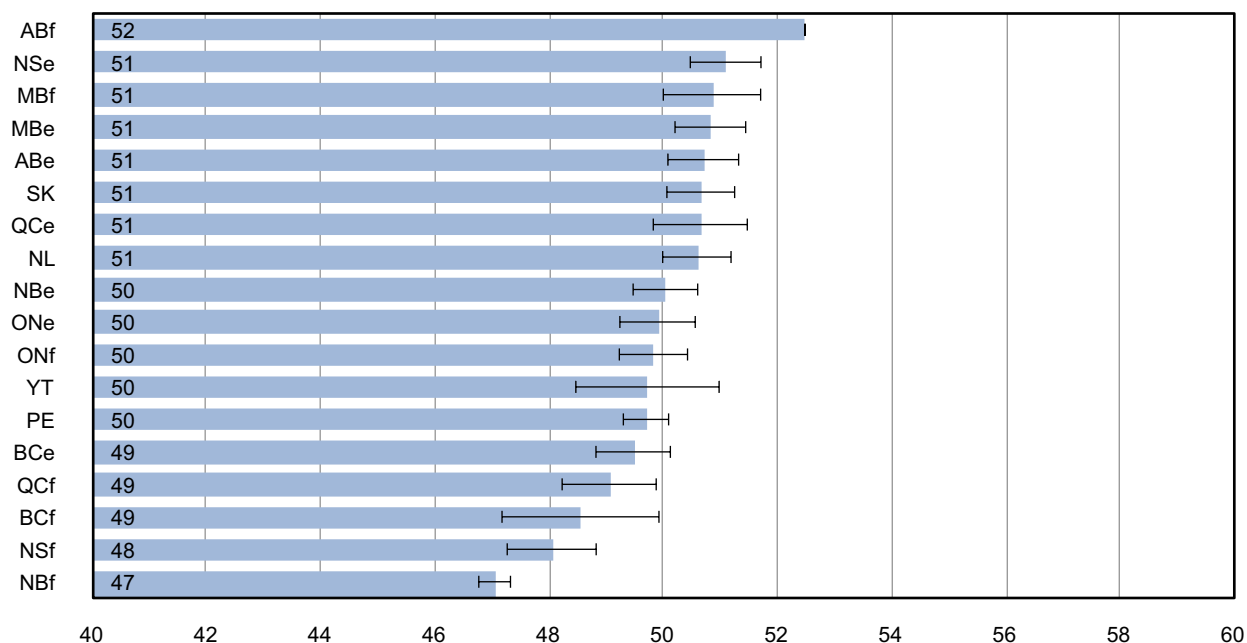
An attempt was made to capture the disciplinary climate in the classroom through a set of three student questions on the frequency (rarely or never, sometimes, often) of disruption and lost time during class sessions. The questions were as follows:

- There is noise or disorder in the classroom
- We lose 5 or 10 minutes because of disruptions
- We discuss or do things other than the topic of the lesson

These questions resolved into a single factor called disciplinary climate. Higher scores on this factor indicate worsening disciplinary climate because the questions were worded negatively.

Chart 8.21 shows the mean factor scores for disciplinary climate by jurisdiction and language. In general, differences across populations are not very large. However, four francophone populations (British Columbia, Quebec, New Brunswick, and Nova Scotia) are the only ones that show mean factor scores below the Canadian average of 50, implying better disciplinary climate in these jurisdictions.

Chart 8.21 Mean factor scores for disciplinary climate by jurisdiction and language



Reading proficiency levels and mean reading scores for the disciplinary climate quintiles are given in Charts 8.22 and 8.23. While the proficiency levels graph suggests a slight tendency toward fewer

students at level 3 where there is a poorer disciplinary climate, the differences in mean scores across quintiles are not statistically significant.

Chart 8.22 Reading proficiency levels by disciplinary-climate quintiles

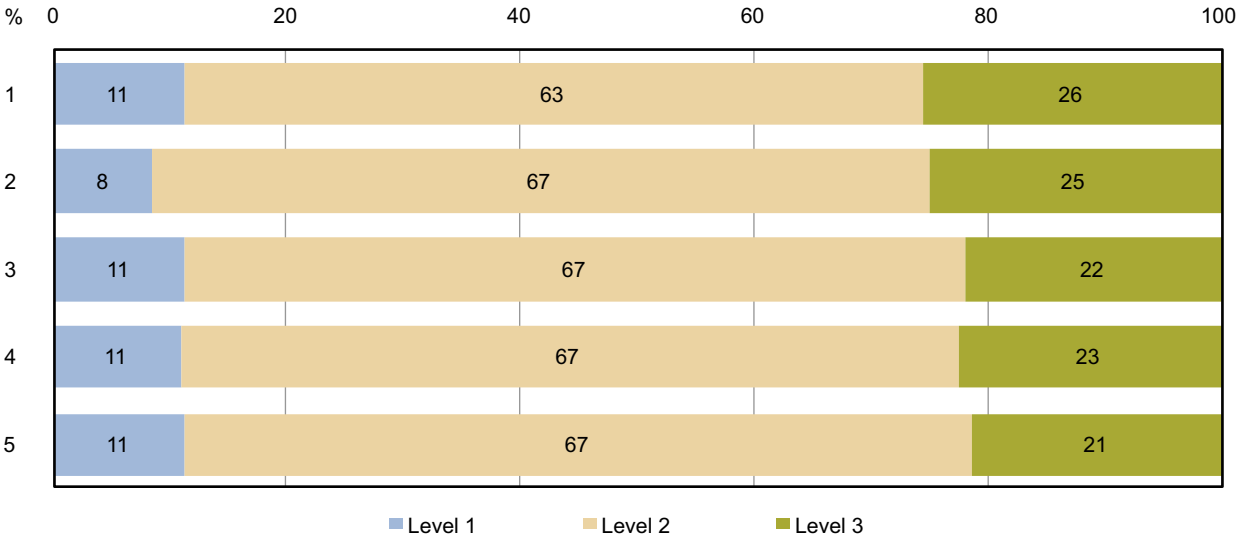
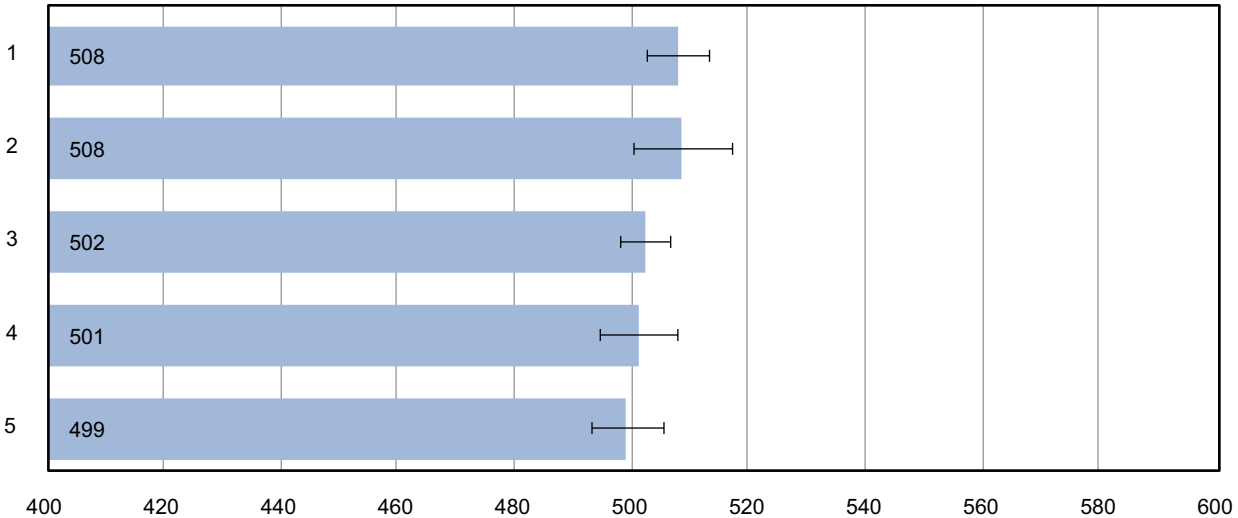


Chart 8.23 Mean reading scores by disciplinary-climate quintiles



Multivariate effects

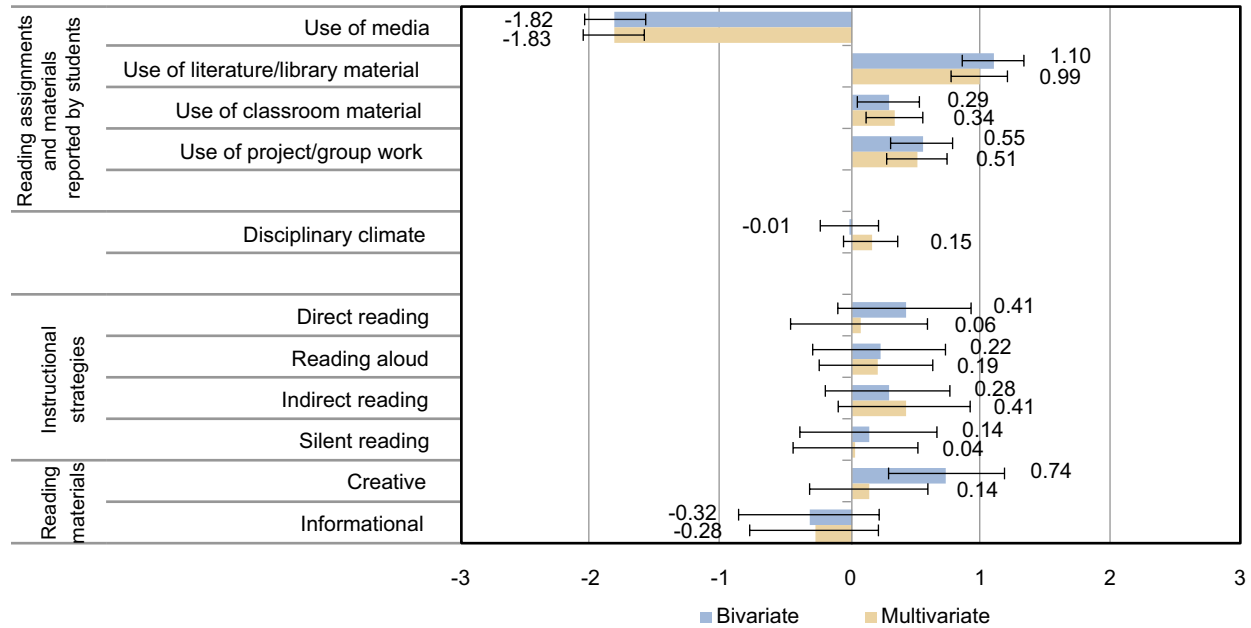
For the multivariate analysis presented here, teacher-level variables were aggregated to the school level, and the same student- and school-level demographic variables were controlled as in the last chapter. Although all variables used in this chapter were entered into the multivariate model, those scaled as factor scores are presented separately to facilitate comparison. Again, it is noted that the coefficients for the factor score effects represent the change in reading score for one factor score unit, which represents one-tenth of a standard deviation on these units.

Chart 8.24 shows the effects for the variables scaled as factor scores. For the student reading assignment factors, reading through media shows negative effects of about the same magnitude for both the bivariate and the multivariate models. All other types of reading assignments yield significant positive effects for both models. Since the effects for student reading assignments are not attenuated by controlling for the other variables in the multivariate model, these may be viewed as robust strategies.

With one exception, none of the instructional strategy or reading material factors shows a significant effect. The exception is use of creative materials, which is significantly positive in the bivariate model.

However, since this effect is attenuated in the multivariable model, it must be concluded that the effect is linked to other variables in the model.

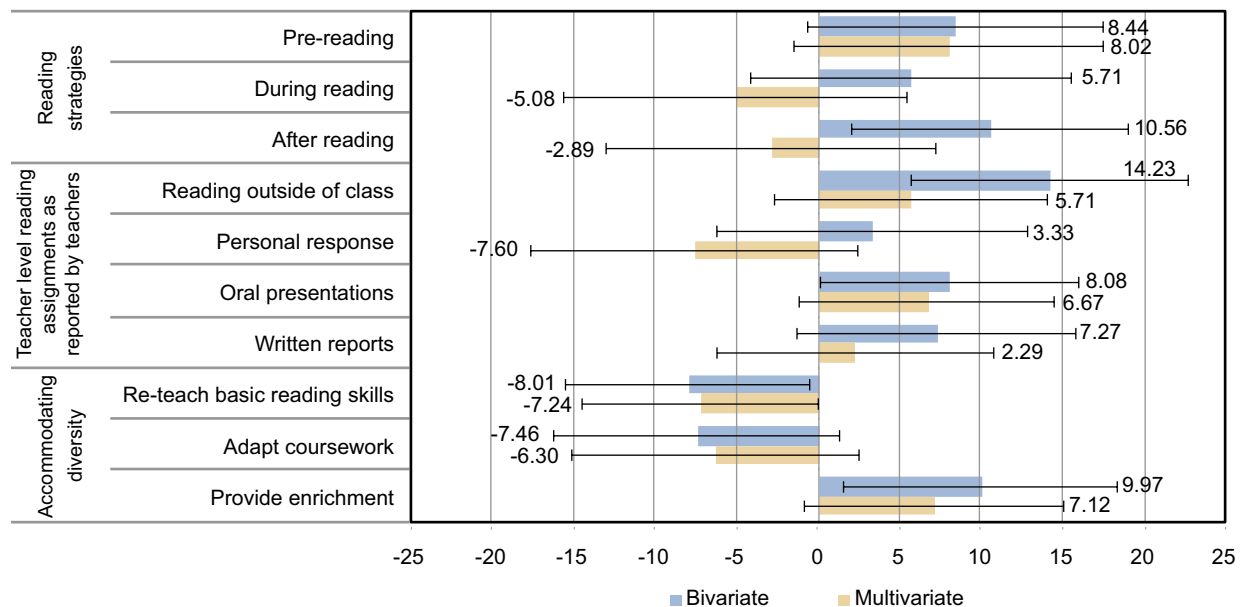
Chart 8.24 Regression coefficients for reading strategies factors



The effects for the observed (questionnaire item) reading strategy variables are shown in Chart 8.25. In this case the effects are directly comparable across variables because all variables are on a three-point frequency of use scale (rarely or never, sometimes,

often). In this case, although several statistically significant effects can be seen for the bivariate model, all of the effects except re-teaching basic reading skills (which is marginally negative in both models) are attenuated in the multivariate model.

Chart 8.25 Regression coefficients for reading strategy observed variables



9. ASSESSMENT

Questions on assessment were included on the student, teacher, and school questionnaires. These had two main focal points. The first was to look at assessment practices used by schools and teachers and their impact on student reading performance. The second was concerned with awareness, use, and impact of large-scale assessment, including provincial/territorial assessments, SAIP, PCAP, and PISA.

Methods of classroom assessment

Students were asked how often they are given marks or grades based on a range of forms of assessment, including selected-response and constructed-response tests, essays and presentations, and other performances. Responses for the various test forms were factor analyzed, with three factors emerging as shown in Table 9.1.

Table 9.1 Questionnaire items and factors for student responses to assessment questions

Factor	Item
Short-test items	True/false or matching questions Multiple-choice questions Fill-in-the-blank questions
Long-test items	Short-answer questions (a sentence or two) Long-answer questions (a paragraph or more)
Essays/presentations	Essays (one page or more) Presentations, speeches, and other performances

Mean factor scores for these factors by jurisdiction and language are given in Charts 9.1 to 9.3. Chart 9.1 shows that short items are used more often than the Canadian average in most jurisdictions. However, Quebec (French) and to a lesser extent, Quebec (English) and Ontario (French) show use that is significantly below that of most other jurisdictions. In general, the differences among populations

for long items are smaller than for short items. The lowest levels for long items are found among francophone populations. However, in this case, Ontario (French) and Quebec (French) show usage close to the Canadian average. Differences in use of essay/presentation methods are also fairly small, with no obvious patterns in the distribution across populations.

Chart 9.1 Mean factor scores for student-reported assessment by short-test items by jurisdiction and language

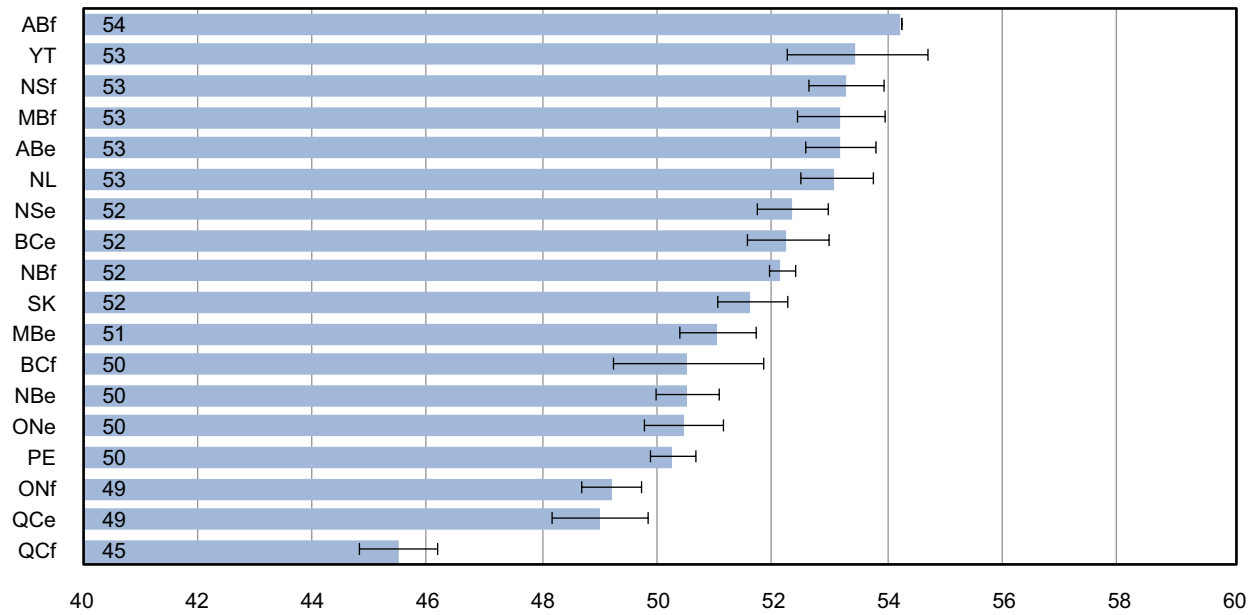


Chart 9.2 Mean factor scores for student-reported assessment by long-test items by jurisdiction and language

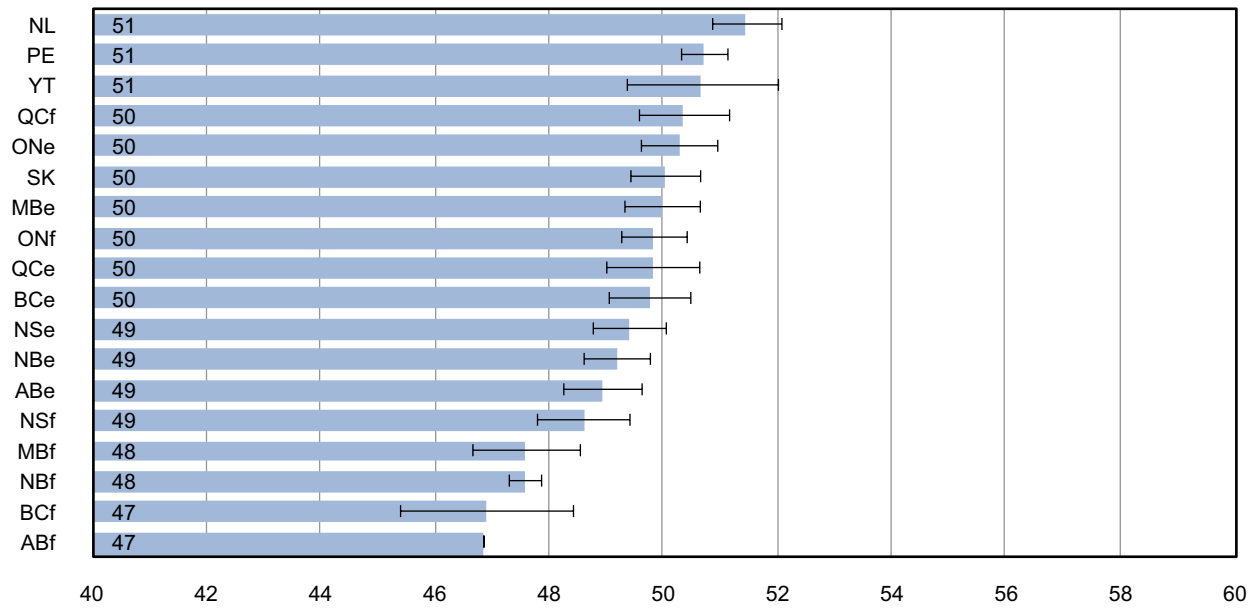
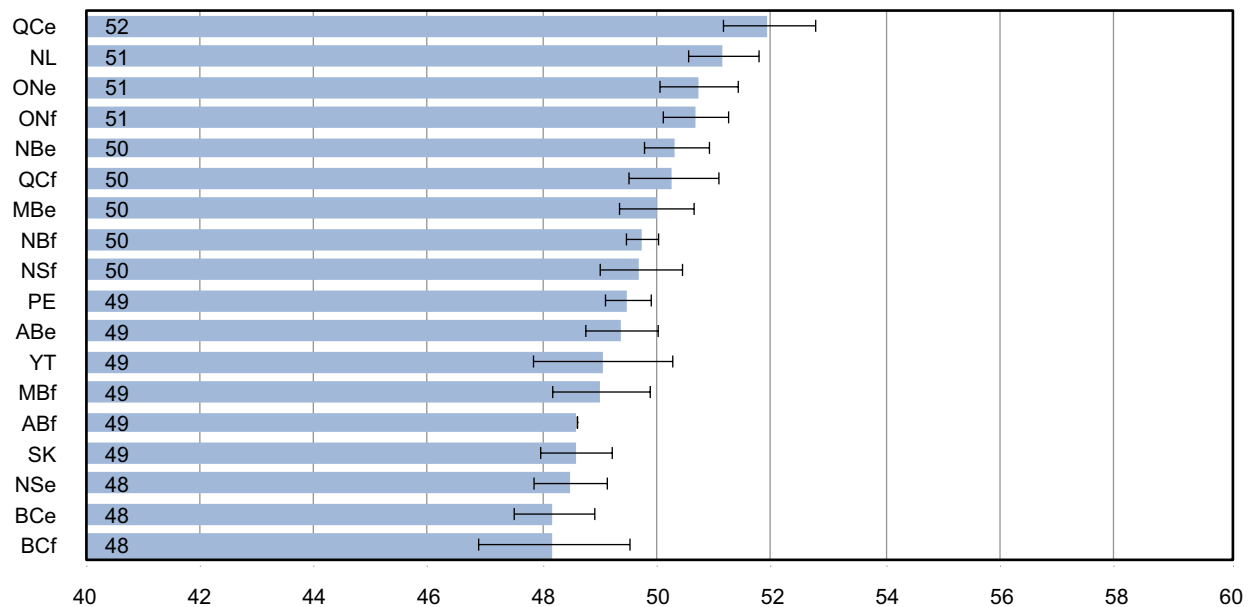


Chart 9.3 Mean factor scores for student-reported assessment by essays and presentations by jurisdiction and language



Reading proficiency levels and mean reading scores for these assessment methods are given in Charts 9.4 and 9.5. There is a clear association between greater use of short-test items and lower reading performance. Conversely, greater use of long-test items is

linked with higher reading performance, although the trend levels off above the third quintile. There is also a slight trend toward higher performance for those at the two highest levels of use of essays/presentations.

Chart 9.4 Reading proficiency levels by student-reported assessment-method quintiles

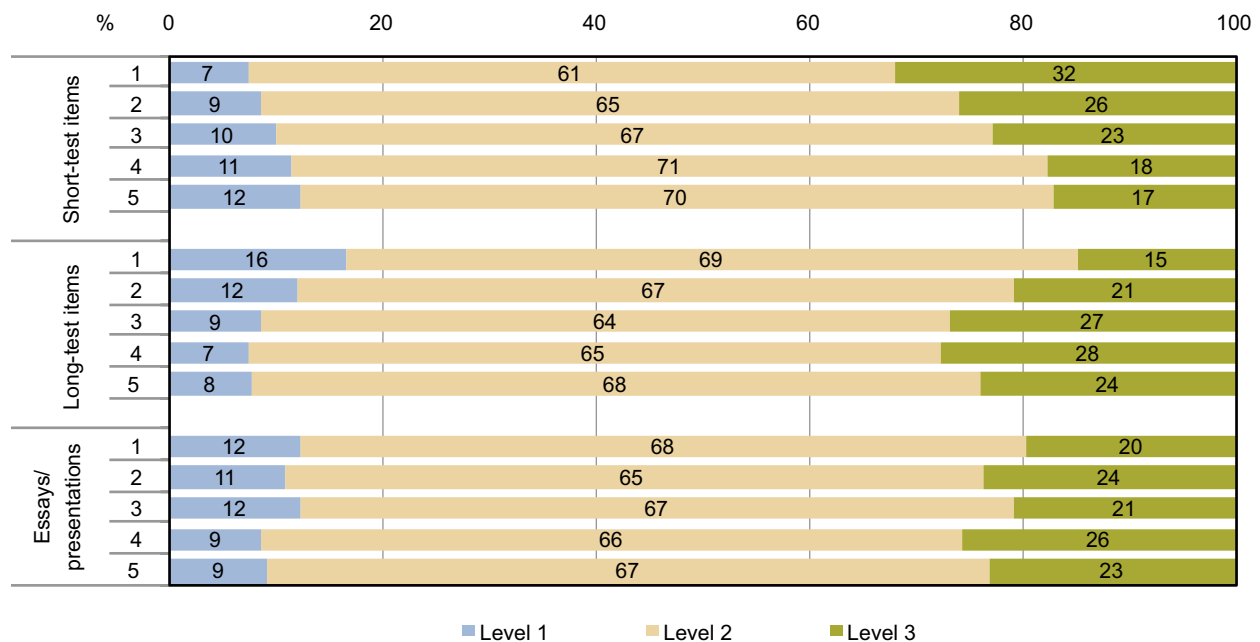
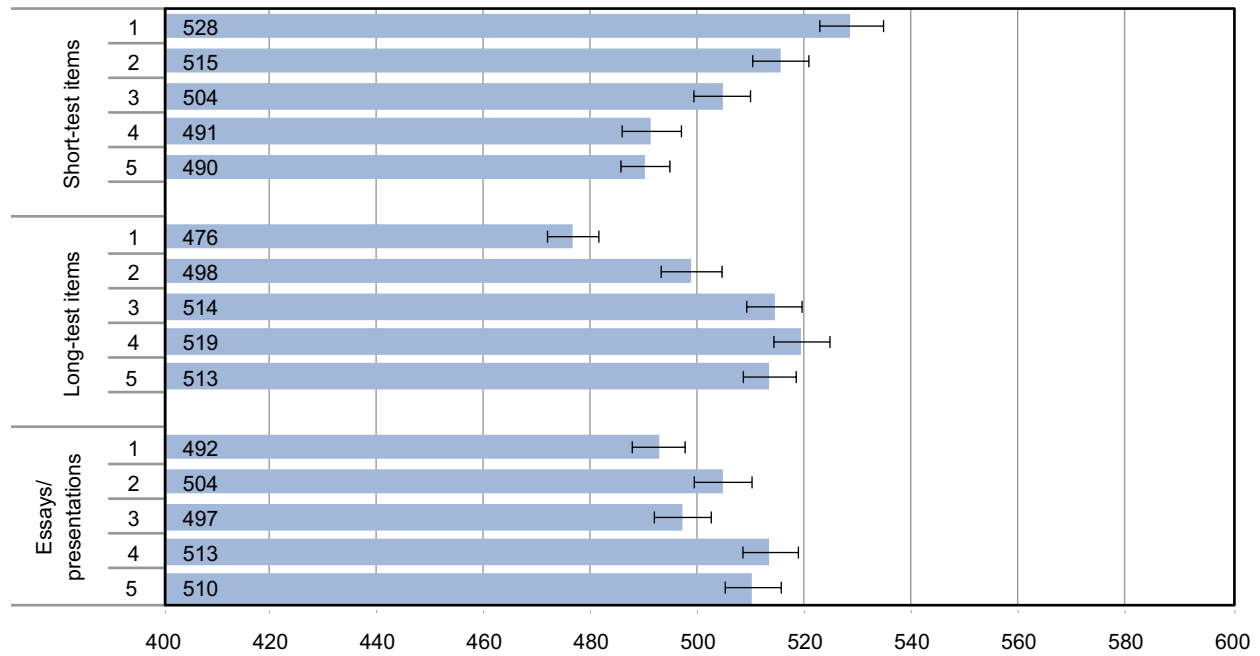


Chart 9.5 Mean reading scores by student-reported–assessment-method quintiles



Teachers were asked a parallel set of questions about assessment methods. In this case, the factor analysis yielded only two factors, with essays and presentations being combined with the use of long-test items and the use of short-test items (a sentence or two) loading equally on both factors, as indicated in

Table 9.2. This structure is slightly less refined but is not inconsistent with the previous one. It is quite plausible that teachers do not make a clear distinction between essays/presentations and other long-test formats. The two-factor solution was thus used in presenting the teacher results.

Table 9.2 Questionnaire items and factors for teacher responses to assessment questions

Factor	Item
Short-test items	True/false or matching questions
	Multiple-choice questions
	Fill-in-the-blank questions
	Short-answer questions (a sentence or two)
Long-test items	Short-answer questions (a sentence or two)
	Essays (one page or more)
	Presentations, speeches, and other performances
	Long-answer questions (a paragraph or more)

Charts 9.6 and 9.7 show the mean factor scores for these two factors by jurisdiction and language. In both cases, the pattern is reasonably consistent with that found for the student factors. For the short-test item factor, three distinct clusters are seen, but with no clear geographic or language pattern across the populations. Again, Quebec, both English

and French, stands out as having the lowest level of use of this method of assessment. Differences among populations for the long-test item factor are smaller. Newfoundland and Labrador and Quebec (English) have significantly higher levels, while Nova Scotia has lower use of long items than most other jurisdictions.

Chart 9.6 Mean factor scores for teacher-reported assessment by short-test items by jurisdiction and language

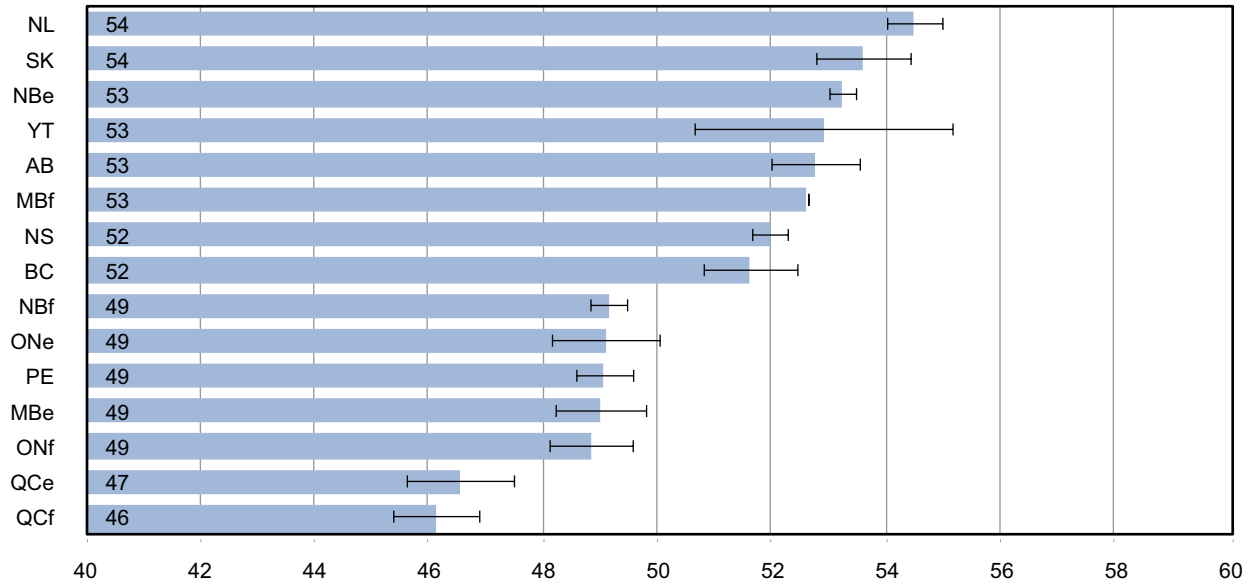
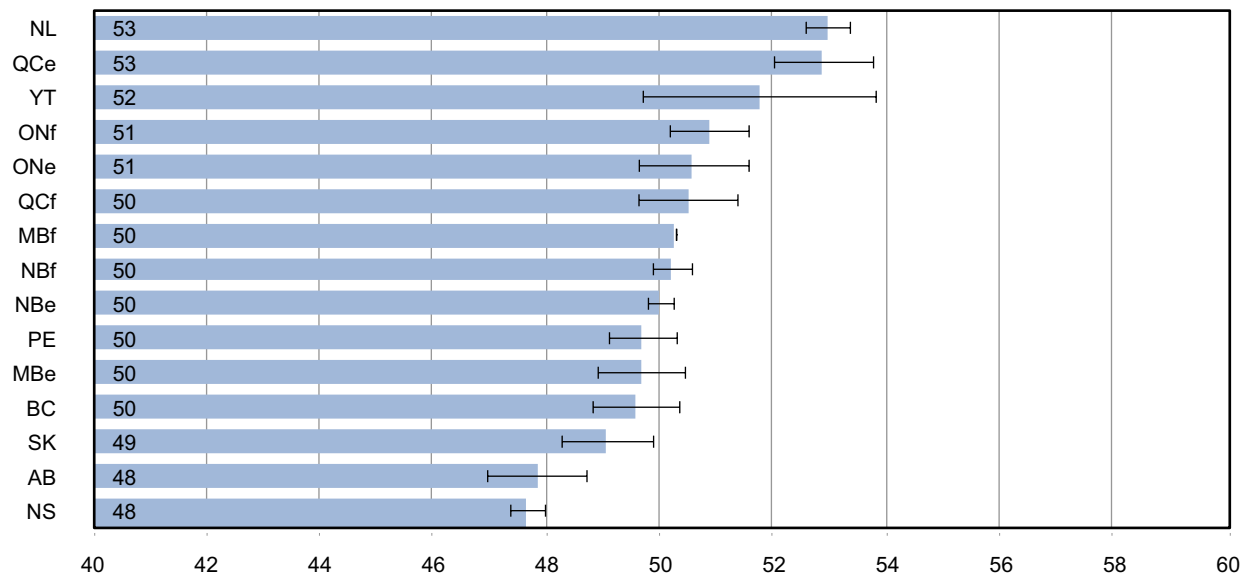


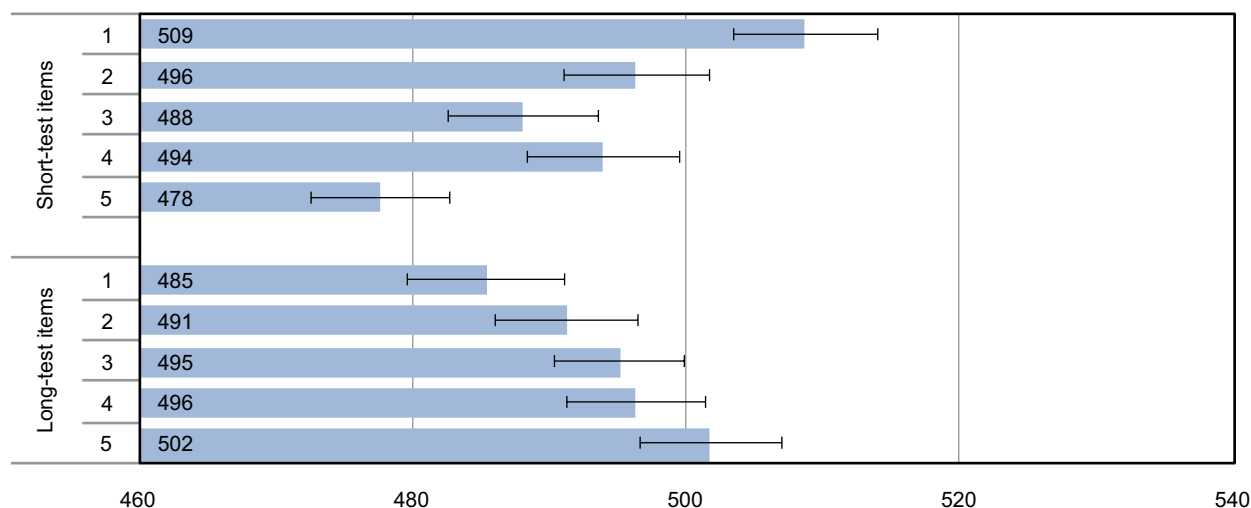
Chart 9.7 Mean factor scores for teacher-reported assessment by long-test items by jurisdiction and language



Mean reading scores for teachers using these two assessment methods are shown in Chart 9.8. For short-test items, the pattern is one of decreasing performance with greater use (though quintile 4 is

an anomaly in this pattern). The opposite is true for use of long-test items, although the differences between adjacent categories are smaller and generally non-significant.

Chart 9.8 Teacher mean reading scores by teacher-reported–assessment-method quintiles



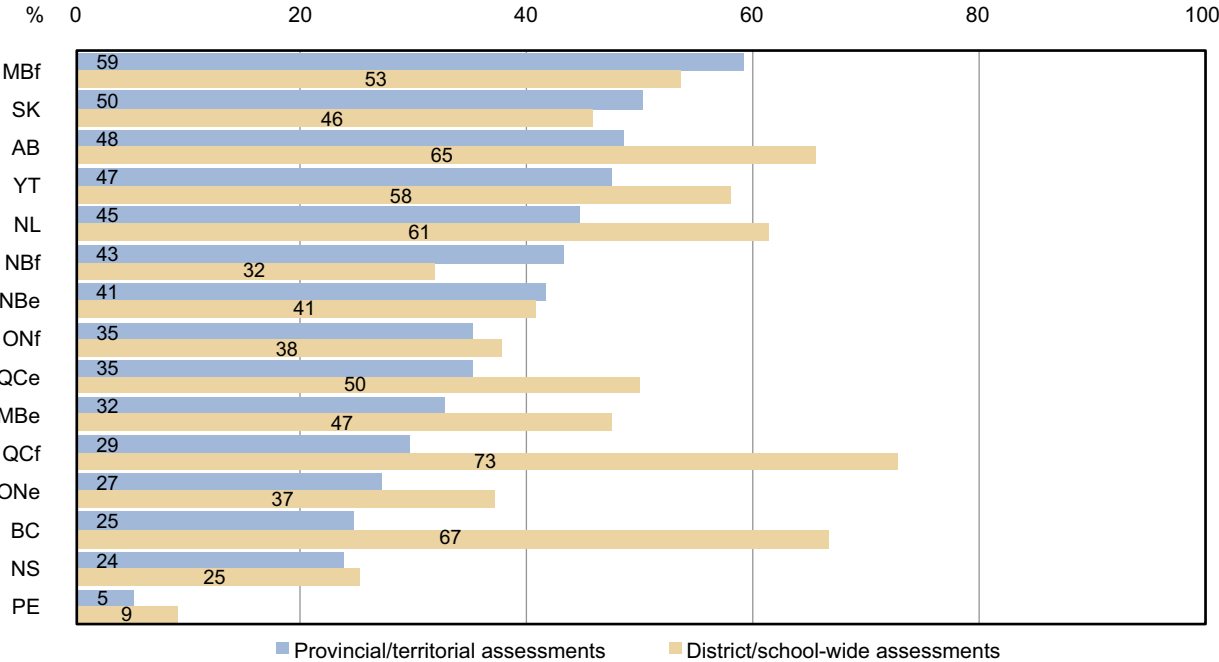
Assessment components contributing to student final marks or grades

Questions in this area had to do with the use of provincial/territorial and district/school-wide assessments and classroom-based assessments (including teacher-made tests, student portfolios, student assignments, and homework) as contributions to students’ final marks or grades. Teachers were asked how often they use these forms of assessment for that purpose, using a five-point scale (never, 1–2 times a year, 3–5 times a year, about every month, or more than once a month). Teachers were also asked whether they used other behavioural elements in determining final marks or grades, and their answers were recorded on a dichotomous (yes/no) scale.

Provincial/territorial and district/school-wide assessments are infrequently used in ways that contribute

to student marks, so categories representing 1–2 times a year or more were combined. Chart 9.9 shows the percentages of teachers reporting that they use such tests for assigning grades 1 to 2 times a year or more. There is wide variation across jurisdictions on both of these measures. For example, about 60% of Manitoba (French) teachers but only 5% of teachers in Prince Edward Island use provincial/territorial assessments for assigning grades. Quebec (French) and British Columbia teachers stand out with a high percentage reporting use of district/school tests but a low percentage using provincial/territorial tests. On the other hand, relatively high proportions of teachers in Alberta, Yukon, and Newfoundland and Labrador use both forms.

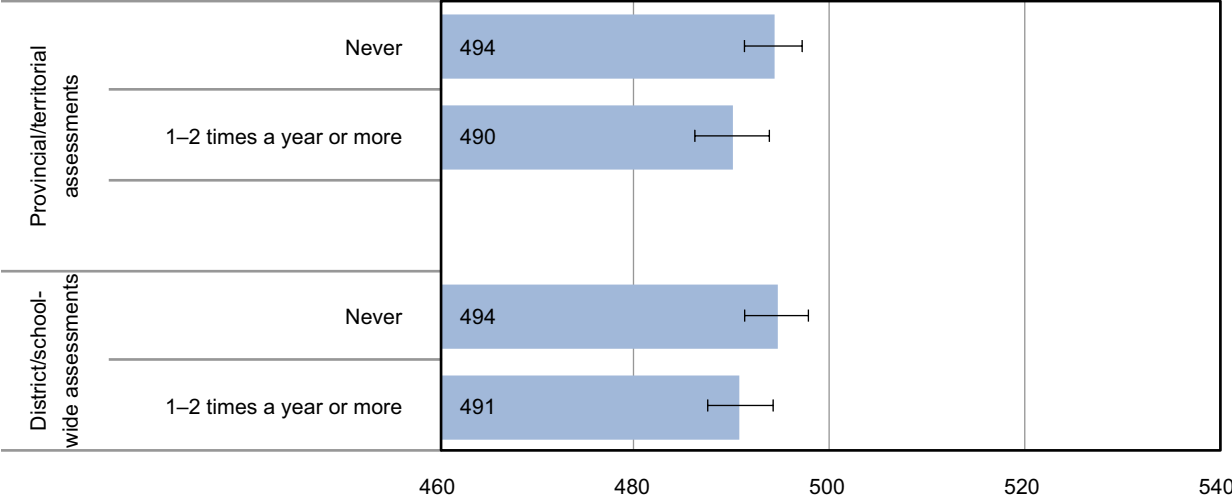
Chart 9.9 Percentage of teachers who use provincial/territorial or district/school-wide assessments to assign marks or grades 1 to 2 times a year or more by jurisdiction and language



The impact of use of these forms of assessment on reading performance is shown in Chart 9.10. In

neither case is the difference between use and non-use of such assessments statistically significant.

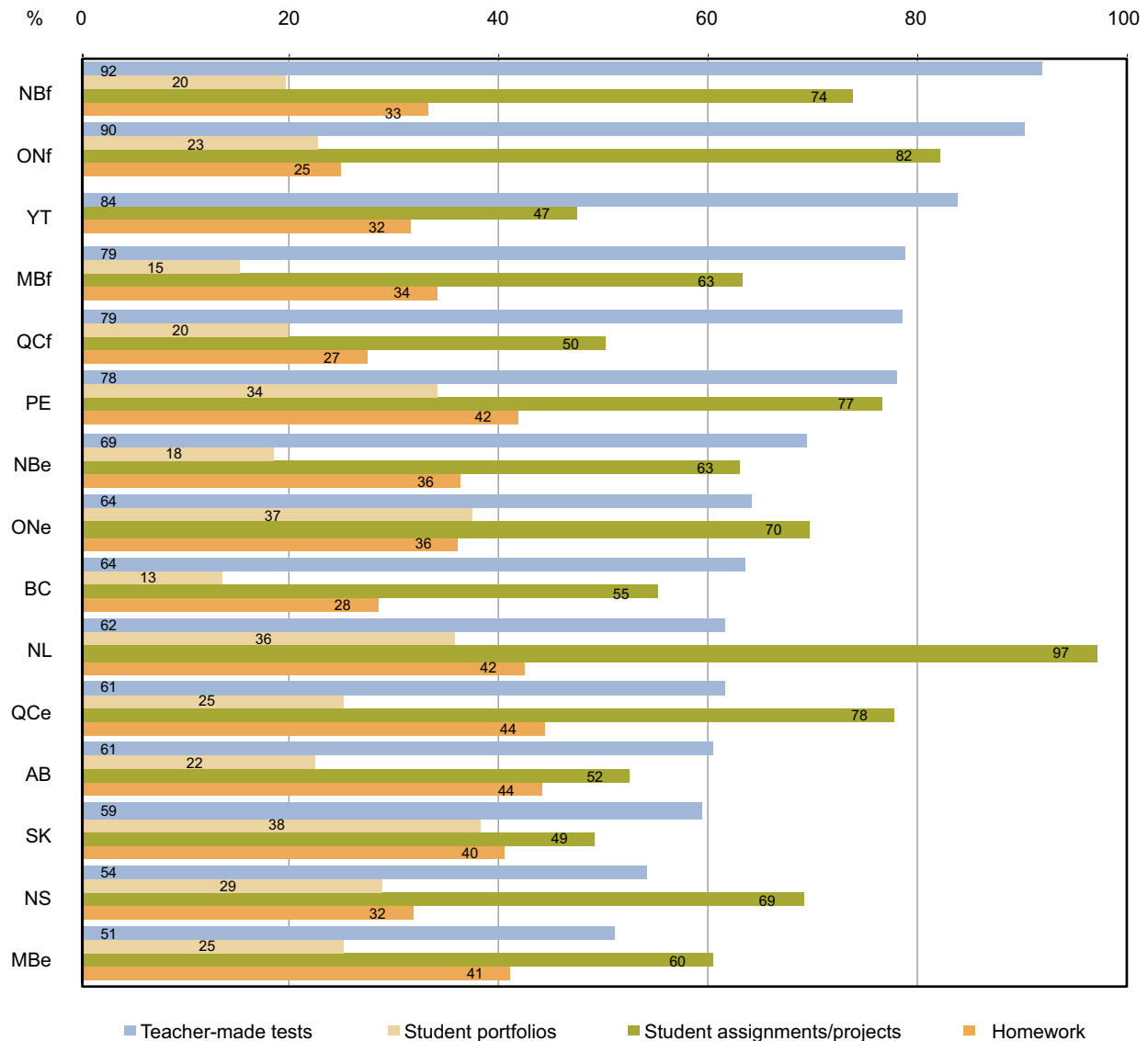
Chart 9.10 Mean reading scores by use of provincial/territorial and district/school-wide assessments for assigning grades



As might be expected, classroom-based assessment is used much more extensively than external assessment. Chart 9.11 shows the percentages of teachers reporting use of teacher-made tests, student portfolios, student assignments/projects, and homework once a month or more. In general, teacher-made tests and student assignments/projects are used more

often than student portfolios or homework. The lowest levels of use are found for student portfolios. Francophone populations tend to have the highest levels of use of teacher-made tests. Teachers in Newfoundland and Labrador make the most extensive use of student assignments/projects. This form shows considerable variation across populations.

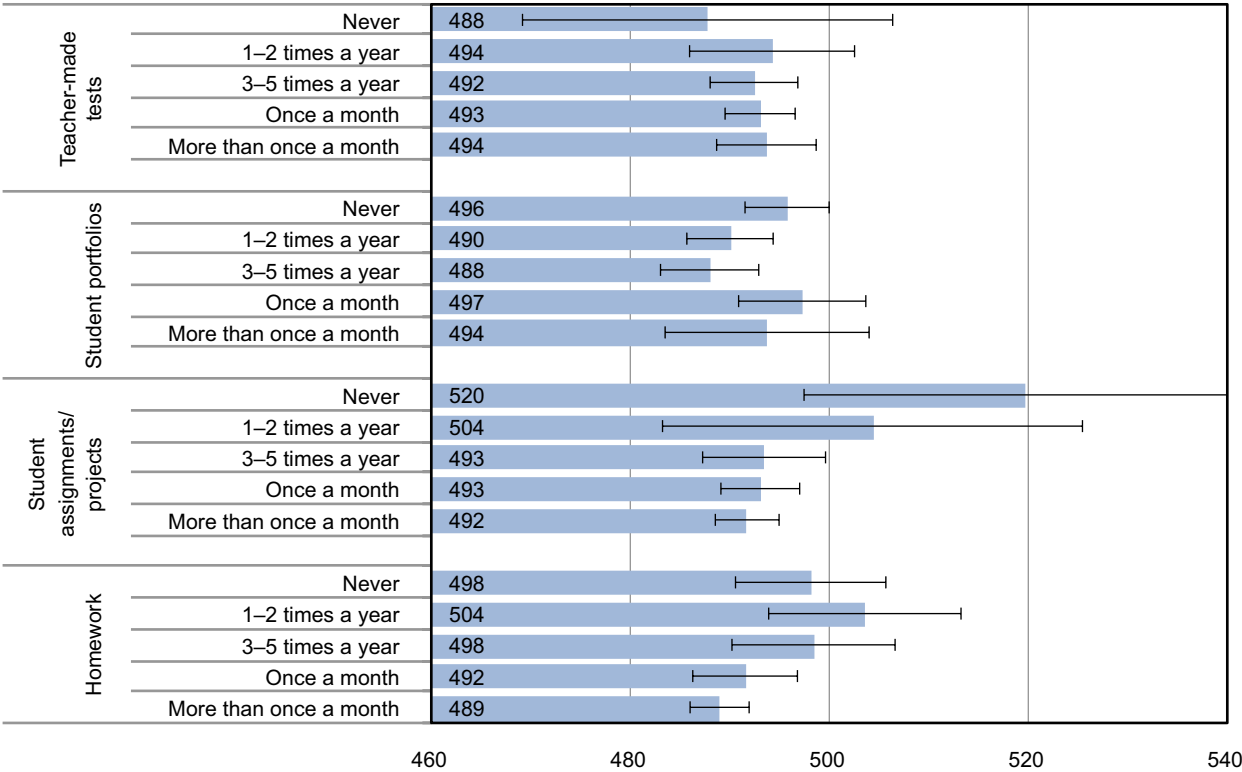
Chart 9.11 Percentage of teachers who use various types of classroom assessment to assign grades 1 to 2 times a year or more by jurisdiction and language



The effects of frequency of use of these assessment forms on reading performance are shown in Chart 9.12. Again, none of these differences is statistically significant. There are no significant differences

for use of teacher-made tests or student portfolios. However, there is a slight trend toward lower reading performance with more extensive use of student assignments/projects and homework.

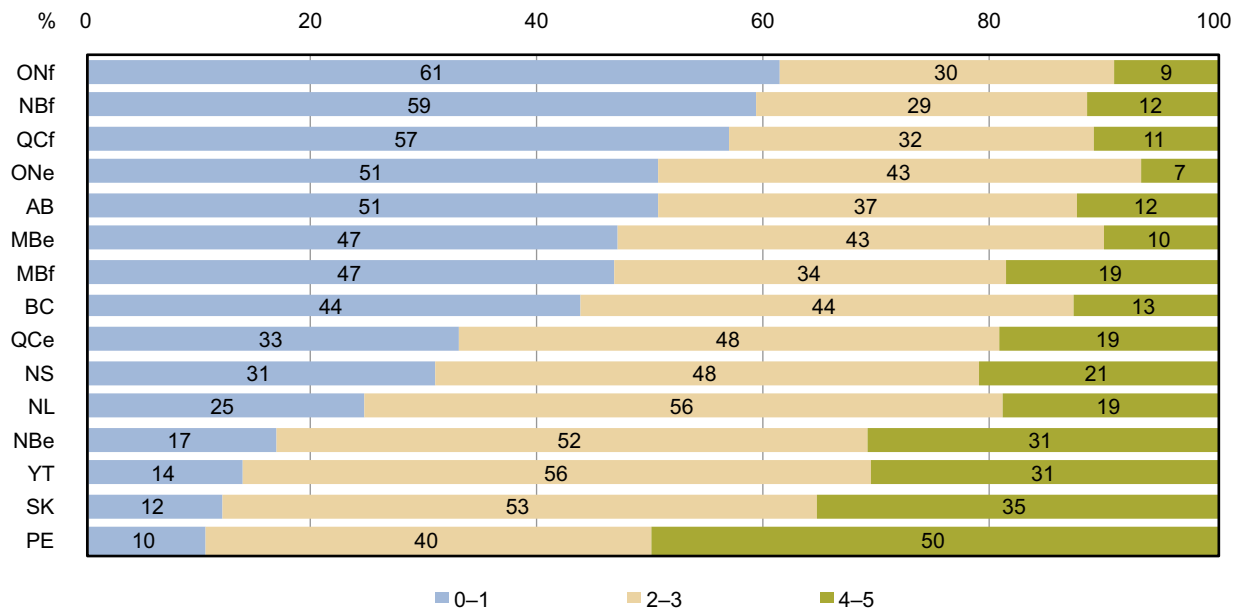
Chart 9.12 Mean reading scores by teacher use of classroom assessments for assigning marks or grades



Non-academic criteria that may be used for assessment purposes include attendance, participation, improvement, effort, and behaviour. In each case, teachers were simply asked whether or not they assign marks on the basis of these elements. “Yes” responses to these items were summed to yield a scale from 0 to 5 based on the number of these elements used. These were then combined into three categories (0–1, 2–3, and 4–5) for simplicity in reporting.

The percentages of teachers using 0 to 1, 2 to 3, and 4 to 5 of these elements for assigning marks are shown in Chart 9.13. There is wide variation across populations in the percentages of teachers reporting use of 0 to 1 and 4 to 5 of these criteria. There is somewhat less variation in the proportions reporting use of 2 to 3 criteria. Three of the four francophone populations make the least use of these criteria.

Chart 9.13 Percentages of teachers who use non-academic criteria to assign grades by jurisdiction and language



Mean reading scores by number of these non-academic criteria used for assigning grades are given in Chart 9.14. The pattern here is one of reduced reading performance with use of more of these

criteria. An analysis of the separate criteria is shown in Chart 9.15. This gives a much clearer picture of lower achievement for students whose teachers use these criteria.

Chart 9.14 Mean reading scores by number of non-academic criteria used for assigning grades

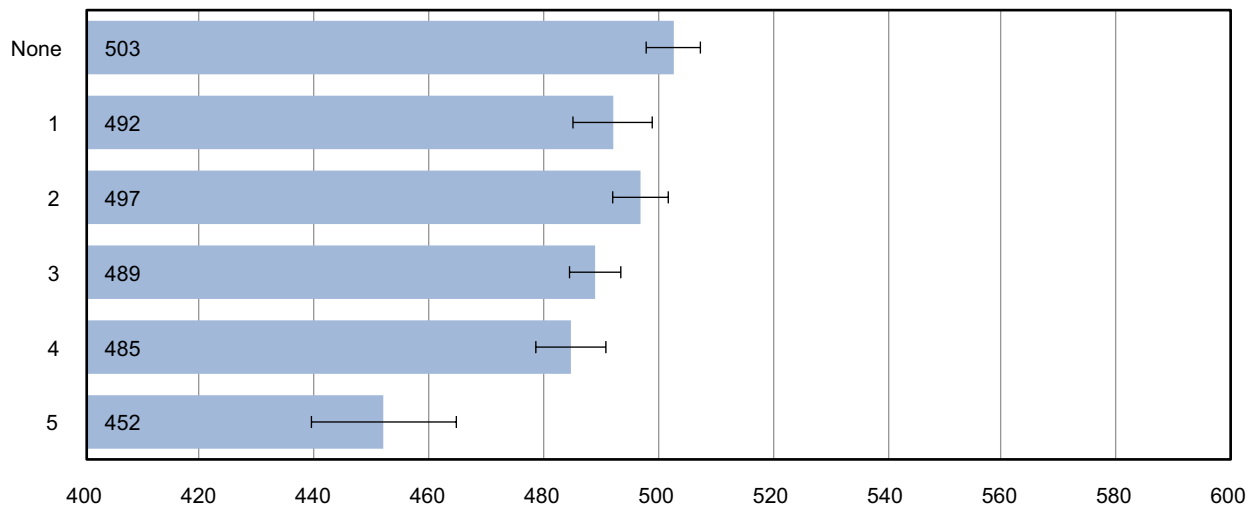
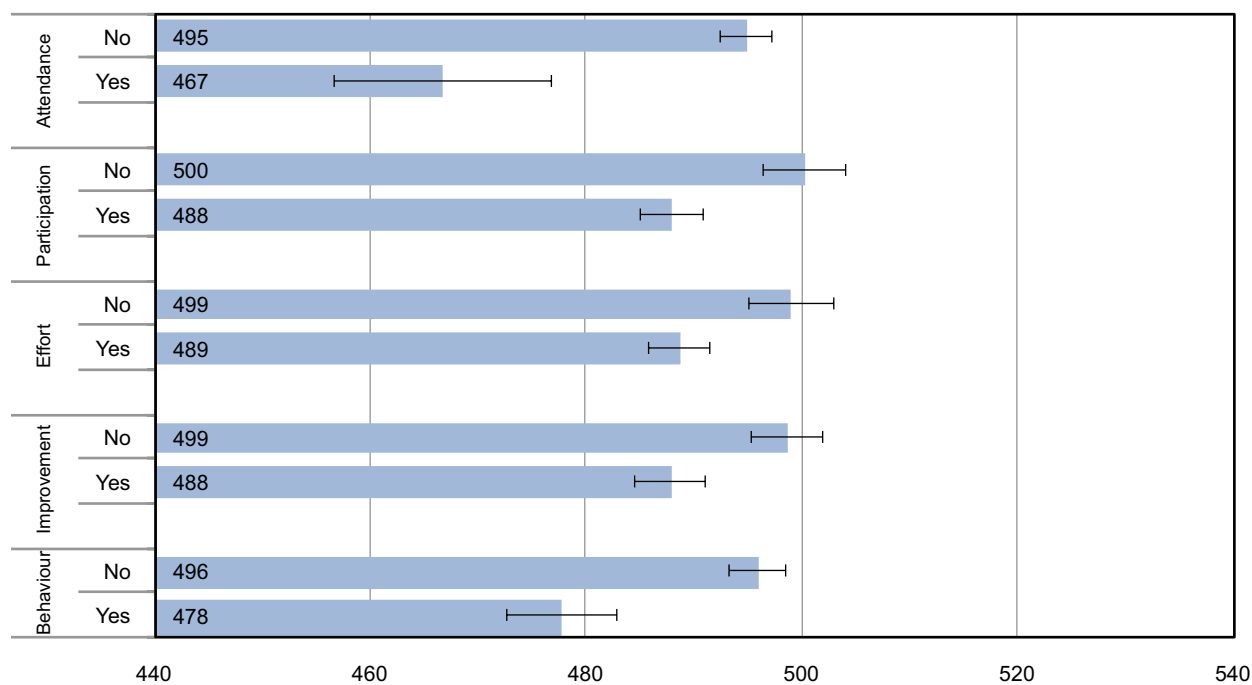


Chart 9.15 Mean reading scores by teacher use of specific non-academic criteria for assigning grades



Use of rubrics

Rubrics are statements designed to capture the desired outcome, and the level of performance expected on that outcome, for a particular learning task. Rubrics are used mainly for scoring when the scoring criteria are qualitative. However, they may also be used to inform students of expectations and to structure learning tasks. Rubrics are now widely used in language arts teaching as a means of clarifying outcomes and expectations.²⁶

Both teachers and students were asked about the use of rubrics in their language arts classes. Almost all teachers indicated that they used rubrics, and no differences were found in reading performance for those using rubrics and the few teachers not using rubrics. Teacher results are therefore not reported in detail here.

Student responses show a somewhat different picture. Overall, about two-thirds of students indicated that they knew what a rubric is, and about 50% of those reported that their teachers used rubrics often. Detailed responses by jurisdiction and language are given in Charts 9.16 and 9.17. (The missing percentages in Chart 9.17 are a result of significant numbers of students giving “don’t know” responses to this question). It is clear from this that students in most francophone populations are less familiar with rubrics and use them less than those in anglophone populations. The exception is Ontario (French). The difference between knowing and use is also larger in four of the seven francophone populations. This is especially true in Ontario, where knowledge is relatively high in both populations, but use at the start of assignments is much lower among francophones than among anglophones. At the same time, both Ontario populations reported high use of rubrics for marking.

²⁶An example of a rubric is found in PCAP-13 2007: Report on the Assessment of 13-Year-Olds in Reading, Mathematics, and Science (Toronto: Council of Ministers of Education, Canada), Table 2-3 (on page 12) and in the accompanying examples on pages 16 and 17. They show what students can be expected to be able to do at each of the three proficiency levels of the PCAP reading scale.

Chart 9.16 Percentage of students who know what a rubric is and who are given a rubric at start of an assignment by jurisdiction and language

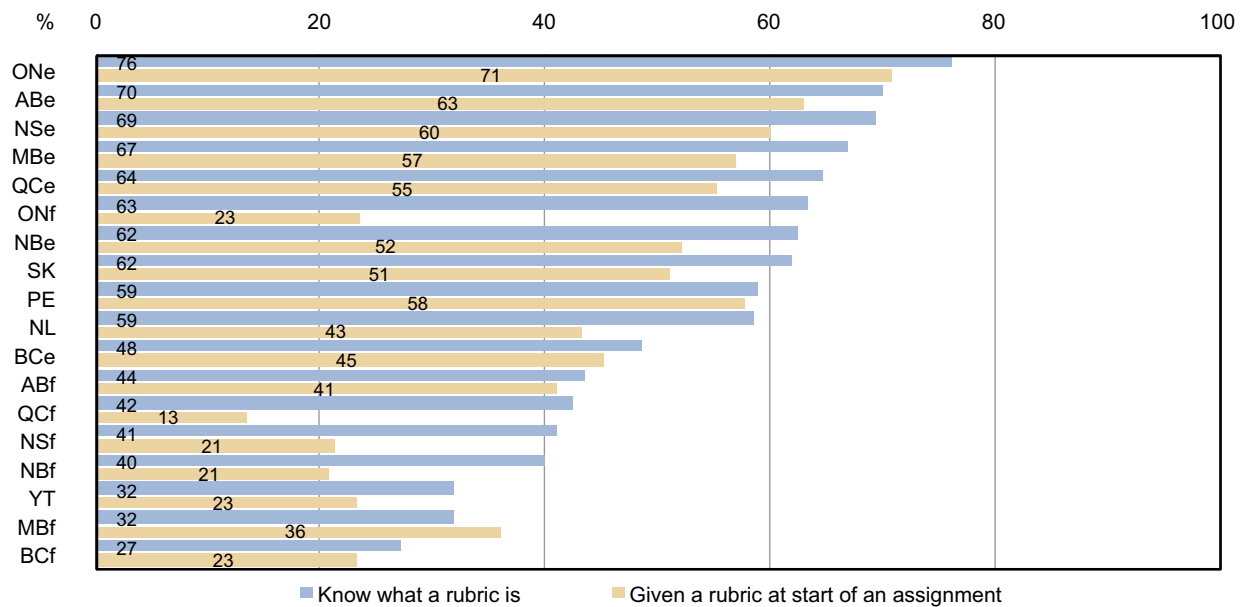


Chart 9.17 Student reports of frequency of use of rubrics for marking by jurisdiction and language

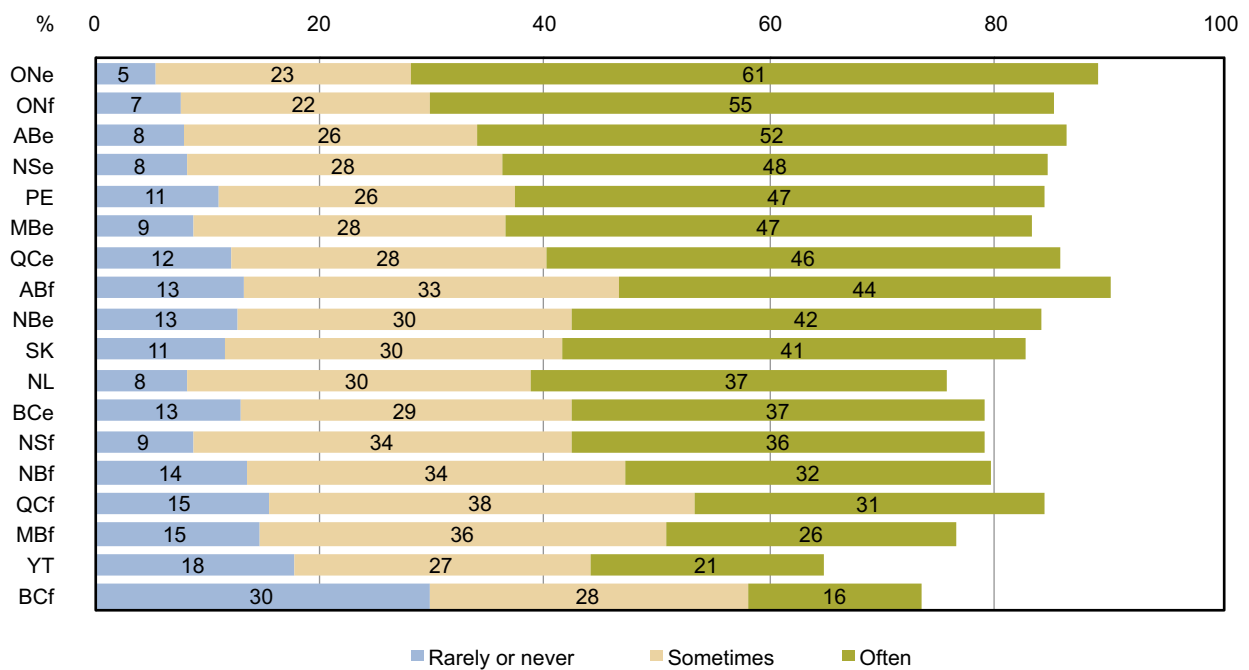


Chart 9.18 gives proficiency levels and Chart 9.19 mean reading scores for students reporting knowledge and use of rubrics. Knowing what a rubric is and using a rubric for marking are both positively

associated with reading performance. However, giving a rubric at the beginning of an assignment shows no significant effect.

Chart 9.18 Reading proficiency levels by knowledge and use of rubrics

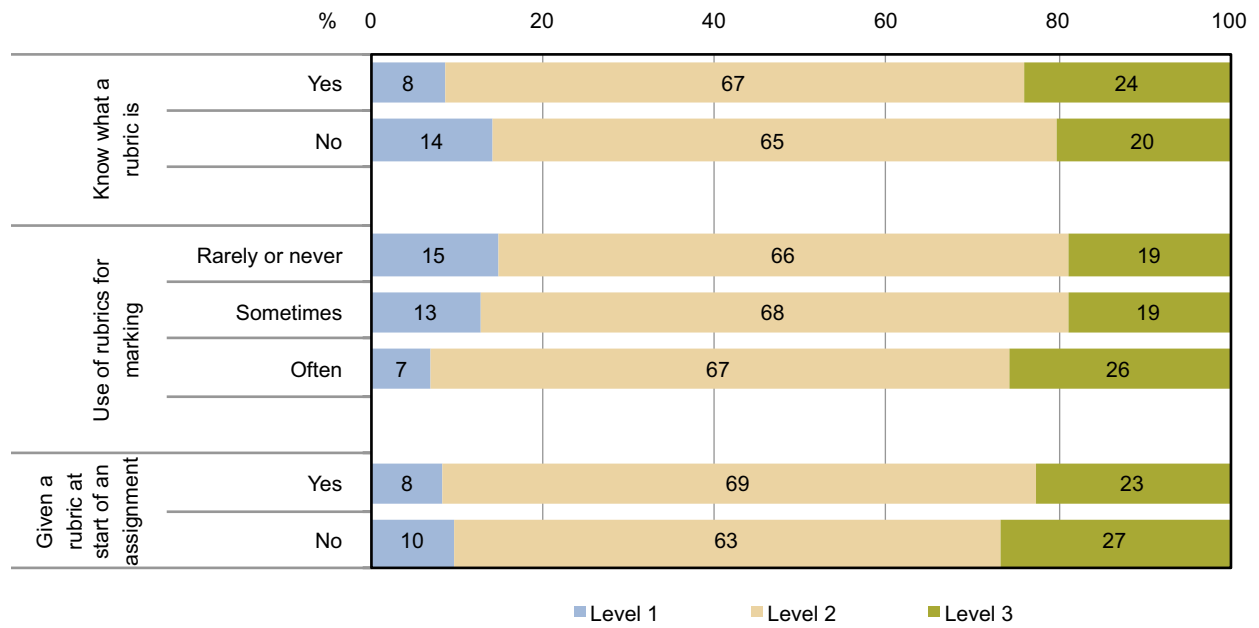
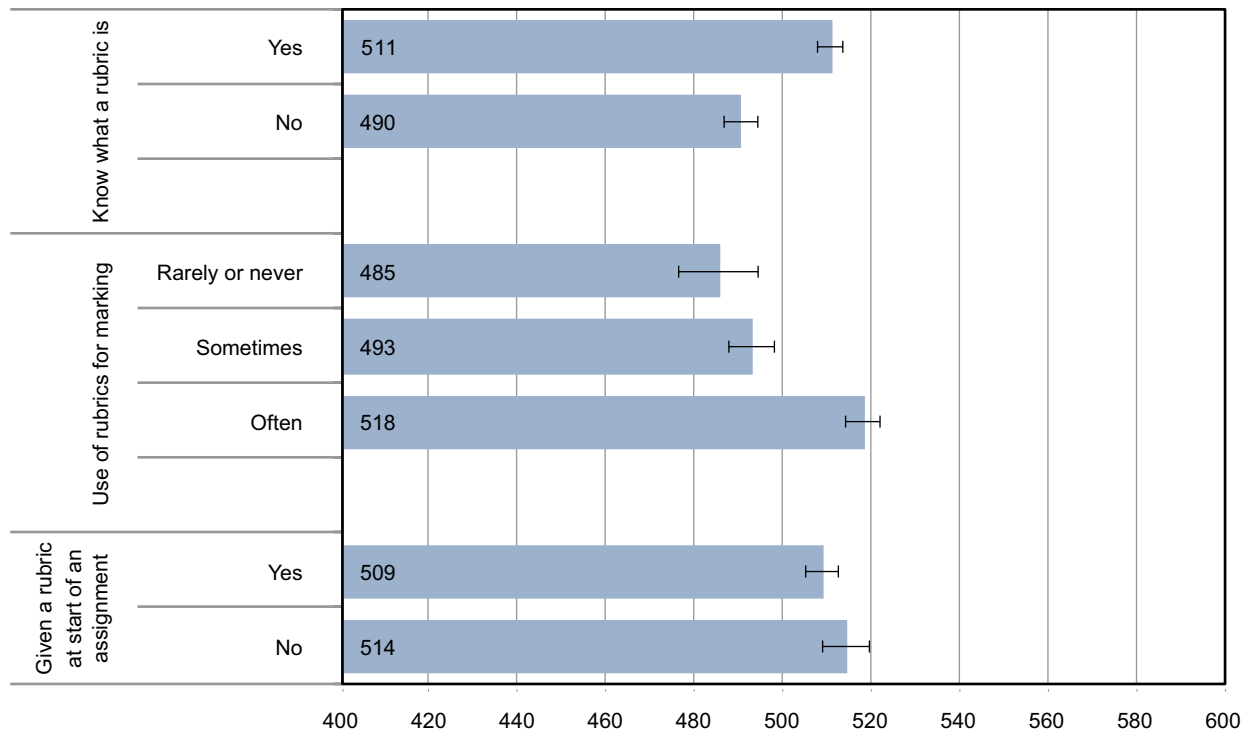


Chart 9.19 Mean reading scores by knowledge and use of rubrics



Assessment skills of teachers

Teachers were asked to rate their skills on nine types of assessment tasks, including construction of various forms of tests, rubric creation and use, interpreting scores, and assigning final grades. Almost all teachers rated themselves as either somewhat skilled or very skilled on most of these tasks. A composite rating was developed by computing the average across the nine items and rounding the average to the nearest whole number. The result was a composite index

with two values: “somewhat skilled” and “very skilled.” (Less than 1% had a composite rating of “not at all skilled,” so this level was disregarded.)

Chart 9.20 shows the breakdown by jurisdiction and language of the composite skill ratings. It is clear from this that teachers from francophone populations rate themselves as more highly skilled than do anglophone teachers.

Chart 9.20 Teacher composite ratings of assessment skills by jurisdiction and language

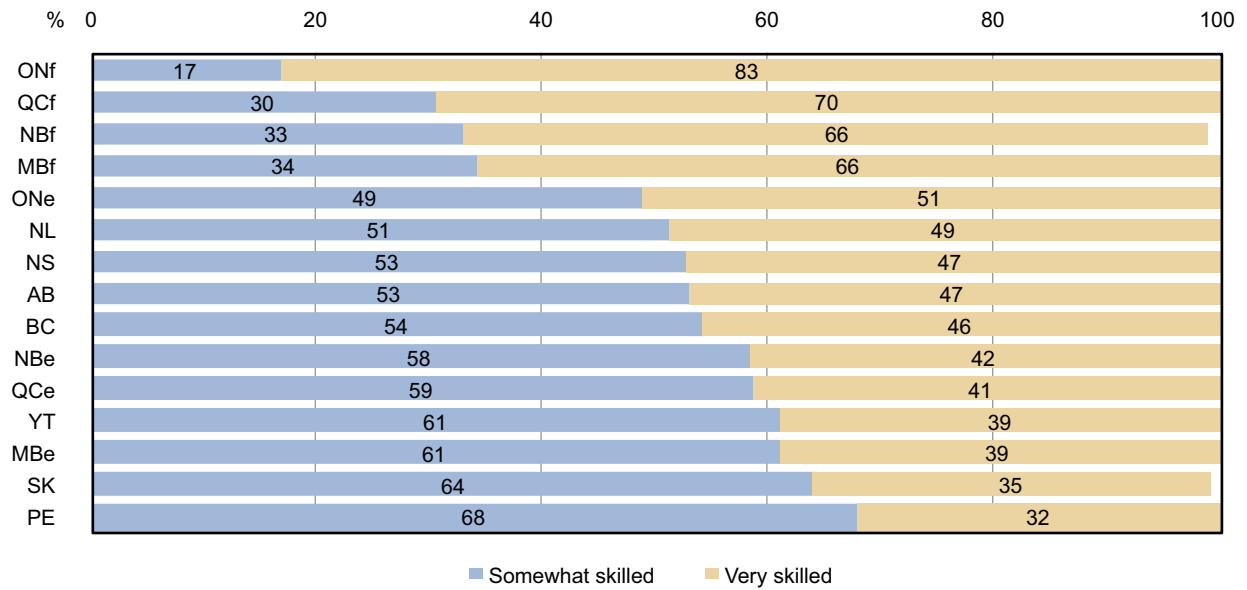
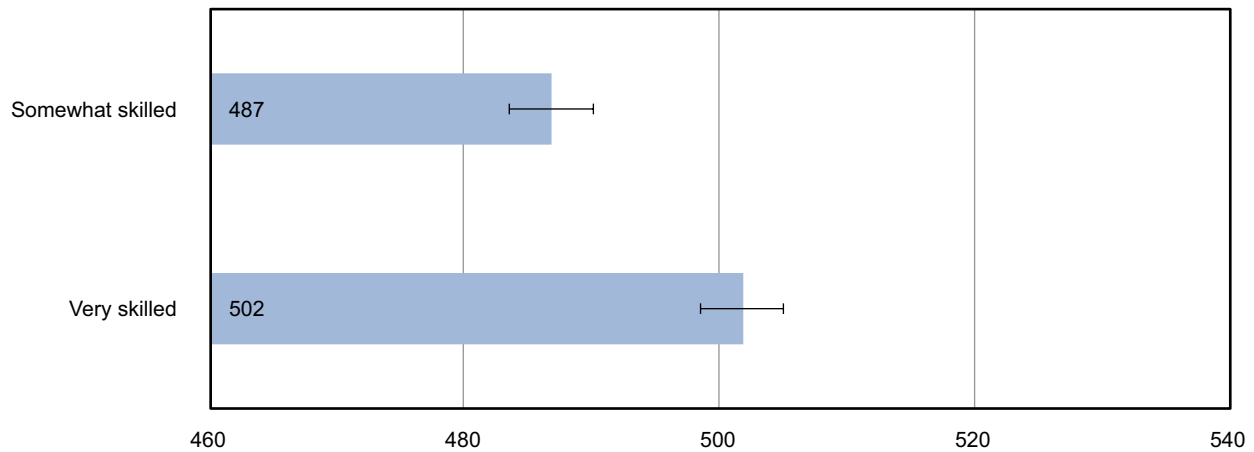


Chart 9.21 indicates that teachers who rate themselves as very skilled in assessment have higher average reading scores than those who rate themselves as only somewhat skilled.

Chart 9.21 Teacher mean reading scores by composite teacher ratings of assessment skills



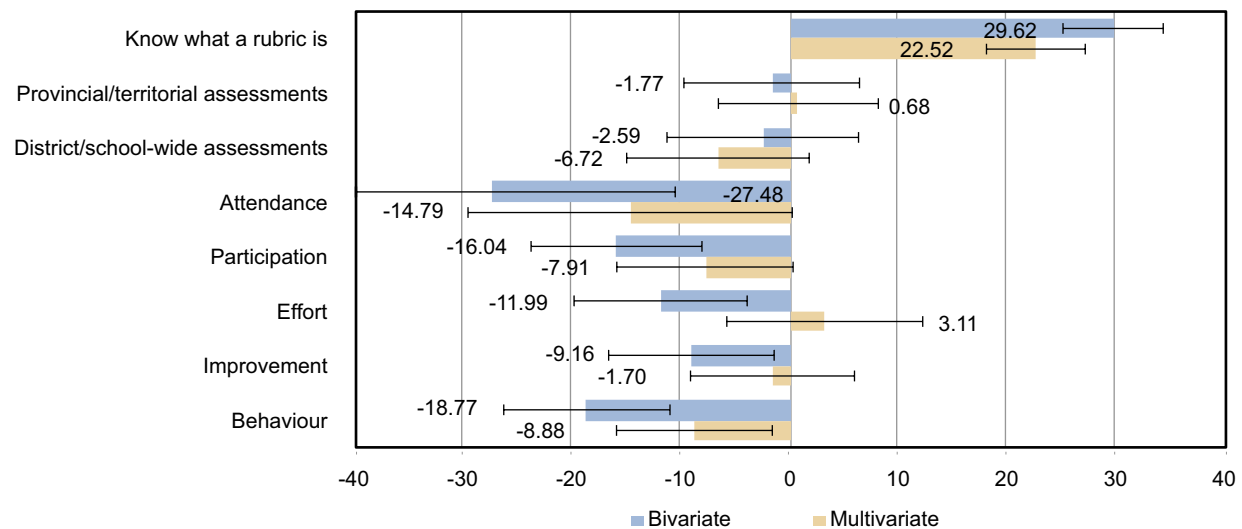
Multivariate effects

Because of the large number of assessment variables and wide differences in the scales used, the variables were clustered and the effects graphed on three scales.

Chart 9.22 shows the coefficients for variables codes as yes/no dichotomies. The student-level effect for knowledge of rubrics is relatively large and is positive

for both models.²⁷ Teacher use of provincial/territorial or district/school-wide assessments to assign marks to students has no significant effect. Almost all of the non-academic ways of assigning marks are significantly negative in the bivariate model. Though somewhat attenuated in the multivariate model, three of these effects remain significantly negative.

Chart 9.22 Regression coefficients for dichotomous assessment variables



²⁷The other two student-level rubric variables, use of rubrics to start assignments and for marking, were omitted from the model because these questions were not asked of students who reported not knowing what a rubric is. Their inclusion in the model would have resulted in a large amount of missing data for all variables in the model, not just for those specific variables.

Chart 9.23 indicates that most teacher-level assessment forms have no significant effect. The notable exception is teacher-made tests, which becomes significant once other variables are controlled. Teacher

assessment skill is attenuated in the multivariate compared to the bivariate model, likely because this effect is absorbed by other effects, such as knowledge of rubrics.

Chart 9.23 Regression coefficients for scaled assessment variables

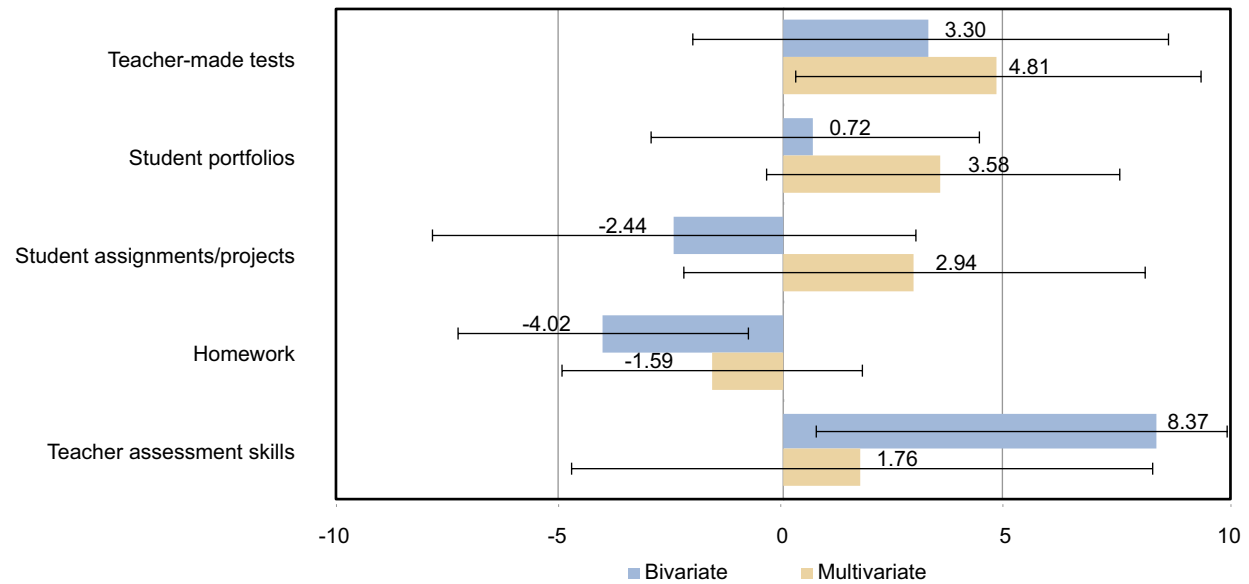
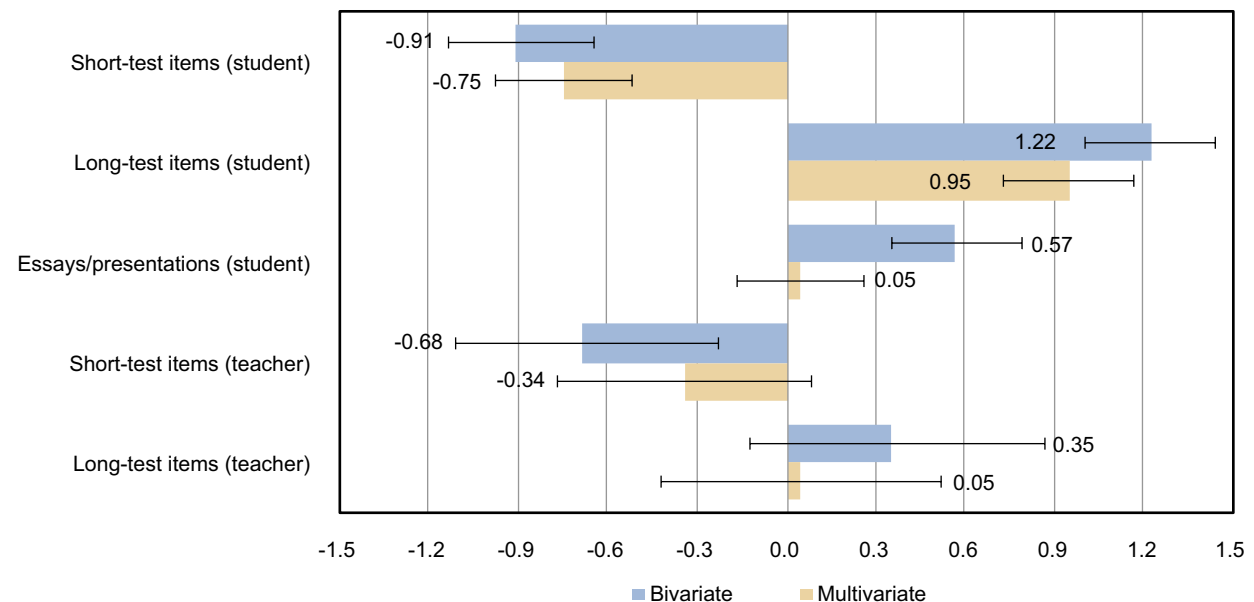


Chart 9.24 shows the effects for the three student and two teacher factors related to types of test items used. The effect of using short-test items (e.g., true/false, multiple choice) is negative for both teacher and student reports, though the multivariate teacher effect is not statistically significant for teacher. The effect of long-test items (e.g., a sentence or more,

a paragraph or more) is significantly positive for students. The essay effect is significantly positive for students in the bivariate but not in the multivariate model. The long-test items and essays are absorbed into the long-test item factor for teachers. This factor is not statistically significant in either model.

Chart 9.24 Regression coefficients for assessment factors



10. SUMMARY MODEL, ROBUST EFFECTS, AND FURTHER RESEARCH

The results presented in previous chapters reinforce what is evident from other large-scale surveys, namely, that a large number of variables are associated with reading outcomes, in both positive and negative ways. However, it is also clear from the models that many of these variables are themselves inter-correlated in complex ways, resulting in a situation where many of the simple bivariate effects are attenuated when other variables are controlled.

The goal here is to identify these effects, which might be considered “robust” in the sense that they remain significant even after many other variables are controlled.

The approach to the multivariate analysis taken in earlier chapters was to control for demographic variables, on the assumption that these are antecedent conditions, which are not within the control of schools or teachers, so that these should be accounted for before examination of the effects of variables that are of more direct interest from an educational policy perspective. This approach can be extended to a more comprehensive model in which variables from all the categories examined earlier can be controlled. The coefficients in such a model can be considered as unique or residual effects for individual variables once everything else is controlled.

It is beyond the scope of this report to investigate all the possible links among variables. Indeed, this would be virtually impossible without also examining possible theoretical connections among variables and reference to other research that might point us in desired directions. For example, the class size effect found in this study (students in larger classes have higher reading performance) is counter-intuitive and inconsistent with other research and with policy directions being taken in many jurisdictions. However, it is likely that class size is confounded with many other demographic variables, such as jurisdic-

tion, school size, and location and with other, more subtle effects such as a tendency to create smaller classes for lower-ability students or differences in teaching strategies used in larger or smaller classes. It is obviously not possible to investigate all possible correlates of both class size and reading performance in this study. However, research focused more explicitly on this variable could shed light on the reasons for the counter-intuitive effects. Before drawing any strong policy conclusions from many of the effects seen here, these need to be examined more closely and linked to other research on the same issue.

Given the general tendency for the various effects to be reduced in the multivariate, as opposed to the bivariate model, the starting point for a more comprehensive model can be those variables which have shown statistically significant effects in the bivariate models. This chapter presents the results of a preliminary attempt to develop such a model, designed to give unique effects for selected variables (mainly those with statistically significant bivariate effects). The goal here is to identify these effects, which might be considered “robust” in the sense that they remain significant even after many other variables are controlled. Because of their robustness, these effects might be considered to be of direct policy interest. At the same time, those variables for which significant shifts are found might warrant further attention to determine the sources of the change. From a statistical modelling perspective, this would require a staged or stepwise approach, in which variables of direct interest are subjected to various stages of control.

Summary model

The model presented here includes a total of 30 student-level and ten school-level variables selected on the basis of their bivariate statistical significance. A couple of variables that did not quite reach statistical significance in the bivariate model were also included because of their policy interest. An example is the number of minutes per week spent on language arts where the results, like those for class size, were counter-intuitive and inconsistent with other research.

Statistical note: Missing data

Missing data is a significant problem in multivariate models with a large number of variables. This is because if data are missing for any one variable for a particular case, that case is deleted before the model is computed. This problem is not serious if the data are missing at random and if a large number of cases are available. However, if the missing responses are systematically linked to other responses and particularly to the outcome (e.g., if lower-achieving students fail to respond to some items), missing data can have a significant impact on the results. Technical solutions (imputation) to the missing data problem are available but have not been used in this report because of time constraints. For this reason, the model presented here should be treated as preliminary and the results used with caution. It is recommended that further research using the PCAP database apply appropriate imputation procedures to reduce the impact of missing data.

At this point, it is worth reiterating some of the main characteristics of the models being used.²⁸ These may be summarized as follows:

- The approach is a variation on multiple regression analysis, specifically designed to deal with data that are hierarchical in nature. In this case, the hierarchy is determined by the two-stage sampling procedure in which schools and then students within schools were sampled.
- The existence of questionnaire data from students, teachers, and schools effectively yields levels for modelling. However, because there were typically only one or two teachers per school, teacher data were aggregated to the school level in developing the models.
- Multiple regression analysis is essentially a prediction model. The model yields coefficients that can be interpreted as the effect on the outcome (scores on the reading assessment) of a one-unit change in a variable of interest.
- The initial models are simple bivariate models, in which the effect of a single predictor is computed. Subsequent multivariate models include other variables, or covariates, with all the

variables in the model acting as controls on all the others. Any change in the coefficient for a specific variable from the bivariate to the multivariate model can be interpreted as a measure of how the inter-correlations among the predictor variables influence the residual effect of a particular predictor in the presence of all other predictors.

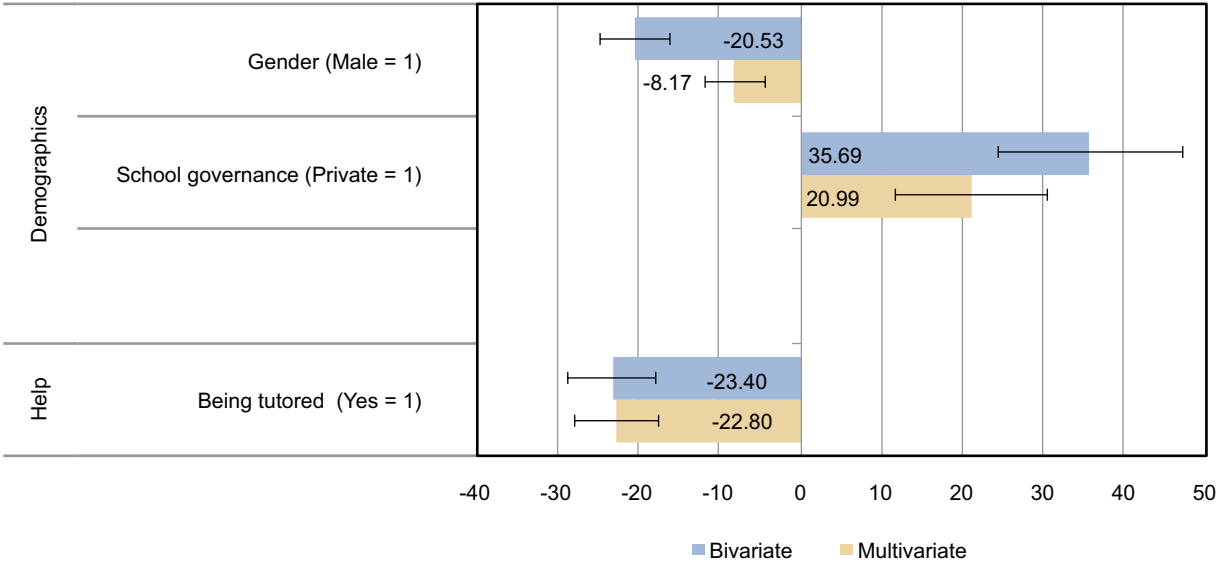
- The impact of the multivariate model is to “isolate,” to the degree possible with the data at hand, the effects of one variable from those of others.
- The regression coefficients computed in these models are not in standardized form. Each coefficient must be interpreted in terms of the scale for the variable of interest. In this chapter, coefficients are grouped by the scale used so that coefficients presented in any one chart are at least approximately comparable. The scale for each variable is given in Table A.1 (Appendix A).

The bivariate and multivariate coefficients for the summary model are given in Charts 10.1 to 10.4.²⁹ Each chart is followed by brief comments on the observed effects.

²⁸ For a more detailed description of the modelling process, please see the statistical note near the end of Chapter 3.

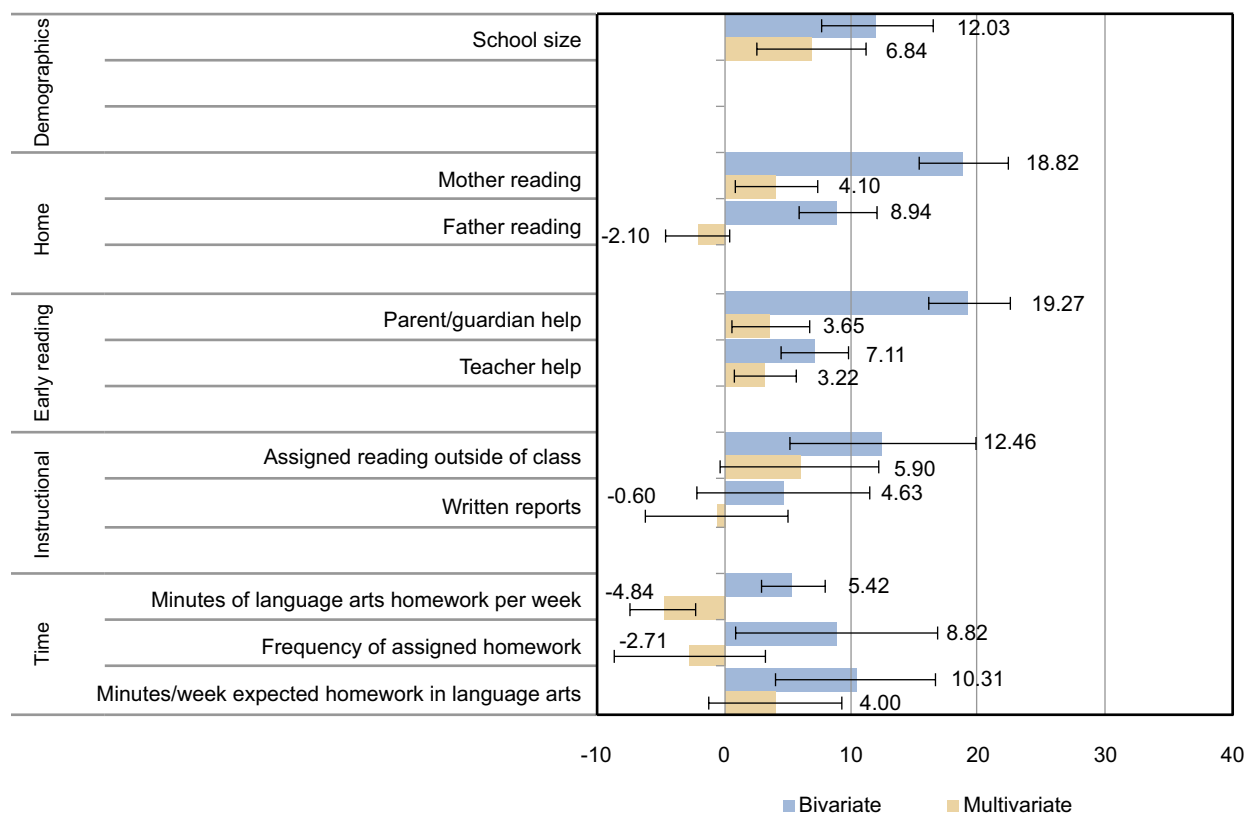
²⁹ Small discrepancies may exist between the bivariate coefficients presented here and those given in previous chapters. This is because of differences in the treatment of missing data in the two instances and because of minor rescaling of some variables. None of these differences has any significant impact on the results.

Chart 10.1 Regression coefficients for dichotomously scaled variables



- The gender effect is in a direction that indicates lower mean reading scores for males. This effect is significantly attenuated in the multivariate model, suggesting that factors other than gender are contributing to the bivariate effect.
- The school governance effect strongly favours private schools. This effect is not significantly attenuated in the multivariate model, indicating that this effect is not strongly mitigated by other variables included in the model.
- The tutoring effect is negative in both models, with no significant change from bivariate to multivariate.

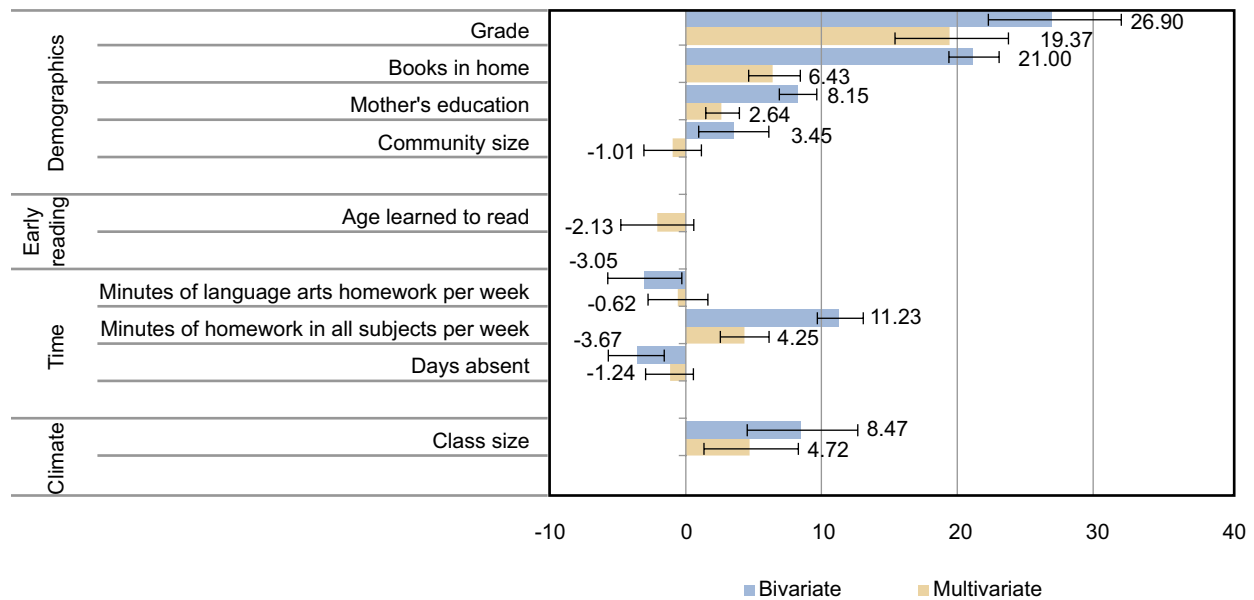
Chart 10.2 Regression coefficients for variables with ordinal³⁰ scales 1–3 and 1–4



- Larger school size is associated with higher reading performance in both models, indicating that this effect is not significantly influenced by other variables in the model.
- The effect of mother reading in the home is positive in both models. The effect of father reading in the home shifts from bivariate positive to multivariate nonsignificant. This indicates that the effect of the student observing the father reading in the home is offset by other factors. Possible examples would be the students' own reading behaviours.
- Both parent/guardian and teacher help with early reading have positive bivariate effects, which are attenuated somewhat in the presence of the other variables in the multivariate model. The parent/guardian effect is significantly larger than the teacher effect at the bivariate level but is also more strongly influenced by other variables as indicated by the multivariate model.
- Teacher assignment of reading outside of class is positive, and written reports on reading show a marginal positive effect in the bivariate model. In the multivariate model, these effects are not significantly different from zero.
- All of the homework variables show positive effects on reading achievement in the bivariate model. Minutes of language arts homework per week changes to negative, and the effects of the other homework variables shift to nonsignificant in the multivariate model.

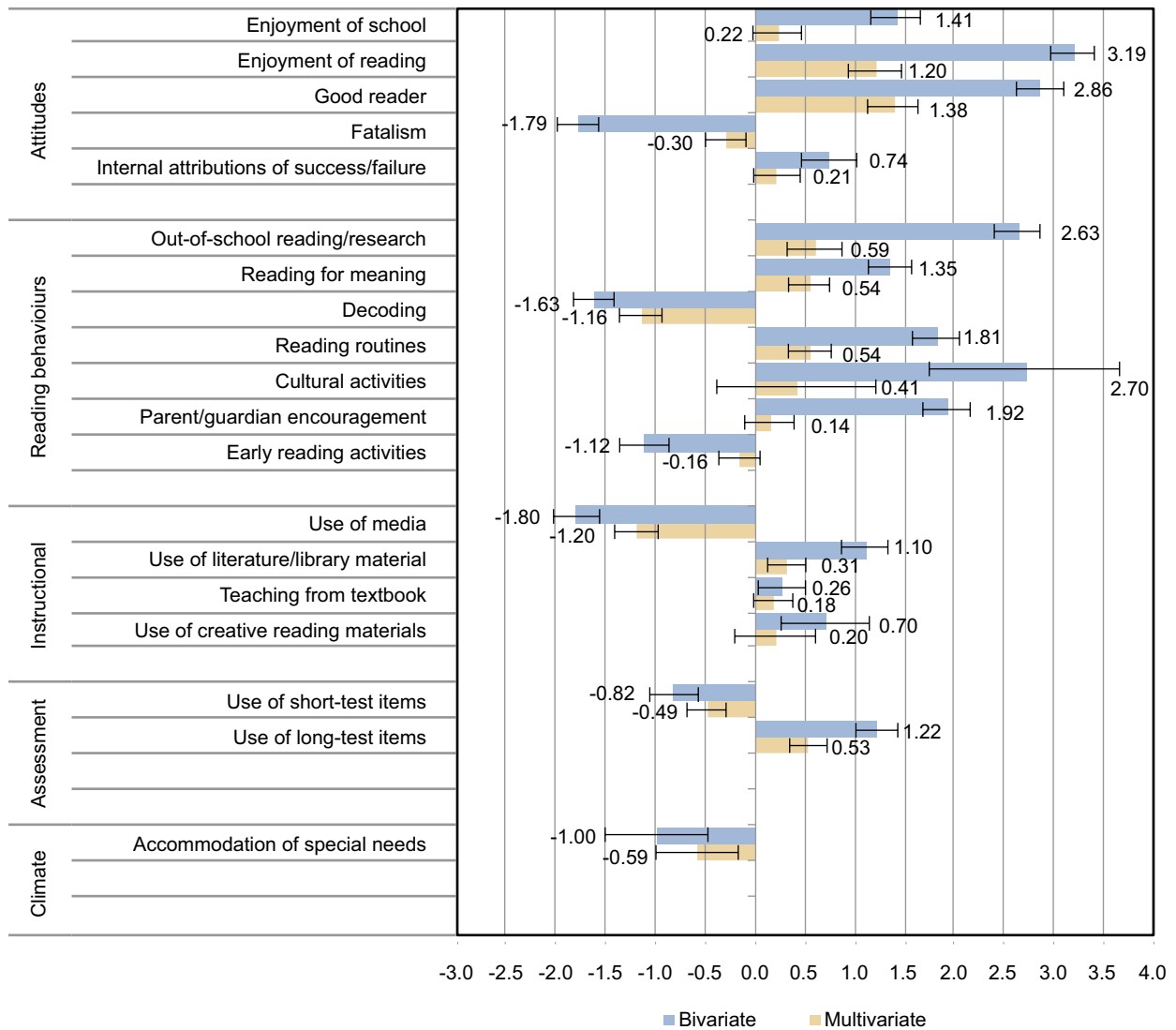
³⁰ An ordinal scale is one that implies a rank order but without equal intervals between scale values. For example, school size was reported on a 1–4 scale: (1) 100 or less, (2) 101–500, (3) 501–1,000, (4) greater than 1,000.

Chart 10.3 Regression coefficients for variables with ordinal scales 1–5 and 1–6



- The grade the student was in at the time the test was written is strongly positively related to achievement in both models. However, the effect is significantly smaller in the multivariate model.
- The two socioeconomic status variables (books in the home and mother's education level) are also significantly related to achievement in both models. Both are significantly attenuated in the multivariate model, suggesting that other variables can offset the effects of socioeconomic status to some degree.
- Students whose schools are in larger communities perform better than those in schools located in smaller communities. However, once other variables are controlled, the effect of community size is essentially reduced to zero.
- Students who learn to read at a younger age perform better in reading than those who learn to read later. Again, however, this effect is offset by other variables in the multivariate model.
- Both time on homework in all subjects and time on language arts homework are positively associated with reading performance. The effect of language arts homework is reversed in the multivariate model. Part of this is likely because language arts homework is included in the total. However, the reversal suggests the possibility that other factors are at play.
- Days absent has a negative effect on achievement. This effect is small relative to many other effects in this series, but it is not significantly attenuated by other variables.
- Minutes per week allocated to language arts has no significant effect on reading achievement.
- Finally, the class size effect is significant in both models in a direction which indicates that students in larger classes perform better than those in smaller classes, even after possible confounding variables, such as school or community size, are controlled.

Chart 10.4 Regression coefficients for variables scaled as factor scores³¹



³¹ As indicated earlier, all factors were scaled to a mean of 50 and a standard deviation of 10. A one-point change in the factor score is thus a much smaller unit change than is the case for other variables. Hence, the scale used in this graph is much smaller. The reader may wish to examine these results on the basis of standard deviation units. To find the change in reading score associated with one standard deviation change in the factor score, the coefficient should be multiplied by 10.

- Attitudes to school and to reading show generally positive effects for both models. The exception is enjoyment of school, which reduces to marginal in the multivariate model. All of these effects show a significant reduction in the multivariate model, indicating that other variables in the model are related to attitudes.
- The negative effect of fatalism and the positive effect of internal attributions of success and failure are both attenuated in the multivariate model, although the fatalism effect remains significantly negative.
- Outside-of-school reading/research, reading for meaning, and having reading routines show significant positive effects for both models, though these effects are reduced by the effects of other variables in the multivariate model.
- Reading by decoding shows a negative effect in both models.
- The positive bivariate effects of parent encouragement of reading are offset by the effects of other variables in the multivariate model.
- Reading at an earlier age contributes to higher reading performance for both models. (This effect shows negative on the chart because the scale value for earlier reading is lower than that

for later reading). However, other early reading activities have a negative bivariate effect, which is reduced to near zero in the multivariate model.

- The negative effects of using media for reading and the positive effects of reading literature hold for both models. However, the relatively small positive bivariate effects for reading from textbooks and for use of creative reading materials are reduced to near zero in the bivariate model.
- The use of long test items for assessing reading shows positive effects and the use of short test items shows negative effects for both models.
- The composite effect of accommodating special-needs students is also negative for both models, though this effect is relatively small in comparison to those for several of the other factors in the model.

Robust effects

Of the many variables that show a relationship to achievement when taken alone, not all remain statistically significant when a large number of other variables are controlled. For purposes of this discussion, those which are statistically significant across both models may be considered robust enough to have direct implications for policy and practice. These robust effects are identified in Table 10.1.

Table 10.1 Robust positive and negative effects

Positive	Negative
Gender (female)	Gender (male)
Private school	Being tutored
Teacher assigning out-of-class reading	More days absent from school
Larger schools	Reading by decoding
Being in a higher grade	Reading using media
Having more books in the home	Use of short-test items to assess reading
Mother having higher education level	Accommodations for special-needs students
Mother reading at home	
Parent help with reading	
Teacher help with reading	
Being in a larger class	
Student enjoys reading	
Student perception of being a good reader	
Reading for meaning	
Having reading routines	
Outside-of-class reading	
Reading using literature/library material	
Use of long-test items to assess reading	

Further research

The omnibus nature of this report limits the ability to explore in more detail the inter-correlations among the many variables that appear to affect reading achievement. This approach also precludes a detailed examination of how these results relate to other research and of the policy implications of the results.

The design of the PCAP provides for a research phase that would follow the release of the public and contextual reports. This phase is intended to allow a focus on specific research issues which arise from the data and which fit the research agendas of

CMEC and the member jurisdictions. The overview of factors associated with achievement presented in this report is expected to set the stage for the research phase. Selection of a few of the effects of most interest, along with a more detailed examination of these effects using models which overcome some of the limitations of this report, would be able to yield a research agenda that might be pursued either through further commissioned studies or through release of the database to independent researchers.

Table A.1. Bivariate and multivariate model coefficients for predictors of reading performance

Variables ³²	Category	Level	Scale	Bivariate Model				Multivariate Model			
				Coeff	SE	Df	Prob	Coeff	SE	Df	Prob
Gender	Demographics	St	0-1	-20.53	2.20	18856	0	-8.17	1.89	18812	0
Grade		St	1-5	26.90	2.48	19192	0	19.37	2.11	18812	0
Books in home		St	1-5	21.00	0.94	19192	0	6.43	0.96	18812	0
Mother's education		St	1-6	8.15	0.70	19192	0	2.64	0.63	18812	0
School size		Sc	1-4	12.03	2.24	1672	0	6.84	2.19	1662	0.002
School governance		Sc	0-1	35.69	5.81	1672	0	20.99	4.79	1662	0
Community size		Sc	1-5	3.45	1.31	1672	0.009	-1.01	1.07	1662	0.346
Enjoyment of school	Attitudes	St	Factor (50,10)	1.41	0.13	19192	0	0.22	0.12	18812	0.082
Enjoyment of reading		St	Factor (50,10)	3.19	0.11	19190	0	1.20	0.14	18812	0
Good reader		St	Factor (50,10)	2.86	0.12	19190	0	1.38	0.13	18812	0
Fatalism		St	Factor (50,10)	-1.79	0.11	19190	0	-0.30	0.10	18812	0.004
Internal attributions of success/failure		St	Factor (50,10)	0.74	0.14	19190	0	0.21	0.12	18812	0.072
Outside-of-school reading/research	Reading behaviours	St	Factor (50,10)	2.63	0.12	19192	0	0.59	0.14	18812	0
Reading for meaning		St	Factor (50,10)	1.35	0.11	19192	0	0.54	0.11	18812	0
Decoding		St	Factor (50,10)	-1.63	0.10	19192	0	-1.16	0.11	18812	0
Reading routines		St	Factor (50,10)	1.81	0.12	19192	0	0.54	0.11	18812	0
Being tutored	Help	St	0-1	-23.40	2.77	19192	0	-22.80	2.64	18812	0
Mother help with reading		St	1-3	18.82	1.79	19192	0	4.10	1.65	18812	0.013
Father help with reading		St	1-3	8.94	1.56	19192	0	-2.10	1.29	18812	0.102
Academic/cultural activities		St	Factor (50,10)	2.70	0.49	19192	0	0.41	0.41	18812	0.317

³² Outcome variables of reading performance

				Bivariate Model				Multivariate Model			
Variables	Category	Level	Scale	Coeff	SE	Df	Prob	Coeff	SE	Df	Prob
Parent/guardian help	Early reading	St	1-4	19.27	1.64	19192	0	3.65	1.56	18812	0.019
Teacher help		St	1-4	7.11	1.35	19192	0	3.22	1.24	18812	0.01
Parent/guardian encouragement		St	Factor (50,10)	1.92	0.12	19192	0	0.14	0.13	18812	0.275
Age learned to read		St	1-5					-2.13	1.36	18812	0.116
Early reading activities		St	Factor (50,10)	-1.12	0.13	19192	0	-0.16	0.11	18812	0.123
Minutes per week on language arts	Time	Sc	1-5 quintile	-3.05	1.38	1672	0.027	-0.62	1.12	1662	0.576
Frequency of assigned homework		Sc	1-4	8.82	4.05	1672	0.029	-2.71	3.03	1662	0.371
Expected minutes per week of homework in language arts		Sc	1-4	10.31	3.21	1672	0.002	4.00	2.67	1662	0.134
Minutes per week of homework in all subjects		St	1-5	11.23	0.86	19191	0	4.25	0.91	18812	0
Minutes per week of language arts homework		St	1-4	5.42	1.28	19191	0	-4.84	1.32	18812	0
Days absent		St	1-5	-3.67	1.04	19191	0.001	-1.24	0.89	18812	0.163
Use of media	Instructional	St	Factor (50,10)	-1.80	0.12	19192	0	-1.20	0.11	18812	0
Use of literature/library material		St	Factor (50,10)	1.10	0.12	19192	0	0.31	0.10	18812	0.002
Teaching from textbook		St	Factor (50,10)	0.26	0.12	19192	0.03	0.18	0.10	18812	0.078
Use of creative reading materials		Sc	Factor (50,10)	0.70	0.23	1672	0.002	0.20	0.21	1662	0.345
Reading outside of class		Sc	1-3	12.46	3.73	1672	0.001	5.90	3.18	1662	0.063
Written reports		Sc	1-3	4.63	3.46	1672	0.181	-0.60	2.86	1662	0.833
Use of short-test items	Assessment	St	Factor (50,10)	-0.82	0.12	19191	0	-0.49	0.10	18812	0
Use of long-test items		St	Factor (50,10)	1.22	0.11	19191	0	0.53	0.10	18812	0
Accommodation of special needs	Climate	Sc	Factor (50,10)	-1.00	0.26	1672	0	-0.59	0.21	1662	0.006
Class size		Sc	1-5	8.47	2.06	1672	0	4.72	1.76	1662	0.008