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ABSTRACT

As a step toward acquiring international measures of geographic competence of students, an optional geography component was included in the second International Assessment of Educational Progress. Nine of the 20 countries participating in the assessment included the geography component, including 8 provinces. In each country a representative sample of 13-year-olds was assessed, a total of about 3,300 students. The assessment contained 24 content-area questions and 14 background questions covering geographic skills and tools, physical geography, and cultural geography. National differences in performance on the geography probe were less pronounced than they were in the mathematics and science portions of the assessment. Overall, students performed better on questions involving map reading and chart reading than on questions that combined use of such skills with prior knowledge of geographic vocabulary, process, or location. There were consistent relationships between books in the home, family size, and leisure reading and achievement, but the relationship of television and time spent on homework to achievement was less clear. Issues in developing and administering similar international assessments are discussed. Eleven figures, 12 tables, 15 sample test questions, a procedural appendix, and a data appendix are included. (SLD)

# LEARNING
## ABOUT THE WORLD





*The International Assessment of Educational Progress*

**IAEP**

*EDUCATIONAL TESTING SERVICE*

# LEARNING
## ABOUT THE WORLD

**Stephen Lazer**

Prepared for the National Center for Education Statistics,
U.S. Department of Education and the National Science Foundation

**June 1992** **Report No. 22-CAEP-05**

*The International Assessment of Educational Progress*

ETS® **IAEP**

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# Introduction

Individual economies, governments, and ecosystems do not exist in isolation. Regions are linked by trade agreements, global markets, communications networks, political alliances, and international organizations. Weather and pollution do not respect borders. If people are to be productive members and responsible citizens of the "global village," they must have some understanding of the world's diverse peoples, cultures, and places, and of the factors that shape their interactions. It is, therefore, essential that schools have education programs that enable students to develop a working knowledge of the complex subject of geography.

If policymakers are to ensure that geography education meets the needs of students and societies, they must first have measures of the skills and knowledge of children, the nature of geographic instruction, and student attitudes toward geography. Beyond this, comparing the geographic competencies of students in different countries may help to identify those components of educational and value systems that contribute to high levels of achievement. As a first step toward acquiring such international measures of skills, knowledge, and education, an optional geography component was included in the second International Assessment of Educational Progress (IAEP).

Any study that compares students in different countries must guard against assessing knowledge and skills in areas inappropriate to certain national

curricula, and formulating questions in ways that will skew results and comparisons. Therefore, the participants in the second IAEP assembled an assessment that focused on the common elements of their curricula. All questions were also pretested in each country to ensure their appropriateness for students. In addition, to provide contexts for the interpretation of student achievement data, the assessment designers added sets of questions about students' home backgrounds and classroom experiences.

This report first examines student achievement in different areas of geography. It then discusses background variables that may affect performance. Throughout, it investigates possible interrelationships between performance, home background, and classroom experience. While surveys such as this cannot establish causal relationships between certain behaviors and student achievement, they may indicate factors that help explain high and low levels of performance.

This IAEP study was not designed to determine and recommend some optimal mode of geography instruction; the instrument was far too limited to yield widely generalizable results, and prescription was not the goal of the assessment. Rather, the participants hoped to identify behaviors and practices that contribute to high levels of achievement, so that education policymakers would have information that might enable them to improve domestic performance in ways that maintain fidelity to national educational goals.

## ABOUT THIS PROJECT

The geography portion of the IAEP was a special probe into the geographic knowledge and skills of 13-year-olds. Twenty countries assessed the mathematics and science achievement of 13-year-olds; of these 20, nine countries also administered the optional geography component.[1] A list of

[1] In all nine countries in the geography study, 90 percent or more of the 13-year-olds in the population were in school at the time of the assessment.

participants is presented below with a description of the limitations of the populations assessed. In Canada, eight of the 10 provinces[2] participated and five provinces drew samples from both English-language and French-language schools, for a total of 13 separate samples. These distinct Canadian samples coincide with the separate provincial education systems and reflect the provinces' concerns for the two language groups they serve. As a group, these samples represent 90 percent of the 13-year-old students in Canada and provide a good estimate of performance of the country as a whole.

| | |
|---|---|
| **Canada** | Eight out of 10 provinces |
| **Hungary** | All students |
| **Ireland** | All students |
| **Korea** | All students |
| **Scotland** | All students |
| **Slovenia** | All students |
| **Soviet Union**[3] | 14 out of 15 republics, Russian-language schools |
| **Spain** | All regions except Cataluña, Spanish-language schools |
| **United States** | All students |

In each country, a representative sample of 13-year-olds was assessed in mathematics, science, and geography. Samples were drawn from about 110 schools and totaled approximately 3,300 students.[4] Test-takers were given four 15-minute blocks of mathematics or science items and one 7-minute block of background questions. In addition, the participants in the geography component completed one 7.5-minute block of geography items and one 2.5-minute block of subject-related background questions.[5]

---

[2] Nova Scotia and Prince Edward Island did not take part.

[3] Since the assessment occurred in 1991, results are applicable to the population of the former Soviet Union; the country is thus referred to as the Soviet Union.

[4] The exception is Canada, where enough students were assessed in each participating province to allow for provincial and language-group reporting.

[5] Students from Hungary and the Soviet Union did not complete the geography-specific background questions.

Steps to ensure the uniformity and quality of the surveys were taken at all stages of the project. While procedures could not always be followed in exactly the same way in each of the separate assessment centers, overall compliance was very high.[6] Translations and adaptations of assessment materials were carefully checked for accuracy. All questions were pilot-tested in participating countries before they were used in the final assessment. Comparable sampling designs were used by all participants, and the quality of their implementation was carefully checked and documented. Participants were provided with training and computer software to facilitate the tasks and to ensure uniformity and quality. Test administrators were trained to administer the tests to students using the same set of instructions and time limits. The standardization of administration procedures was carefully checked within each country and across countries by an international monitoring team. The accuracy of the database was validated through independent checks of a random selection of student test booklets and school questionnaires; the accuracy of the data analysis was validated by comparing the results obtained using different statistical programs and computer equipment.

## THE IAEP GEOGRAPHY ASSESSMENT AND FRAMEWORK

The geography component of the IAEP consisted of 24 content-area questions and 14 background questions. Designed as a brief assessment of

[6] Additional documentation of data collection is provided in the Procedural Appendix and in Adam Chu, et al, *IAEP Technical Report*, Princeton, NJ, Educational Testing Service 1992.

basic geographic skills and knowledge, it was not intended to cover a full range of geographic information, concepts, and abilities. The geography questions fall into three major content and skill categories:[7]

- **Geographic Skills and Tools,** including using maps, charts, and globes (8 questions)
- **Physical Geography,** covering location of physical features and concepts of climate (9 questions)
- **Cultural Geography,** focusing on the location of cultural entities as well as interactions between people and their environment (7 questions)

Clearly, a number of different classification schemes might have been used to organize the subject of geography. Furthermore, the participants in the IAEP did not wish to perpetuate, through use of these categories, a largely artificial separation between the physical and human components of an integrated field of study. However, for the purpose of organizing geographic content for both a brief assessment and for this report, the three content categories described above seemed appropriate.

## A WORD ABOUT COMPARISONS

It is important to remember that the primary goal of an international analysis is not to rank countries, but rather to give each country's educators and policymakers information that will lead to improvement in domestic performance. Comparisons are difficult to make fairly and accurately. However, if the limitations of such analyses are recognized, comparative

[7] For a more thorough description of the IAEP Geography framework, see *The 1991 IAEP Assessment; Objectives for Mathematics, Science, and Geography.* Center for the Assessment of Educational Progress. Princeton, NJ: Educational Testing Service, 1991.

studies can provide useful information about the aspects of educational systems that are positively correlated with high levels of achievement.

Many contextual variables must be considered when making comparisons of student achievement levels in different countries. For this project, information was collected on only a small number of these factors:

- What home and personal experiences seem to support geographic learning?
- To what extent do students take geography courses in school?
- What other school courses cover geography topics?
- What specific geography topics are covered in school?

Survey data on factors such as these cannot yield causal explanations of variations in achievement levels, but they can inform examinations of assessment results and suggest topics for further study. Information on such background variables also helps provide a setting for meaningful comparisons of diverse international populations.

Even if care is taken, complete international comparability is difficult to attain. Three potential sources of bias warrant special attention: the representativeness of the target population; the appropriateness of the measures; and educational and cultural differences among the countries. As indicated earlier, some participants confined assessments to particular geographic areas or language groups. Specifically, two Canadian provinces (Nova Scotia and Prince Edward Island) did not take part in the geography assessment. In the Soviet Union, the Republic of Uzbekistan did not participate, and in the other republics, only students in Russian-language schools were assessed. In Spain, neither students in the Catalan autonomous community nor those attending exclusively Valencian- or Basque-language schools took part in the assessment. There is simply no way to measure the bias introduced when certain groups of children are excluded from a sample or when response rates are low; the

participation of those excluded could have raised performance scores, lowered them, or not affected them at all.

All countries participated in the development of the geography framework that guided the design of the instruments; curricular experts in each country reviewed the appropriateness of all potential questions for their own students.[8] While acceptable to all, the content areas measured in the IAEP tests are not equally representative of each country's curriculum. Furthermore, the testing format -- multiple-choice questions -- was not equally familiar to students from all countries. To address this issue, participants were given the option of administering a practice test to sampled students prior to the actual assessment. Finally, since countries differed in the age at which students start school and in policies for promotion, students at age 13 were further along in their schooling in some countries than in others. While all results presented in this report represent performance of all students at age 13, participants were also provided with results broken down by the two most common grade levels for these students, grades 7 and 8.

International results must ultimately be interpreted in light of the educational and cultural context of each country. The countries that participated in the IAEP were large and small, rich and poor, and have varied ethnic, religious, language, and cultural traditions. Likewise, educational goals, expectations, and even the meaning of achievement varied from nation to nation.

[8] See Center for the Assessment of Educational Progress, *The 1991 IAEP Assessment, Objectives for Mathematics, Science, and Geography*, op. cit., for a full discussion of the development of frameworks and selection of questions.

# Highlights

- Students from Hungary performed at a significantly higher level on the 24 geography items than their counterparts from the other countries in the study.

- National differences in performance on the geography probe were less pronounced than they were in the IAEP mathematics and science studies. The range of average performance in the nine participating countries spanned only 11.5 percentage points.

- In all populations except the Soviet Union (Russian-language schools), male students performed at a significantly higher level than female students.

- The relationship between background variables and geographic performance was not consistent across national educational systems. For all countries in the study, there was a positive, linear relationship between the number of books in a student's home and geography achievement. On the other hand, the relationship between the amount of time a student spent on homework and geography performance was inconsistent across populations.

- The relationship between country of residence and a student's performance on individual assessment items was inconsistent: on some questions geographic or cultural proximity seemed related to achievement, while in other cases connections were less clear.

- Students seemed to perform well on questions involving map- or chart-reading skills. On the other hand, students seemed to have far more difficulty on questions that required them to combine the use of such skills and prior knowledge of geographic vocabulary, process, or location.

- In all the countries except Slovenia, more than 70 percent of students reported watching two or more hours of television each day. In the United States and Scotland, more than one-fifth of students claimed to watch more than five hours of television on a daily basis.

Chapter One

# Geographic Performance of 13-Year-Olds

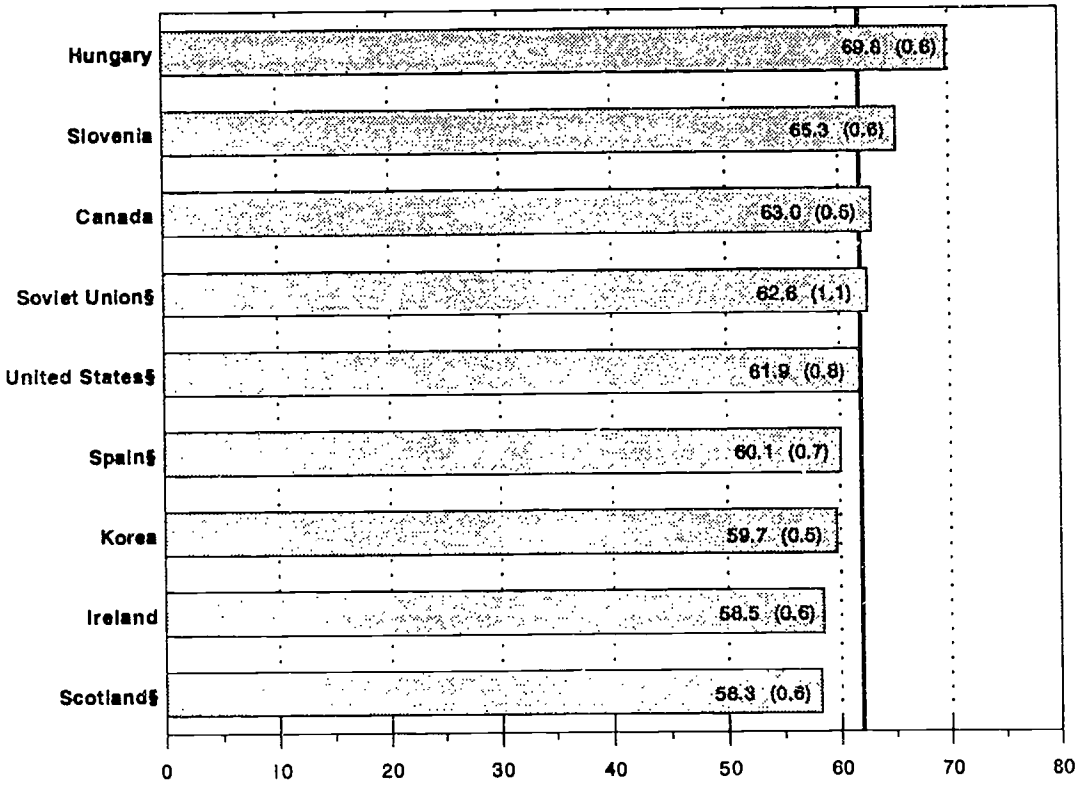
Overall student performance on the 24 items that made up the geography component of the assessment is presented in Figure 1.1 as the average percent correct for students in each of the countries that participated.[9]

The average performance of the countries that participated in the geography component of the assessment was 62.1 percent correct.[10] International differences on this assessment were not as pronounced as they were on the IAEP mathematics assessment. In fact, the average percent correct of students in the highest-performing country was only 11.5 percentage points higher than that of students in the country with the lowest observed performance.

[9] When interpreting mean percent correct data, it is important to be wary of unsupported comparisons, extrapolations, and generalizations. Percent correct can be a function of either the ability of test-takers or the difficulty of the question asked. Before making generalizations from average percent correct values, it is important to examine the domain being assessed and the questions that make up the assessment.

[10] The IAEP average is the simple average of the scores of the countries in the study. An unweighted average has been chosen to describe the midpoint because it is not influenced by the differential weights of very large and very small populations.

**FIGURE 1.1 Average Percent Correct on All 24 Geography Items for Countries***




* *Jackknifed standard errors are presented in parentheses.*

| *IAEP Average: 62.1*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: Combined school and student participation rate below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

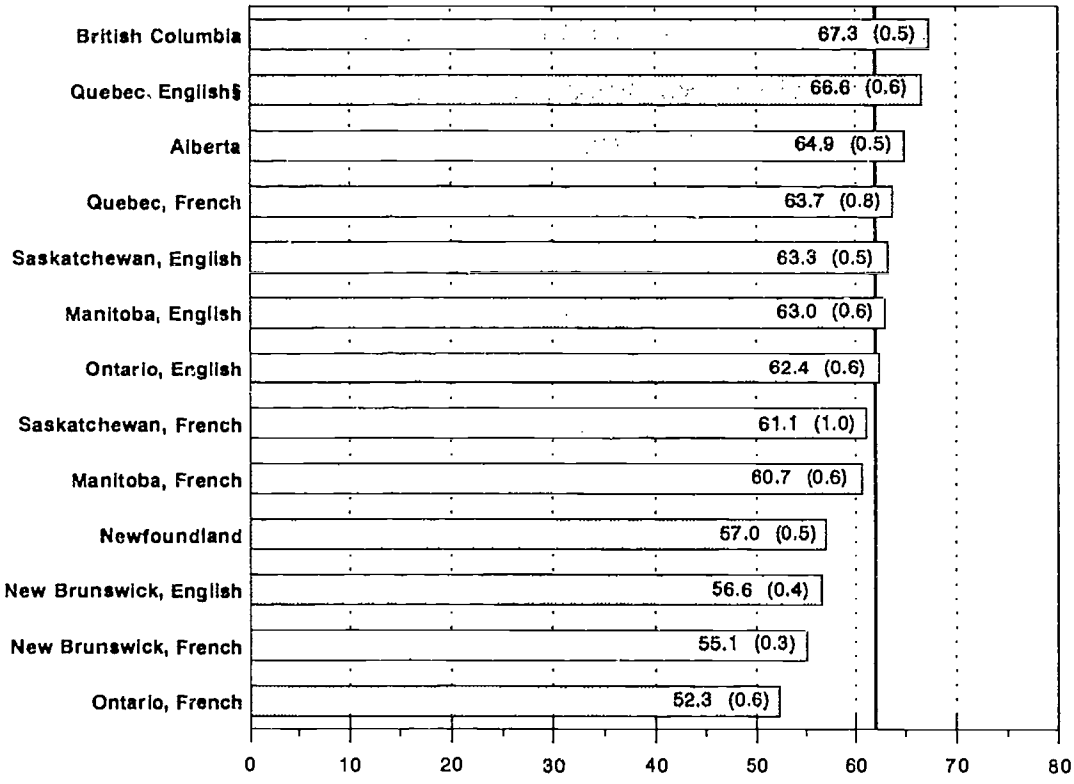
Hungary's 13-year-olds achieved an average of 69.8 percent correct, significantly higher than the average performance of students in any other national population in the study.[11] There were no statistically significant differences in the average performance levels of children in Slovenia, Canada, and the Soviet Union (Russian-language schools). While Slovenian students performed significantly better than did 13-year-olds in the United States and Spain (except Cataluña), there were no statistically significant differences in performance among Canadian, Soviet (Russian-language schools), United States, and Spanish (except Cataluña) students. In these four countries, test-takers scored close to the average level of performance. The lowest observed percent correct (58.3) was found in Scotland. However, it is important to note that there were no statistically significant differences among student performance in Spain, Korea, Ireland, and Scotland.

[11] Where indicated as significant in this report, differences are significant at the .05 level. The Bonferroni procedure was used to determine statistical significance of differences in performance. This procedure holds the probability of falsely declaring a significant difference to 5 percent across the entire set of comparisons.

## CANAD AN POPULATIONS

The performance of Canadian populations is summarized in Figure 1.2.

**FIGURE 1.2 Average Percent Correct on All 24 Geography Items for Canadian Populations***




* *Jackknifed standard errors are presented in parentheses.*

| *IAEP Average: 62.1*

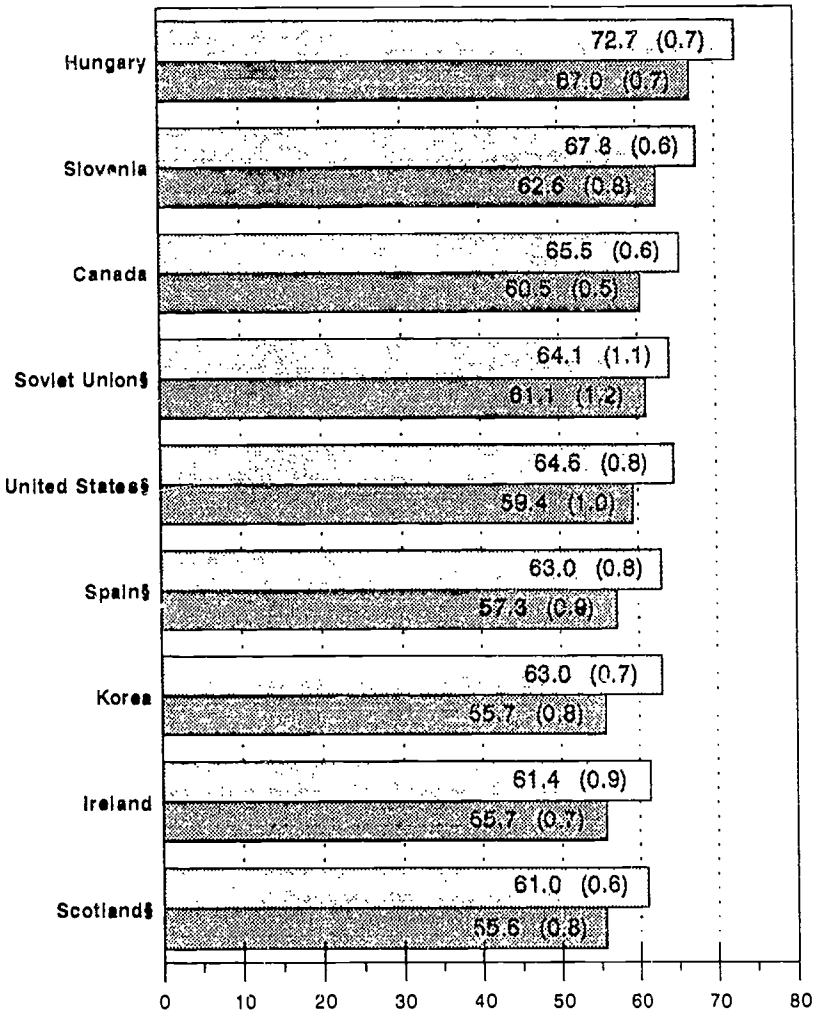
§ *Population exceptions are as follows:*
*Quebec English: combined school and student participation rate below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

The range of average performance among Canadian populations was wider than that among all countries. The average percent correct of British Columbia students was 67.3. On the other hand, the average percent correct scored by students in French-language schools in Ontario was 15 percentage points lower. This population registered the lowest average percent correct of any population in the study. Ontario was also the province in which the observed difference in performance between the French-language and English-language samples was the greatest: the English-language school population scored an average percent correct that was 10 percentage points higher than that of their counterparts from French-language schools.

## GENDER DIFFERENCES

The results of the geography probe showed significant differences in the performance of male and female students. In all participating countries except for the Soviet Union (Russian-language schools), males performed significantly better than females on the geography questions. Furthermore, the gap between male and female performance was quite similar in most of the countries in the study. These gender comparisons are summarized in Figure 1.3.

FIGURE 1.3 Average Percents Correct on All 24 Geography Items by Gender for Countries*




* *Jackknifed standard errors are presented in parentheses.*

§ *Population exceptions are as follows:*
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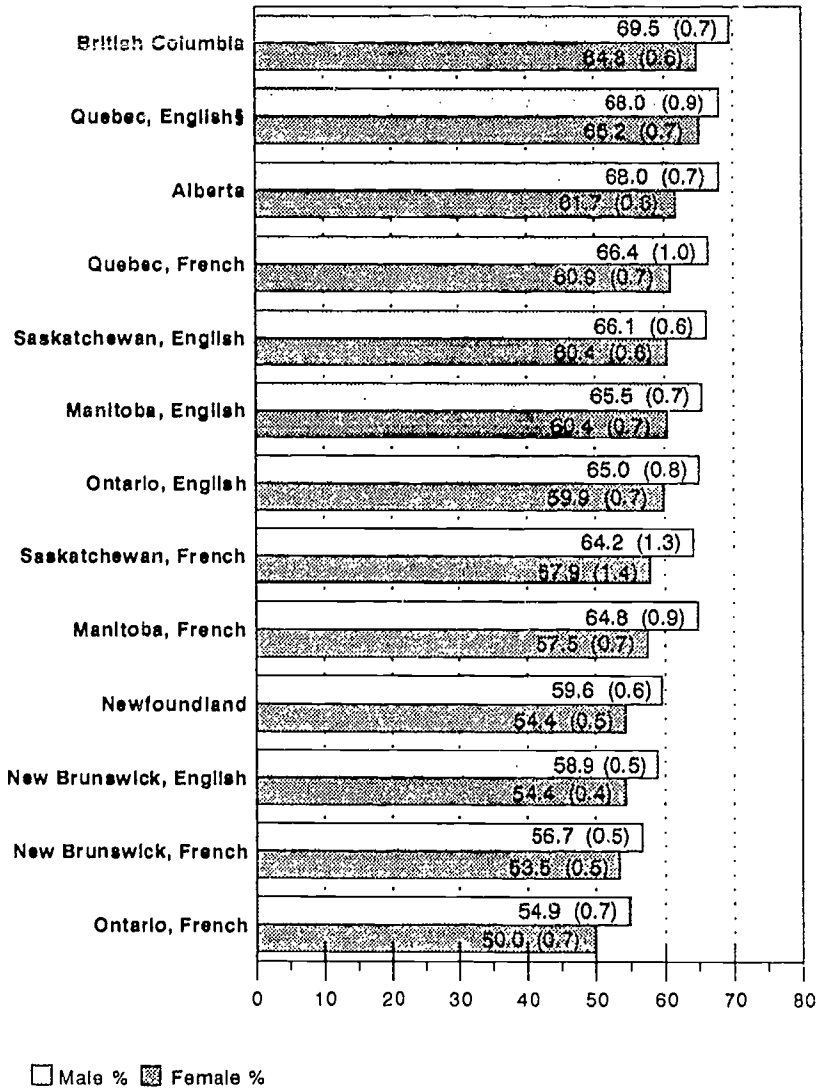
## GENDER DIFFERENCES IN CANADIAN POPULATIONS

Differences between male and female performance also existed in the Canadian populations. In all these populations, males scored significantly higher than did females. These results are summarized in Figure 1.4.

**FIGURE 1.4 Average Percents Correct on All 24 Geography Questions by Gender for Canadian Populations***




* *Jackknifed standard errors are presented in parentheses.*

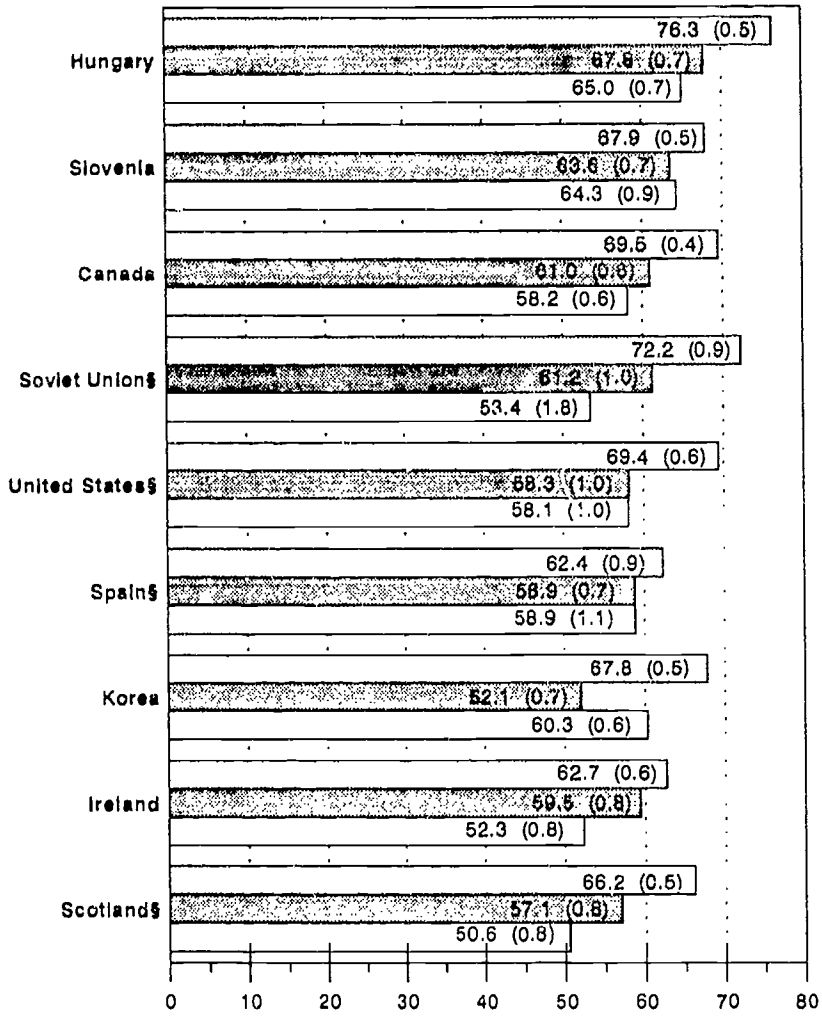
§ *Population exceptions are as follows:*
*Quebec English: combined school and student participation rate below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

## PERFORMANCE IN MAJOR CONTENT AREAS

The three content categories reflected in the geography assessment framework are geographic skills and tools, physical geography, and cultural geography. When considering the major content areas, it is important to remember that it is impossible to make hard and fast distinctions between categories in a highly integrated discipline. Answering questions about physical geography often involves the use of geographic skills and tools; individual items may involve aspects of both physical and cultural geography. Furthermore, since assessment coverage is limited, the averages in the three areas are affected by the difficulty of the items selected and do not necessarily reflect differential student ability levels. So, while measures of student performance in specific content areas have undeniable heuristic and comparative value and allow reporting on useful clusters of knowledge and skills, one must exercise care in making distinctions and interpreting results.

The performance of students in the three content areas is summarized in Figure 1.5.

FIGURE 1.5 Average Percents Correct by Content Area*

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*Scotland and United States: Combined school and student participation rate below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

In every national population in the study, students achieved the highest average percent correct on questions that measured the area of geographic skills and tools,[12] but the consistency of student performance across the three major content areas varied markedly from country to country. For example, in the Soviet Union (Russian-language schools), the difference between performance in the content category in which students scored the highest percent correct (Skills and Tools) and that in which they scored the lowest percent correct (Cultural Geography) was 18.8 percentage points. On the other hand, in Spain (except Cataluña) the difference between the same content categories (also representing the highest and lowest observed percents correct) was only 3.5 percentage points.

Usually, the performance of countries in the major content categories tended to mirror their performance on the geography assessment as a whole. However, there were significant exceptions. On questions covering geographic skills and tools, students in Slovenia and Spain (except Cataluña) did not perform as well, relative to the average, as they did relative to the average on the geography assessment as a whole.[13] On the other hand, students in the Soviet Union (Russian-language schools) scored better on these questions than they did on the total assessment.

In two of the nine countries participating in the study, student performance on questions measuring understanding of physical geography did not mirror achievement on the total assessment. In relative terms, students in

[12] It is essential to avoid unwarranted comparisons based on the percent correct in different skill areas. These differences may be functions either of student ability levels or of differential item difficulty. In other words, without a thorough examination of the questions that make up the assessment, it is not possible from the data in this table to determine whether students are "better" at geographic skills and tools than at physical geography, or whether the questions on skills and tools are simply "easier" than those on physical geography.

[13] For these analyses of achievement by topic, populations are cited as deviating from their normal pattern if the difference between their deviation from the mean for the topic and their deviation from the overall mean is twice the standard error of the difference between these deviations, or greater. So while, for example, Slovenian students scored a higher observed percent correct on geographic skills and tools questions than they did on the assessment as a whole, in relative terms they did not perform as well on these items.

Korea did not perform as well in this area as they did on the assessment as a whole, whereas students in Ireland scored better.

In four countries the average performance of students on cultural geography questions did not closely reflect their performance on the total assessment. In relative terms, students in Slovenia and Korea performed better on these questions than on the assessment as a whole, while students in the Soviet Union (Russian-language schools) and Scotland did not perform as well.

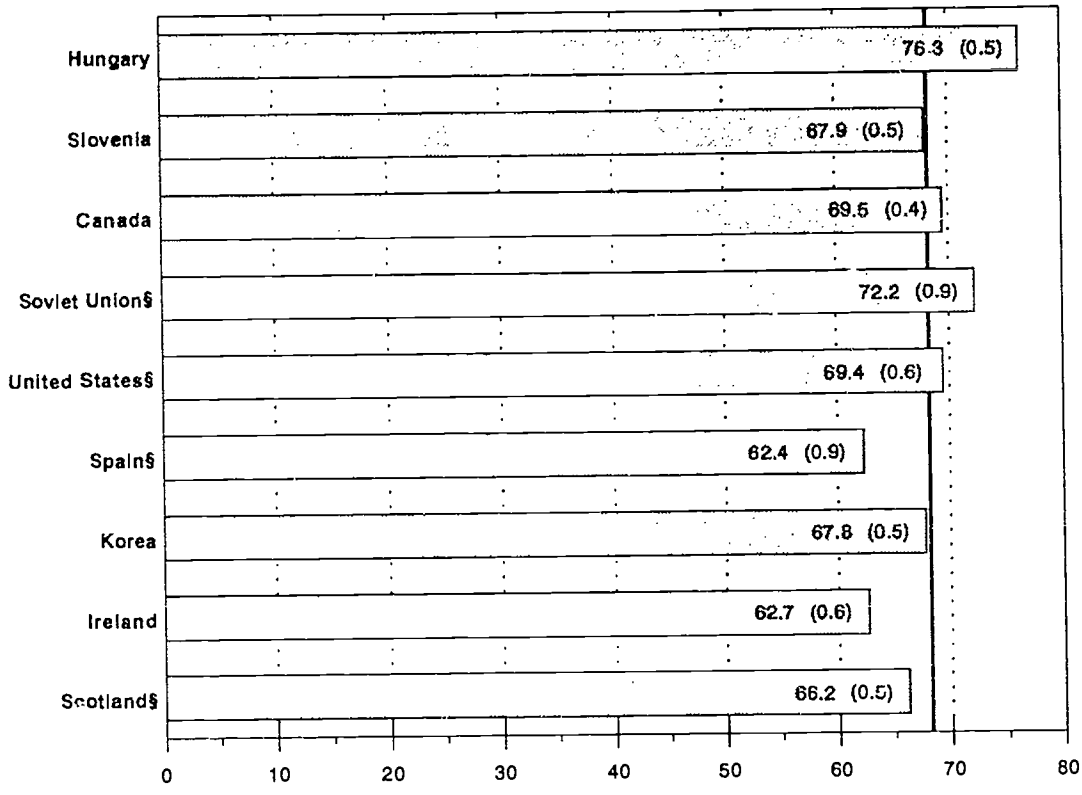
Chapter Two

# Geographic Skills and Tools

Eight questions in the assessment focused on geographic skills and tools. These items were designed to gauge skills such as interpreting map and globe symbols, using scales to measure distance, determining absolute location using latitude and longitude, identifying the relative location of different places, understanding the uses of different map projections, and establishing patterns and relationships across maps. The performance of students on geographic skills and tools questions is summarized in Figure 2.1 on the following page. Countries are listed in order of performance across all geography questions.

Hungarian students scored, on average, significantly higher on skills and tools questions than their counterparts from other countries. Soviet (Russian-language schools) students performed at a higher level than 13-year-olds in Slovenia, Korea, Scotland, Ireland, and Spain (except Cataluña). There were no statistically significant differences between the average scores of test-takers in the Soviet Union (Russian-language schools), Canada, and the United States. Students in Canada and the United States performed at a higher level than

FIGURE 2.1 Average Percent Correct on 8 Geographic Skills and Tools Items for Countries*




* *Jackknifed standard errors are presented in parentheses.*

| *IAEP Average: 68.3*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: Combined school and student participation rate below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

students in Scotland, while there were no significant differences between the average performance of students in Slovenia, Korea, and Scotland. Finally, 13-year-olds in Ireland and Spain (except Cataluña) performed at a lower level on geographic skills and tools questions than children in the other countries.[14]

[14] Statistically significant differences between populations are summarized in the Data Appendix.

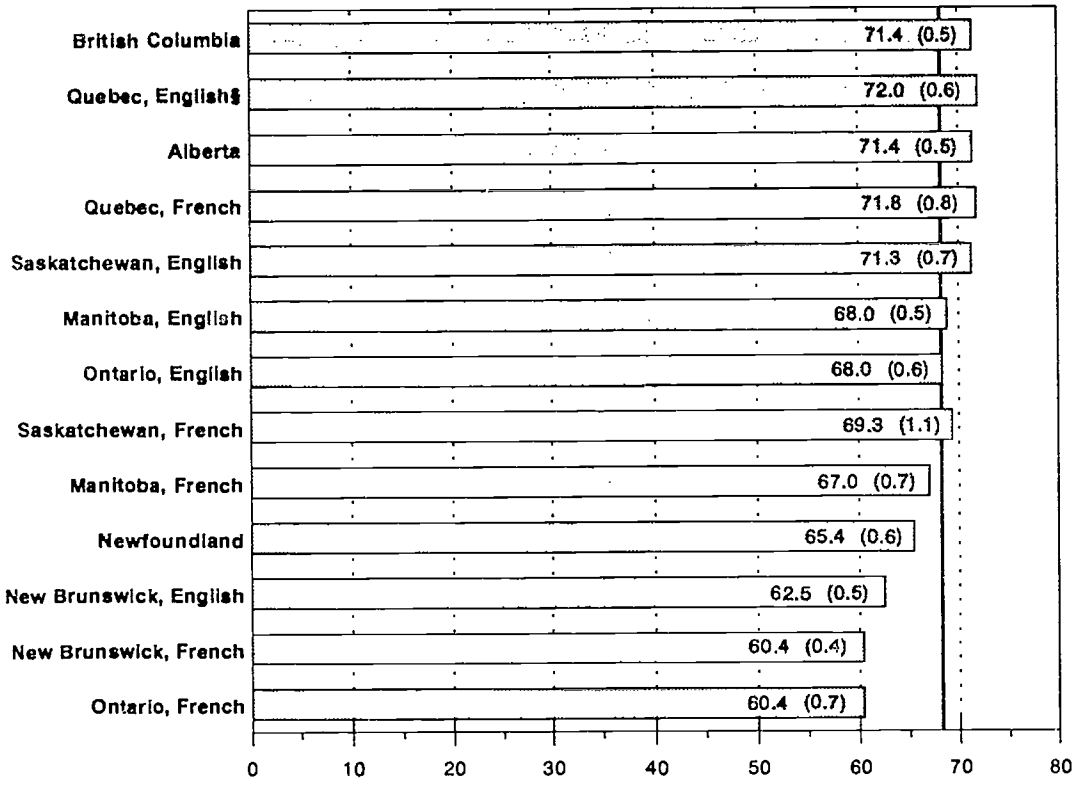
As mentioned above, in most cases the performance of a country's students on geographic skills and tools questions mirrored their performance on the geography assessment as a whole. The exceptions were students in Slovenia and Spain (except Cataluña) who did not perform, relative to the average on skills and tools items, as well as they did relative to the overall average on the assessment. Students in the Soviet Union performed relatively better.

## CANADIAN POPULATIONS

The performance of Canadian populations on geographic skills and tools questions is summarized in Figure 2.2. Populations are listed in order of their performance across all geography questions.

There was less deviation among Canadian populations on geographic skills and tools questions than on the total assessment: 11.6 percentage points separate the highest- and lowest-performing populations in this content area. On the other hand, the performance of these populations tended to mirror closely their performance on all geography items. No population scored significantly better or worse in this content area, relative to the average, than it scored relative to the average on the assessment as a whole.

FIGURE 2.2 Average Percent Correct on 8 Geographic Skills and Tools Items for Canadian Populations*




* *Jackknifed standard errors are presented in parentheses.*

| *IAEP Average: 68.3*

§ *Population exceptions are as follows:*
*Quebec English: combined school and student participation rate below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

## GEOGRAPHIC SKILLS AND TOOLS: INSTRUCTIONAL VARIABLES

Table 2.1 shows average percent correct on the geographic skills and tools questions on the assessment, and percentage of students who reported having been taught particular skills subtopics in school. Countries are listed in order of performance across all geography questions.

**TABLE 2.1 Performance on Geographic Skills and Tools Items and Study of Geographic Skills and Tools Topics***

| | | Percents Reporting Studied Topic In School | | |
|---|---|---|---|---|
| | Average Percent Correct: Geographic Skills and Tools Items | Symbols on Maps and Globes | Scales to Measure Distance | Longitude and Latitude |
| Hungary | 76.3 (0.5) | -- | -- | -- |
| Slovenia | 67.9 (0.5) | 83 (0.9) | 80 (1.0) | 95 (0.4) |
| Canada | 69.5 (0.4) | 91 (0.4) | 89 (0.7) | 95 (0.4) |
| Soviet Union§ | 72.2 (0.9) | -- | -- | -- |
| United States§ | 69.4 (0.6) | 94 (0.8) | 91 (0.9) | 94 (0.7) |
| Spain§ | 62.4 (0.9) | 54 (1.6) | 69 (2.0) | 88 (1.2) |
| Korea | 67.8 (0.5) | 65 (1.0) | 80 (1.0) | 74 (1.1) |
| Ireland | 62.7 (0.6) | 70 (1.4) | 67 (1.6) | 71 (1.7) |
| Scotland§ | 66.2 (0.5) | 87 (0.9) | 81 (1.0) | 75 (2.3) |

* *Jackknifed standard errors appear in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

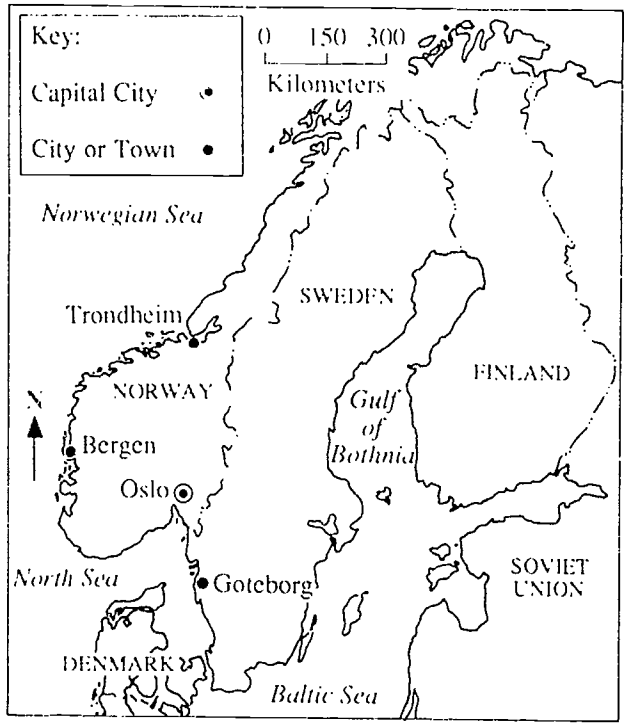
-- *Information is not available.*

The data in the table suggest a relationship between topics covered in school and achievement on geographic skills and tools items. Students in the United States and Canada averaged more than 69 percent correct on skills and tools questions; in both these countries roughly nine in 10 students said that they had studied the skills and tools subtopics listed in the background questionnaire. Conversely, students in Spain (except Cataluña) and Ireland averaged under 63 percent correct; in these countries lower percentages of students reported having studied the skills and tools subtopics. This relationship between topical coverage and assessment performance was not consistently evident in the other content categories.

## SAMPLE QUESTIONS

An examination of individual assessment items reveals certain interesting patterns.[15] In the following question, students were asked to use a symbol on a political map to identify a national capital.

[15] Short descriptions of all the questions in this category and the average percent correct achieved by each population in the study are included in the Data Appendix, along with the same information for items in the other three content areas.




As shown on the map above, which of the following is a capital city?

A. Bergen
B. Goteborg
C. Trondheim
(D.) Oslo

**IAEP Average and Percent Correct by Country***

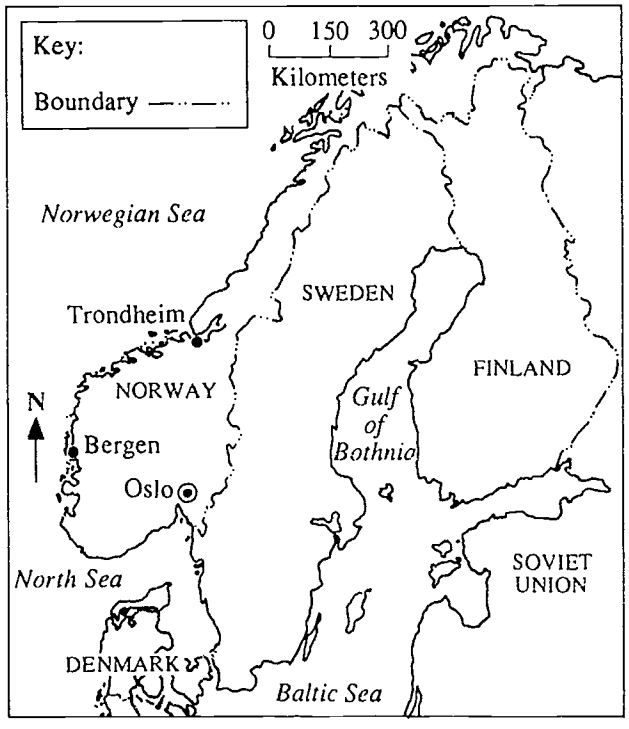
| IAEP | Hungary | Slovenia | Canada | Soviet Union§ | United States§ | Spain§ | Korea | Ireland | Scotland§ |
|---|---|---|---|---|---|---|---|---|---|
| *92.5* | *95.0 (0.5)* | *91.7 (0.7)* | *91.3 (0.6)* | *92.8 (0.7)* | *95.8 (0.6)* | *93.8 (0.7)* | *86.4 (0.9)* | *93.0 (0.7)* | *92.8 (0.8)* |

* *Jackknifed standard errors are presented in parentheses.*
§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

On this question, the average percent correct of the nine countries participating was 92.5, the highest for any question in the geography assessment. There was comparatively little deviation among countries in performance levels; fewer than 10 percentage points separated the averages of the highest- and lowest-performing populations. Interestingly, students from Korea found this question somewhat more difficult than did other students. But while this might suggest that performance on a given question is closely related to the subject of the stimulus (in this case, a map of Scandinavia) and the students' region of residence, such a pattern is not consistently evident in all items that dealt with specific world locations. In fact, in an item that asked children to determine that Hamilton, Ontario is approximately 100 kilometers southwest of Toronto, Canadian students scored lower than their counterparts in Hungary, the Soviet Union (Russian-language schools), and the United States.[16] And, as will be discussed in chapter three, physical geography questions that were based on a map of Korea did not prove to be relatively easier for Korean students than for children from other countries. In any case, while possible connections between student location and performance on a given stimulus-based geography question are noteworthy, further study is needed before consistent correlations can be positively demonstrated or disproved.

Another item based on a slightly modified version of the political map of Scandinavia was included in the assessment. This question asked the students to identify Sweden and Finland as countries that share a land boundary.

[16] This raw score information may be misleading Students in the Soviet Union did better, in relative terms, on skills and tools questions than on the assessment as a whole, so one might expect a high level of performance on a given item. But the observed percents correct are, nonetheless, interesting: within Canada students in Ontario scored below the national average on the Hamilton-Toronto question.




According to the map above, which of the following pairs of countries share a land boundary?

A. Sweden and Denmark
B. Sweden and the Soviet Union
(C.) Sweden and Finland
D. Denmark and Norway

**IAEP Average and Percent Correct by Country***

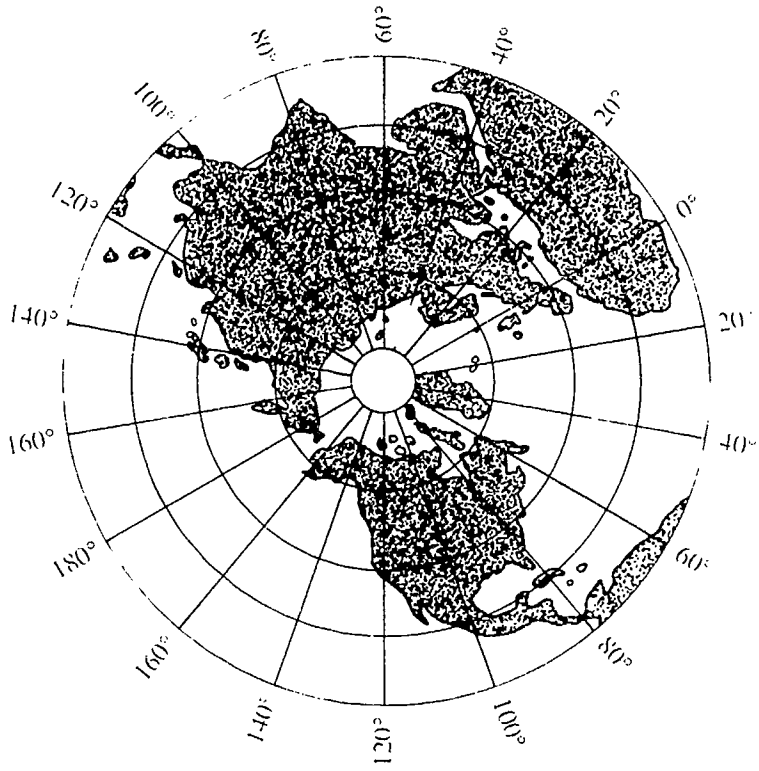
| IAEP | Hungary | Slovenia | Canada | Soviet Union§ | United States§ | Spain§ | Korea | Ireland | Scotland§ |
|---|---|---|---|---|---|---|---|---|---|
| *81.4* | *86.5 (1.0)* | *79.6 (1.1)* | *78.9 (0.7)* | *78.8 (1.6)* | *82.0 (1.4)* | *81.3 (1.3)* | *80.2 (1.2)* | *81.1 (1.0)* | *84.2 (1.0)* |

* *Jackknifed standard errors are presented in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

As was the case with the previous question, a high percentage of students answered this item correctly (the average percent correct was 81.4), and there was little deviation among countries. Students in all of the countries seemed to be able to read basic map symbols on political maps.

Students were also asked to interpret different types of maps. Two of the questions involved polar projections.




Which of the following is the only hemisphere that is shown completely on the map projection above?

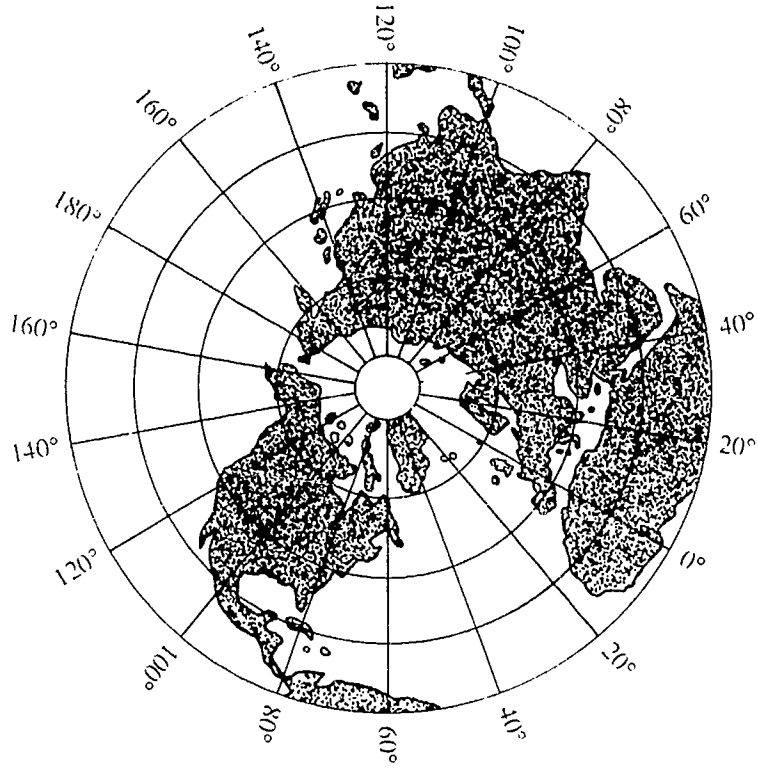
A. Eastern
B. Western
C. Northern
D. Southern

**IAEP Average and Percent Correct by Country***

| IAEP | Hungary | Slovenia | Canada | Soviet Union§ | United States§ | Spain§ | Korea | Ireland | Scotland§ |
|---|---|---|---|---|---|---|---|---|---|
| *71.3* | *83.3 (1.1)* | *75.1 (1.3)* | *76.5 (0.8)* | *73.5 (1.5)* | *74.8 (1.7)* | *66.3 (1.4)* | *72.5 (1.1)* | *60.1 (1.2)* | *59.4 (1.5)* |

* *Jackknifed standard errors are presented in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*




On the map above, the parallels of latitude are represented by which of the following?

A. Land-water boundaries
B. Shaded areas
C. Straight lines
(D.) Circles

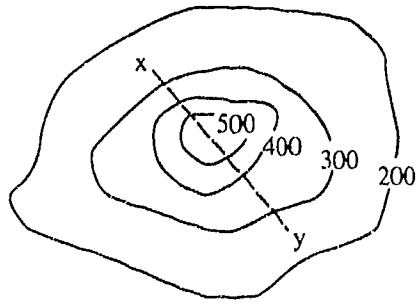
**IAEP Average and Percent Correct by Country***

| IAEP | Hungary | Slovenia | Canada | Soviet Union§ | United States§ | Spain§ | Korea | Ireland | Scotland§ |
|---|---|---|---|---|---|---|---|---|---|
| *45.9* | *73.7 (1.2)* | *56.7 (1.5)* | *37.6 (1.0)* | *64.9 (1.6)* | *32.7 (1.5)* | *38.4 (1.5)* | *46.2 (1.3)* | *33.6 (1.4)* | *28.9 (1.3)* |

* *Jackknifed standard errors are presented in parentheses.*
§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

Both of these questions proved more difficult for students than the questions based on the political map of Scandinavia. Still, the first question was relatively easy for students in the assessment; on average, 71.3 percent of each population understood that the map showed the northern hemisphere. On the other hand, the item that tested understanding of lines of latitude on the polar projection was significantly more difficult for students: the average percent correct was 45.9. Unlike the questions based on the map of Scandinavia, these questions evidenced large differences in the performance of countries: on the first polar-projection item, the average percent correct of the highest-performing population was 23.9 percentage points higher than that of the lowest-performing population. On the second polar-projection item, the difference between the highest- and lowest-performing countries was 44.8 percentage points. This may indicate that skills related to the interpretation of polar (and possibly other) map projections are not as fully integrated into the various curricula as those skills relating to reading straightforward political maps.

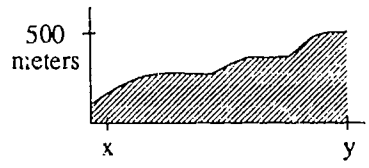
Finally, the following item assessed students' ability to read a contour map and then express their reading graphically.



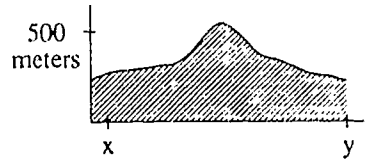

Elevation (meters)

Which of the following cross sections corresponds most closely to the dashed line connecting x and y on the contour map above?

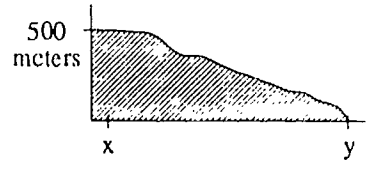
A.



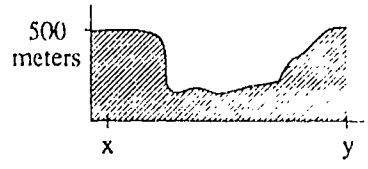

B.




C.




D.




**IAEP Average and Percent Correct by Country***

| IAEP | Hungary | Slovenia | Canada | Soviet Union§ | United States§ | Spain§ | Korea | Ireland | Scotland§ |
|---|---|---|---|---|---|---|---|---|---|
| *49.8* | *48.3* | *50.0* | *53.3* | *43.1* | *50.8* | *41.4* | *60.4* | *46.1* | *54.6* |
| | *(1.4)* | *(1.7)* | *(1.0)* | *(2.3)* | *(2.3)* | *(1.6)* | *(1.4)* | *(1.6)* | *(1.5)* |

* *Jackknifed standard errors are presented in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

This question proved to be relatively difficult; the IAEP average percent correct was 49.8. Interestingly, students in Korea, Scotland, and Canada achieved the highest scores on this question; whether this indicates that geography curricula in these countries include the teaching of contour maps is not clear from the data gathered for this study. It is possible that student difficulty with this item is indicative of a more general lack of "spatial" or "visual" thinking skills (skills that geographers view as essential components of sophisticated understanding). However, such a hypothesis awaits further proof.

## SUMMARY

Eight questions are not sufficient to measure students' command of geographic skills and tools. Assessment results seem to suggest a positive relationship between performance and coverage of skills and tools topics in school. However, the IAEP gathered data on only three of the many content subtopics that might correlate with high levels of performance on geographic skills and tools questions. More complete information on geography curricula and teaching practices would inform analyses of assessment results. This also might help to determine which topics, skills, and knowledge students need for high levels of geographic achievement. Also, some types of maps appear to be more difficult for students than do others. Future assessments might attempt to investigate more fully the correlation between different types of geographic tasks and student performance levels. Finally, research might be conducted to examine the various ways in which geography item and stimulus types affect populations.

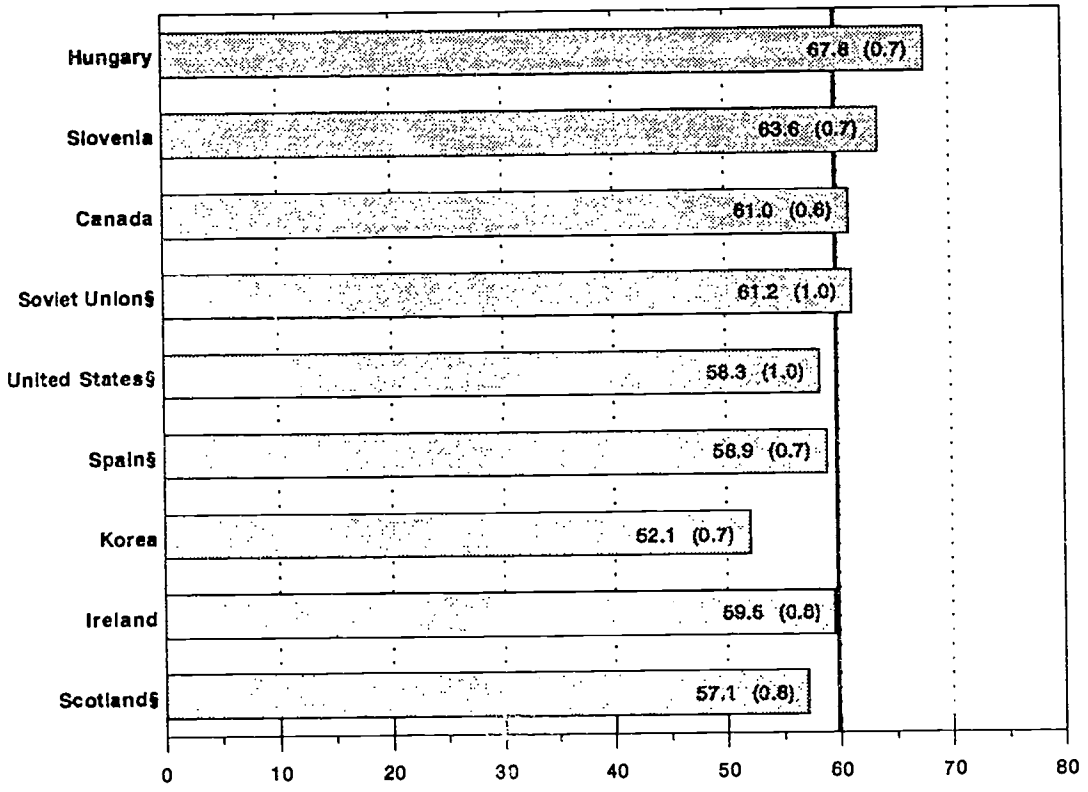
Chapter Three

# Physical Geography

Slightly more than one-third of the assessment (nine questions) was devoted to physical geography, which focuses on the configuration and major geological and topographical features of the earth. Specifically, IAEP questions were designed to test students' knowledge of landmasses, landforms, climate, and climatic regions.

The performance of students on physical geography questions is summarized in Figure 3.1. Countries are listed in order of performance across all geography questions.

FIGURE 3.1 Average Percent Correct on 9 Physical Geography Items for Countries*




* *Jackknifed standard errors are presented in parentheses.*

| *IAEP Average: 59.9*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: Combined school and student participation rate below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

As on the assessment as a whole, Hungarian students performed, on average, significantly better on the physical geography questions than their counterparts in any other country. There were no statistically significant differences among 13-year-olds from Slovenia, the Soviet Union (Russian-language schools), and Canada. While Slovenian students achieved significantly higher scores than their counterparts in Ireland, Spain (except Cataluña), and the United States, there were no statistically significant differences among test-takers from the Soviet Union (Russian-language schools), Canada, Ireland, Spain (except Cataluña), and the United States. Canadian students performed at significantly higher levels than did Scottish students, but there were no statistical differences between test populations in Scotland, the United States, Spain (except Cataluña), Ireland, and the Soviet Union (Russian-language schools). Finally, on physical geography questions, Korean students scored, on average, at a significantly lower level than students from all other countries.[17]

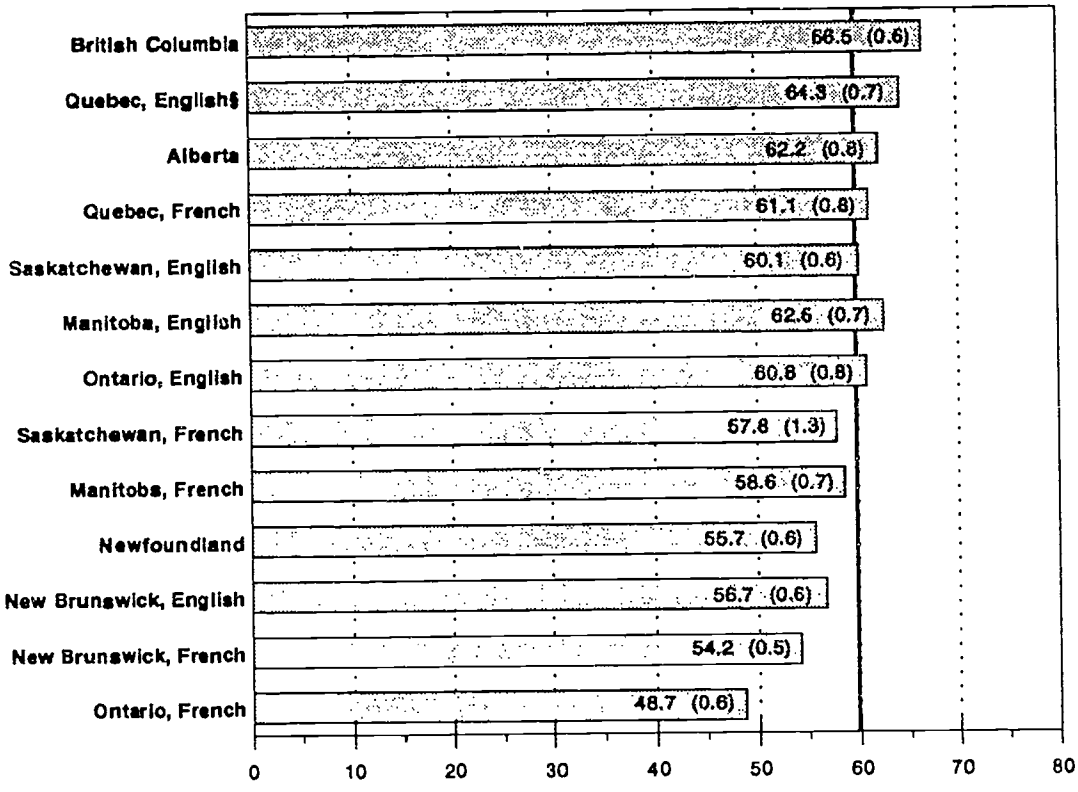
Performance on physical geography questions mirrored the overall geography results with two exceptions. In this content area, students from Ireland performed better, relative to the average, than they did relative to the average on the geography assessment as a whole, whereas students from Korea performed worse.

## CANADIAN POPULATIONS

The performance of Canadian populations on physical geography questions is summarized in Figure 3.2. Populations are listed in the order of performance on all geography items.

[17] Statistically significant differences between populations are summarized in the Data Appendix.

**FIGURE 3.2 Average Percent Correct on 9 Physical Geography Items for Canadian Populations***




* *Jackknifed standard errors are presented in parentheses.*

| *IAEP Average: 59.9*

§ *Population exceptions are as follows:*
*Quebec English: combined school and student participation rate below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

The gap in average percent correct between the highest-performing Canadian population (British Columbia) and the lowest (Ontario-French) was almost 18 percentage points, the widest disparity for Canada of any of the content areas. As was the case in geographic skills and tools, the performance of populations closely mirrored their performance on the total geography assessment. In other words, no Canadian population scored significantly better or worse, relative to the average, on physical geography items than it scored relative to the average on the assessment as a whole.

## PHYSICAL GEOGRAPHY: INSTRUCTIONAL VARIABLES

Table 3.1 shows average percent correct on the assessment's physical geography questions and the percentage of students who reported having been taught particular physical geography subtopics in school. Countries are listed in order of performance across all geography questions.

**TABLE 3.1 Performance on Physical Geography Items and Study of Physical Geography Topics***

| | | Percent Reporting Studied Topic in School | |
|---|---|---|---|
| | Average Percent Correct: Physical Geography | Location of Continents, Oceans, Rivers, and Mountains | Climate and Natural Resources |
| Hungary | 67.8 (0.7) | -- | -- |
| Slovenia | 63.6 (0.7) | 92 (0.7) | 95 (0.4) |
| Canada | 61.0 (0.6) | 92 (0.5) | 85 (0.6) |
| Soviet Unions§ | 61.2 (1.0) | -- | -- |
| United States§ | 58.3 (1.0) | 94 (0.8) | 84 (1.1) |
| Spain§ | 58.9 (0.7) | 93 (0.5) | 92 (0.8) |
| Korea | 52.1 (0.7) | 85 (0.7) | 85 (0.8) |
| Ireland | 59.5 (0.8) | 84 (0.9) | 76 (1.0) |
| Scotland§ | 57.1 (0.8) | 87 (0.9) | 80 (1.2) |

* *Jackknifed standard errors appear in parentheses.*

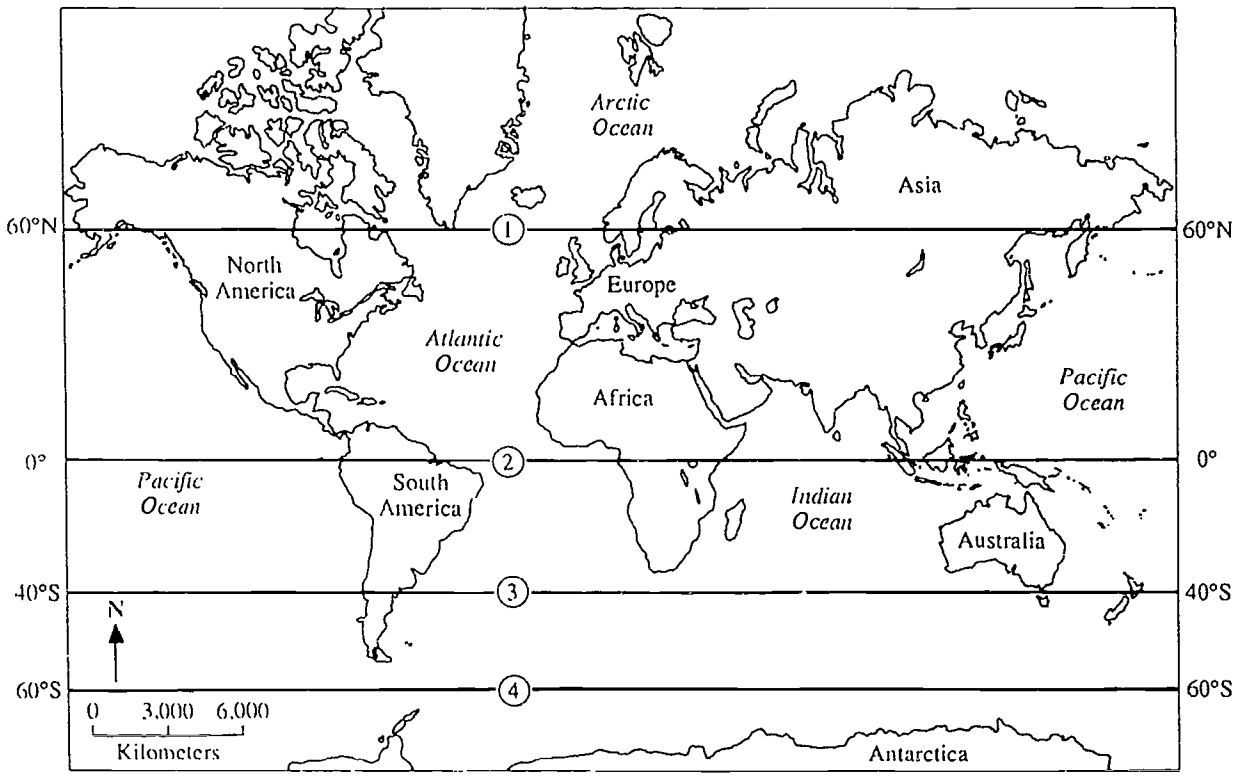
§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

-- *Information is not available.*

In each country that supplied responses to these questions, more than three-fourths of the students reported having studied climate and natural resources, while 84 percent or more had studied the location of continents, oceans, rivers, and mountains. There did not seem to be a consistent relationship between students' reports of having studied physical geography topics in school and their performance on physical geography questions. More than 90 percent of Slovenian students reported that they had studied the physical geography topics listed in the background questions; they performed quite well on the items in this content area. On the other hand, although Irish students reported the lowest level of study of the two physical geography topics, they were the only group that, in relative terms, performed better on physical geography items than on the total assessment.

## SAMPLE QUESTIONS

A number of the assessment items used world maps to test students' ability to locate and identify landmasses, landforms, and climatic regions. The following question required students to show knowledge of the location of the tropics on a world map.




Which line on the map above is drawn through a tropical zone?

A. 1
B. 2
C. 3
D. 4

**IAEP Average and Percent Correct by Country***

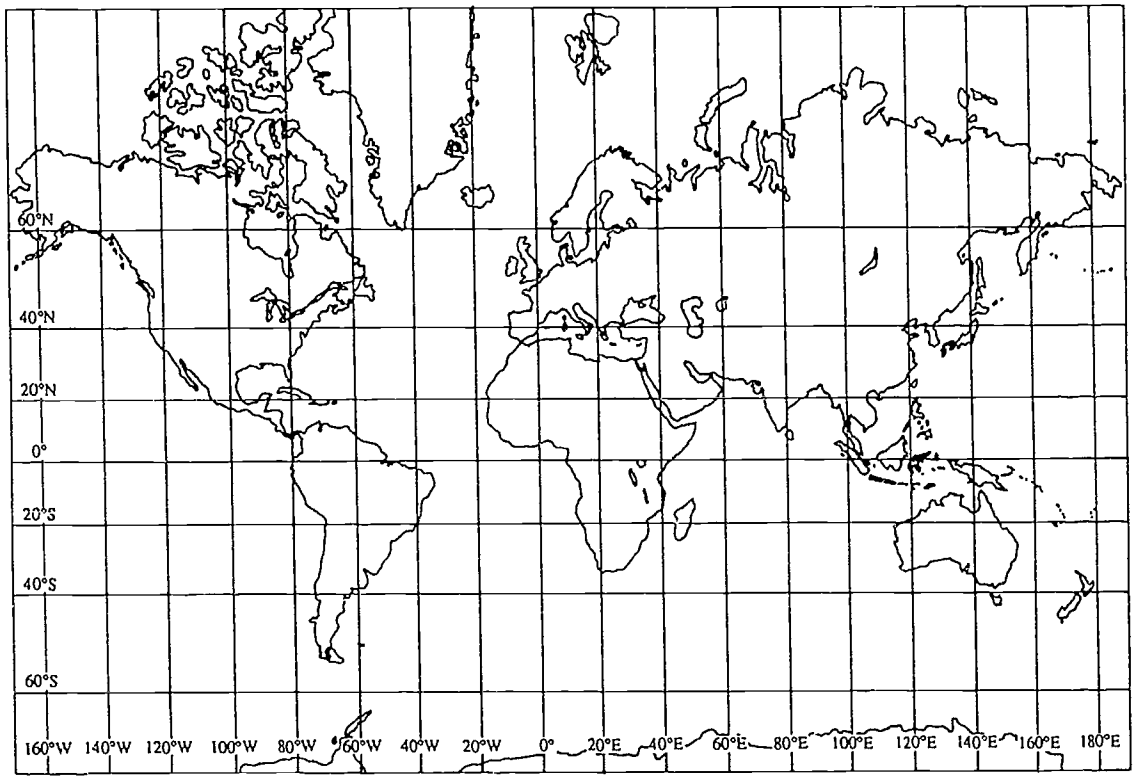
| IAEP | Hungary | Slovenia | Canada | Soviet Union§ | United States§ | Spain§ | Korea | Ireland | Scotland§ |
|---|---|---|---|---|---|---|---|---|---|
| 67.8 | 81.0 (1.1) | 81.8 (1.2) | 64.2 (1.1) | 49.0 (2.2) | 64.3 (1.4) | 63.3 (1.6) | 77.8 (1.1) | 61.9 (1.5) | 67.1 (1.5) |

* *Jackknifed standard errors are presented in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

This question had the highest average score of all those that asked students to locate places on a world map; the IAEP populations averaged 67.8 percent correct. Student performance varied widely, however, from country to country; 81.8 percent of the students in the highest-performing country (Slovenia) answered correctly compared to 49 percent in the lowest-performing country (the Soviet Union Russian-language schools). Whether these variations represent curricular differences is unclear from the findings of the assessment.

Two other questions involved the location or description of places on a world map. The following item was designed to measure students' ability to use longitude and latitude to find absolute location.




Which continent is located between latitudes 35° N and 35° S and longitudes 50° E and 20° W?

A. Europe
B. South America
(C.) Africa
D. Australia

**IAEP Average and Percent Correct by Country***

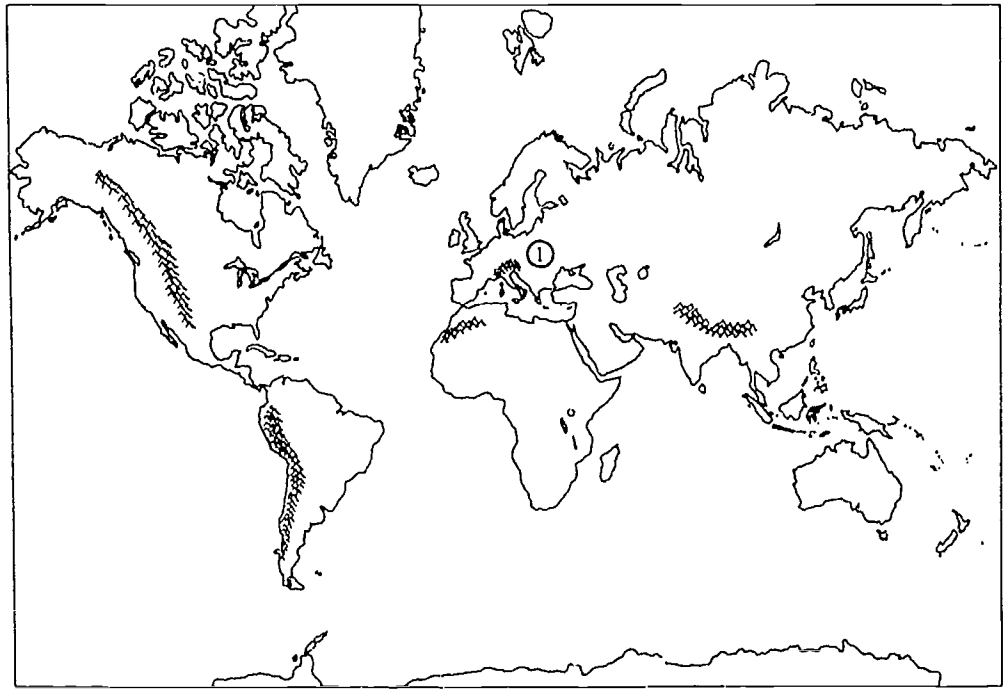
| IAEP | Hungary | Slovenia | Canada | Soviet Union§ | United States§ | Spain§ | Korea | Ireland | Scotland§ |
|---|---|---|---|---|---|---|---|---|---|
| 56.8 | 67.8 (1.7) | 53.3 (1.7) | 62.3 (0.9) | 67.8 (1.9) | 62.7 (2.3) | 57.4 (1.6) | 38.6 (1.3) | 50.2 (1.4) | 50.9 (1.7) |

* *Jackknifed standard errors appear in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: combined school and student participation rate is below .80 but at least .70: interpret results with caution because of possible nonresponse bias.*

The average percent correct on this question was 56.8. In only one country did students score below 50 percent correct (Korea, at 38.6 percent). It is interesting to note that, unlike the geographic skills and tools questions, this item required students to integrate geographic skills (using longitude and latitude) with an essential piece of prior knowledge (the ability to identify Africa on a world map).

The following question asked students to identify the Alps.




On the map above, the number 1 indicates which of the following mountain ranges?

(A.) The Alps
B. The Andes
C. The Atlas
D. The Himalayas

**IAEP Average and Percent Correct by Country***

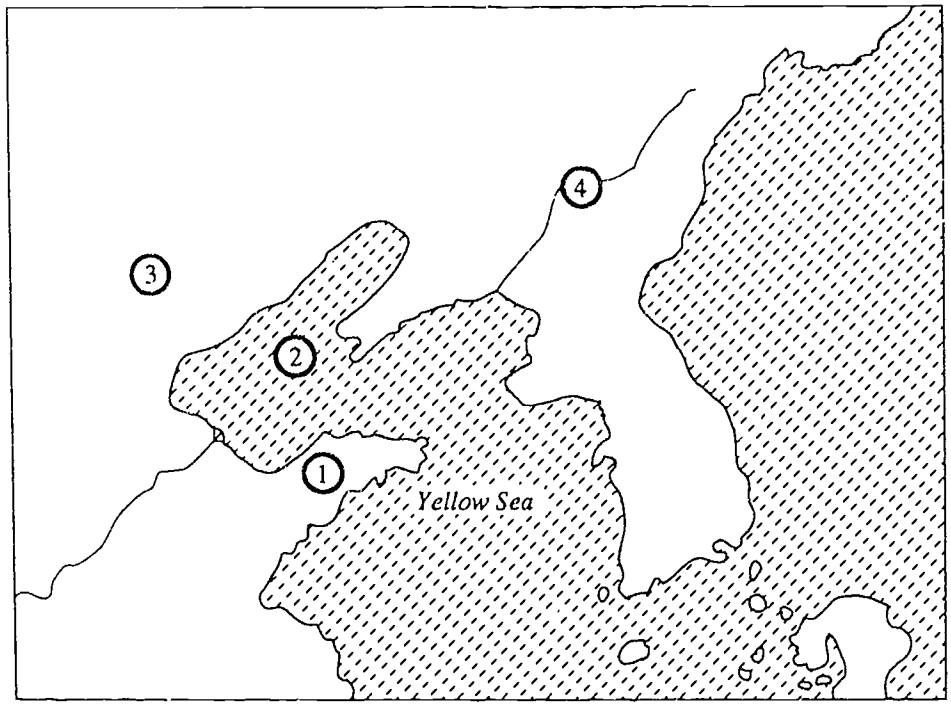
| IAEP | Hungary | Slovenia | Canada | Soviet Union§ | United States§ | Spain§ | Korea | Ireland | Scotland§ |
|---|---|---|---|---|---|---|---|---|---|
| *61.4* | *76.8* | *73.9* | *52.4* | *64.8* | *46.4* | *62.4* | *47.1* | *65.7* | *62.8* |
| | *(1.2)* | *(1.5)* | *(1.1)* | *(2.1)* | *(1.8)* | *(1.4)* | *(1.4)* | *(1.5)* | *(1.3)* |

* *Jackknifed standard errors appear in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

The average percent correct for this question was 61.4. In this case, students from Europe and the Soviet Union (Russian-language schools) were significantly more likely to answer correctly than were students from other regions. This may be a function of the fact that this question required prior knowledge of a specific place. In other words, unlike questions in which "real-world" maps are used as stimulus but no outside knowledge is needed to arrive at an answer, this item required students to have specific information that was not included in the map. And, not surprisingly, students from Europe seemed to have greater familiarity with the location of the Alps than students from other regions.

Compare the previous question with the following item, in which a map of Korea is used as a stimulus, but the prompt requires the students to identify a "generic" body of water. The results for this question did not evidence the pattern of regional differences that marked the results for the item about the Alps.




Which of the following numbers on the map above identifies a bay?

A. 1
B. 2
C. 3
D. 4

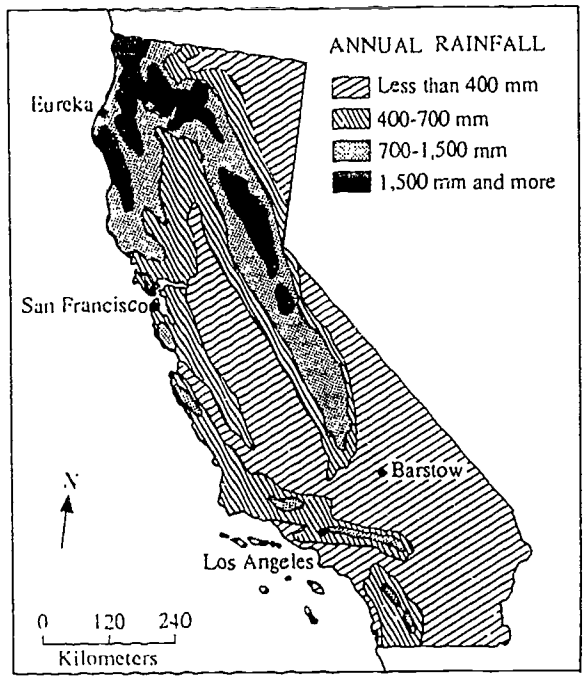
**IAEP Average and Percent Correct by Country***

| IAEP | Hungary | Slovenia | Canada | Soviet Union§ | United States§ | Spain§ | Korea | Ireland | Scotland§ |
|---|---|---|---|---|---|---|---|---|---|
| *52.1* | *62.2 (1.2)* | *59.9 (1.7)* | *54.1 (1.0)* | *56.6 (2.9)* | *43.4 (1.8)* | *49.8 (1.4)* | *49.9 (1.6)* | *50.7 (1.5)* | *41.9 (1.6)* |

* *Jackknifed standard errors appear in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

Other physical geography questions, such as the one below, assessed knowledge and understanding of weather and climate.




According to the map above, which city is most likely to have a desert-type climate?

A. Los Angeles
B. San Francisco
C. Barstow
D. Eureka

**IAEP Average and Percent Correct by Country***

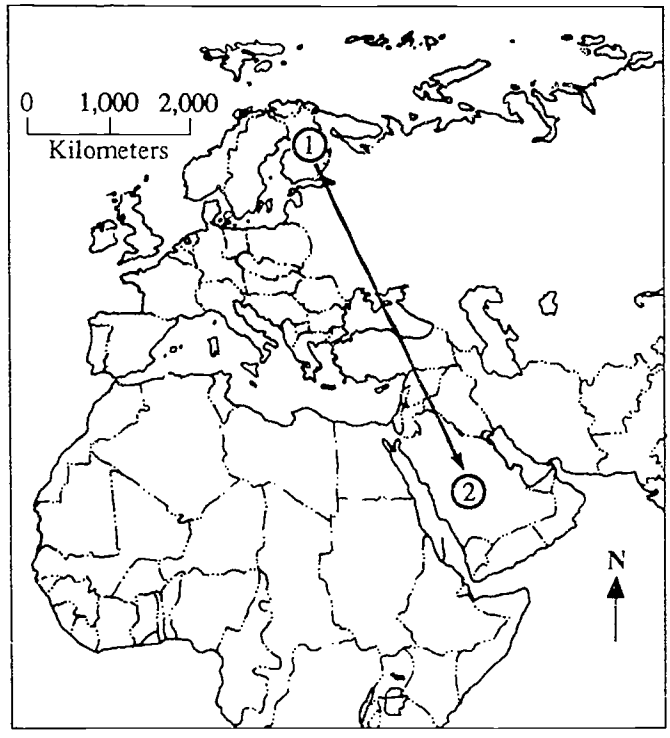
| IAEP | Hungary | Slovenia | Canada | Soviet Union§ | United States§ | Spain§ | Korea | Ireland | Scotland§ |
|---|---|---|---|---|---|---|---|---|---|
| *77.9* | *80.7 (1.1)* | *78.0 (1.3)* | *81.9 (0.7)* | *84.1 (1.1)* | *79.7 (2.0)* | *67.2 (1.4)* | *71.5 (1.3)* | *76.3 (1.1)* | *81.8 (1.3)* |

* *Jackknifed standard errors appear in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

This item was based on a map of California, but this seemed to have little effect on response patterns. While students in the United States performed relatively well on the item, they did not score, on average, higher than students in most of the other countries. In fact, students from the Soviet Union (Russian-language schools) achieved the highest average percent correct on this item. It is also worth noting that interpreting a precipitation map proved easy for students: the IAEP average was 77.9 percent correct. Also, variations in the percent correct achieved by national groups were not as great as they were for several of the physical geography questions discussed above.

The question below assessed students' understanding of climatic regions.




In January, a traveler going from Nation 1 to Nation 2 shown on the map above, would experience which of the following climatic changes?

(A.) Cold to hot desert
B. Subtropical to Mediterranean
C. Cold to tropical rain forest
D. Tropical to Mediterranean

**IAEP Average and Percent Correct by Country***

| IAEP | Hungary | Slovenia | Canada | Soviet Union§ | United States§ | Spain§ | Korea | Ireland | Scotland§ |
|---|---|---|---|---|---|---|---|---|---|
| *62.7* | *70.4 (1.3)* | *62.7 (1.2)* | *58.7 (1.0)* | *59.2 (2.4)* | *60.7 (1.6)* | *72.5 (1.7)* | *49.8 (1.2)* | *66.6 (1.3)* | *63.5 (1.4)* |

* *Jackknifed standard errors appear in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

On average, 62.7 percent of all the students answered this question correctly. The two climatic questions suggest a pattern similar to one postulated on the location items. Students seemed to answer correctly questions in which all information needed is included in the question itself; on the other hand, questions that ask students to relate information given in stimulus material to outside knowledge or intellectual constructs seemed to pose greater problems. Of course, a more thorough assessment is needed to determine whether or not these observations reflect more general patterns of student performance.

## SUMMARY

It is difficult to draw conclusions based on a small number of items, but certain patterns suggest topics for further study. Since the percentage of students who had studied the two physical geography subtopics included in the background questionnaire did not distinguish between high- and low-performing populations, a more thorough probe into the nature of curriculum, teaching, and geography achievement might help explain national differences. Also, results suggest that items that involve the use of outside knowledge are more difficult for students than those that simply require map-reading skills. The relationship between geographic tasks assessed (map and chart reading, recall of prior knowledge, and synthesis of stimulus-reading and outside knowledge) and student performance warrants further investigation, as does the connection between item content, region of student residence, and level of student achievement.

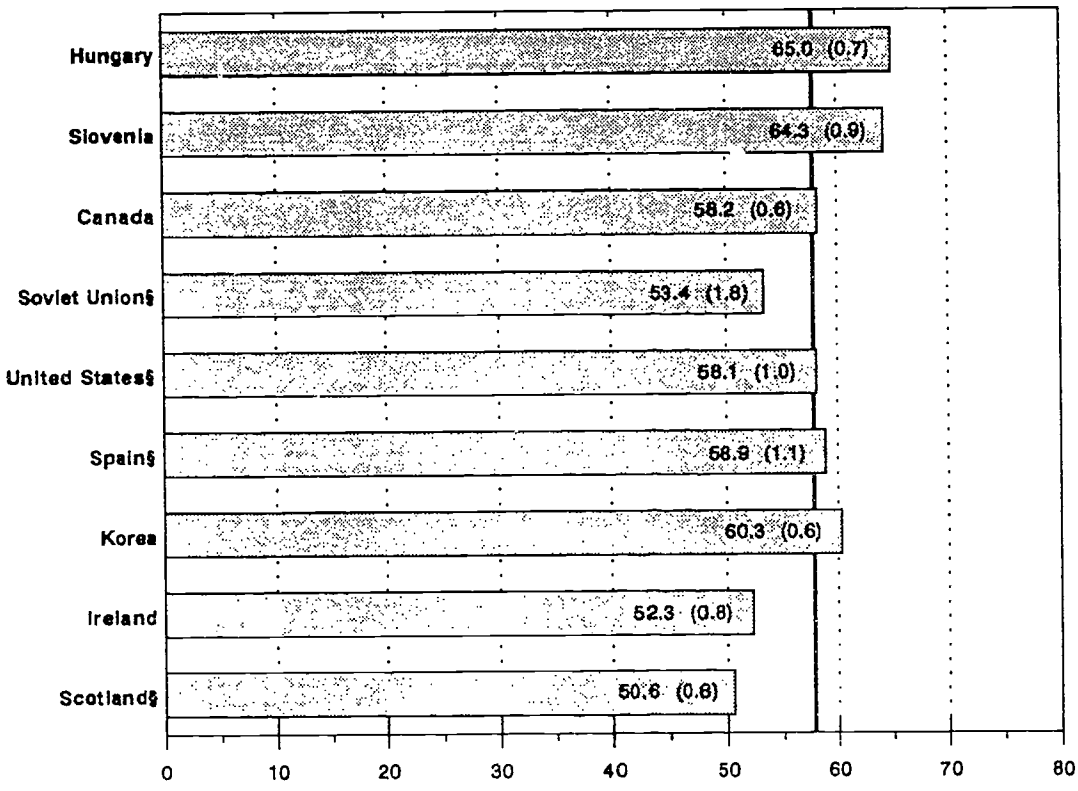
Chapter Four

# Cultural Geography

Seven of the questions in the assessment covered cultural geography, which focuses on explanations of the origins, spatial distributions, and importance of human settlements and activities, as well as the interactions of people and environments. The emphasis of the cultural geography component of the IAEP probe was on the location of cultural entities such as countries, regions, language groups, and population concentrations. The assessment also tested the students' abilities to analyze factors that cause cultural and environmental change.

The performance of students on questions in this content area is summarized in Figure 4.1. Countries are listed in order of performance across all geography questions.

**FIGURE 4.1** Average Percent Correct on 7 Cultural Geography Questions for Countries*




* *Jackknifed standard errors are presented in parentheses.*

| *IAEP Average: 57.9*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: Combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

Students in Hungary and Slovenia performed at a higher level than their counterparts in other countries. There were no significant differences among Korea, Spain (except Cataluña), Canada, and the United States. While Korean students performed at a higher level than Soviet 13-year-olds, the differences between test-takers in the Soviet Union (Russian-language schools), Spain (except Cataluña), Canada, and the United States were not significant. Students in Ireland and Scotland performed at a significantly lower level than those in all the other countries except the Soviet Union (Russian-language schools).[18]

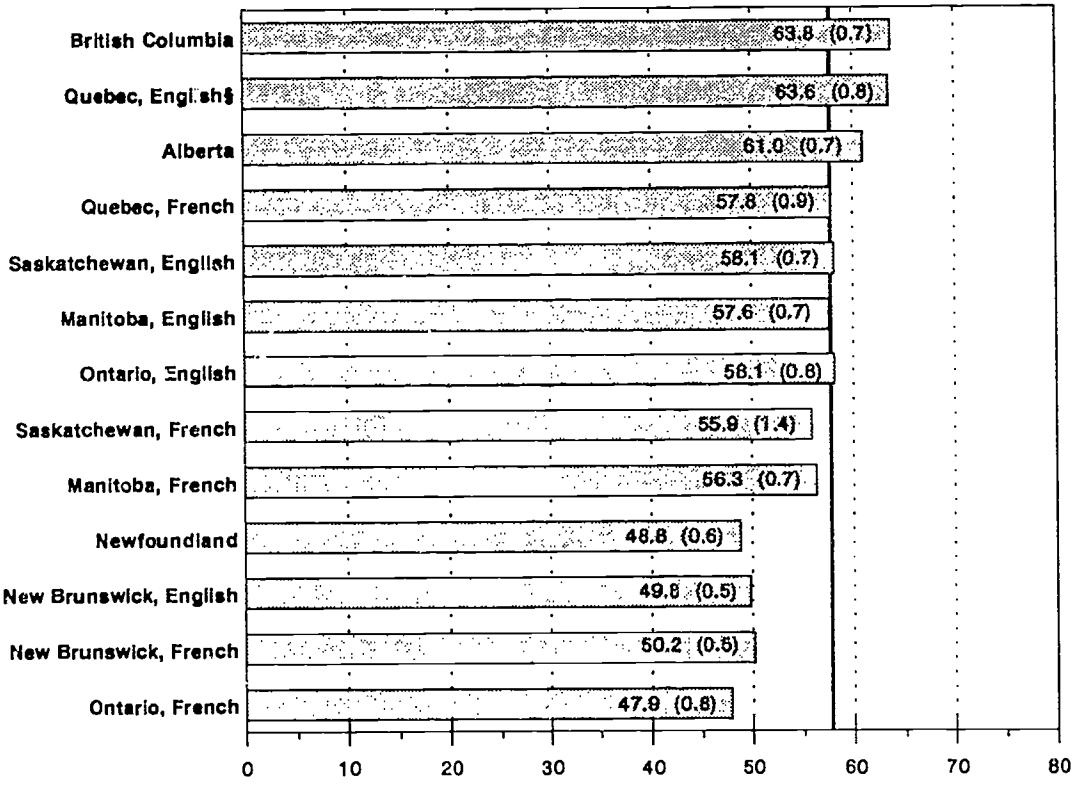
Students in Slovenia and Korea performed better, relative to the average, on cultural geography questions than they did relative to the average on the assessment as a whole. On the other hand, students in Scotland and the Soviet Union (Russian-language schools) did not score as well on these items, relatively speaking, as on the total assessment.

[18] Statistically significant differences are summarized in the Data Appendix.

## CANADIAN POPULATIONS

The performance of Canadian populations on cultural geography questions is presented in Figure 4.2. Populations are listed in order of performance across all geography questions.

**FIGURE 4.2 Average Percent Correct on 7 Cultural Geography Questions for Canadian Populations***




* *Jackknifed standard errors are presented in parentheses.*

| *IAEP Average: 57.9*

§ *Population exceptions are as follows:*
*Quebec English: Combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

As was the case in the physical geography category, the British Columbia population scored the highest average percent correct among Canadian populations, while the Ontario-French population scored the lowest. In this content area, about 16 percentage points separated these two populations. Students in Newfoundland did not perform as well on cultural geography questions, relative to the average, as they did on the geography assessment as a whole.

## CULTURAL GEOGRAPHY: INSTRUCTIONAL VARIABLES

Table 4.1 shows average percent correct on the cultural geography questions and percentage of students who reported having covered particular cultural geography subtopics in school. Countries are listed in order of performance across all geography questions.

**TABLE 4.1 Performance on Cultural Geography Items and Study of Cultural Geography Topics**

| | Average Percent Correct: Cultural Geography | Percent Reporting Studied Topics in School | |
|---|---|---|---|
| | | Location of Cities and Regions in Your Own Country | Location of Foreign Countries and Cultures |
| Hungary | 65.0 (0.7) | -- | -- |
| Slovenia | 64.3 (0.9) | 87 (0.9) | 90 (0.7) |
| Canada | 58.2 (0.6) | 89 (0.5) | 74 (0.9) |
| Soviet Unions§ | 53.4 (1.8) | -- | -- |
| United States§ | 58.1 (1.0) | 89 (0.8) | 82 (1.1) |
| Spain§ | 58.9 (1.1) | 91 (0.7) | 76 (1.2) |
| Korea | 60.3 (0.6) | 82 (0.8) | 81 (0.8) |
| Ireland | 52.3 (0.8) | 85 (0.9) | 66 (1.1) |
| Scotland§ | 50.6 (0.8) | 76 (0.9) | 64 (1.1) |

* *Jackknifed standard errors are presented in parentheses.*

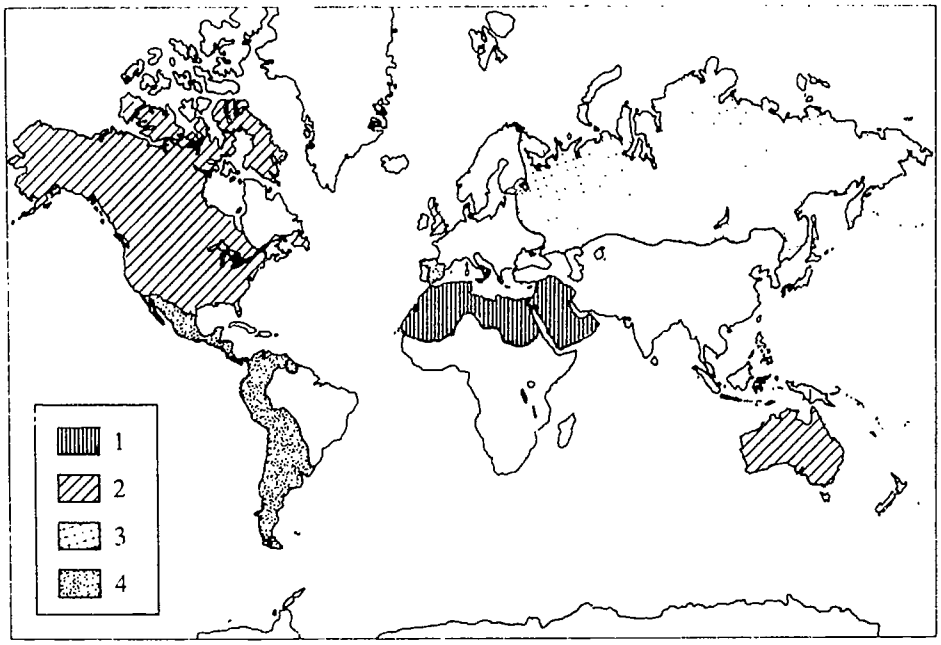
§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: Combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

More than three-fourths of the students in each nation reported studying the location of cities and regions in their home countries. On the other hand, in Canada, the United States, Spain (except Cataluña), Ireland, and Scotland, significantly smaller proportions reported studying the location of foreign countries and cultures. Students in the two countries with the lowest observed scores on these items (Ireland and Scotland) were the least likely to report studying the location of foreign countries and cultures.

## SAMPLE QUESTIONS

In the following item, students were asked to relate geographic region and language.

WORLD LANGUAGES




Which of the following languages corresponds to number 4 in the key of the map above?

A. French
B. Chinese
C. English
(D.) Spanish

**IAEP Average and Percent Correct by Country***

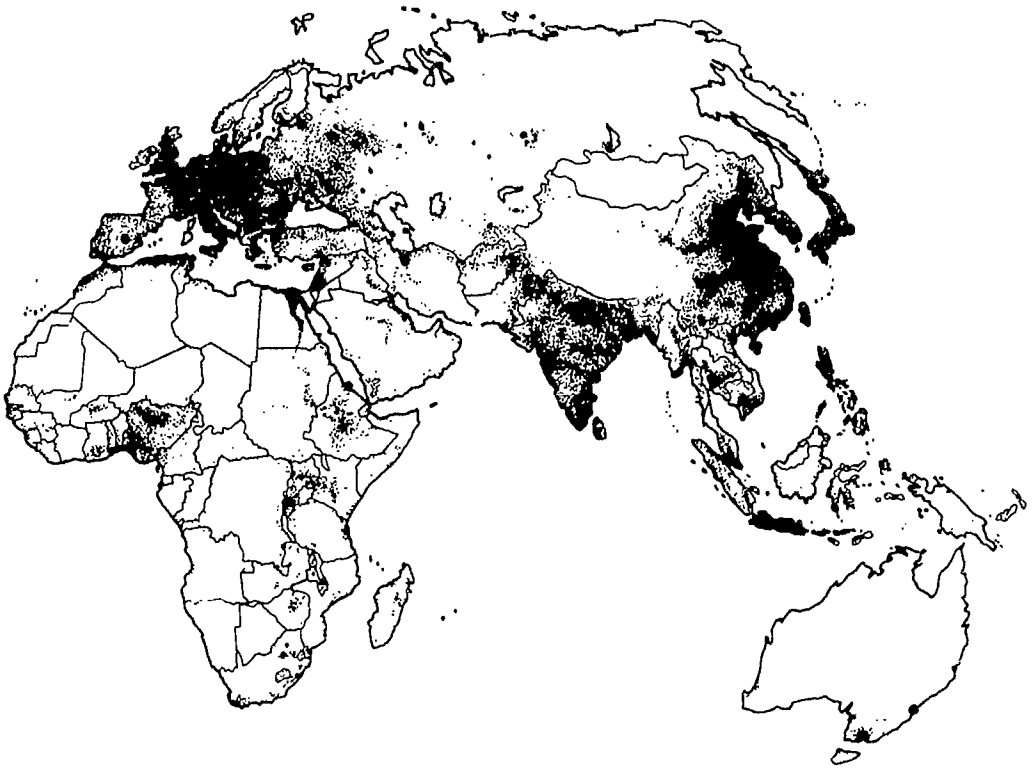
| IAEP | Hungary | Slovenia | Canada | Soviet Union§ | United States§ | Spain§ | Korea | Ireland | Scotland§ |
|---|---|---|---|---|---|---|---|---|---|
| *64.0* | *60.8 (1.3)* | *45.2 (1.8)* | *75.6 (1.1)* | *52.9 (3.2)* | *74.1 (1.9)* | *79.5 (1.3)* | *63.1 (1.3)* | *65.0 (1.4)* | *59.6 (1.5)* |

* *Jackknifed standard errors are presented in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: Combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

The IAEP average percent correct for this question was 64.0. Students in the United States, Canada, and Spain (except Cataluña) were more likely to answer this question correctly than other students. As was the case on the physical geography question that asked students to locate the Alps, student region of residence appeared to be related to performance. And, as was the case with the earlier item, knowledge of the characteristics of a specific region was needed to answer this question.

However, the question on the following page, in which students were asked to interpret a map showing population concentrations, evidenced a different response pattern.



The dots and shadings on the map above indicate areas with which of the following?

(A) Population concentrations
B. Intensive farming
C. Industrial development
D. Abundant mineral deposits

**IAEP Average and Percent Correct by Country***

| IAEP | Hungary | Slovenia | Canada | Soviet Union§ | United States§ | Spain§ | Korea | Ireland | Scotland§ |
|---|---|---|---|---|---|---|---|---|---|
| *51.9* | *59.0 (1.6)* | *66.0 (1.7)* | *62.0 (1.1)* | *49.8 (3.0)* | *48.4 (2.2)* | *47.3 (1.6)* | *51.1 (1.2)* | *39.8 (1.4)* | *43.9 (1.7)* |

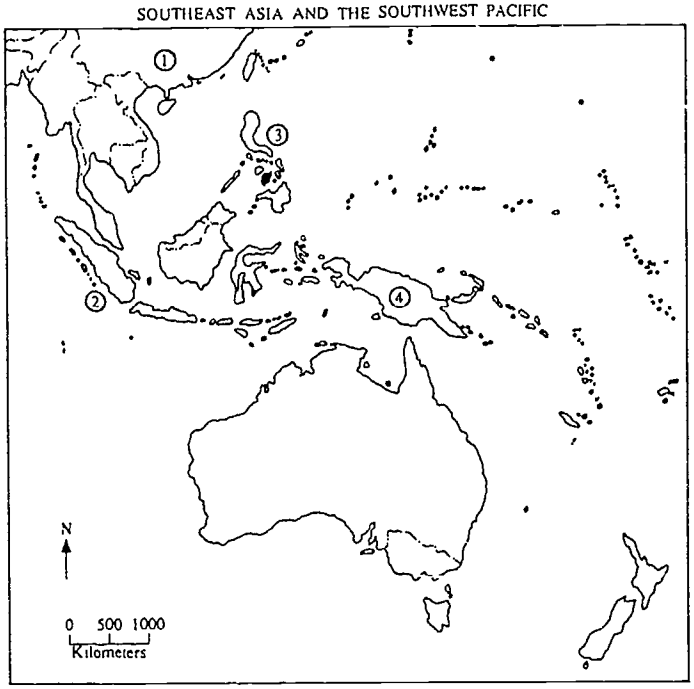
* *Jackknifed standard errors are presented in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: Combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

Unlike the previous question, on this item students who lived in the area covered by the item stimulus (Europe, Asia, Africa, and Oceania) did not perform significantly better than students from other regions (in this case, North America). In fact, Canadian students performed at a higher level on this item than students from all other countries except Slovenia. United States students, while scoring somewhat below the average, still had a higher average percent correct than their counterparts in Spain (except Cataluña), Ireland, and Scotland.

Certain items asked students to identify specific countries.

SOUTHEAST ASIA AND THE SOUTHWEST PACIFIC




On the map above, which of the following numbers identifies the Philippines?

A. 1
B. 2
C. 3
D. 4

**IAEP Average and Percent Correct by Country***

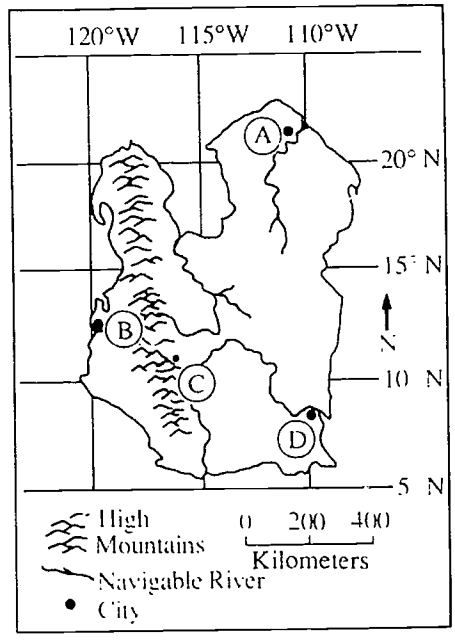
| IAEP | Hungary | Slovenia | Canada | Soviet Union§ | United States§ | Spain§ | Korea | Ireland | Scotland§ |
|---|---|---|---|---|---|---|---|---|---|
| *44.5* | *46.1* | *61.8* | *38.7* | *39.1* | *43.7* | *40.3* | *49.0* | *40.6* | *41.2* |
| | *(1.4)* | *(1.7)* | *(0.9)* | *(2.4)* | *(1.7)* | *(1.8)* | *(1.5)* | *(1.4)* | *(1.2)* |

* *Jackknifed standard errors are presented in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: Combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

This item proved difficult for the students; the IAEP average percent correct was only 44.5. Only in Slovenia were more than half the 13-year-olds able to answer this question correctly.

Finally, one question asked students to evaluate geographic forces that lead to cultural change.




The island shown above is in an early stage of economic development. Transportation systems are not well developed and manufacturing is carried out in homes and small shops for local use. People in Village C have very limited contact with the outside world and still follow most of the customs of their ancestors. Which of the following would most likely bring about the greatest change in their culture?

A. An increase in the birth rate
B. Construction of a highway from City B to City D through Village C
C. Construction of airports in Cities A and D
D. Occurrence of a flood in the village

**IAEP Average and Percent Correct by Country***

| IAEP | Hungary | Slovenia | Canada | Soviet Union§ | United States§ | Spain§ | Korea | Ireland | Scotland§ |
|---|---|---|---|---|---|---|---|---|---|
| *58.4* | *77.3 (1.3)* | *58.0 (1.3)* | *56.4 (1.0)* | *57.4 (2.0)* | *58.1 (2.5)* | *42.7 (1.5)* | *68.2 (1.2)* | *51.9 (1.5)* | *56.0 (1.7)* |

* *Jackknifed standard errors are presented in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: Combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

On average, 58.4 percent of the IAEP populations answered this question correctly. The difference between the scores of the highest- and lowest-performing groups was 34.6 percentage points.

## SUMMARY

Although understanding human and cultural geography has become increasingly important as the world has grown more interdependent, the results of this probe suggest that 13-year-old students' knowledge in this area is somewhat limited. Large percentages of students could not identify regions of the world in which Spanish is spoken or the location of the Philippines, and could not interpret a map showing population concentrations. In general, questions that asked students to use both outside knowledge and geographic skills proved a good deal more difficult than those that did not require outside knowledge. Finally, the relationship between region of student residence and performance on individual items is inconsistent; further research is needed to determine if consistent patterns can be found.

The seven questions in this area of the assessment provide only the most limited glimpse of a major domain of knowledge. Furthermore, the two topics included in the background questionnaire do not yield much information on instructional practices in cultural geography. More extensive assessments are necessary to accurately compare national patterns of performance in human geography.

Chapter Five

# Background Questions

Taken alone, the results of assessments are of limited value to educators and policymakers. Low test scores can indicate poor curricula or inadequate teaching, but they may just as easily reflect students' home environments or study habits. Assessment information is more useful if enhanced by data on instructional practices, school policies, curricular designs, home characteristics, and student attitudes and experiences. For that reason, the IAEP contained a series of background questions designed to gather basic information on these factors and on their relationship to geographic achievement.

The assessment included two main categories of background questions. All participants in the IAEP answered a set of general background questions designed to measure aspects of students' home environments as well as reading and study habits. Students who took part in the geography assessment were asked an additional 14 questions about the nature of the geography instruction that they had received in school and about personal experiences that might have contributed to greater geographic awareness. The results reported in this chapter reflect the perceptions of those students. Responses of others -- for example, teachers or parents -- might provide a different picture of classrooms or home environments.

It is important to remember that one cannot, on the basis of this report, establish causal relationships between background variables and geographic achievement. This survey was not designed to prove or disprove causal

hypotheses. Furthermore, it is difficult to untangle the myriad of factors that affect student achievement: it is usually impossible to tell whether a single background variable is a "cause" of a high or low level of performance or simply a symptom of other background factors.

## HOME ENVIRONMENT

Family size and the number of books in the home are background variables that are useful in examining and interpreting data on academic achievement. Family size tends to affect disposable income, which may, in turn, have an impact on student achievement. The number of books in the home is often an indicator of social and economic status; the presence of books also provides children opportunities for learning and intellectual growth.

Family size varied significantly among the countries in the study. In Hungary, only 3 percent of the students reported having four or more brothers and sisters, whereas in Ireland 34 percent of test-takers came from families with four or more children. And while Hungary had both the smallest percentage of large families and the highest level of performance, the relationship between the two variables was not consistent across populations. However, while differences in family size do not consistently explain performance differences between countries, this variable can be quite informative when examined *within* individual countries. Table 5.1 includes data on family size and performance in geography.

TABLE 5.1 Family Size and Geographic Performance*

| | | Number of Brothers and Sisters | | | | | | | Relationship with Achievement† |
|---|---|---|---|---|---|---|---|---|---|
| | | 0 | 1 | 2 | 3 | 4 | 5 | 6/More | |
| **Hungary** | Percent of Students | 12 (0.7) | 61 (1.1) | 19 (0.7) | 5 (0.5) | 1 (0.2) | 1 (0.2) | 1 (0.2) | |
| | Percent Correct | 72 (1.1) | 72 (0.6) | 67 (1.1) | 62 (1.6) | 54 (3.0) | 46 (6.2) | 49 (2.7) | - |
| **Slovenia** | Percent of Students | 12 (0.7) | 60 (1.1) | 20 (0.9) | 6 (0.6) | 2 (0.3) | 1 (0.2) | 1 (0.2) | |
| | Percent Correct | 68 (1.2) | 67 (0.6) | 62 (0.9) | 60 (1.7) | 62 (3.5) | 59 (4.8) | 46 (5.3) | - |
| **Canada** | Percent of Students | 7 (0.4) | 44 (0.8) | 30 (0.6) | 12 (0.4) | 4 (0.3) | 2 (0.2) | 2 (0.3) | |
| | Percent Correct | 65 (1.0) | 64 (0.5) | 63 (0.6) | 61 (1.0) | 60 (1.5) | 58 (2.2) | 57 (1.8) | - |
| **Soviet Union§** | Percent of Students | 14 (1.3) | 52 (2.9) | 16 (1.4) | 5 (0.9) | 3 (0.7) | 1 (0.2) | 8 (0.9) | |
| | Percent Correct | 65 (1.3) | 64 (1.3) | 61 (1.2) | 62 (2.5) | 58 (1.8) | 59 (2.4) | 54 (1.7) | - |
| **United States§** | Percent of Students | 6 (0.7) | 34 (1.2) | 27 (0.9) | 17 (0.7) | 8 (0.8) | 3 (0.3) | 5 (0.5) | |
| | Percent Correct | 59 (1.6) | 65 (1.0) | 63 (0.8) | 61 (1.1) | 58 (1.9) | 55 (2.9) | 54 (2.2) | - |
| **Spain§** | Percent of Students | 6 (0.5) | 38 (1.2) | 31 (1.0) | 14 (0.7) | 7 (0.5) | 2 (0.3) | 2 (0.3) | |
| | Percent Correct | 62 (1.6) | 62 (0.8) | 60 (0.9) | 59 (1.1) | 57 (1.8) | 53 (2.7) | 47 (2.7) | - |
| **Korea** | Percent of Students | 3 (0.3) | 29 (1.0) | 30 (0.8) | 17 (0.6) | 11 (0.7) | 6 (0.4) | 4 (0.4) | |
| | Percent Correct | 61 (1.9) | 66 (0.8) | 61 (0.7) | 56 (0.9) | 53 (1.2) | 49 (1.7) | 51 (1.5) | - |
| **Ireland** | Percent of Students | 2 (0.2) | 16 (0.7) | 24 (0.9) | 24 (0.8) | 15 (0.8) | 8 (0.5) | 11 (0.6) | |
| | Percent Correct | 61 (3.0) | 61 (1.3) | 60 (0.9) | 59 (0.9) | 59 (0.9) | 57 (1.1) | 53 (1.3) | - |
| **Scotland§** | Percent of Students | 7 (0.5) | 46 (1.1) | 27 (0.9) | 12 (0.6) | 4 (0.4) | 2 (0.3) | 2 (0.3) | |
| | Percent Correct | 58 (1.4) | 60 (0.6) | 58 (1.0) | 57 (1.5) | 52 (1.6) | 54 (2.2) | 48 (3.0) | - |

* *Jackknifed standard errors are presented in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: Combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

† *+ Statistically significant positive linear relationship*
*- Statistically significant negative linear relationship*
*0 No statistically significant linear relationship*

The relationship between family size and performance was negative in all populations; that is, average scores tended to decrease as family size increased. Similarly, small families (those with three or fewer children) are, on the whole, more common in higher-performing countries than in lower-performing countries.[19]

[19] There were, of course, counterexamples. In Scotland, a population with a relatively low level of performance, 80 percent of the test-takers reported having fewer than three brothers and sisters.

Table 5.2 shows information on the number of books in the home and performance on the geography assessment.

**TABLE 5.2 Number of Books in the Home and Geographic Performance***

| | | Number of Books at Home | | | | Relationship with Achievement† |
|---|---|---|---|---|---|---|
| | | 0-10 | 11-24 | 25-100 | Over 100 | |
| **Hungary** | Percent of Students | 3 (0.4) | 7 (0.5) | 32 (1.0) | 58 (1.2) | |
| | Percent Correct | 51 (2.4) | 55 (1.4) | 65 (0.7) | 75 (0.6) | + |
| **Slovenia** | Percent of Students | 3 (0.4) | 15 (0.8) | 46 (1.1) | 36 (1.4) | |
| | Percent Correct | 56 (2.0) | 58 (1.1) | 64 (0.7) | 71 (0.8) | + |
| **Canada** | Percent of Students | 3 (0.2) | 10 (0.4) | 40 (0.8) | 47 (1.0) | |
| | Percent Correct | 52 (1.8) | 56 (0.8) | 62 (0.4) | 66 (0.5) | + |
| **Soviet Union§** | Percent of Students | 2 (0.4) | 9 (1.2) | 45 (0.8) | 43 (1.8) | |
| | Percent Correct | 51 (3.6) | 59 (1.7) | 62 (1.3) | 65 (1.0) | + |
| **United States§** | Percent of Students | 5 (0.7) | 12 (0.8) | 38 (1.3) | 45 (1.7) | |
| | Percent Correct | 49 (1.8) | 54 (1.6) | 60 (0.7) | 68 (0.9) | + |
| **Spain§** | Percent of Students | 4 (0.4) | 16 (0.9) | 44 (1.2) | 36 (1.8) | |
| | Percent Correct | 52 (1.6) | 53 (1.1) | 59 (0.6) | 66 (1.1) | + |
| **Korea** | Percent of Students | 9 (0.6) | 16 (0.8) | 37 (1.0) | 38 (1.2) | |
| | Percent Correct | 50 (1.2) | 52 (1.0) | 60 (0.6) | 65 (0.8) | + |
| **Ireland** | Percent of Students | 8 (0.8) | 16 (0.9) | 41 (1.2) | 35 (1.7) | |
| | Percent Correct | 44 (1.4) | 53 (0.8) | 59 (0.7) | 65 (0.8) | + |
| **Scotland§** | Percent of Students | 8 (0.7) | 17 (0.9) | 37 (1.1) | 38 (1.6) | |
| | Percent Correct | 46 (1.0) | 51 (0.7) | 56 (0.6) | 66 (0.7) | + |

* *Jackknifed standard errors are presented in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: Combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

† *+ Statistically significant positive linear relationship*
*- Statistically significant negative linear relationship*
*0 No statistically significant linear relationship*

Books may truly represent windows on the world, and in all countries in the assessment the number of books in the home was positively related to geographic achievement. Within some countries the findings were striking. In Hungary, for example, students who reported having 25-100 books at home

scored, on average, 10 percentage points higher than those who reported having 11-24 books, and children from homes with more than 100 books achieved an average assessment score 20 percentage points higher. Similar, if less dramatic, patterns were manifest in the other countries in the study. On the other hand, this variable did not always differentiate *between* high- and low-performing countries.

## STUDENTS' OUT-OF-SCHOOL ACTIVITIES

Educational reformers usually focus on improving curriculum and instruction, and sometimes lose sight of the fact that children spend the majority of their time outside school. What students do when they are not in school may have a profound effect on academic achievement. Some out-of-school activities, such as reading for fun and doing homework, may help students in the classroom. Extensive television watching, on the other hand, is likely to prove less beneficial. Certain activities, such as international travel, may be supportive of the development of geographic knowledge. The IAEP asked students about their homework, reading, and television viewing habits. Children were also asked if they had ever visited a foreign country.

Frequent readers tend to be high achievers in many academic areas, and one might expect reading to be particularly highly related to geographic knowledge and skills. With the exception of Korea, the percentage of students identifying themselves as daily readers was fairly consistent across countries. Although in Hungary -- the highest performing country in the study -- a very low proportion of students reported never or almost never reading for fun, national percentages of students who are daily readers did not consistently differentiate among high- and low-performing countries.

However, frequency of reading was positively related to geographic achievement *within* all countries in the assessment. Differences between the performance of 13-year-olds who read daily, weekly, monthly, and almost never, varied from country to country. In Korea, daily readers scored, on average, 15 percentage points higher than students who never or almost never

read, while in Spain (except Cataluña) the observed difference was only 6 percentage points. Table 5.3 summarizes leisure reading and geographic performance.

**TABLE 5.3 Leisure Reading and Geographic Performance***

| | | How Often Student Reads For Fun | | | | |
|---|---|---|---|---|---|---|
| | | Never or Hardly Ever | 1-2 Times Per Month | 1-2 Times Per Week | Every Day | Relationship with Achievement† |
| **Hungary** | Percent of Students | *3 (0.4)* | *17 (0.7)* | *35 (0.8)* | *44 (0.9)* | |
| | Percent Correct | *64 (2.2)* | *66 (1.1)* | *66 (0.7)* | *75 (0.7)* | + |
| **Slovenia** | Percent of Students | *8 (0.7)* | *14 (0.7)* | *35 (1.1)* | *42 (1.2)* | |
| | Percent Correct | *59 (1.4)* | *66 (1.0)* | *64 (0.7)* | *67 (0.9)* | + |
| **Canada** | Percent of Students | *16 (0.5)* | *16 (0.5)* | *31 90.6)* | *37 (0.7)* | |
| | Percent Correct | *58 (0.7)* | *61 (0.7)* | *63 (0.5)* | *66 (0.6)* | + |
| **Soviet Union§** | Percent of Students | *10 (0.5)* | *12 (0.8)* | *31 (0.8)* | *47 (0.9)* | |
| | Percent Correct | *56 (1.9)* | *60 (1.4)* | *61 (1.2)* | *66 (1.1)* | + |
| **United States§** | Percent of Students | *21 (0.8)* | *17 (1.1)* | *34 (1.0)* | *29 (1.0)* | |
| | Percent Correct | *59 (1.2)* | *60 (1.4)* | *61 (1.0)* | *66 (1.1)* | + |
| **Spain§** | Percen. of Students | *13 (0.7)* | *11 (0.7)* | *41 (1.0)* | *35 (1.1)* | |
| | Percent Correct | *57 (1.0)* | *59 (1.2)* | *59 (0.8)* | *63 (1.0)* | + |
| **Korea** | Percent of Students | *13 (0.7)* | *34 (1.1)* | *42 (1.1)* | *11 (0.7)* | |
| | Percent Correct | *53 (1.0)* | *60 (0.8)* | *60 (0.6)* | *68 (1.2)* | + |
| **Ireland** | Percent of Students | *16 (0.9)* | *12 (0.6)* | *32 (0.9)* | *41 (1.1)* | |
| | Percent Correct | *52 (1.2)* | *57 (1.0)* | *57 (0.8)* | *63 (0.8)* | + |
| **Scotland§** | Percent of Students | *16 (0.8)* | *14 (0.6)* | *32 (1.0)* | *38 (1.2)* | |
| | Percent Correct | *51 (0.9)* | *57 (0.9)* | *58 (0.8)* | *62 (0.8)* | + |

* *Jackknifed standard errors are presented in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: Combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

† *+ Statistically significant positive linear relationship*
*- Statistically significant negative linear relationship*
*0 No statistically significant linear relationship*

Researchers and policymakers have posited a strong relationship between achievement and the amount of time students spend on homework. The percentages of students reporting two or more hours of homework daily

ranged from a high of 65 percent in Ireland to a low of 14 percent in Scotland. Although the time spent on homework varies among countries, there was no consistent relationship between the average percents correct of national groups and the percentages who reported two or more hours of daily homework.

Similarly, the relationship between homework and performance was inconsistent within populations. In Hungary, Spain (except Cataluña), and Ireland, amount of time spent doing homework was positively related to performance. However, in Slovenia and Canada the relationship was negative. In the remaining populations, no statistically significant linear relationship between amount of time spent doing homework and performance on the geography assessment was found. One should keep in mind that the background variable measures the amount of time students spent doing homework, and not how much homework they were assigned. It is possible students who are better prepared or have higher ability do their homework more quickly than others. It is also worth remembering that students reported how much homework they do for all school subjects, and not specifically for geography. Table 5.4 summarizes data on amount of time spent on homework and geographic performance.

TABLE 5.4 Time Spent Doing Homework and Geographic Performance*

| | | Time Spent Each Day On Homework | | | | | |
|---|---|---|---|---|---|---|---|
| | | No Homework | .5 Hour or Less | 1 Hour | 2 Hours | More Than 2 Hours | Relationship With Achievement† |
| **Hungary** | Percent of Students | 0 (0.1) | 9 (0.6) | 31 (0.9) | 37 (1.0) | 22 (0.8) | |
| | Percent Correct | 48 (6.8) | 67 (1.8) | 70 (0.7) | 72 (0.7) | 68 (0.8) | + |
| **Slovenia** | Percent of Students | 1 (0.1) | 22 (1.0) | 49 (1.1) | 21 (0.9) | 6 (0.5) | |
| | Percent Correct | 71 (6.4) | 70 (0.9) | 66 (0.8) | 62 (1.0) | 59 (1.3) | - |
| **Canada** | Percent of Students | 8 (0.6) | 21 (0.5) | 44 (0.8) | 19 (0.6) | 8 (0.4) | |
| | Percent Correct | 65 (1.0) | 64 (0.6) | 63 (0.5) | 63 (0.7) | 59 (1.1) | - |
| **Soviet Union§** | Percent of Students | 0 (0.1) | 13 (1.1) | 34 (0.7) | 32 (1.0) | 20 (1.0) | |
| | Percent Correct | 53 (6.9) | 62 (2.0) | 64 (1.3) | 64 (1.1) | 60 (1.8) | 0 |
| **United States§** | Percent of Students | 10 (0.9) | 18 (0.9) | 41 (0.8) | 22 (1.0) | 8 (0.6) | |
| | Percent Correct | 61 (1.6) | 62 (1.3) | 62 (1.1) | 63 (1.3) | 60 (1.6) | 0 |
| **Spain§** | Percent of Students | 1 (0.3) | 10 (0.8) | 25 (1.2) | 31 (1.1) | 33 (1.6) | |
| | Percent Correct | 51 (4.6) | 58 (1.3) | 60 (1.0) | 61 (1.0) | 60 (0.9) | + |
| **Korea** | Percent of Students | 3 (0.3) | 14 (0.7) | 44 (1.0) | 29 (1.1) | 11 (0.6) | |
| | Percent Correct | 57 (2.9) | 58 (1.1) | 60 (0.6) | 61 (0.8) | 59 (1.3) | 0 |
| **Ireland** | Percent of Students | 1 (0.5) | 6 (0.6) | 28 (1.1) | 42 (1.2) | 23 (1.3) | |
| | Percent Correct | 42 (7.4) | 53 (1.9) | 58 (0.9) | 60 (0.7) | 59 (1.0) | + |
| **Scotland§** | Percent of Students | 17 (1.3) | 28 (1.0) | 41 (1.1) | 11 (1.1) | 3 (0.3) | |
| | Percent Correct | 57 (1.1) | 60 (0.9) | 58 (0.6) | 59 (1.7) | 59 (2.5) | 0 |

* *Jackknifed standard errors are presented in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: Combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

† *+ Statistically significant positive linear relationship*
*- Statistically significant negative linear relationship*
*0 No statistically significant linear relationship*

Television viewing is blamed for many inadequacies in educational performance. However, television clearly has the potential to teach children much about the geography of the world in which they live. Almost all children in the study reported watching some television each day. In Slovenia and Ireland, fewer than 10 percent of test-takers report watching more than five hours per day, while in the United States and Scotland more than 20 percent of students reported spending more than five hours each day watching television. However, levels of television viewing did not consistently differentiate between high- and low-performing countries.

Within countries, children who watched six or more hours of television per day scored significantly lower on the assessment than those who watched one hour or less. And in six of the nine countries, there was a statistically significant negative linear relationship between television watching and geographic achievement. Of course, one cannot necessarily infer causation; television viewing may not in and of itself hinder performance, and this study has no information on the educational value of the programming students watched. Table 5.5 summarizes data on television watching and geographic performance.

**TABLE 5.5 Time Spent Watching Television and Geographic Performance***

| | | Time Spent Each Day Watching Television | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | None | 1 Hour Or Less | 2 Hours | 3 Hours | 4 Hours | 5 Hours | 6 Hours Or More | Relationship with Achievement† |
| **Hungary** | Percent of Students | 1 (0.2) | 10 (0.6) | 28 (0.9) | 28 (0.8) | 19 (0.7) | 9 (0.6) | 5 (0.5) | |
| | Percent Correct | 55 (4.9) | 72 (1.3) | 73 (0.9) | 70 (0.7) | 69 (0.8) | 65 (1.2) | 61 (1.9) | 0 |
| **Slovenia** | Percent of Students | 3 (0.3) | 28 (1.1) | 37 (1.0) | 19 (0.9) | 8 (0.6) | 2 (0.3) | 2 (0.3) | |
| | Percent Correct | 61 (1.7) | 66 (0.8) | 64 (0.8) | 66 (1.2) | 67 (1.4) | 67 (2.5) | 60 (2.7) | 0 |
| **Canada** | Percent of Students | 3 (0.3) | 15 (0.6) | 28 (0.6) | 24 (0.5) | 15 (0.5) | 8 (0.4) | 7 (0.3) | |
| | Percent Correct | 66 (1.9) | 65 (1.0) | 64 (0.5) | 63 (0.6) | 63 (0.7) | 61 (1.1) | 57 (1.0) | - |
| **Soviet Union§** | Percent of Students | 2 (0.4) | 10 (0.6) | 26 (0.9) | 25 (1.3) | 19 (0.8) | 8 (0.6) | 10 (0.6) | |
| | Percent Correct | 59 (2.4) | 64 (1.7) | 62 (1.1) | 64 (1.3) | 64 (1.2) | 63 (1.8) | 58 (1.3) | 0 |
| **United States§** | Percent of Students | 1 (0.3) | 14 (1.0) | 23 (0.9) | 24 (1.1) | 17 (0.9) | 9 (0.8) | 12 (1.2) | |
| | Percent Correct | 63 (3.2) | 66 (1.4) | 64 (0.9) | 64 (1.1) | 62 (1.2) | 59 (2.0) | 52 (1.2) | - |
| **Spain§** | Percent of Students | 2 (0.4) | 22 (0.9) | 29 (0.9) | 23 (0.9) | 13 (0.7) | 6 (0.5) | 5 (0.5) | |
| | Percent Correct | 62 (2.4) | 62 (1.3) | 61 (0.9) | 58 (0.9) | 60 (1.1) | 57 (1.7) | 56 (2.1) | - |
| **Korea** | Percent of Students | 2 (0.3) | 20 (0.9) | 28 (0.8) | 24 (0.8) | 14 (0.7) | 7 (0.5) | 4 (0.3) | |
| | Percent Correct | 66 (2.7) | 65 (0.9) | 62 (0.8) | 57 (0.8) | 56 (1.0) | 54 (1.4) | 52 (1.8) | - |
| **Ireland** | Percent of Students | 3 (0.5) | 25 (1.1) | 32 (0.8) | 20 (0.7) | 11 (0.7) | 5 (0.4) | 4 (0.4) | |
| | Percent Correct | 62 (2.9) | 61 (0.9) | 60 (0.7) | 58 (0.8) | 56 (1.4) | 53 (1.8) | 44 (1.7) | - |
| **Scotland§** | Percent of Students | 1 (0.2) | 8 (0.8) | 21 (0.9) | 25 (0.8) | 20 (0.7) | 13 (0.9) | 11 (0.8) | |
| | Percent Correct | 63 (5.8) | 63 (1.7) | 61 (1.1) | 58 (0.8) | 56 (0.8) | 58 (1.2) | 52 (1.0) | - |

* *Jackknifed standard errors are presented in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: Combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

† *+ Statistically significant positive linear relationship*
*- Statistically significant negative linear relationship*
*0 No statistically significant linear relationship*

While one might expect travel abroad to promote greater geographic awareness and knowledge, the data on this variable were not conclusive. Students in only six countries provided information on travel abroad. In five countries, students reporting international travel achieved slightly higher observed geography scores than their counterparts who had not traveled. But whether performance differences were due to the educational value of travel or to the socioeconomic factors associated with the ability to travel is unclear from this study. Data on international travel and geographic performance are summarized in Table 5.6.

**TABLE 5.6 Foreign Travel and Average Percent Correct***

| | Average Percent Correct | Percent Who Have Traveled Outside Own Country |
|---|---|---|
| Hungary | *69.8 (0.6)* | -- |
| Slovenia | *65.3 (0.6)* | *81 (1.5)* |
| Canada | *63.0 (0.5)* | *78 (0.7)* |
| Soviet Union§ | *62.6 (1.1)* | -- |
| United States§ | *61.9 (0.8)* | *39 (1.9)* |
| Spain§ | *60.1 (0.7)* | *38 (1.6)* |
| Korea | *59.7 (0.5)* | *3 (0.5)* |
| Ireland | *58.5 (0.6)* | -- |
| Scotland§ | *58.3 (0.6)* | *68 (1.3)* |

* *Jackknifed standard errors are presented in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: Combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

-- *Information not available.*

## GEOGRAPHIC INSTRUCTION

The teaching of geography varies from country to country, and in many cases from region to region within countries. Some students take classes that focus on geography, while others receive geography instruction only in social studies, history, or science classes. Children in some countries report studying a greater number of geographic topics than do their counterparts in others.[20]

In Slovenia, virtually all 13-year-olds reported taking a separate geography course during the same year as the assessment. In no other country were more than 46 percent of the students enrolled in a geography course. At least half of the students in all countries reported taking a geography course in one of the two school years preceding the assessment. Level of enrollment in geography courses did not consistently differentiate between high- and low-performing countries.

As was the case with other variables, it is also informative to look at the relationship between classroom-related factors and geographic performance within countries. Geographic educators often argue that geography should be taught as a discrete course. However, the relationship between taking a separate geography course and assessment performance was unclear. In most cases, students who had taken such classes scored, on average, slightly higher than those who had not. But there were a number of counterexamples. Table 5.7 summarizes the relationship between taking a geography course and performance on the assessment.

[20] Students in Hungary and the Soviet Union did not answer the questions reported in this section.

TABLE 5.7 Enrollment in Geography Courses and Geographic Performance*

| | | Taking Geography Course This Year | Not Taking Geography Course This Year | Took Geography Course During Previous Two Years | Did Not Take Geography Course Previous Two Years |
|---|---|---|---|---|---|
| Hungary | Percent of Students | -- | -- | -- | -- |
| | Percent Correct | -- | -- | -- | -- |
| Slovenia | Percent of Students | 99 (0.1) | 1 (0.1) | 79 (0.8) | 11 (0.5) |
| | Percent Correct | 65 (0.6) | 46 (6.1) | 67 (0.6) | 64 (1.3) |
| Canada | Percent of Students | 46 (1.1) | 54 (1.1) | 87 (0.5) | 13 (0.5) |
| | Percent Correct | 63 (0.6) | 63 (0.4) | 64 (0.4) | 59 (0.8) |
| Soviet Union§ | Percent of Students | -- | -- | -- | -- |
| | Percent Correct | -- | -- | -- | -- |
| United States§ | Percent of Students | 20 (1.6) | 80 (1.6) | 58 (2.3) | 42 (2.3) |
| | Percent Correct | 62 (1.2) | 62 (0.8) | 64 (0.9) | 59 (0.9) |
| Spain§ | Percent of Students | 34 (1.4) | 66 (1.4) | 87 (1.2) | 13 (1.2) |
| | Percent Correct | 54 (1.1) | 64 (0.9) | 61 (0.7) | 54 (1.7) |
| Korea | Percent of Students | 19 (1.0) | 81 (1.0) | 53 (1.3) | 47 (1.4) |
| | Percent Correct | 50 (0.8) | 62 (0.6) | 61 (0.7) | 58 (0.6) |
| Ireland | Percent of Students | -- | -- | -- | -- |
| | Percent Correct | -- | -- | -- | -- |
| Scotland§ | Percent of Students | 42 (1.2) | 58 (1.2) | 70 (1.3) | 30 (1.3) |
| | Percent Correct | 63 (0.8) | 55 (0.6) | 60 (0.7) | 55 (0.9) |

* *Jackknifed standard errors are presented in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: Combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

-- *Information not available.*

Geography is, of course, not taught only in geography classes. Over half of the students in each of the countries reported studying geography topics in history, social studies, and science classes, as shown in Table 5.8. Across all countries, geography was not consistently taught in one of these classes more than in others. Although performance information is not included in Table 5.8, there was no consistent relationship between coverage of topics in a

specific class and geographic performance. Remember when interpreting these data that they are based on student self reporting.

**TABLE 5.8 Coverage of Geography in Non-Geography Classes**

| | Percent of Students Who Studied Geography Topics "A Lot" or "Some" | | |
|---|---|---|---|
| | In History Class | In Social Studies Class | In Science Class |
| Hungary | -- | -- | -- |
| Slovenia | 91 (0.5) | 82 (0.8) | 82 (0.8) |
| Canada | 77 (0.7) | 68 (0.7) | 72 (0.7) |
| Soviet Union§ | -- | -- | -- |
| United States§ | 75 (1.5) | 78 (1.6) | 73 (1.5) |
| Spain§ | 56 (1.2) | 51 (1.7) | 38 (1.4) |
| Korea | 79 (0.8) | 90 (0.7) | 68 (1.2) |
| Ireland | 79 (1.4) | 56 (1.6) | 68 (1.4) |
| Scotland§ | 63 (0.9) | 54 (1.5) | 63 (1.2) |

* *Jackknifed standard errors are presented in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: Combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

-- *Information not available.*

The IAEP asked students whether they had studied a series of seven geography topics in school. The topics are listed below:

1. How to read symbols on maps and globes
2. How to use scales to measure distances
3. Longitude and latitude
4. Location of continents, oceans, rivers, and mountains
5. Location of cities and regions in home country
6. Location of foreign countries and cultures
7. Climate and natural resources

More than three-fourths of the children in Slovenia, Canada, and the United States reported studying at least six of the geography topics. Between 46 and 58 percent of students in Spain (except Cataluña), Korea, Ireland, and Scotland studied this many topics. This suggests that curricula in Slovenia, Canada, and the United States are more closely related to the IAEP geography framework than are the curricula in the four other countries.

The relationship between the study of specific topics and performance on major content areas of the assessment was discussed in chapters two, three, and four. Table 5.9 summarizes data on the number of geography topics studied and overall geographic performance. In all countries for which information was available, there was a positive linear relationship between the number of geography topics studied and levels of performance on the assessment. However, one should interpret this information with some caution: the topics listed in the background questionnaire were also those that were covered in the assessment, so students who had studied more of these topics were bound to have an advantage.

**TABLE 5.9 Geography Topics Studied and Geographic Performance***

| | | Number of Topics Studied | | | Relationship with Achievement† |
|---|---|---|---|---|---|
| | | 0-3 | 4-5 | 6-7 | |
| **Hungary** | Percent of Students | -- | -- | -- | |
| | Percent Correct | -- | -- | -- | |
| **Slovenia** | Percent of Students | *7 (0.5)* | *17 (0.9)* | *76 (1.1)* | |
| | Percent Correct | *56 (1.4)* | *61 (1.1)* | *67 (0.6)* | + |
| **Canada** | Percent of Students | *7 (0.4)* | *18 (0.7)* | *75 (0.8)* | |
| | Percent Correct | *60 (0.9)* | *58 (0.6)* | *65 (0.5)* | + |
| **Soviet Union§** | Percent of Students | -- | -- | -- | |
| | Percent Correct | -- | -- | -- | |
| **United States§** | Percent of Students | *5 (0.6)* | *16 (1.0)* | *79 (1.4)* | |
| | Percent Correct | *53 (2.5)* | *54 (1.2)* | *64 (0.8)* | + |
| **Spain§** | Percent of Students | *20 (1.4)* | *29 (1.4)* | *51 (1.1)* | |
| | Percent Correct | *57 (1.9)* | *57 (0.9)* | *64 (0.8)* | + |
| **Korea** | Percent of Students | *16 (0.7)* | *26 (0.9)* | *58 (1.0)* | |
| | Percent Correct | *51 (0.9)* | *56 (0.8)* | *64 (0.6)* | + |
| **Ireland** | Percent of Students | *21 (1.2)* | *33 (0.9)* | *46 (1.5)* | |
| | Percent Correct | *52 (1.2)* | *56 (0.7)* | *63 (0.7)* | + |
| **Scotland§** | Percent of Students | *13 (0.8)* | *32 (1.1)* | *55 (1.4)* | |
| | Percent Correct | *51 (1.2)* | *56 (0.8)* | *61 (0.7)* | + |

* *Jackknifed standard errors are presented in parentheses.*

§ *Population exceptions are as follows:*
*Soviet Union: Russian-language schools in 14 Republics*
*Spain: Spanish-language schools except in Cataluña*
*Scotland and United States: Combined school and student participation rate is below .80 but at least .70; interpret results with caution because of possible nonresponse bias.*

-- *Information not available.*

† *+ Statistically significant positive linear relationship*
*- Statistically significant negative linear relationship*
*0 No statistically significant linear relationship*

## SUMMARY

There appear to be positive relationships between several background variables (books in the home, study of geography topics, reading habits) and geographic achievement. Other factors have negative or less consistent relationships to performance. While it is possible to postulate reasons for these relationships, further research must be conducted for hypotheses to be tested and proved. Finally, other background variables (such as geographic teaching practices, geography curricula, students' access to geographic reference materials, and student attitudes toward geography) must be examined for geographic performance to be understood and recommendations made for its improvement.

# A Final Word

The task of reporting the achievement from nine countries and 13 Canadian populations represents both a challenging and unique opportunity. The difficulty of reporting these results appropriately is increased by the diversity of the populations involved. Because one must interpret the geographic performance of such a varied group of populations within the educational and cultural context of each participant, achievement data have been presented together with descriptive information about curricula, classrooms, and home environments.

While it would have been satisfying to observe clear patterns of behavior that distinguish high- from low-performing countries, the data on a limited assessment such as this cannot suggest a universal set of factors that contribute to effective schooling and high levels of achievement. Although there were consistent relationships between books in the home, family size, and leisure reading on the one hand and achievement on the other, television viewing and time spent doing homework related to performance in a less predictable fashion. Perhaps this is one of the most important findings of the study: factors affect academic performance in complex ways and operate differently in diverse settings.

The second set of findings apply to achievement levels. While the survey was far too limited to provide thorough information on students' knowledge of geography, it does provide a limited glimpse of the skills and abilities of 13-year-olds in this complex and important academic discipline. Unfortunately, the IAEP data may lead some individuals to focus on the

relative ranking of countries and others to decide that international comparisons are both unfair and unhelpful. However, comparative analyses can provide a setting for national findings. As policymakers attempt to set goals and standards for their own young citizens, it is instructive to know both the levels of achievement that are possible and the educational practices that correlate with success.

Finally, the results of the IAEP geography assessment should cause all those concerned with education to focus on the future. Global developments make a knowledge of geography indispensable for both economic competitiveness and responsible citizenship. At best, the IAEP can direct us to areas in need of more work and research.

# Procedural Appendix

The second International Assessment of Educational Progress (IAEP), conducted in 1991, is a comparative study of the mathematics and science skills of samples of 9- and 13-year-old students from 20 countries. The first IAEP in 1988 provided results on the mathematics and science achievement of 13-year-olds from six countries: Canada (which conducted separate surveys in four provinces), Ireland, Korea, Spain, the United Kingdom, and the United States.[21] These countries and 14 others agreed to participate in the second study.

The IAEP applies a technology developed for a United States project, the National Assessment of Educational Progress (NAEP), which has conducted national surveys of the educational achievement of United States' students for more than 20 years. Using reliable and uniform scientific procedures, NAEP has obtained comprehensive educational achievement data and reported trends over time on student performance. Since 1983, Educational Testing Service (ETS) has administered NAEP as well as related projects, including the IAEP.

IAEP was designed to collect and efficiently report data on what students know and can do, on the educational and cultural factors associated with achievement, and on students' attitudes, backgrounds, and classroom

[21] Archie E. Lapointe, Nancy A. Mead, and Gary W. Phillips, *A World of Differences. An International Assessment of Mathematics and Science.* Princeton, NJ: Educational Testing Service, 1989.

experiences. By utilizing existing NAEP technology and procedures, the time and money required to conduct these international comparative studies was reduced and many interested countries were able to experiment with these innovative psychometric techniques.

After the first international assessment, interest from representatives of several foreign countries prompted ETS staff to develop a proposal for a second international assessment that sought to expand upon the 1988 experience. This second project was a four-part survey: a main assessment of 13-year-olds' performance in mathematics and science; an assessment of 9-year-olds' performance in mathematics and science; an experimental, performance-based assessment of 13-year-olds' ability to use equipment and materials to solve mathematics and science problems; and a short probe of the geography skills and knowledge of 13-year-olds. All countries participated in the main assessment of 13-year-olds; participation in the other assessment components was optional. Nine countries participated in the geography assessment.

This report provides the results of the international geography assessment. Complete discussions of students' mathematics and science performance on the main assessment and the experimental, performance-based tasks are found in three other documents.[22]

[22] Archie E. Lapointe, Nancy A. Mead, and Janice M. Askew, *Learning Mathematics.* Princeton, NJ: Educational Testing Service, 1992.

Archie E. Lapointe, Janice M. Askew, and Nancy A. Mead, *Learning Science.* Princeton, NJ: Educational Testing Service, 1992.

Brian McLean Semple, *Performance Assessment: An International Experiment.* Princeton, NJ: Educational Testing Service, 1992.

## DEVELOPING THE ASSESSMENT

The IAEP assessment was developed through a consensus-building process that involved curriculum and measurement experts from each of the participating countries and provinces. As models, several existing NAEP frameworks were reviewed by participants and evaluated on their appropriateness for their own countries' curriculums. Together, the participants then adapted the NAEP frameworks to reflect an international consensus of the content areas and cognitive abilities within mathematics, science, and geography of what they believed constituted the curricula being implemented in their own school systems.[23]

More than one-half of the participants submitted test items from their countries' own assessment programs that they felt were appropriate and met the requirements of the IAEP. Many questions from the United States' NAEP assessments were included as well. These items, more than 1,500 across the three content areas, were then distributed to each participant and each was evaluated and rated for its quality, relevance to the framework, and appropriateness for its culture and curricula. The items with the highest ratings across all countries were placed into a pool of acceptable questions from which a subset was selected and pilot-tested in all of the participating provinces and countries.

All questions for the IAEP assessment were screened by subject-matter experts as well as by editors and sensitivity reviewers to detect any potential bias or lack of sensitivity to any particular student group.

A total of 24 cognitive test questions or items were selected for the final geography assessment at age 13. These items, all of which used a multiple-choice format, measured three objectives, as shown in Figure A.1.

[23] For a full discussion of the development process, see *The 1991 IAEP Assessment: Objectives for Mathematics, Science, and Geography*. Center for the Assessment of Educational Progress. Princeton, NJ: Educational Testing Service, 1991.

The target percentages of questions within each category were established at the onset of the project. The final numbers and percentages of questions within each category represent final decisions after examining the results of pilot testing in the participating countries.

**FIGURE A.1 Percentage Distributions of Questions for 13-year-olds by Geography Objectives Areas**

| | Target Percentage of Questions | Actual Number of Questions | Actual Percentage of Questions |
|---|---|---|---|
| Skills | 33 | 8 | 33 |
| Physical Geography | 33 | 9 | 38 |
| Cultural Geography | 33 | 7 | 29 |

Because it is particularly instructive to policymakers and educators to interpret achievement results in context, IAEP developed three separate background questionnaires -- for the student, the school, and the country. These asked various questions about resources within the school and at home, curricular emphases, instructional practices, as well as other school and non-school factors that may influence learning. In addition, a limited set of subject-specific background questions asked students for information about the instruction they received and relevant out-of-school experiences.

In this report, the answers to background questions are examined along with student performance -- for example, the relationship between how much television students report watching and their performance on the IAEP geography assessment. Since IAEP was designed to collect only a limited amount of background information from a sample of students at one point in time, these analyses cannot be used to establish cause-and-effect relationships, which may be influenced by a great number of variables.

## ASSESSMENT DESIGN

At each age level, two separate booklets, one for each subject area in the main assessment, were prepared. At age 13, the mathematics and science booklets also included a small number of geography items for countries that chose to assess geography. At both ages 9 and 13, students were administered either a mathematics or a science booklet. The administration instructions and procedures for both the mathematics and science assessments were identical and permitted sampled students at a particular school to be assessed together in a single 90-minute session.

The test questions in each block were arranged in easy-to-more-difficult order and reflected a broad range of content and cognitive abilities based on the frameworks described earlier.

## SAMPLING

The general sampling design for the IAEP survey called for representative samples of 3,300 students from about 110 schools in each participating country at each age level. School samples were drawn from public and private elementary and secondary schools. Samples of 9- and 13-year-old students were drawn from those born during calendar years 1981 and 1977, respectively. A total of about 175,000 9- and 13-year-olds were assessed in March 1991.[24] The numbers of schools and students assessed in geography and the school and student cooperation rates are presented in Figure A.2.

[24] Because their school years begin in March instead of September, Brazil, Korea, and Mozambique assessed six months earlier, in September 1990, and to compensate for the earlier assessment in Brazil and Korea, the sampled students were six months older (born between July 1, 1976 through June 30, 1977). Mozambique assessed students born in 1977 in mathematics only.

FIGURE A.2 Numbers of Schools and Students Assessed and School and Student Cooperation Rates

| | Number of Schools Assessed | Number of Students Assessed | Weighted School Response Rate | Student Completion Rate in Participating Schools | Combined Overall Response Rate |
|---|---|---|---|---|---|
| Canada† | 1,373 | 36,329 | 97 | 94 | 91 |
| Hungary | 144 | 3,255 | 100 | 92 | 92 |
| Ireland | 110 | 3,311 | 96 | 94 | 90 |
| Korea | 110 | 3,272 | 100 | 99 | 99 |
| Scotland | 92 | 3,148 | 82 | 91 | 75 |
| Slovenia | 114 | 3,194 | 100 | 95 | 95 |
| Soviet Union | 138 | 3,655 | 97 | 94 | 91 |
| Spain | 109 | 3,233 | 93 | 96 | 89 |
| United States | 96 | 2,811 | 77 | 92 | 71 |

† Details of participation in individual Canadian populations are provided in the IAEP Technical Report.

## DATA COLLECTION

Each participating country and Canadian province appointed a National Coordinator to administer data collection for the IAEP project. These individuals were provided with a detailed *IAEP National Coordinator's Manual* and training at one of two regional meetings. While participants strove to implement all procedures as outlined, occasionally they encountered situations where deviations were necessary. The administration procedures used by each participating country and Canadian province are summarized in Figure A.3.

**FIGURE A.3 Overall Summary of Test Administration by Country and Canadian Province for Age 9 and Age 13**

| | Scheduled Assessment Month | Who Gave Test | Test Administrator Training | Practice Test Used | Percent of Site Visits |
|---|---|---|---|---|---|
| **Canada** | March '91 | School Personnel | No | No | 18 |
| **Alberta** | | | | | |
| **British Columbia** | March '91 | School Personnel | No | No | Informal |
| **Manitoba** | March '91 | School Personnel | Yes | No | 18 |
| **New Brunswick, English** | March '91 | School Personnel | Yes | Optional | 14 |
| **New Brunswick, French** | March '91 | School Personnel | Yes | Yes | 28 |
| **Newfoundland** | March '91 | School Personnel | No | No | 21 |
| **Ontario** | March '91 | School Personnel | Yes | Yes (9)<br>Optional (13) | 18 |
| **Quebec** | March '91 | School Personnel | Yes | Yes | 20 |
| **Saskatchewan** | March '91 | School Personnel | No | No | Informal |
| **Hungary** | March '91 | External Administrators | Yes | No | -- |
| **Ireland** | March '91 | School Personnel | No | No | Informal |
| **Korea** | Sept. '90 | School Personnel | Yes | Yes | 20 |
| **Scotland** | March '91 | School Personnel | No | Optional (9)<br>No (13) | Informal |
| **Slovenia** | March '91 | External Administrators | Yes | Optional | 10 |
| **Soviet Union** | March '91 (9)<br>April '91 (13) | School Personnel | Yes | Yes | 49 |
| **Spain** | March '91 | External Administrators | Yes | Optional (9)<br>No (13) | 20 |
| **United States** | March '91 | School Personnel | No | No | 12 |

-- *Information is not available.*

Local school personnel or external administrators conducted the assessments at the selected schools, using standardized procedures provided in a *School Coordinator's Manual* during the specified assessment period (see Figure A.3). The administration script read aloud to students and the time limits for each part of the test were the same in all countries.

In addition to providing administrators with the *School Coordinator's Manual*, IAEP recommended that each country train each administrator in the procedures for conducting the assessment. To facilitate the training process, IAEP developed a training package that included a script for the trainers, suggested overhead transparencies, and provided simulations on how to complete the forms and implement the procedures. Based on their own testing programs, participants determined which method of training would be most helpful and efficient. Some of the countries conducted regional training sessions or used telephone conferences and audiotapes to supplement the *School Coordinator's Manual* (see Figure A.3).

Countries were provided with a practice test that students could take a day or two prior to the assessment to help them prepare for the assessment. It was designed particularly for students who were unfamiliar with multiple-choice formats. Countries were not required to use the practice test if they felt it was unnecessary (see Figure A.3).

## QUALITY CONTROL AND ON-SITE OBSERVATIONS

In order to ensure that the assessments were conducted uniformly in all locations, each country was required to develop and follow a quality-control plan approved by ETS. The participants were encouraged to conduct unannounced site visits to a random number of participating schools on the day of the assessment to determine if the standardized procedures of the assessment were being followed. Observation of 20 percent on the assessments was recommended. Due to limited resources, some countries conducted fewer visits (see Figure A.3). Some countries felt that making unannounced site visits would jeopardize their relationship with schools and instead implemented informal monitoring systems.

The quality-control visits were typically conducted by officials from the ministry, research center, or by external staff hired and trained in IAEP test administration procedures. An *IAEP Quality Control Observers Manual* was developed as a guide for observation visits. The main purpose of the visits was

to document that the test administrator had maintained test security and correctly followed the administration script, time limits, and rules for answering student questions.

Because the project considered quality control of administration crucial to the validity and reliability of assessment results, a second, independent group of observers was hired by ETS to make site visits within each of the countries. These observers, trained in the same procedures, in most cases, were fluent in the language of the assessment and familiar with the cultural idiosyncrasies of the populations being assessed. They visited testing sessions and interviewed project personnel on the management of the assessment in most participating countries.

## DATA PROCESSING

Once the assessments were completed, the booklets were returned to a central location within each country and checked for completeness. All responses were then either key-entered or scanned into a database.

Each country was responsible for developing a preliminary data file that followed a standard format and contained student responses and other demographic information for each population assessed. Requirements for the data files, including 100 percent verification of key entry, were specified in the *IAEP Data Processing Manual.* Specially designed software was created for data entry and verification and data processing personnel from each country received training in these procedures at one of five regional meetings. All participants were required to use the verification program, which checked for duplicate identification numbers and responses that fell outside the expected ranges, and to resolve inconsistencies in the data.

Completed data files were sent to the IAEP Data Processing Center where files were verified a second time and item analyses were conducted to identify other problems in the data files. Each participant also sent 10 samples (selected at random) of each type of test booklet and questionnaire so

that the data files could be re-checked against the original source documents. If the student response portion of the records that were checked contained 1 percent or more errors, participants were required to rekey the entire data file. This happened in one instance, and the data file was rekeyed.

## ITEM PERCENTS CORRECT

The first stage of data analysis involved the calculation of the percentage of correct answers and standard errors for individual questions. For each population, the weighted percentage of correct answers was calculated for each question. The results of students who omitted questions at the ends of sections because they did not reach them were excluded from the calculations for those questions. For each percent correct, an estimate of its standard error was calculated using the jackknife procedure. Percentages and standard errors were calculated for subgroups within each population, including gender and grade.

## SUMMARY MEASURES

Weighted average percentages of correct responses were then computed for each content and process area and across all questions within mathematics and science for each population. They were computed by averaging across the individual weighted percents correct for the items included in each category. For each average, an estimate of its standard error was calculated using the jackknife procedure. Average percentages and standard errors were calculated for subgroups within each population including school finance category, district size, race/ethnicity, gender, and grade.

## TESTS OF SIGNIFICANCE

A Bonferroni multiple comparison procedure was used to determine the statistical significance of differences in performance or background characteristics among participating countries or among Canadian provinces. This procedure holds the probability of falsely declaring a significant difference to 5 percent across the entire set of possible pairwise comparisons being analyzed.[25]

The procedure used to determine the statistical significance of differences in performance of a population on a particular content area and on the geography test as a whole looked at the difference between a population's deviation from the mean for the content area and its deviation from the overall mean. Values greater than 0 indicated performance in the category was relatively higher than performance overall and values less than 0 indicated performance was relatively lower than performance overall. If the absolute value of the difference in those deviations was equal to or greater than twice the standard error of that difference, it was cited as statistically significant.

The linear relationship between levels of a background variable and average performance was estimated by applying a set of orthogonal contrasts to the set of average performance by level of the background variable. The linear component was estimated by the sum of $b = \sum c_j x_j$, where the $x_j$ are the average percent correct for students with level j on the background variable and the $c_j$ are defined so that b corresponds to the slope of the unweighted regression of the average percents correct on the levels of the background variable. The statistical significance of b was evaluated by comparison with its standard error, computed as the square root of the sum $\sum c_j^2 SE_j^2$, where $SE_j$ is the standard error of $x_j$. Values of b that were equal to or greater than twice the standard error were considered to be statistically significant.

[25] For a detailed discussion of the Bonferroni multiple comparison procedure see the *IAEP Technical Report*.

# Data Appendix

## Skills and Tools: Item Description, IAEP Average, and Percent Correct by Population

| BLOCK/ITEM | DESCRIPTION |
|---|---|
| 2G1 1 | Use a legend and locate a capital city on a map |
| 2G1 4 | Identify the direction of travel from one location to another on a map |
| 2G1 6 | Recognize the hemisphere completely shown in a polar projection |
| 2G1 8 | Identify a cross section that corresponds with a contour map |
| 2G2 1 | Use a legend on a map and recognize a land boundary |
| 2G2 4 | Identify lines of latitude and longitude on a globe |
| 2G2 7 | Recognize latitude lines on a non-mercator projection |
| 2G2 10 | Use a scale and direction to find a city on a map |

| BLOCK/ITEM | IAEP | CAN | HUN | IRE | KOR | SCO | SLO | SOV | SPA | USA |
|---|---|---|---|---|---|---|---|---|---|---|
| 2G1 1 | 92.5 | 91 | 95 | 93 | 86 | 93 | 92 | 93 | 94 | 96 |
| 2G1 4 | 75.2 | 78 | 79 | 72 | 79 | 76 | 72 | 72 | 70 | 78 |
| 2G1 6 | 71.3 | 77 | 83 | 60 | 73 | 59 | 75 | 73 | 66 | 75 |
| 2G1 8 | 49.8 | 53 | 48 | 46 | 60 | 55 | 50 | 43 | 41 | 51 |
| 2G2 1 | 81.4 | 79 | 86 | 81 | 80 | 84 | 80 | 79 | 81 | 82 |
| 2G2 4 | 71.7 | 76 | 73 | 68 | 65 | 71 | 68 | 86 | 67 | 71 |
| 2G2 7 | 45.9 | 38 | 74 | 34 | 46 | 29 | 57 | 65 | 38 | 33 |
| 2G2 10 | 58.3 | 64 | 71 | 48 | 53 | 62 | 50 | 66 | 41 | 69 |

| BLOCK/ITEM | ALB | BCO | MANE | MANF | NBWE | NBWF | NFL | ONTE | ONTF | QUEE | QUEF | SASE | SASF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2G1 1 | 95 | 96 | 93 | 89 | 90 | 81 | 93 | 93 | 77 | 92 | 86 | 95 | 95 |
| 2G1 4 | 78 | 79 | 75 | 74 | 71 | 69 | 70 | 77 | 69 | 82 | 81 | 76 | 78 |
| 2G1 6 | 74 | 74 | 73 | 77 | 67 | 77 | 71 | 74 | 68 | 77 | 83 | 75 | 80 |
| 2G1 8 | 54 | 59 | 49 | 54 | 41 | 42 | 43 | 50 | 44 | 56 | 59 | 55 | 60 |
| 2G2 1 | 84 | 80 | 81 | 68 | 81 | 61 | 84 | 80 | 63 | 84 | 75 | 85 | 72 |
| 2G2 4 | 78 | 77 | 74 | 77 | 66 | 73 | 68 | 73 | 72 | 80 | 81 | 76 | 73 |
| 2G2 7 | 39 | 37 | 33 | 33 | 25 | 30 | 34 | 35 | 33 | 36 | 43 | 40 | 33 |
| 2G2 10 | 68 | 71 | 65 | 63 | 58 | 50 | 58 | 61 | 57 | 68 | 65 | 68 | 65 |

### Key

| | |
|---|---|
| IAEP | IAEP Average |
| CAN | Canada |
| HUN | Hungary |
| IRE | Ireland |
| KOR | Korea |
| SCO | Scotland |
| SLO | Slovenia |
| SOV | Soviet Union |
| SPA | Spain |
| USA | United States |

| | |
|---|---|
| ALB | Alberta |
| BCO | British Columbia |
| MANE | Manitoba English |
| MANF | Manitoba French |
| NBWE | New Brunswick English |
| NBWF | New Brunswick French |
| NFL | Newfoundland |
| ONTE | Ontario English |
| ONTF | Ontario French |
| QUEE | Quebec English |
| QUEF | Quebec French |
| SASE | Saskatchewan English |
| SASF | Saskatchewan French |

## Physical Geography: Item Description, IAEP Average, and Percent Correct by Population

| BLOCK/ITEM | DESCRIPTION |
|---|---|
| 2G1 2 | Use a legend and identify a desert climate |
| 2G1 3 | Locate a major mountain range on a world map |
| 2G1 7 | Identify a bay on a map |
| 2G1 10 | Identify two climatic regions on a map of Europe and Africa |
| 2G1 12 | Identify a continent on a map from its exact latitude/longitude |
| 2G2 3 | Locate a tropical zone |
| 2G2 5 | Read a temperature and rainfall chart |
| 2G2 6 | Understand that the earth's tilt influences seasons |
| 2G2 9 | Identify a peninsula on a map |

| BLOCK/ITEM | IAEP | CAN | HUN | IRE | KOR | SCO | SLO | SOV | SPA | USA |
|---|---|---|---|---|---|---|---|---|---|---|
| 2G1 2 | 77.9 | 82 | 81 | 76 | 71 | 82 | 78 | 84 | 67 | 80 |
| 2G1 3 | 61.4 | 52 | 77 | 66 | 47 | 63 | 74 | 65 | 62 | 46 |
| 2G1 7 | 52.1 | 54 | 62 | 51 | 50 | 42 | 60 | 57 | 50 | 43 |
| 2G1 10 | 62.7 | 59 | 70 | 67 | 50 | 64 | 63 | 59 | 73 | 61 |
| 2G1 12 | 56.8 | 62 | 68 | 50 | 39 | 51 | 53 | 68 | 57 | 63 |
| 2G2 3 | 67.8 | 64 | 81 | 62 | 78 | 67 | 82 | 49 | 63 | 64 |
| 2G2 5 | 48.4 | 55 | 52 | 51 | 44 | 55 | 39 | 42 | 49 | 49 |
| 2G2 6 | 63.7 | 75 | 56 | 67 | 51 | 53 | 61 | 69 | 66 | 74 |
| 2G2 9 | 48.8 | 46 | 63 | 47 | 39 | 38 | 63 | 58 | 42 | 44 |

| BLOCK/ITEM | ALB | BCO | MANE | MANF | NBWE | NBWF | NFL | ONTE | ONTF | QUEE | QUEF | SASE | SASF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2G1 2 | 89 | 90 | 83 | 75 | 77 | 65 | 80 | 82 | 69 | 82 | 81 | 89 | 80 |
| 2G1 3 | 50 | 59 | 52 | 59 | 47 | 42 | 42 | 50 | 36 | 58 | 57 | 44 | 61 |
| 2G1 7 | 60 | 63 | 53 | 58 | 47 | 45 | 45 | 54 | 48 | 54 | 53 | 51 | 57 |
| 2G1 10 | 59 | 64 | 56 | 52 | 55 | 57 | 50 | 61 | 46 | 64 | 54 | 56 | 45 |
| 2G1 12 | 61 | 65 | 58 | 61 | 50 | 5. | 42 | 61 | 58 | 64 | 66 | 59 | 67 |
| 2G2 3 | 71 | 68 | 69 | 58 | 72 | 62 | 66 | 65 | 44 | 65 | 60 | 66 | 62 |
| 2G2 5 | 53 | 60 | 56 | 49 | 53 | 43 | 49 | 59 | 48 | 58 | 49 | 54 | 54 |
| 2G2 6 | 67 | 74 | 80 | 68 | 72 | 68 | 81 | 71 | 52 | 79 | 83 | 76 | 53 |
| 2G2 9 | 50 | 56 | 57 | 48 | 37 | 46 | 46 | 44 | 38 | 55 | 47 | 47 | 41 |

## Cultural Geography: Item Description, IAEP Average, and Percent Correct by Population

| BLOCK/ITEM | DESCRIPTION |
|---|---|
| 2G1 5 | Identify a country on a map of Africa |
| 2G1 9 | Locate the Middle East on a world map |
| 2G1 11 | Identify the language group represented by a legend on a world map |
| 2G2 2 | Identify that a group of countries are made up of islands |
| 2G2 8 | Identify a country in Southeast Asia |
| 2G2 11 | Identify that symbols on a map represent population concentrations |
| 2G2 12 | Identify a major factor in changing culture of a developing country |

| BLOCK/ITEM | IAEP | CAN | HUN | IRE | KOR | SCO | SLO | SOV | SPA | USA |
|---|---|---|---|---|---|---|---|---|---|---|
| 2G1 5 | 67.6 | 56 | 79 | 63 | 61 | 53 | 85 | 73 | 77 | 62 |
| 2G1 9 | 59.1 | 63 | 66 | 64 | 45 | 58 | 64 | 44 | 60 | 66 |
| 2G1 11 | 64.0 | 76 | 61 | 65 | 63 | 60 | 45 | 53 | 80 | 74 |
| 2G2 2 | 59.7 | 55 | 66 | 42 | 84 | 42 | 71 | 58 | 65 | 54 |
| 2G2 8 | 44.5 | 39 | 46 | 41 | 49 | 41 | 62 | 39 | 40 | 44 |
| 2G2 11 | 51.9 | 62 | 59 | 40 | 51 | 44 | 66 | 50 | 47 | 48 |
| 2G2 12 | 58.4 | 56 | 77 | 52 | 68 | 56 | 58 | 57 | 43 | 58 |

| BLOCK/ITEM | ALB | BCO | MANE | MANF | NBWE | NBWF | NFL | ONTE | ONTF | QUEE | QUEF | SASE | SASF |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2G1 5 | 49 | 67 | 56 | 68 | 42 | 63 | 37 | 52 | 57 | 64 | 65 | 47 | 61 |
| 2G1 9 | 65 | 72 | 65 | 43 | 59 | 45 | 55 | 67 | 38 | 72 | 54 | 67 | 37 |
| 2G1 11 | 80 | 79 | 73 | 82 | 65 | 62 | 67 | 77 | 70 | 80 | 72 | 78 | 72 |
| 2G2 2 | 63 | 65 | 48 | 54 | 42 | 43 | 47 | 56 | 41 | 59 | 53 | 58 | 66 |
| 2G2 8 | 45 | 45 | 45 | 43 | 40 | 33 | 34 | 39 | 37 | 41 | 36 | 45 | 47 |
| 2G2 11 | 58 | 55 | 61 | 54 | 46 | 58 | 46 | 60 | 44 | 67 | 69 | 53 | 55 |
| 2G2 12 | 66 | 63 | 57 | 50 | 55 | 46 | 55 | 56 | 48 | 62 | 55 | 60 | 55 |

### Key

| | |
|---|---|
| IAEP | IAEP Average |
| CAN | Canada |
| HUN | Hungary |
| IRE | Ireland |
| KOR | Korea |
| SCO | Scotland |
| SLO | Slovenia |
| SOV | Soviet Union |
| SPA | Spain |
| USA | United States |

| | |
|---|---|
| ALB | Alberta |
| BCO | British Columbia |
| MANE | Manitoba English |
| MANF | Manitoba French |
| NBWE | New Brunswick English |
| NBWF | New Brunswick French |
| NFL | Newfoundland |
| ONTE | Ontario English |
| ONTF | Ontario French |
| QUEE | Quebec English |
| QUEF | Quebec French |
| SASE | Saskatchewan English |
| SASF | Saskatchewan French |

Bonferroni Multiple Comparisons for Countries: Overall Geography

| | Hungary | Slovenia | Canada | Soviet Union | United States | Spain | Korea | Ireland | Scotland | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hungary | ⊛ | △ | △ | △ | △ | △ | △ | △ | △ | 69.8 (0.6) |
| Slovenia | ▽ | ⊛ | ○ | ○ | △ | △ | △ | △ | △ | 35.3 (0.6) |
| Canada | ▽ | ○ | ⊛ | ○ | ○ | △ | △ | △ | △ | 63.0 (0.5) |
| Soviet Union | ▽ | ○ | ○ | ⊛ | ○ | ○ | ○ | △ | △ | 62.6 (1.1) |
| United States | ▽ | ▽ | ○ | ○ | ⊛ | ○ | ○ | △ | △ | 61.9 (0.8) |
| Spain | ▽ | ▽ | ▽ | ○ | ○ | ⊛ | ○ | ○ | ○ | 60.1 (0.7) |
| Korea | ▽ | ▽ | ▽ | ○ | ○ | ○ | ⊛ | ○ | ○ | 59.7 (0.5) |
| Ireland | ▽ | ▽ | ▽ | ▽ | ▽ | ○ | ○ | ⊛ | ○ | 58.5 (0.6) |
| Scotland | ▽ | ▽ | ▽ | ▽ | ▽ | ○ | ○ | ○ | ⊛ | 58.3 (0.6) |

Bonferroni Multiple Comparisons for Countries: Geography Skills and Tools

| | Hungary | Soviet Union | Canada | United States | Slovenia | Korea | Scotland | Ireland | Spain | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hungary | ⊛ | △ | △ | △ | △ | △ | △ | △ | △ | 76.3 (0.5) |
| Soviet Union | ▽ | ⊛ | ○ | ○ | △ | △ | △ | △ | △ | 72.2 (0.9) |
| Canada | ▽ | ○ | ⊛ | ○ | ○ | ○ | △ | △ | △ | 69.5 (0.4) |
| United States | ▽ | ○ | ○ | ⊛ | ○ | ○ | △ | △ | △ | 69.4 (0.6) |
| Slovenia | ▽ | ▽ | ○ | ○ | ⊛ | ○ | ○ | △ | △ | 67.9 (0.5) |
| Korea | ▽ | ▽ | ○ | ○ | ○ | ⊛ | ○ | △ | △ | 67.8 (0.5) |
| Scotland | ▽ | ▽ | ▽ | ▽ | ○ | ○ | ⊛ | △ | △ | 66.2 (0.5) |
| Ireland | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ⊛ | ○ | 62.7 (0.6) |
| Spain | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ○ | ⊛ | 62.4 (0.9) |

NOTE: Reading *across* from left to right this chart shows whether the average proficiency of each country is lower than, the same as, or higher than that of other participants. Average proficiencies and their standard errors are shown on the diagonal for each country.

LEGEND:

△ Overall average proficiency statistically significantly higher than comparison country.

○ No statistically significant difference from comparison country.

▽ Overall average proficiency statistically significantly lower than comparison country.

Bonferroni Multiple Comparisons for Countries: Physical Geography

| | Hungary | Slovenia | Soviet Union | Canada | Ireland | Spain | United States | Scotland | Korea | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hungary | ⊛ | △ | △ | △ | | | | | | 67.8 (0.7) |
| Slovenia | ▽ | ⊛ | ○ | ○ | | | | | | 63.6 (0.7) |
| Soviet Union | ▽ | ○ | ⊛ | ○ | ○ | ○ | ○ | | | 61.2 (1.0) |
| Canada | ▽ | ○ | ○ | ⊛ | ○ | ○ | ○ | | | 61.0 (0.6) |
| Ireland | ▽ | ▽ | ○ | ○ | ⊛ | ○ | ○ | ○ | | 59.5 (0.8) |
| Spain | ▽ | ▽ | ○ | ○ | ○ | ⊛ | ○ | ○ | △ | 58.9 (0.7) |
| United States | ▽ | ▽ | ○ | ○ | ○ | ○ | ⊛ | ○ | △ | 58.3 (1.0) |
| Scotland | ▽ | ▽ | ▽ | ▽ | ○ | ○ | ○ | ⊛ | △ | 57.1 (0.8) |
| Korea | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ⊛ | 52.1 (0.7) |

Bonferroni Multiple Comparisons for Countries: Cultural Geography

| | Hungary | Slovenia | Korea | Spain | Canada | United States | Soviet Union | Ireland | Scotland | |
|---|---|---|---|---|---|---|---|---|---|---|
| Hungary | ⊛ | ○ | △ | △ | △ | △ | △ | △ | △ | 65.0 (0.7) |
| Slovenia | ○ | ⊛ | △ | △ | △ | △ | △ | △ | △ | 64.3 (0.9) |
| Korea | ▽ | ▽ | ⊛ | ○ | ○ | ○ | △ | △ | △ | 60.3 (0.6) |
| Spain | ▽ | ▽ | ○ | ⊛ | ○ | ○ | ○ | △ | △ | 58.9 (1.1) |
| Canada | ▽ | ▽ | ○ | ○ | ⊛ | ○ | ○ | △ | △ | 58.2 (0.6) |
| United States | ▽ | ▽ | ○ | ○ | ○ | ⊛ | ○ | △ | △ | 58.1 (1.0) |
| Soviet Union | ▽ | ▽ | ▽ | ○ | ○ | ○ | ⊛ | ○ | ○ | 53.4 (1.8) |
| Ireland | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ○ | ⊛ | ○ | 52.3 (0.8) |
| Scotland | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ○ | ○ | ⊛ | 50.6 (0.8) |

NOTE: Reading *across* from left to right this chart shows whether the average proficiency of each country is lower than, the same as, or higher than that of other participants. Average proficiencies and their standard errors are shown on the diagonal for each country.

LEGEND:

△ Overall average proficiency statistically significantly higher than comparison country.

○ No statistically significant difference from comparison country.

▽ Overall average proficiency statistically significantly lower than comparison country.

Bonferroni Multiple Comparisons for Canadian Populations: Overall Geography

| | British Columbia | English Quebec | Alberta | French Quebec | English Saskatchewan | English Manitoba | English Ontario | French Saskatchewan | French Manitoba | Newfoundland | English New Brunswick | French New Brunswick | French Ontario | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| British Columbia | ⊛ | o | o | Δ | Δ | Δ | Δ | Δ | Δ | Δ | Δ | Δ | Δ | 67.3 (0.5) |
| English Quebec | o | ⊛ | o | o | Δ | Δ | Δ | Δ | Δ | Δ | Δ | Δ | Δ | 66.6 (0.6) |
| Alberta | o | o | ⊛ | o | o | o | o | o | Δ | Δ | Δ | Δ | Δ | 64.9 (0.5) |
| French Quebec | ∇ | o | o | ⊛ | o | o | o | o | o | Δ | Δ | Δ | Δ | 63.7 (0.8) |
| English Saskatchewan | ∇ | ∇ | o | o | ⊛ | o | o | o | o | Δ | Δ | Δ | Δ | 63.3 (0.5) |
| English Manitoba | ∇ | ∇ | o | o | o | ⊛ | o | o | o | Δ | Δ | Δ | Δ | 63.0 (0.6) |
| English Ontario | ∇ | ∇ | o | o | o | o | ⊛ | o | o | Δ | Δ | Δ | Δ | 62.4 (0.6) |
| French Saskatchewan | ∇ | ∇ | o | o | o | o | o | ⊛ | o | Δ | Δ | Δ | Δ | 61.1 (1.0) |
| French Manitoba | ∇ | ∇ | ∇ | o | o | o | o | o | ⊛ | Δ | Δ | Δ | Δ | 60.7 (0.6) |
| Newfoundland | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ⊛ | o | o | Δ | 57.0 (0.5) |
| English New Brunswick | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | o | ⊛ | o | Δ | 56.6 (0.4) |
| French New Brunswick | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | o | o | ⊛ | Δ | 55.1 (0.3) |
| French Ontario | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ⊛ | 52.3 (0.6) |

Bonferroni Multiple Comparisons for Canadian Populations: Geography Skills and Tools

| | English Quebec | French Quebec | Alberta | British Columbia | English Saskatchewan | French Saskatchewan | English Manitoba | English Ontario | French Manitoba | Newfoundland | English New Brunswick | French New Brunswick | French Ontario | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| English Quebec | ⊛ | o | o | o | o | o | Δ | Δ | Δ | Δ | Δ | Δ | Δ | 72.0 (0.6) |
| French Quebec | o | ⊛ | o | o | o | o | Δ | Δ | Δ | Δ | Δ | Δ | Δ | 71.8 (0.8) |
| Alberta | o | o | ⊛ | o | o | o | Δ | Δ | Δ | Δ | Δ | Δ | Δ | 71.4 (0.5) |
| British Columbia | o | o | o | ⊛ | o | o | Δ | Δ | Δ | Δ | Δ | Δ | Δ | 71.4 (0.5) |
| English Saskatchewan | o | o | o | o | ⊛ | o | Δ | Δ | Δ | Δ | Δ | Δ | Δ | 71.3 (0.7) |
| French Saskatchewan | o | o | o | o | o | ⊛ | o | o | o | o | Δ | Δ | Δ | 69.3 (1.1) |
| English Manitoba | ∇ | ∇ | ∇ | ∇ | ∇ | o | ⊛ | o | o | o | Δ | Δ | Δ | 68.0 (0.5) |
| English Ontario | ∇ | ∇ | ∇ | ∇ | ∇ | o | o | ⊛ | o | o | Δ | Δ | Δ | 68.0 (0.6) |
| French Manitoba | ∇ | ∇ | ∇ | ∇ | ∇ | o | o | o | ⊛ | o | Δ | Δ | Δ | 67.0 (0.7) |
| Newfoundland | ∇ | ∇ | ∇ | ∇ | ∇ | o | o | o | o | ⊛ | Δ | Δ | Δ | 65.4 (0.6) |
| English New Brunswick | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ⊛ | o | o | 62.5 (0.5) |
| French New Brunswick | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | o | ⊛ | o | 60.4 (0.4) |
| French Ontario | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | ∇ | o | o | ⊛ | 60.4 (0.7) |

NOTE: Reading *across* from left to right this chart shows whether the average proficiency of each country is lower than, the same as, or higher than that of other participants. Average proficiencies and their standard errors are shown on the diagonal for each country.

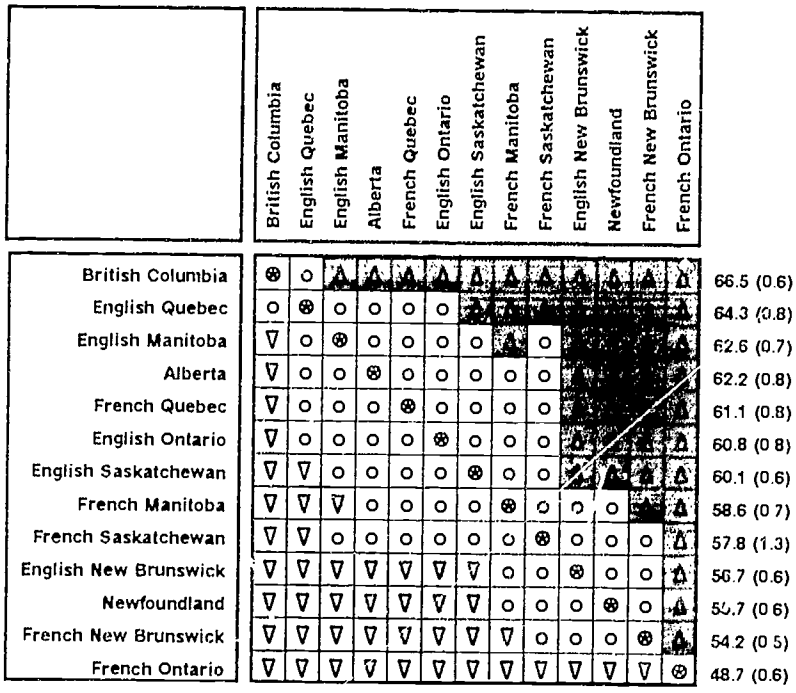
LEGEND:

[Δ] Overall average proficiency statistically significantly higher than comparison country.

[o] No statistically significant difference from comparison country.

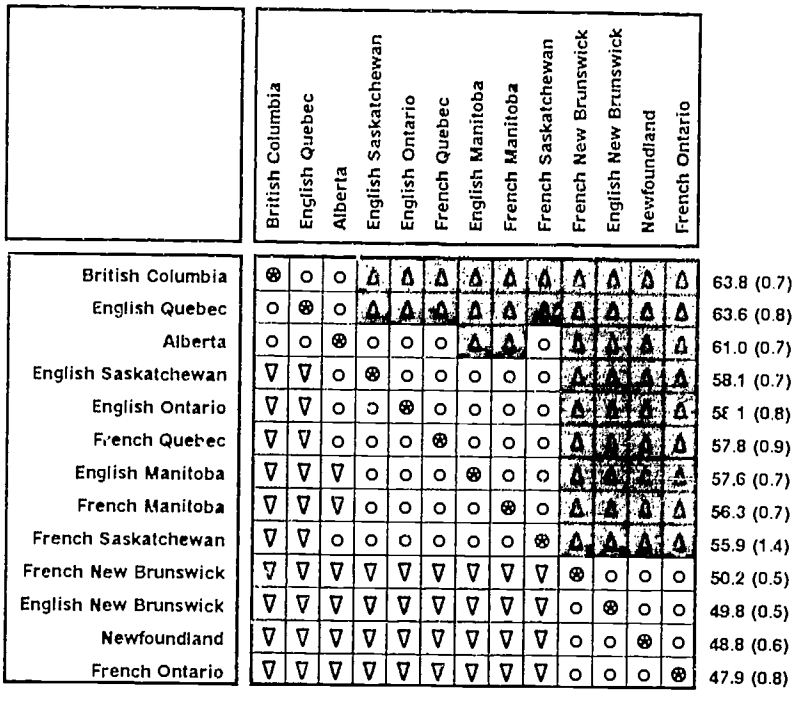
[∇] Overall average proficiency statistically significantly lower than comparison country.

Bonferroni Multiple Comparisons for Canadian Populations: Physical Geography



| | British Columbia | English Quebec | English Manitoba | Alberta | French Quebec | English Ontario | English Saskatchewan | French Manitoba | French Saskatchewan | English New Brunswick | Newfoundland | French New Brunswick | French Ontario | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| British Columbia | ⊛ | ○ | △ | △ | △ | △ | △ | △ | △ | △ | △ | △ | △ | 66.5 (0.6) |
| English Quebec | ○ | ⊛ | ○ | ○ | ○ | ○ | △ | △ | △ | △ | △ | △ | △ | 64.3 (0.8) |
| English Manitoba | ▽ | ○ | ⊛ | ○ | ○ | ○ | ○ | △ | ○ | △ | △ | △ | △ | 62.6 (0.7) |
| Alberta | ▽ | ○ | ○ | ⊛ | ○ | ○ | ○ | ○ | ○ | △ | △ | △ | △ | 62.2 (0.8) |
| French Quebec | ▽ | ○ | ○ | ○ | ⊛ | ○ | ○ | ○ | ○ | △ | △ | △ | △ | 61.1 (0.8) |
| English Ontario | ▽ | ○ | ○ | ○ | ○ | ⊛ | ○ | ○ | ○ | △ | △ | △ | △ | 60.8 (0.8) |
| English Saskatchewan | ▽ | ▽ | ○ | ○ | ○ | ○ | ⊛ | ○ | ○ | △ | △ | △ | △ | 60.1 (0.6) |
| French Manitoba | ▽ | ▽ | ▽ | ○ | ○ | ○ | ○ | ⊛ | ○ | ○ | ○ | △ | △ | 58.6 (0.7) |
| French Saskatchewan | ▽ | ▽ | ○ | ○ | ○ | ○ | ○ | ○ | ⊛ | ○ | ○ | ○ | △ | 57.8 (1.3) |
| English New Brunswick | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ○ | ○ | ⊛ | ○ | ○ | △ | 56.7 (0.6) |
| Newfoundland | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ○ | ○ | ○ | ⊛ | ○ | △ | 56.7 (0.6) |
| French New Brunswick | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ○ | ○ | ○ | ⊛ | △ | 54.2 (0.5) |
| French Ontario | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ⊛ | 48.7 (0.6) |

Bonferroni Multiple Comparisons for Canadian Populations: Cultural Geography



| | British Columbia | English Quebec | Alberta | English Saskatchewan | English Ontario | French Quebec | English Manitoba | French Manitoba | French Saskatchewan | French New Brunswick | English New Brunswick | Newfoundland | French Ontario | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| British Columbia | ⊛ | ○ | ○ | △ | △ | △ | △ | △ | △ | △ | △ | △ | △ | 63.8 (0.7) |
| English Quebec | ○ | ⊛ | ○ | △ | △ | △ | △ | △ | △ | △ | △ | △ | △ | 63.6 (0.8) |
| Alberta | ○ | ○ | ⊛ | ○ | ○ | ○ | △ | △ | ○ | △ | △ | △ | △ | 61.0 (0.7) |
| English Saskatchewan | ▽ | ▽ | ○ | ⊛ | ○ | ○ | ○ | ○ | ○ | △ | △ | △ | △ | 58.1 (0.7) |
| English Ontario | ▽ | ▽ | ○ | ○ | ⊛ | ○ | ○ | ○ | ○ | △ | △ | △ | △ | 58.1 (0.8) |
| French Quebec | ▽ | ▽ | ○ | ○ | ○ | ⊛ | ○ | ○ | ○ | △ | △ | △ | △ | 57.8 (0.9) |
| English Manitoba | ▽ | ▽ | ▽ | ○ | ○ | ○ | ⊛ | ○ | ○ | △ | △ | △ | △ | 57.6 (0.7) |
| French Manitoba | ▽ | ▽ | ▽ | ○ | ○ | ○ | ○ | ⊛ | ○ | △ | △ | △ | △ | 56.3 (0.7) |
| French Saskatchewan | ▽ | ▽ | ○ | ○ | ○ | ○ | ○ | ○ | ⊛ | △ | △ | △ | △ | 55.9 (1.4) |
| French New Brunswick | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ⊛ | ○ | ○ | ○ | 50.2 (0.5) |
| English New Brunswick | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ○ | ⊛ | ○ | ○ | 49.8 (0.5) |
| Newfoundland | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ○ | ○ | ⊛ | ○ | 48.8 (0.6) |
| French Ontario | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ▽ | ○ | ○ | ○ | ⊛ | 47.9 (0.8) |

NOTE: Reading *across* from left to right this chart shows whether the average proficiency of each country is lower than, the same as, or higher than that of other participants. Average proficiencies and their standard errors are shown on the diagonal for each country.

LEGEND:

△ Overall average proficiency statistically significantly higher than comparison country.

○ No statistically significant difference from comparison country.

▽ Overall average proficiency statistically significantly lower than comparison country.

**Canadian Populations -- Numbers of Brothers and Sisters: Percentage Reporting and Average Percent Correct (With Standard Errors)**

| Populations | | NONE | ONE | TWO | THREE | FOUR | FIVE | SIX/MORE |
|---|---|---|---|---|---|---|---|---|
| Alberta | % | 5(0.4) | 40(1.2) | 31(0.8) | 14(0.7) | 6(0.5) | 3(0.4) | 2(0.3) |
| | P | 62(2.0) | 66(0.8) | 66(0.8) | 63(1.1) | 63(2.0) | 62(2.3) | 61(2.7) |
| British Columbia | % | 7(0.4) | 42(1.1) | 30(0.9) | 12(0.7) | 5(0.4) | 2(0.4) | 2(0.3) |
| | P | 70(1.7) | 68(0.6) | 67(0.8) | 67(1.1) | 66(2.2) | 63(2.5) | 58(2.4) |
| Manitoba-English | % | 6(0.5) | 38(1.1) | 32(1.0) | 13(0.7) | 4(0.4) | 2(0.3) | 4(0.5) |
| | P | 63(1.4) | 64(0.7) | 64(0.7) | 61(1.3) | 61(1.6) | 54(2.5) | 54(2.0) |
| Manitoba-French | % | 6(0.6) | 40(1.4) | 32(1.3) | 13(1.0) | 5(0.5) | 2(0.4) | 2(0.4) |
| | P | 65(3.0) | 62(0.8) | 59(1.0) | 60(1.5) | 60(2.5) | 59(3.7) | 58(4.7) |
| New Brunswick-English | % | 7(0.5) | 39(1.0) | 31(0.9) | 13(0.6) | 5(0.4) | 2(0.3) | 3(0.2) |
| | P | 57(1.6) | 58(0.5) | 57(0.7) | 57(1.0) | 55(1.3) | 53(2.0) | 47(1.9) |
| New Brunswick-French | % | 8(0.5) | 47(0.8) | 28(0.7) | 10(0.5) | 4(0.3) | 1(0.2) | 2(0.2) |
| | P | 54(1.2) | 56(0.5) | 56(0.7) | 54(1.1) | 53(2.0) | 51(2.4) | 46(2.4) |
| Newfoundland | % | 6(0.6) | 37(1.0) | 32(0.9) | 13(0.5) | 6(0.5) | 3(0.3) | 3(0.3) |
| | P | 59(1.4) | 59(0.6) | 57(0.7) | 56(1.1) | 53(1.6) | 52(2.2) | 48(2.0) |
| Ontario-English | % | 7(0.6) | 43(1.2) | 30(0.9) | 12(0.6) | 4(0.4) | 2(0.3) | 3(0.4) |
| | P | 65(1.6) | 63(0.8) | 63(0.8) | 61(1.3) | 59(1.9) | 56(2.8) | 56(2.1) |
| Ontario-French | % | 7(0.5) | 45(1.0) | 30(0.9) | 12(0.7) | 3(0.3) | 1(0.2) | 1(0.3) |
| | P | 51(1.7) | 53(0.7) | 53(0.9) | 51(1.3) | 51(2.3) | 51(2.8) | 43(2.8) |
| Quebec-English | % | 8(0.5) | 41(0.9) | 31(1.1) | 12(0.7) | 5(0.6) | 2(0.2) | 2(0.6) |
| | P | 67(1.3) | 69(0.7) | 66(0.9) | 66(1.4) | 60(4.0) | 62(3.2) | 59(2.9) |
| Quebec-French | % | 10(0.5) | 45(1.2) | 30(0.8) | 10(0.5) | 3(0.3) | 1(0.2) | 1(0.2) |
| | P | 64(1.5) | 65(0.8) | 63(0.9) | 61(1.5) | 59(2.0) | 59(3.8) | 64(4.8) |
| Saskatchewan-English | % | 4(0.4) | 35(1.1) | 34(0.7) | 18(0.8) | 5(0.4) | 3(0.3) | 3(0.3) |
| | P | 68(1.3) | 64(0.7) | 64(0.8) | 62(1.0) | 59(1.5) | 60(2.2) | 53(2.3) |
| Saskatchewan-French | % | 6(1.1) | 38(2.2) | 31(1.8) | 15(1.9) | 5(1.0) | 2(0.7) | 4(0.7) |
| | P | 61(4.3) | 63(1.6) | 63(1.8) | 55(2.5) | 55(4.2) | 61(6.0) | 58(3.7) |

**Canadian Populations -- Number of Books at Home: Percentage Reporting and Average Percent Correct (With Standard Errors)**

| Populations | | 0-10 | 11-24 | 25-100 | >100 |
|---|---|---|---|---|---|
| Alberta | % | 2(0.3) | 8(0.6) | 35(1.2) | 55(1.3) |
| | P | 49(2.9) | 59(1.4) | 63(0.7) | 68(0.6) |
| British Columbia | % | 3(0.5) | 7(0.5) | 34(1.1) | 57(1.4) |
| | P | 54(2.6) | 60(1.5) | 66(0.6) | 70(0.6) |
| Manitoba-English | % | 4(0.5) | 8(0.6) | 37(0.9) | 51(1.3) |
| | P | 51(1.8) | 56(1.3) | 62(0.6) | 66(0.6) |
| Manitoba-French | % | 2(0.4) | 12(1.0) | 47(1.5) | 38(1.2) |
| | P | 51(3.5) | 54(1.5) | 60(0.8) | 65(1.0) |
| New Brunswick-English | % | 3(0.4) | 10(0.4) | 38(0.8) | 48(0.9) |
| | P | 44(1.4) | 47(1.0) | 56(0.6) | 60(0.5) |
| New Brunswick-French | % | 9(0.4) | 22(0.8) | 45(0.8) | 24(0.8) |
| | P | 46(1.1) | 50(0.8) | 56(0.5) | 62(0.7) |
| Newfoundland | % | 5(0.5) | 12(0.6) | 39(0.8) | 44(1.1) |
| | P | 44(1.4) | 49(1.1) | 55(0.6) | 62(0.6) |
| Ontario-English | % | 2(0.4) | 8(0.5) | 36(1.1) | 54(1.4) |
| | P | 48(2.2) | 55(1.2) | 61(0.7) | 65(0.7) |
| Ontario-French | % | 5(0.4) | 21(0.8) | 45(0.8) | 28(0.9) |
| | P | 42(1.3) | 47(0.9) | 53(0.7) | 57(0.9) |
| Quebec-English | % | 2(0.7) | 6(0.5) | 31(1.1) | 61(1.1) |
| | P | 48(4.6) | 58(1.6) | 64(0.7) | 70(0.7) |
| Quebec-French | % | 4(0.5) | 15(0.9) | 50(1.1) | 30(1.5) |
| | P | 54(2.6) | 57(1.1) | 64(0.8) | 68(0.9) |
| Saskatchewan-English | % | 3(0.3) | 10(0.6) | 37(0.8) | 51(1.1) |
| | P | 50(2.0) | 55(1.3) | 61(0.6) | 67(0.6) |
| Saskatchewan-French | % | 0(0.3) | 13(1.5) | 51(2.4) | 36(2.3) |
| | P | 59(***) | 54(2.6) | 60(1.3) | 65(1.5) |

% Percentage of students
P Average percent correct
*** Jackknifed standard error greater than 9.9.

**Canadian Populations -- How Often Student Reads For Fun: Percentage Reporting and Average Percent Correct (With Standard Errors)**

| Populations | | EVR/DAY | 1-2/WEEK | 1-2/MTH | NEVER |
|---|---|---|---|---|---|
| Alberta | % | 39(1.2) | 30(1.1) | 14(0.7) | 18(0.8) |
| | P | 67(0.9) | 64(0.8) | 65(1.1) | 61(1.0) |
| British Columbia | % | 39(1.0) | 29(0.9) | 15(0.6) | 17(0.7) |
| | P | 70(0.8) | 67(0.6) | 68(1.0) | 61(0.9) |
| Manitoba-English | % | 36(1.1) | 28(0.7) | 15(0.7) | 21(0.8) |
| | P | 66(0.8) | 63(0.9) | 63(1.0) | 58(0.9) |
| Manitoba-French | % | 43(1.3) | 32(1.3) | 12(1.0) | 12(0.8) |
| | P | 64(0.8) | 59(0.9) | 60(1.7) | 55(1.7) |
| New Brunswick-English | % | 37(0.8) | 25(0.8) | 15(0.5) | 22(0.7) |
| | P | 60(0.6) | 56(0.7) | 56(1.0) | 52(0.8) |
| New Brunswick-French | % | 29(0.9) | 36(0.9) | 16(0.6) | 19(0.7) |
| | P | 60(0.6) | 55(0.6) | 54(0.9) | 50(0.7) |
| Newfoundland | % | 38(1.0) | 29(0.8) | 16(0.7) | 18(0.7) |
| | P | 59(0.6) | 57(0.6) | 56(0.9) | 53(0.9) |
| Ontario-English | % | 39(1.1) | 30(0.9) | 16(0.7) | 16(0.8) |
| | P | 60(0.8) | 62(0.8) | 61(1.1) | 57(1.0) |
| Ontario-French | % | 34(1.1) | 33(1.1) | 17(0.8) | 16(0.8) |
| | P | 57(0.8) | 52(0.8) | 51(1.1) | 47(1.0) |
| Quebec-English | % | 38(1.1) | 33(1.1) | 14(0.8) | 14(0.8) |
| | P | 69(0.7) | 65(1.2) | 67(1.0) | 63(1.0) |
| Quebec-French | % | 32(0.8) | 36(0.9) | 17(0.8) | 14(0.7) |
| | P | 68(1.0) | 63(0.9) | 62(1.2) | 59(1.3) |
| Saskatchewan-English | % | 38(1.1) | 27(0.8) | 16(0.7) | 19(0.7) |
| | P | 67(0.6) | 63(0.8) | 62(1.0) | 59(1.0) |
| Saskatchewan-French | % | 45(2.6) | 29(2.2) | 15(1.8) | 11(1.4) |
| | P | 63(1.5) | 60(1.6) | 62(2.6) | 55(3.1) |

**Canadian Populations -- Time Spent Each Day On Homework: Percentage Reporting and Average Percent Correct (With Standard Errors)**

| Populations | | NO HMWK | .5HR/LES | 1HR | 2HRS | >2HRS |
|---|---|---|---|---|---|---|
| Alberta | % | 10(0.8) | 24(0.9) | 45(1.1) | 15(0.7) | 5(0.5) |
| | P | 68(1.6) | 65(0.9) | 65(0.6) | 64(1.0) | 62(1.5) |
| British Columbia | % | 9(0.6) | 21(1.1) | 43(1.2) | 19(1.0) | 7(0.7) |
| | P | 68(1.2) | 69(1.0) | 67(0.6) | 65(1.0) | 68(1.1) |
| Manitoba-English | % | 17(1.0) | 29(1.0) | 36(1.0) | 13(0.7) | 5(0.5) |
| | P | 64(1.1) | 65(0.9) | 62(0.6) | 60(1.1) | 59(1.7) |
| Manitoba-French | % | 10(0.7) | 28(1.1) | 42(1.2) | 15(1.0) | 6(0.6) |
| | P | 68(2.0) | 63(1.2) | 60(0.8) | 57(1.2) | 53(2.5) |
| New Brunswick-English | % | 9(0.5) | 30(0.8) | 43(1.0) | 14(0.6) | 4(0.4) |
| | P | 57(1.1) | 58(0.7) | 57(0.6) | 54(1.0) | 53(2.4) |
| New Brunswick-French | % | 8(0.5) | 28(0.8) | 45(0.9) | 14(0.6) | 4(0.4) |
| | P | 58(1.3) | 57(0.6) | 55(0.6) | 52(1.0) | 53(1.9) |
| Newfoundland | % | 6(0.8) | 20(1.0) | 47(1.1) | 20(0.9) | 8(0.6) |
| | P | 59(1.7) | 59(1.0) | 57(0.5) | 56(0.7) | 50(1.7) |
| Ontario-English | % | 10(1.0) | 20(0.8) | 42(1.2) | 19(0.9) | 8(0.8) |
| | P | 66(1.2) | 64(0.8) | 63(0.7) | 61(1.2) | 57(1.3) |
| Ontario-French | % | 10(0.8) | 24(1.1) | 43(1.0) | 16(0.9) | 6(0.6) |
| | P | 52(1.5) | 53(0.8) | 53(0.8) | 52(1.1) | 51(1.2) |
| Quebec-English | % | 5(0.9) | 18(0.9) | 43(1.4) | 24(1.1) | 10(0.7) |
| | P | 67(2.0) | 69(1.2) | 66(0.8) | 67(0.9) | 66(1.6) |
| Quebec-French | % | 4(0.6) | 22(1.2) | 47(1.3) | 20(1.3) | 7(0.6) |
| | P | 63(2.3) | 65(0.9) | 63(0.9) | 65(1.1) | 60(1.5) |
| Saskatchewan-English | % | 21(1.2) | 27(0.8) | 38(0.9) | 10(0.7) | 3(0.3) |
| | P | 67(1.1) | 64(0.8) | 62(0.6) | 61(1.3) | 55(2.2) |
| Saskatchewan-French | % | 12(1.3) | 30(2.1) | 42(1.9) | 13(1.6) | 3(0.9) |
| | P | 63(2.3) | 61(1.9) | 61(1.4) | 62(2.8) | 60(6.8) |

% Percentage of students
P Average percent correct

**Canadian Populations -- Time Spent Each Day Watching Television: Percentage Reporting and Average Percent Correct (With Standard Errors)**

| Populations | | NONE | 1HR/LESS | 2HRS | 3HRS | 4HRS | 5HRS | 6HR/MORE |
|---|---|---|---|---|---|---|---|---|
| Alberta | % | 2(0.3) | 15(1.0) | 29(0.9) | 25(0.9) | 15(0.8) | 7(0.5) | 6(0.5) |
| | P | 69(2.3) | 67(1.1) | 66(0.7) | 65(1.0) | 64(1.0) | 62(1.4) | 59(1.4) |
| British Columbia | % | 5(0.8) | 18(0.8) | 28(0.8) | 23(0.9) | 13(0.6) | 6(0.4) | 7(0.6) |
| | P | 69(1.7) | 70(0.9) | 70(0.8) | 67(0.8) | 65(1.2) | 66(1.4) | 61(1.6) |
| Manitoba-English | % | 2(0.3) | 13(0.8) | 25(0.9) | 25(0.7) | 17(0.7) | 8(0.6) | 10(0.7) |
| | P | 59(2.9) | 64(1.2) | 65(0.6) | 64(0.8) | 63(1.0) | 62(1.3) | 56(1.3) |
| Manitoba-French | % | 2(0.4) | 15(1.0) | 31(1.3) | 23(1.2) | 14(0.9) | 8(0.6) | 6(0.6) |
| | P | 65(3.9) | 64(1.4) | 62(1.0) | 60(1.0) | 57(1.7) | 63(2.1) | 51(2.1) |
| New Brunswick-English | % | 2(0.2) | 11(0.6) | 23(0.8) | 26(0.7) | 18(0.7) | 10(0.5) | 10(0.5) |
| | P | 49(2.4) | 59(1.2) | 58(0.7) | 59(0.8) | 57(0.7) | 54(0.9) | 50(1.1) |
| New Brunswick-French | % | 1(0.2) | 12(0.6) | 26(0.8) | 27(0.7) | 18(0.7) | 7(0.5) | 8(0.5) |
| | P | 58(2.7) | 57(1.0) | 57(0.7) | 56(0.7) | 55(1.0) | 51(1.2) | 48(1.3) |
| Newfoundland | % | 1(0.2) | 9(0.4) | 21(0.9) | 27(0.8) | 20(0.7) | 11(0.6) | 12(0.6) |
| | P | 51(3.3) | 57(1.5) | 59(0.8) | 57(0.7) | 57(0.9) | 57(1.1) | 52(1.1) |
| Ontario-English | % | 3(0.5) | 14(0.8) | 27(0.9) | 24(0.7) | 15(0.7) | 9(0.6) | 8(0.5) |
| | P | 64(3.0) | 65(1.4) | 63(0.7) | 62(0.9) | 63(0.9) | 61(1.5) | 56(1.5) |
| Ontario-French | % | 1(0.2) | 13(0.7) | 26(1.0) | 24(0.9) | 17(0.7) | 9(0.6) | 9(0.7) |
| | P | 63(3.4) | 55(1.2) | 53(0.9) | 52(0.9) | 52(1.0) | 51(1.3) | 47(1.3) |
| Quebec-English | % | 4(0.6) | 18(1.2) | 25(1.0) | 24(1.0) | 14(0.8) | 8(0.6) | 6(0.5) |
| | P | 67(2.0) | 70(1.2) | 69(0.9) | 65(1.3) | 64(1.1) | 64(1.0) | 60(1.5) |
| Quebec-French | % | 2(0.4) | 17(1.0) | 30(0.9) | 25(0.9) | 15(0.7) | 6(0.4) | 5(0.5) |
| | P | 67(2.7) | 65(1.5) | 65(1.0) | 63(0.8) | 61(0.9) | 64(1.3) | 59(1.9) |
| Saskatchewan-English | % | 2(0.3) | 13(0.7) | 27(0.6) | 27(0.7) | 17(0.6) | 8(0.5) | 7(0.5) |
| | P | 64(3.9) | 64(1.1) | 65(0.7) | 63(0.9) | 63(1.0) | 62(1.3) | 57(1.4) |
| Saskatchewan-French | % | 3(0.8) | 19(2.1) | 37(2.3) | 21(2.0) | 10(1.3) | 5(1.1) | 5(1.1) |
| | P | 61(5.5) | 64(2.1) | 60(1.5) | 61(2.4) | 60(2.8) | 58(4.3) | 59(4.6) |

**Canadian Populations -- Percentage Reporting and Average Percent Correct (With Standard Errors)**

| | | Taking Geography This Year | | Took Geography in Past | |
|---|---|---|---|---|---|
| Populations | | YES | NO | YES | N |
| Alberta | % | 23(1.0) | 77(1.0) | 67(1.2) | 33(1.2) |
| | P | 64(1.0) | 65(0.5) | 65(0.5) | 64(0.8) |
| British Columbia | % | 10(0.8) | 90(0.8) | 56(1.1) | 44(1.1) |
| | P | 63(1.4) | 68(0.5) | 67(0.6) | 68(0.7) |
| Manitoba-English | % | 21(1.1) | 79(1.1) | 78(1.2) | 22(1.2) |
| | P | 62(0.8) | 63(0.7) | 65(0.5) | 57(1.0) |
| Manitoba-French | % | 40(1.2) | 60(1.2) | 90(0.7) | 10(0.7) |
| | P | 57(0.9) | 63(0.8) | 62(0.6) | 50(1.6) |
| New Brunswick-English | % | 14(0.6) | 86(0.6) | 57(0.8) | 43(0.8) |
| | P | 56(1.1) | 57(0.4) | 59(0.5) | 54(0.5) |
| New Brunswick-French | % | 39(0.7) | 61(0.7) | 91(0.5) | 9(0.5) |
| | P | 49(0.6) | 59(0.5) | 56(0.3) | 43(1.1) |
| Newfoundland | % | 28(1.1) | 72(1.1) | 78(1.1) | 22(1.1) |
| | P | 57(0.7) | 57(0.5) | 57(0.5) | 58(0.8) |
| Ontario-English | % | 56(1.6) | 44(1.6) | 90(0.7) | 10(0.7) |
| | P | 64(0.8) | 60(0.7) | 63(0.6) | 56(1.7) |
| Ontario-French | % | 98(0.4) | 2(0.4) | 96(0.4) | 4(0.4) |
| | P | 53(0.6) | 43(2.9) | 53(0.6) | 43(1.4) |
| Quebec-English | % | 23(1.5) | 77(1.5) | 89(0.7) | 11(0.7) |
| | P | 67(1.6) | 67(0.5) | 68(0.6) | 59(1.3) |
| Quebec-French | % | 40(1.6) | 60(1.6) | 89(0.7) | 11(0.7) |
| | P | 59(1.0) | 67(0.8) | 65(0.7) | 55(1.3) |
| Saskatchewan-English | % | 10(0.8) | 90(0.8) | 56(1.1) | 44(1.1) |
| | P | 59(1.4) | 64(0.5) | 65(0.6) | 61(0.8) |
| Saskatchewan-French | % | 33(2.2) | 67(2.2) | 81(1.9) | 19(1.9) |
| | P | 59(1.6) | 62(1.3) | 62(1.1) | 57(2.4) |

% Percentage of students
P Average percent correct

**Canadian Populations -- Number of Topics Studied: Percentage Reporting and Average Percent Correct (With Standard Errors)**

| Populations | | 6-7 Topics | 4-5 Topics | 0-3 Topics |
|---|---|---|---|---|
| Alberta | % | 79(1.3) | 17(1.1) | 4(0.4) |
| | P | 67(0.5) | 58(1.1) | 53(1.9) |
| British Columbia | % | 70(1.4) | 23(1.0) | 8(0.6) |
| | P | 70(0.6) | 63(0.7) | 57(1.6) |
| Manitoba-English | % | 75(1.1) | 19(0.9) | 7(0.5) |
| | P | 66(0.5) | 56(1.0) | 54(1.4) |
| Manitoba-French | % | 65(1.3) | 26(1.3) | 9(0.8) |
| | P | 64(0.8) | 56(1.1) | 51(1.6) |
| New Brunswick-English | % | 48(0.8) | 34(0.7) | 18(0.7) |
| | P | 60(0.5) | 55(0.6) | 52(0.8) |
| New Brunswick-French | % | 68(0.9) | 21(0.7) | 11(0.6) |
| | P | 58(0.4) | 50(0.7) | 50(1.0) |
| Newfoundland | % | 80(0.8) | 15(0.7) | 5(0.4) |
| | P | 59(0.5) | 50(0.9) | 50(1.8) |
| Ontario-English | % | 76(1.4) | 17(1.0) | 6(0.6) |
| | P | 64(0.6) | 58(0.8) | 57(1.5) |
| Ontario-French | % | 69(1.2) | 23(0.9) | 8(0.7) |
| | P | 55(0.6) | 48(0.9) | 46(1.6) |
| Quebec-English | % | 76(1.3) | 18(1.0) | 5(0.7) |
| | P | 69(0.7) | 60(1.4) | 60(2.0) |
| Quebec-French | % | 75(1.0) | 19(0.8) | 7(0.7) |
| | P | 66(0.8) | 60(1.3) | 55(1.8) |
| Saskatchewan-English | % | 79(1.0) | 15(0.8) | 6(0.4) |
| | P | 65(0.6) | 57(1.0) | 52(1.4) |
| Saskatchewan-French | % | 68(2.1) | 23(2.1) | 10(1.3) |
| | P | 64(1.1) | 54(2.0) | 55(3.5) |

% Percentage of students
P Average percent correct

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