INTRODUCTION

1

TIMSS 1999 International Science Report

In 1999, The Third International Mathematics and Science Study (TIMSS) was replicated at the eighth grade. Thirty-eight countries participated in this mathematics and science assessment, known as TIMSS-R or TIMSS 1999. The science results are presented in this report for the 38 countries that participated in TIMSS in 1999. Trend data also are included for 26 countries that participated in TIMSS in 1995.

What Is TIMSS?

Originally conducted in 1994-1995, the Third International Mathematics and Science Study (TIMSS) was the largest and most comprehensive comparative international study of education ever undertaken. Designed to provide a base from which policy makers, curriculum specialists, and researchers could better understand the performance of their educational systems, TIMSS compared the mathematics and science achievement of students in 41 countries at five grade levels. Using questionnaires, videotapes, and analyses of curriculum materials, TIMSS also investigated the contexts for learning mathematics and science in the participating countries. Information was collected about educational systems, curriculum, teacher and school characteristics, and instructional practices, providing an extremely rich source of valuable insights into science teaching and learning.

TIMSS results, which were first reported in 1996, have stirred debate, spurred reform efforts, and provided important information to academics, researchers, and decision makers around the world.[1] Since that time most of the participating countries have published one or more national reports, analyzing the findings from their own perspective. In addition, at least 12 book-length international reports have been published, along with hundreds of articles and comments in newsletters, newspapers, and magazines.

What Is TIMSS 1999?

TIMSS was the first step in a long-term strategy, with further assessments in mathematics and science planned for 1999, 2003, and beyond. TIMSS 1999, also known as TIMSS-Repeat or TIMSS-R, is a replication of TIMSS at the lower-secondary or middle-school level – the eighth grade in most countries. As a follow-up to the earlier study, TIMSS 1999 adds to the richness of the TIMSS data and their potential to have an impact on policy and practice.

Administered during the 1998-99 school year, TIMSS 1999 was designed to provide trends in eighth-grade mathematics and science achievement in an international context. Also, 1999 represents four years since the first TIMSS, and the population of students originally assessed as fourth-graders had advanced to the eighth grade. Thus, TIMSS 1999

[1] Robitaille, D.F., Beaton, A.E., and Plomp, T., eds. (2000), *The Impact of TIMSS on the Teaching and Learning of Mathematics and Science*, Vancouver, BC: Pacific Educational Press.

also provides information about whether the relative performance of these students has changed in the intervening years. As in the original 1995 study, TIMSS 1999 included a full range of context questionnaires and the TIMSS-R Videotape Classroom Study examining mathematics and science instructional practices in seven nations.[2]

In countries new to the study as well as those that participated in 1995, the data from TIMSS 1999 can help policy makers and practitioners assess their comparative standing and gauge the rigor and effectiveness of their mathematics and science programs. The aim is to improve the teaching and learning of mathematics and science for students everywhere by providing data about what types of curricula, instructional practices, and school environments result in higher student achievement.

Who Conducted TIMSS 1999?

The original TIMSS and TIMSS 1999 were conducted by the International Association for the Evaluation of Educational Achievement (IEA). With a permanent secretariat based in Amsterdam, the Netherlands, the IEA is an independent international cooperative of national research institutions and governmental research agencies. Its primary purpose is to conduct large-scale comparative studies of educational achievement to gain a deeper understanding of the effects of policies and practices within and across systems of education.

Four IEA studies in the areas of mathematics and science preceded TIMSS. These were the First International Mathematics Study, 1959-1967; the First International Science Study, 1966-1973; the Second International Mathematics Study, 1976-1987; and the Second International Science Study, 1980-1989. During the same period, the IEA conducted a number of studies that focused on other areas of schooling, including reading literacy, civics, computer applications, and early childhood education.

Funding for TIMSS 1999 was provided by the United States, the World Bank, and the participating countries. Within the United States, funding agencies include the National Center for Education Statistics of the U.S. Department of Education, the National Science Foundation, and the Department of Education's Office of Educational Research and Improvement.

2 Sponsored by the United States, the TIMSS-R Videotape Classroom Study builds on the work of the first TIMSS videotape study of mathematics (Stigler, J.W., Gonzales P., Kawanaka, T., Knoll S., and Serrano, A. (1999), *The TIMSS Videotape Classroom Study: Methods and Findings from an Exploratory Research Project on Eighth-Grade Mathematics Instruction in Germany, Japan, and the United States*, NCES 1999-074, Washington, DC: National Center for Education Statistics). The first data from the Videotape Classroom Study are anticipated in late 2001.

The IEA delegated responsibility for the overall direction and management of the project to the International Study Center in the Lynch School of Education at Boston College, headed by Michael O. Martin and Ina V.S. Mullis. In carrying out the project, the International Study Center worked closely with the IEA Secretariat in Amsterdam, Statistics Canada in Ottawa, the IEA Data Processing Center in Hamburg, and Educational Testing Service in Princeton, New Jersey.

Which Countries Participated?

Exhibit 1 shows the 38 countries that participated in TIMSS 1999. The decision to participate in any IEA study is coordinated through the secretariat in Amsterdam and made solely by each member country according to its own data needs and resources. Exhibit 1 shows that 26 countries also participated in TIMSS 1995.[3] For these, trend data are included in this report, while for 12 of the participants data are included only for TIMSS 1999.[4] Seventeen of the 26 countries that participated in TIMSS 1995 also have data at the fourth grade.[5] A list of the countries participating in TIMSS 1995 at grades 4 and 8 can be found in Exhibit A.1 in the appendix.

Each participating country designated a national center to conduct the activities of the study and a National Research Coordinator (NRC) to implement it in accordance with international procedures – a considerable responsibility given the complexity of the data collection and the measurement instruments. The quality of the study depends on the work of the NRCs and their colleagues, and all those involved deserve deep appreciation for their continued commitment to the project.[6]

For the sake of comparability across countries and across assessments, all testing was conducted at the end of the school year, except in Lithuania. As noted in the exhibits in this report, Lithuania tested the same cohort of students as other countries, but later in 1999, at the beginning of the next school year. The six countries on a Southern Hemisphere school schedule (Australia, Chile, Malaysia, New Zealand, Singapore, and South Africa) tested in October through December of 1998, which was the end of the school year there. The remaining countries tested at the end of the 1998-1999 school year, most often in May and June of 1999.

3 Hong Kong became a Special Administrative Region of the People's Republic of China in 1999, and is labeled "Hong Kong, SAR" in the exhibits in this report.

4 Italy was unable to complete the steps necessary to have its data available for reporting in 1996, but all scoring and database tasks were completed subsequently. Indonesia and the Philippines participated in 1995, but were unable to complete the steps necessary for their 1995 data to be reported comparably to those of other countries.

5 Israel and Thailand also participated at the fourth grade in 1995, but did not satisfy guidelines for sampling procedures at the classroom level, and were not included in the comparison for fourth and eighth grade.

6 Please see Appendix E for a list of the TIMSS 1999 National Research Coordinators and the TIMSS 1999 advisory committees.

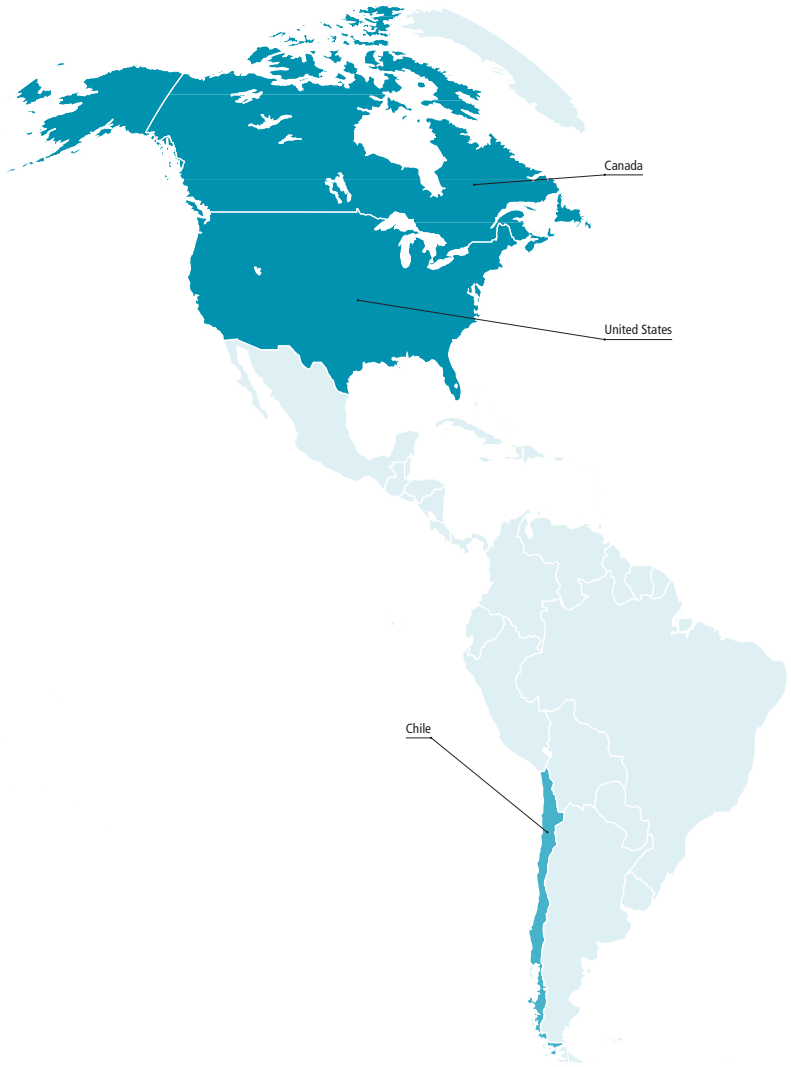
Exhibit 1 Countries Participating in TIMSS 1999

Countries with Data from 1995 and 1999

Australia
Belgium (Flemish)
Bulgaria
Canada
Cyprus
Czech Republic
England
Hong Kong, SAR*
Hungary
Iran, Islamic Republic
Israel
Italy
Japan
Korea, Republic of
Latvia (LSS)
Lithuania
Netherlands
New Zealand
Romania
Russian Federation
Singapore
Slovak Republic
Slovenia
South Africa
Thailand
United States

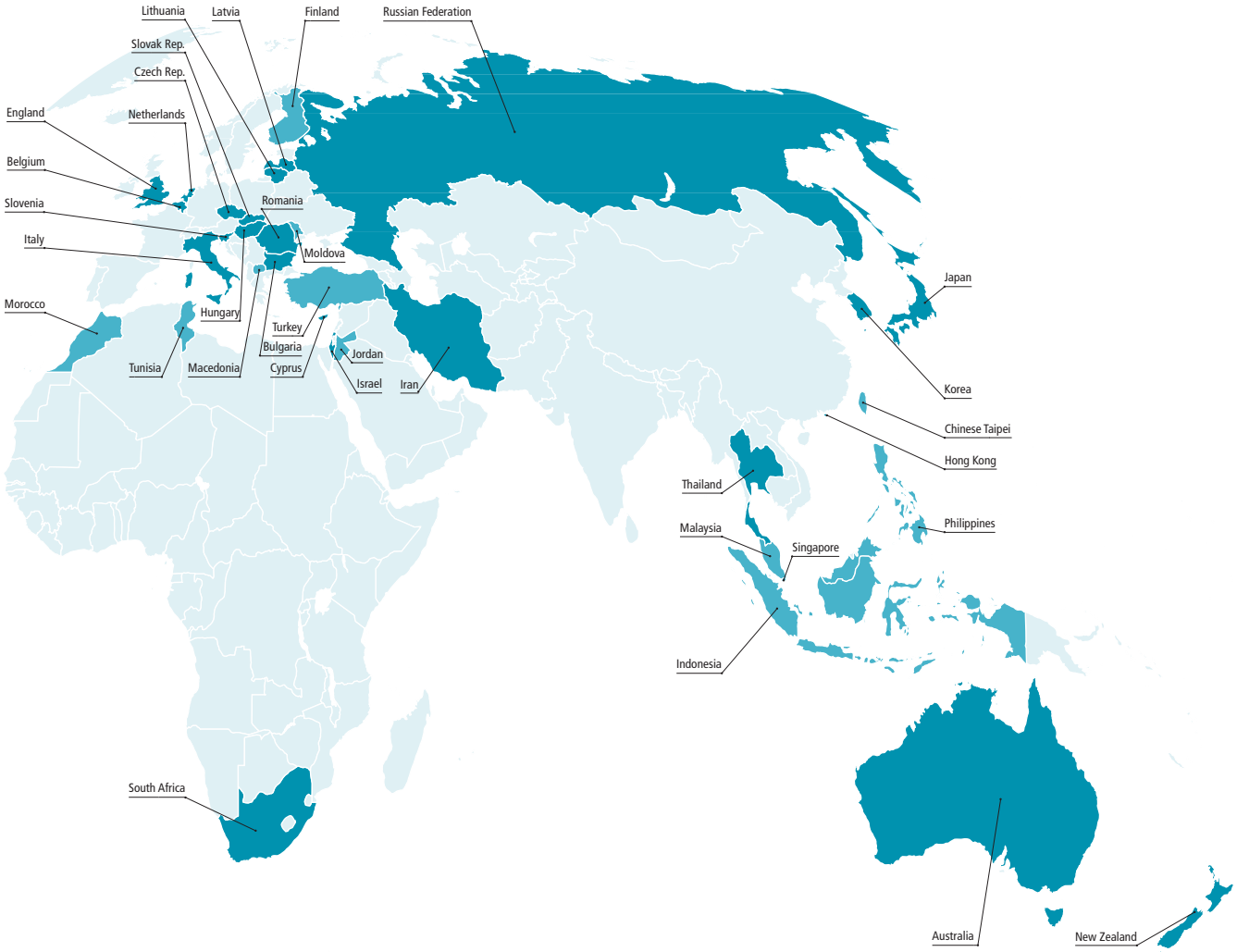
Countries with Data from 1999 Only

Chile
Chinese Taipei
Finland
Indonesia
Jordan
Macedonia, Republic of
Malaysia
Moldova
Morocco
Philippines
Tunisia
Turkey



Countries Participa

* For 1995, Hong Kong. It became a Special Administrative Region of the People's Republic of China in 1999.



ting in TIMSS 1999

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

What Is the Comparability Across the Grades and Ages Tested?

2

Exhibit 2 shows information about the grade tested in each country for TIMSS 1999, including each country's name for the grade and the years of formal schooling students in the grade had completed when they were tested. Based on reassessing the same target population as originally defined for TIMSS in 1995, all countries that participated in TIMSS 1999 were to test students in the upper of the two grades with the largest proportion of 13-year-olds. Although in 1995 TIMSS tested students in the two grades with the largest proportion of 13-year-olds, the 1999 replication was carried out at only the upper of the two middle-school grades tested in 1995.

Exhibit 2 reveals that for most but not all countries, the grade tested represented the eighth year of formal schooling. Thus, solely for convenience, the report usually refers to the grade tested as the eighth grade.

It should be noted that students in Finland, in particular, had one year less of formal schooling and were about half a year younger, on average, than were the students tested internationally. Students in Morocco and the Philippines also had only seven years of formal schooling, as did some students in the Russian Federation. Students in the Czech Republic, England, and Moldova, as well as some in Australia and New Zealand, had nine years of formal schooling, yet the average age of the students was at or below the international average. Two countries, Romania and Slovenia, had students somewhat older than the international average, and a third, South Africa, had students about one year older, though these students had eight years of formal schooling. These countries, however, assessed the same grade as in 1995 in order to measure trends.

Having valid and efficient samples in each country is crucial to the quality and integrity of the study. The accuracy of the survey results depends on the quality of the sampling information available, and particularly on the quality of the samples. TIMSS developed procedures and guidelines to ensure that the national samples were of the highest quality possible. Standards were established and well documented for coverage of the target population, participation rates, and the age of students. For the most part, the national samples were drawn in accordance with the TIMSS standards, and achievement results can be compared with confidence. Countries that deviated from the guidelines are specially annotated in the exhibits in this report.[7]

[7] The TIMSS 1999 sampling requirements and the outcomes of the sampling procedures are described in Appendix A.

Exhibit 2 Information About the Students Tested in TIMSS 1999

	Country's Name for Grade Tested	Years of Formal Schooling[1]	Average Age of Students Tested
Australia	8 or 9	8 or 9	14.3
Belgium (Flemish)	2A & 2P	8	14.1
Bulgaria	8	8	14.8
Canada	8	8	14.0
Chile	8	8	14.4
Chinese Taipei	2nd Grade Junior High School	8	14.2
Cyprus	8	8	13.8
Czech Republic	8	8	14.4
England	Year 9	9	14.2
Finland	7	7	13.8
Hong Kong, SAR	Secondary 2	8	14.2
Hungary	8	8	14.4
Indonesia	2nd Grade Junior Secondary	8	14.6
Iran, Islamic Rep.	8	8	14.6
Israel	8	8	14.1
Italy	3rd Grade Middle School	8	14.0
Japan	2nd Grade Lower Secondary	8	14.4
Jordan	8	8	14.0
Korea, Rep. of	2nd Grade Middle School	8	14.4
Latvia (LSS)	8	8	14.5
Lithuania ‡	9	8.5	15.2
Macedonia, Rep. of	8	8	14.6
Malaysia	Form 2	8	14.4
Moldova	8	9	14.4
Morocco	7	7	14.2
Netherlands	Secondary 2	8	14.2
New Zealand [2]	Year 9	8.5 to 9.5	14.0
Philippines	1st Year High School	7	14.1
Romania	8	8	14.8
Russian Federation	8	7 or 8	14.1
Singapore	Secondary 2	8	14.4
Slovak Republic	8	8	14.3
Slovenia	8	8	14.8
South Africa	8	8	15.5
Thailand	Secondary 2	8	14.5
Tunisia	8	8	14.8
Turkey	8	8	14.2
United States	8	8	14.2
		International Avg.	14.4

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

‡ Lithuania tested the same cohort of students as other countries, but later in 1999, at the beginning of the next school year.

1 Years of schooling based on the number of years children in the grade level have been in formal schooling, beginning with primary education (International Standard of Classification of Education Level 1). Does not include pre-primary education.

2 The official nomenclature used in New Zealand since 1996 refers to students' years of schooling rather than to a class/grade level. Year 9 students are found in a class level equivalent to grade 8.

What Was the Nature of the Science Test?

Together with the quality of the samples, the quality of the test also receives considerable scrutiny in any comparative study. Developing the 1995 TIMSS tests was a cooperative venture involving all of the NRCs during the entire process. Through a series of efforts, countries submitted items that were reviewed by science subject-matter specialists, and additional items were written to ensure that the desired science topics were covered adequately. Items were pilot tested, the results were reviewed, and new items were written and piloted. As part of the TIMSS dissemination strategy, approximately two-thirds of the 1995 items were released for public use. For TIMSS 1999, these items were replaced with items similar in content, format, and difficulty level.[8] All of the potential replacement items were reviewed thoroughly by subject-matter experts and field tested. Nearly all the TIMSS 1999 countries participated in field testing the replacement items with nationally representative samples, and all the NRCs had several opportunities to review the items and scoring criteria. The resulting TIMSS 1999 science test contained 146 items representing a range of science topics and skills.

The TIMSS curriculum frameworks developed for 1995 were also used for 1999. They describe the content dimensions for the TIMSS tests as well as the performance expectations (behaviors that might be expected of students in school science).[9] Six content areas are covered in the TIMSS 1999 science test. These areas and the percentage of the test items devoted to each are earth science (15 percent), life science (27 percent), physics (27 percent), chemistry (14 percent), environmental and resource issues (nine percent), and scientific inquiry and the nature of science (eight percent). The performance expectations include understanding simple information (39 percent), understanding complex information (31 percent), theorizing, analyzing, and solving problems (19 percent), using tools, routine procedures, and science processes (seven percent), and investigating the natural world (four percent).

About one-fourth of the questions were in the free-response format, requiring students to generate and write their answers. These questions, some of which required extended responses, were allotted about one-third of the testing time. Responses to the free-response questions were evaluated to capture diagnostic information, and some were scored using procedures that permitted partial credit. Chapter 2 of this report contains 20 example items illustrating the range of science concepts and processes covered in the TIMSS 1999 tests.

8 The TIMSS 1999 item replacement procedures are described in Appendix A.

9 Robitaille, D.F., McKnight, C.C., Schmidt, W.H., Britton, E.D., Raisen, S.A., and Nicol, C. (1993), *TIMSS Monograph No. 1: Curriculum Frameworks for Mathematics and Science*, Vancouver, BC: Pacific Educational Press.

The TIMSS 1999 tests were prepared in English and translated into 33 languages. A series of verification checks were conducted to ensure the comparability of the translations.[10]

Testing was designed so that no one student took all the items, which would have required more than three hours. Instead, exactly as in 1995, the test was assembled in eight booklets, each requiring 90 minutes to complete. Each student took only one booklet, and the items were rotated through the booklets so that each item was answered by a representative sample of students.

TIMSS conducted a Test-Curriculum Matching Analysis in which countries examined the TIMSS 1999 test to identify items measuring topics not covered in their curricula. The analysis showed that omitting such items for each country had little effect on the overall pattern of achievement results across all countries.[11]

10 See Appendix A for more information about the translation procedures.

11 Results of the Test-Curriculum Matching Analysis are presented in Appendix C.

How Do Country Characteristics Differ?

International studies of student achievement provide valuable comparative information about student performance, instructional practice, and curriculum. Accompanying the benefits of international studies, though, are challenges associated with comparing achievement across countries, cultures, and languages. In both the 1995 and 1999 studies, extensive efforts were made to attend to these issues through careful planning and documentation, cooperation among the participating countries, standardized procedures, and rigorous attention to quality control throughout.[12]

Beyond ensuring the integrity of the study procedures and collecting information about system-wide factors that influence students' opportunity to learn,[13] the results from comparative studies such as TIMSS also need to be considered in light of country-wide demographic and economic factors. Some selected demographic characteristics of the TIMSS 1999 countries are presented in Exhibit 3. Countries range widely in population size, from almost 270 million in the United States to less than one million in Cyprus, and in size, from almost 17 million square kilometers in the Russian Federation to less than one thousand in Hong Kong SAR and Singapore. Countries also vary widely on indicators of health, such as life expectancy at birth and infant mortality rate, and of literacy, including adult literacy rate and daily newspaper circulation. Exhibit 4 shows information for selected economic indicators, such as gross national product (GNP) per capita, expenditure on education and research and development as a percentage of GNP, unemployment rate, and amount of development aid. The data reveal that there is great disparity in the economic resources available to countries. Together the indicators in these two exhibits highlight the diversity of the TIMSS 1999 countries, and although the factors they reflect do not necessarily determine high or low performance in science, they do provide a context for considering the challenges involved in the educational task from country to country.

3

4

In some countries science at the eighth grade is taught as a single general or integrated subject, while in other countries it is taught as separate science subjects, namely earth science, biology, physics, and chemistry. Exhibit 5 shows how science instruction is organized at grade 8 in each of the TIMSS 1999 countries. The majority teach science as a single integrated subject, although in many countries, particularly the European ones, it is common practice to teach science as separate subjects.

5

[12] Appendix A contains an overview of the procedures used. More detailed information is provided in Martin, M.O., Gregory, K.A., and Stemler, S.E., eds., (2000), *TIMSS 1999 Technical Report*, Chestnut Hill, MA: Boston College.

[13] See Chapter 5 for information about the official science curriculum for each country participating in TIMSS 1999.

Exhibits 3–5 Overleaf

Exhibit 3 Selected Characteristics of TIMSS 1999 Countries

TIMSS 1999 8th grade Science

	Population Size (in millions)[1]	Area of Country (1000 square kilometers)[2]	Life Expectancy at Birth[3]	Infant Mortality Rate (per 1000 live births)[4]	Adult Literacy Rate (%)[5]	Daily Newspaper Circulation (per 1000)[6]
Australia	18.5	7682	78	5	99.0	296
Belgium (Flemish) [7]	10.2	33	77	6	99.0	161
Bulgaria	8.3	111	71	18	98.2	254
Canada	30.3	9221	79	6	99.0	158
Chile	14.6	749	75	11	95.2	98
Chinese Taipei [8]	22.1	36	75	8	–	–
Cyprus [9]	0.8	9	–	6	95.9	111
Czech Republic	10.3	77	74	6	99.0	254
England [10]	50.0	130	–	–	99.0	–
Finland	5.1	305	77	4	99.0	455
Hong Kong	6.5	1	79	5	92.4	786
Hungary	10.2	92	71	10	99.0	186
Indonesia	200.4	1812	65	47	85.0	23
Iran, Islamic Rep.	60.9	1622	69	32	73.3	26
Israel [11]	6.1	21	78	7	95.4	288
Italy	57.5	294	78	5	98.3	104
Japan	126.1	377	80	4	99.0	578
Jordan	4.4	89	71	29	87.2	42
Korea, Rep.	46.0	99	72	9	97.2	394
Latvia	2.5	62	69	15	99.0	247
Lithuania	3.7	65	71	10	99.0	93
Macedonia	2.0	25	72	16	94.0	21
Malaysia	21.7	329	72	11	85.7	163
Moldova	4.3	33	67	20	98.3	60
Morocco [12]	27.3	711	67	51	45.9	27
Netherlands	15.6	34	78	5	99.0	306
New Zealand	3.8	268	77	7	99.0	216
Philippines	73.5	298	68	35	94.6	82
Romania	22.6	230	69	22	97.8	298
Russian Federation	147.3	16889	67	17	99.0	105
Singapore	3.1	1	76	4	91.4	324
Slovak Republic	5.4	48	73	9	99.0	184
Slovenia	2.0	20	75	5	99.0	199
South Africa	40.6	1221	65	48	84.0	34
Thailand	60.6	511	69	33	94.7	64
Tunisia	9.2	155	70	30	67.0	31
Turkey [13]	62.5	815	69	40	83.2	110
United States	267.6	9159	76	7	99.0	212

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

1 Estimates for 1997 based, in most cases, on a de facto definition. Refugees not permanently settled in the country of asylum are generally considered to be part of their country of origin. World Bank (1999) World Development Indicators, p. 42-44.

2 Area is the total surface area in square kilometers, comprising all land area and inland waters. World Bank (1999) World Development Indicators, p. 120-122.

3 Number of years a newborn infant would live if prevailing patterns of mortality at its birth were to stay the same throughout its life. World Bank (1999) World Development Indicators, p. 110-112.

4 Infant mortality rate is the number of deaths of infants under one year of age during 1997 per 1,000 live births in the same year. World Bank (1999) World Development Indicators, p.16-18.

5 Population aged 15 years and over. UNDP (1999) Human Development Report 1999 (134-137).

6 A newspaper issued at least four times a week is considered to be a daily newspaper. Circulation figures show the average circulation. UNESCO (1999) Statistical Yearbook, IV (106-133).

7 Figures for Belgium (Flemish) are for the whole country of Belgium.

8 Data provided by Department of Statistics, Ministry of Interior, Republic of China.

9 Data for population, area, and infant mortality provided by Cypriot Government Statistics Department.

10 The Statesman's Yearbook, 1998-99. Edited by Barry Turner, p.1411.

11 Data provided by Israel's Central Bureau of Statistics, publication no. 1133.

12 Data provided by Ministere du plan et de l'initiation economique: Annuaire de Maroc, 1999.

13 Data provided by Turkey's State Institute of Statistics.

A dash (–) indicates data are not available.

Exhibit 4 Selected Economic Indicators of TIMSS 1999 Countries

	Gross National Product per Capita (in US dollars)[1]	GNP per Capita (Purchasing Power Parity)[2]	Expenditure on Education as % of Gross National Product[3]	Expenditure on Research and Development as % of Gross National Product[4]	Total Unemployment (% of total labor force)[5]	Aid per Capita[6]
Australia	20650	19510	5.5	1.8	8.4	–
Belgium (Flemish) [7]	26730	23090	3.1	1.6	12.7	–
Bulgaria	1170	3870	3.2	0.6	11.1	25
Canada	19640	21750	6.9	1.7	9.4	0
Chile	4820	12240	3.6	0.6	5.3	9
Chinese Taipei [8]	13235	–	4.9	2.0	2.9	–
Cyprus	–	–	4.5	0.2	–	–
Czech Republic	5240	10380	5.1	1.2	3.1	10
England	–	–	–	–	–	–
Finland	24790	19660	7.5	2.8	14.7	–
Hong Kong	25200	24350	2.9	0.3	2.2	–
Hungary	4510	6970	4.6	0.7	10.5	16
Indonesia	1110	3390	1.4	0.1	–	4
Iran, Islamic Rep.	1780	5690	4.0	0.5	–	3
Israel [9]	16180	17680	10.1	2.4	7.7	204
Italy	20170	20100	4.9	2.2	12.1	–
Japan	38160	24400	3.6	2.8	3.2	–
Jordan	1520	3350	7.9	0.3	–	104
Korea, Rep.	10550	13430	3.7	2.8	2.7	-3
Latvia	2430	3970	6.3	0.4	7.0	33
Lithuania	2260	4140	5.5	0.7	7.1	27
Macedonia	1100	3180	5.1	–	38.8	75
Malaysia	4530	7730	4.9	0.2	2.5	-11
Moldova	460	1450	10.6	0.9	1.6	15
Morocco	1260	3210	5.3	–	17.8	17
Netherlands	25830	21300	5.1	2.1	6.2	–
New Zealand	15830	15780	7.3	1.0	6.0	–
Philippines	1200	3670	3.4	0.2	7.9	9
Romania	1410	4270	3.6	0.7	6.3	9
Russian Federation	2680	4280	3.5	0.9	3.4	5
Singapore	32810	29230	3.0	1.1	2.4	0
Slovak Republic	3680	7860	5.0	1.1	12.6	13
Slovenia	9840	11880	5.7	1.5	13.9	49
South Africa	3210	7190	8.0	0.7	–	12
Thailand	2740	6490	4.8	0.1	0.9	10
Tunisia	2110	5050	7.7	0.3	–	21
Turkey	3130	6470	2.2	0.5	6.6	0
United States	29080	29080	5.4	2.6	5.0	–

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

1 World Bank (1999) World Development Indicators, p. 12-14.

2 An international dollar has the same purchasing power over GNP as a U.S. dollar in the United States. World Bank (1999) World Development Indicators, p. 12-14.

3 UNESCO (1999) Statistical Yearbook, p.II-(490-513); Belgium figure is for the Flemish community only; Cyprus is for Greek section only.

4 UNESCO (1999) Statistical Yearbook, p.III-(6-17); Belgium figure is for the Flemish community only; Cyprus is for Greek section only.

5 Unemployment is the share of the labor force that is without work but available for and seeking employment. Definitions of labor force and unemployment differ by country. World Bank (1999) World Development Indicators, p. 58-60.

6 World Bank (1999) World Development Indicators, p. 352-355. Aid per capita includes official development assistance, which consists of disbursement of loans and grants, and official aid, which consists of capital projects, budget and balance of payments support, food and other commodity services, technical co-operation and emergency relief. A negative value indicates repayments exceed aid payments.

7 Figures for Belgium (Flemish) are for the whole country of Belgium.

8 Data provided by Department of Statistics, Ministry of Interior, Republic of China.

9 Data Provided by Israel's Central Bureau of Statistics, publication no. 1133.

A dash (–) indicates data are not available or that aggregates cannot be calculated because of missing data in year shown.

Exhibit 5 Organization of Science Instruction at Grade 8

TIMSS 1999 8th grade Science

Countries Teaching Science as a Single General/Integrated Subject	Countries Teaching Science as Separate Subjects
Australia	Belgium (Flemish)
Canada	Bulgaria
Chile	Chinese Taipei [1]
Cyprus	Czech Republic
England	Finland
Hong Kong, SAR	Hungary
Iran, Islamic Republic	Indonesia [2]
Israel	Latvia
Italy	Lithuania
Japan	Macedonia, Republic of
Jordan	Moldova
Korea, Republic of	Morocco
Malaysia	Netherlands
New Zealand	Romania
Philippines	Russian Federation
Singapore	Slovak Republic
South Africa	Slovenia
Thailand	
Tunisia	
Turkey	
United States	

General/ Integrated Science

Earth Science

Biology

Physics

Chemistry

SOURCE: IEA Third International Mathematics and Science Study (TIMSS), 1998-1999.

1 Chinese Taipei: separate sciences are taught starting in grade 7, with biology in grade 7 and physics/chemistry in grade 8. Teacher background data are reported for the grade 8 physics/chemistry teachers in the physics section of the teacher exhibits. Students were administered the general version of the questionnaire and asked about 'natural science'; student data are presented in the general science section of the student exhibits and pertain to the physics/chemistry course in grade 8.

2 Indonesia: students are taught 'IPA science' by separate biology and physics teachers, but students receive a single composite grade. Teacher background data are reported separately for biology and physics teachers. Students were administered the general version of the questionnaire and asked about 'IPA science'; student data are presented in the general science section of the student exhibits and pertain to the composite course in grade 8.