Chapter 9

TIMSS 2007 Sampling Weights and Participation Rates

Marc Joncas

9.1 Overview

Rigorous sampling of schools and students was a key component of the TIMSS 2007 project. Implementing the sampling plan was the responsibility of the National Research Coordinator (NRC) in each participating country. NRCs were supported in this endeavor by TIMSS 2007 sampling consultants, Statistics Canada, and the Samplin g Unit of the IEA Data Processing and Research Center (DPC). Sampling consultants conducted the school sampling for most countries and trained NRCs in selecting probability samples of students and using the *Windows® Within-school Sampling Software (WinW3S)* (2006) provided by the IEA DPC. As an essential part of their sampling activities, NRCs were responsible for providing detailed documentation describing their national sampling plans (sampling data, school sampling frames, and school sample selections). The documentation for each TIMSS participant was reviewed and completed by the sampling consultants, including details on coverage and exclusion levels, stratification variables, sampling, participation rates, and variance estimates. The TIMSS & PIRLS International Study Center and the TIMSS 2007 Sampling Referee, Dr. Keith Rust of Westat, Inc., used this information to evaluate the quality of the samples.

This chapter gives a summary of the major characteristics of the national samples, along with a description of how sampling weights and participation rates were calculated for TIMSS 2007. School, classroom, and student participation rates for each country also are presented. More detailed summaries of the sample design for each country, including details of population coverage and exclusions, stratification variables, and schools' sampling allocations, are provided in Appendix B.

9.2 Sampling Implementation

9.2.1 Target Populations

As described in Chapter 5, TIMSS 2007 chose to study achievement in two target populations, and participating countries were free to select either population or both. The *international target populations* for TIMSS were defined as the grade that represented 4 or 8 years of schooling, counting from the first year of primary or elementary schooling, unless this would result in an average student age of less than 9.5 years for the lower grade or 13.5 for the higher grade.

Exhibits 9.1 and 9.2 present the grades identified as the target grades for sampling by each country, together with the number of years of formal schooling the grades represent and the average age of students in the target grade that were sampled for TIMSS at the time of testing for fourth and eighth grades, respectively. For most countries, the target grades did indeed turn out to be the grades with 4 and 8 years of schooling. In England, Malta, New Zealand, and Scotland, children begin primary school at age 5, and therefore, these countries assessed students in the fifth or ninth year of schooling. Their students were still among the youngest in TIMSS 2007. In Bosnia and Herzegovina, students from the five regions of the Republika Srpska had 9 years of schooling, compared to 8 years for the rest of the country, due to the early school-entry age (at age 6, compared to age 7 for the other regions). Finally, Kuwait and the non-Indian schools of Dubai, UAE[1] also tested in the fifth and ninth grade in October 2007 due to late data collection.

1 The school year for the Indian schools starts in April, and students under that schedule were tested at the end of their school year (grade 4 or grade 8). All other students start their school year in September and were tested at the beginning of their school year (grade 5 or grade 9).

Exhibit 9.1 National Grade Definitions – Fourth Grade

Country	Country's Name for Grade Tested	Years of Formal Schooling*	Average Age at Time of Testing
Algeria	Four year primary	4	10.2
Armenia	Grade 4	4	10.6
Australia	Year 4	4	9.9
Austria	Fourth grade / Last grade of primary education	4	10.3
Chinese Taipei	Elementary school, grade 4	4	10.2
Colombia	Fourth grade	4	10.4
Czech Republic	Grade 4	4	10.3
Denmark	Grade 4	4	11.0
El Salvador	Fourth grade of basic education	4	11.0
England	Year 5	5	10.2
Georgia	Grade 4	4	10.1
Germany	Grade 4	4	10.4
Hong Kong SAR	Primary 4	4	10.2
Hungary	Fourth grade	4	10.7
Iran, Islamic Rep. of	Fourth grade of primary school	4	10.2
Italy	Grade 4 (IV class of primary school)	4	9.8
Japan	Fourth grade at the elementary school	4	10.5
Kazakhstan	Fourth grade (1st stage of basic education)	4	10.6
Kuwait	Grade 5 (Primary)	4	10.2
Latvia	Grade 4	4	11.0
Lithuania	Grade 4	4	10.8
Morocco	Grade 4 primary school	4	10.6
Netherlands	Grade 6 (the first year of kindergarten is grade 1)	4	10.2
New Zealand	Year 5 (year 1 is equivalent to Kindergarten)	4.5–5.5	10.0
Norway	Grade 4	4	9.8
Qatar	Fourth grade	4	9.7
Russian Federation	Fourth grade	4	10.8
Scotland	Primary 5 (P5)	5	9.8
Singapore	Primary 4	4	10.4
Slovak Republic	Fourth grade	4	10.4
Slovenia	Grade 4	4	9.8
Sweden	Grade 4	4	10.8
Tunisia	Fourth grade of basic school	4	10.2
Ukraine	Grade 4	4	10.3
United States	Grade 4 of elementary school	4	10.3
Yemen	Grade 4	4	11.2
Benchmarking Participants			
Alberta, Canada	Grade 4	4	9.8
British Columbia, Canada	Grade 4	4	9.8
Dubai, UAE	Grade 4 or Grade 5	4	10.0
Massachusetts, US	Fourth grade	4	10.3
Minnesota, US	Fourth grade	4	10.3
Ontario, Canada	Grade 4	4	9.8
Quebec, Canada	Second year of second cycle	4	10.1

* Represents years of schooling counting from the first year of ISCED Level 1.

Exhibit 9.2 National Grade Definitions – Eighth Grade

Country	Country's Name for Grade Tested	Years of Formal Schooling*	Average Age at Time of Testing
Algeria	Second year of middle school	8	14.5
Armenia	Grade 8	8	14.9
Australia	Year 8	8	13.9
Bahrain	Second Intermediate	8	14.1
Bosnia and Herzegovina	Final grade (grade 8 and grade 9)	8 or 9	14.7
Botswana	Form One	8	14.9
Bulgaria	Grade 8	8	14.9
Chinese Taipei	Junior high school, grade 8	8	14.2
Colombia	Eighth grade	8	14.5
Cyprus	B Gymnasium	8	13.8
Czech Republic	Grade 8	8	14.4
Egypt	Preparatory 2	8	14.1
El Salvador	Eighth grade of basic education	8	15.0
England	Year 9	9	14.2
Georgia	Grade 8	8	14.2
Ghana	Junior secondary school II (JSS II)	8	15.8
Hong Kong SAR	Secondary 2	8	14.4
Hungary	Eighth grade	8	14.6
Indonesia	Grade 8	8	14.3
Iran, Islamic Rep. of	Third year in guidance school	8	14.2
Israel	Eighth grade	8	14.0
Italy	Grade 8 (III Media)	8	13.9
Japan	Second grade at the lower secondary school	8	14.5
Jordan	Grade 8	8	14.0
Korea, Rep. of	Grade 2 of middle school	8	14.3
Kuwait	Ninth grade (Intermediate)	8	14.4
Lebanon	Grade 8 of the basic educational level	8	14.4
Lithuania	Grade 8	8	14.9
Malaysia	Form 2 (Grade 8)	8	14.3
Malta	Form 3 (Grade 9)	9	14.0
Morocco	Second year collegial	8	14.8
Norway	Grade 8	8	13.8
Oman	Grade 8	8	14.3
Palestinian Nat'l Auth.	Eighth grade	8	14.0
Qatar	Grade 8	8	13.9
Romania	Grade 8	8	15.0
Russian Federation	Eighth grade	7 or 8	14.6
Saudi Arabia	Second year of middle school	8	14.4
Scotland	Secondary 2 (S2)	9	13.7
Serbia	Eighth grade	8	14.9
Singapore	Secondary 2	8	14.4
Slovenia	Grade 8	7 or 8	13.8
Sweden	Grade 8	8	14.8
Syrian Arab Republic	Grade 8	8	13.9
Thailand	Middle school grade 2	8	14.3
Tunisia	Eighth year of basic school	8	14.5
Turkey	Eighth grade	8	14.0
Ukraine	Grade 8	8	14.2
United States	Grade 8	8	14.3
Benchmarking Participants			
Basque Country, Spain	Second course of secondary compulsory education	8	14.1
British Columbia, Canada	Grade 8	8	13.9
Dubai, UAE	Grade 8 or Grade 9	8	14.2
Massachusetts, US	Eighth grade	8	14.2
Minnesota, US	Eighth grade	8	14.3
Ontario, Canada	Grade 8	8	13.8
Quebec, Canada	Secondary II (cycle one)	8	14.2

* Represents years of schooling counting from the first year of ISCED Level 1.

9.2.2 Population Coverage and Exclusions

Exhibits 9.3 and 9.4 summarize population coverage and exclusions for the TIMSS 2007 target populations. National coverage of the international target population was generally comprehensive, with some exceptions. For example, at the fourth grade (Exhibit 9.3), Georgia (tested only students taught in Georgian), Kazakhstan (students taught in Kazakh or Russian), Latvia (students taught in Latvian), and Lithuania (students taught in Lithuanian) chose a national target population that was less than the international target population. Since coverage was below 100 percent, the results for these countries were footnoted in the TIMSS 2007 international reports. At eighth grade, as shown in Exhibit 9.4, all countries except Georgia (tested only students taught in Georgian), Lithuania (students taught in Lithuanian), and Serbia (did not include Kosovo) sampled from 100 percent of the international target population. Since coverage was below 100 percent for these countries, the results were footnoted in the TIMSS 2007 international reports.

Bulgaria presents an unusual case since its eighth grade exclusion statistics differ between mathematics and science. Because a number of schools in Bulgaria do not teach science at the eighth grade, students sampled in those schools were not administered the science part of the assessment and consequently became part of the excluded population for science. The entries for Bulgaria in eighth grade exhibits in this chapter represent the population of students assessed in mathematics. The figures for science are presented in a footnote.

Exhibit 9.3 Coverage of TIMSS 2007 Target Population – Fourth Grade

Country	International Target Population		Exclusions from National Target Population		
	Coverage	Notes on Coverage	School-level Exclusions	Within-sample Exclusions	Overall Exclusions
Algeria	100%		2.1%	0.0%	2.1%
Armenia	100%		2.7%	0.7%	3.4%
Australia	100%		1.3%	2.7%	4.0%
Austria	100%		1.3%	3.7%	5.0%
Chinese Taipei	100%		0.2%	2.5%	2.8%
Colombia	100%		1.3%	0.8%	2.1%
Czech Republic	100%		4.4%	0.5%	4.9%
Denmark	100%		2.0%	2.1%	4.1%
El Salvador	100%		1.4%	0.9%	2.3%
England	100%		1.6%	0.5%	2.1%
Georgia	85%	Students taught in Georgian	2.3%	2.5%	4.8%
Germany	100%		1.2%	0.2%	1.3%
Hong Kong SAR	100%		4.9%	0.5%	5.4%
Hungary	100%		2.6%	1.7%	4.4%
Iran, Islamic Rep. of	100%		2.9%	0.0%	3.0%
Italy	100%		0.1%	5.3%	5.3%
Japan	100%		0.4%	0.6%	1.1%
Kazakhstan	94%	Students taught in Kazakh or Russian	2.2%	3.1%	5.3%
Kuwait	100%		0.0%	0.0%	0.0%
Latvia	72%	Students taught in Latvian	4.2%	0.4%	4.6%
Lithuania	93%	Students taught in Lithuanian	2.2%	3.1%	5.4%
Morocco	100%		1.4%	0.0%	1.4%
Netherlands	100%		3.7%	1.0%	4.8%
New Zealand	100%		2.8%	2.6%	5.4%
Norway	100%		1.9%	3.3%	5.1%
Qatar	100%		1.5%	0.2%	1.8%
Russian Federation	100%		2.2%	1.5%	3.6%
Scotland	100%		2.6%	1.9%	4.5%
Singapore	100%		1.5%	0.0%	1.5%
Slovak Republic	100%		1.4%	1.9%	3.3%
Slovenia	100%		0.8%	1.3%	2.1%
Sweden	100%		2.0%	1.1%	3.1%
Tunisia	100%		2.7%	0.2%	2.9%
Ukraine	100%		0.6%	0.0%	0.6%
United States	100%		0.0%	9.2%	9.2%
Yemen	100%		1.9%	0.1%	2.0%
Benchmarking Participants					
Alberta, Canada	100%		2.0%	5.7%	7.6%
British Columbia, Canada	100%		2.2%	6.9%	9.2%
Dubai, UAE	100%		4.2%	1.2%	5.4%
Massachusetts, US	100%		0.0%	10.4%	10.4%
Minnesota, US	100%		0.0%	8.3%	8.3%
Ontario, Canada	100%		0.6%	5.7%	6.3%
Quebec, Canada	100%		2.1%	4.3%	6.4%

Exhibit 9.4 Coverage of TIMSS 2007 Target Population – Eighth Grade

Country	International Target Population		Exclusions from National Target Population		
	Coverage	Notes on Coverage	School-level Exclusions	Within-sample Exclusions	Overall Exclusions
Algeria	100%		0.1%	0.0%	0.1%
Armenia	100%		2.7%	0.5%	3.3%
Australia	100%		0.6%	1.2%	1.9%
Bahrain	100%		1.4%	0.1%	1.5%
Bosnia and Herzegovina	100%		0.4%	1.1%	1.5%
Botswana	100%		0.0%	0.1%	0.1%
Bulgaria	100%		2.2%	1.3%	3.4%
Chinese Taipei	100%		0.1%	3.3%	3.3%
Colombia	100%		1.5%	0.1%	1.6%
Cyprus	100%		0.0%	2.5%	2.5%
Czech Republic	100%		4.3%	0.3%	4.6%
Egypt	100%		0.1%	0.4%	0.5%
El Salvador	100%		1.2%	1.6%	2.8%
England	100%		2.0%	0.3%	2.3%
Georgia	85%	Students taught in Georgian	2.3%	1.6%	3.9%
Ghana	100%		0.9%	0.0%	0.9%
Hong Kong SAR	100%		3.7%	0.1%	3.8%
Hungary	100%		2.6%	1.4%	3.9%
Indonesia	100%		3.4%	0.0%	3.4%
Iran, Islamic Rep. of	100%		0.5%	0.0%	0.5%
Israel	100%		14.5%	8.3%	22.8%
Italy	100%		0.0%	4.9%	5.0%
Japan	100%		0.6%	2.9%	3.5%
Jordan	100%		0.2%	1.8%	2.0%
Korea, Rep. of	100%		1.2%	0.5%	1.6%
Kuwait	100%		0.0%	0.3%	0.3%
Lebanon	100%		1.4%	0.0%	1.4%
Lithuania	92%	Students taught in Lithuanian	1.4%	2.7%	4.2%
Malaysia	100%		3.3%	0.0%	3.3%
Malta	100%		0.8%	2.1%	2.9%
Morocco	100%		0.1%	0.0%	0.1%
Norway	100%		0.9%	1.7%	2.6%
Oman	100%		0.3%	0.9%	1.2%
Palestinian Nat'l Auth.	100%		0.1%	0.9%	1.0%
Qatar	100%		0.6%	0.2%	0.8%
Romania	100%		1.5%	0.3%	1.8%
Russian Federation	100%		1.1%	1.2%	2.3%
Saudi Arabia	100%		0.4%	0.1%	0.5%
Scotland	100%		1.3%	0.4%	1.7%
Serbia	80%	Serbia without Kosovo	2.9%	3.9%	6.8%
Singapore	100%		1.8%	0.0%	1.8%
Slovenia	100%		0.9%	1.0%	1.9%
Sweden	100%		2.1%	1.6%	3.6%
Syrian Arab Republic	100%		0.6%	0.0%	0.6%
Thailand	100%		3.4%	0.0%	3.4%
Tunisia	100%		0.0%	0.0%	0.0%
Turkey	100%		2.1%	0.5%	2.6%
Ukraine	100%		0.2%	0.0%	0.2%
United States	100%		0.0%	7.9%	7.9%
Benchmarking Participants					
Basque Country, Spain	100%		1.2%	3.0%	4.2%
British Columbia, Canada	100%		2.8%	15.0%	17.7%
Dubai, UAE	100%		4.2%	0.8%	5.0%
Massachusetts, US	100%		0.0%	8.4%	8.4%
Minnesota, US	100%		0.0%	7.5%	7.5%
Ontario, Canada	100%		0.4%	5.8%	6.2%
Quebec, Canada	100%		1.5%	12.1%	13.6%

Note: In Bulgaria, the figures shown above are for eighth grade mathematics. The figures for the eighth grade science population are as follows: 100%, 2.2%, 18.2%, and 20.3%, respectively.

Within the national target population, it was possible to exclude certain types of schools, such as very small or very remote schools and certain students, such as those who had a disability that prevented them from participating in the assessment. For the most part, school-level exclusions consisted of schools for students with disabilities and very small or remote schools. Occasionally, schools were excluded for other reasons, as documented in Appendix B. Within-school exclusions generally consisted of students with disabilities or students who could not be assessed in the language of the test (Appendix B gives more details about the exclusions for each participant in TIMSS 2007). For most participants, the overall percentage of excluded students (combining school and within-school levels) was less than 5 percent. However, at fourth grade, the United States along with almost all of the benchmarking participants (the U.S. states of Massachusetts and Minnesota and the Canadian provinces of Québec, Ontario, Alberta, and British Columbia) have exclusions accounting for between 5 and 10 percent of the national target population. At eighth grade, Serbia, the United States, and the U.S. states of Massachusetts and Minnesota, along with the Canadian province of Ontario, have exclusions accounting for between 5 and 10 percent of the national target population. Only Israel and the Canadian provinces of Québec and British Columbia had exclusions exceeding 10 percent. Results for participants with more than 5 percent exclusions were annotated in the international reports. Note that some TIMSS participants had no within-school exclusions.

9.2.3 General Sampling Approach

The basic sample design used in TIMSS 2007 is known as a two-stage stratified cluster design, with the first stage consisting of a sample of schools, and the second stage having a sample of intact classrooms (usually mathematics classes) from the target grades in the sampled schools. While all participants adopted this basic two-stage design, there were some acceptable variations, as follows. The Russian Federation introduced a preliminary stage (first sampling regions). Singapore also added a third sampling stage—subsampling students within classrooms rather than selecting intact classes. Finally, the Basque Country, Spain had a frame of split schools by type (Castilian, Basque, or mixed) and the first stage consisted of a sample of school/type entities rather than schools. As a result, some schools appeared in the sample up to three times (see Section 9.3.1). The reason for this

deviation from the general sampling design was to optimize the sampling results by school type.

For countries participating in TIMSS 2007, school stratification was used to enhance the precision of the survey results. Many participants employed explicit stratification, where the complete school sampling frame was divided into smaller sampling frames according to some criterion, such as region, to ensure a predetermined number of schools sampled in each stratum. For example, Australia divided its sampling frame into eight states and territories to ensure equal precision in the survey results between states and between the two territories (see Appendix B for stratification information for each country). Stratification also could be done implicitly, a procedure by which schools in a sampling frame were sorted according to a set of stratification variables prior to sampling. For example, Australia employed implicit stratification by school type (Government, Catholic, Independent) and school location (metropolitan area or elsewhere) within each explicit stratum. Regardless of the other stratification variables used, all countries used implicit stratification by a measure of size of the school.

All countries used a systematic (random start, fixed interval) probability-proportional-to-size (PPS) sampling approach to sample schools. Note that when this method is combined with an implicit stratification procedure, the allocation of schools in the sample is approximately proportional to the size of the implicit strata. Within sampled schools, classes were sampled using a systematic random start method in all countries except Singapore, where classes were sampled with a systematic PPS approach and students within classes were sampled with equal probability using a systematic random start method.

About half of the countries sampled 150 schools, which was the minimum required to meet the TIMSS sampling standards. Most countries sampled one or two classrooms per sampled school. Details on the sampling of schools and classrooms for each country are provided in Appendix B.

The TIMSS 2007 sample designs were implemented in an acceptable manner by all participating countries except Morocco (eighth grade) and Mongolia. Both adopted classroom sampling procedures that did not meet the TIMSS sampling standards and, therefore, could not be approved by the TIMSS & PIRLS International Study Center. For Morocco, schools where the classroom sampling was not implemented correctly were eliminated from the sample, reducing the participation rate. As a result, data for Morocco for

eighth grade appear at the bottom of all tables in the international reports. In addition to sampling irregularities, Mongolia had problems implementing and documenting sampling operations in the field. As a result, data for this country were summarized in an appendix to the international reports.

9.2.4 Target Population Sizes

Exhibits 9.5 and 9.6 show the number of schools and students in each participant's target population,[2] based on the sampling frame used to select the TIMSS 2007 sample, as well as the number of sampled schools and students that participated in the study and an estimate of the student population size based on the student sample. The sample figures were derived using sampling weights (see Section 9.3). The population size estimate based on the sampling frame did not take into account the portion of the population excluded within schools and made no adjustment for changes in the population between the date when the information in the sampling frame was collected and the date of the TIMSS 2007 data collection—usually a 2-year interval. Nevertheless, a comparison of the two estimates of the population size can be seen as a check on the sampling procedure. In most cases, the estimated population size closely matched the population size from the sampling frame.

2 After school level exclusions.

Exhibit 9.5 Population and Sample Sizes – Fourth Grade

Country	Population		Sample			Average Age at Time of Testing
	Schools	Students	Schools	Students	Est. Pop.	
Algeria	13,767	719,784	149	4,223	609,356	10.2
Armenia	1,332	55,289	148	4,079	38,614	10.6
Australia	6,755	266,540	229	4,108	233,914	9.9
Austria	3,236	90,422	196	4,859	85,156	10.3
Chinese Taipei	2,512	318,160	150	4,131	308,536	10.2
Colombia	38,591	926,735	142	4,801	946,135	10.4
Czech Republic	3,391	96,768	144	4,235	90,676	10.3
Denmark	1,789	67,179	137	3,519	59,331	11.0
El Salvador	4,558	161,459	148	4,166	146,032	11.0
England	15,304	608,118	143	4,316	578,564	10.2
Georgia	2,059	46,061	144	4,108	46,056	10.1
Germany	18,364	801,257	246	5,200	805,112	10.4
Hong Kong SAR	599	68,244	126	3,791	69,095	10.2
Hungary	2,897	107,693	144	4,048	96,917	10.7
Iran, Islamic Rep. of	47,562	1,248,474	224	3,833	1,081,972	10.2
Italy	7,651	555,976	170	4,470	535,617	9.8
Japan	19,645	1,188,308	148	4,487	1,149,805	10.5
Kazakhstan	6,475	240,140	141	3,990	222,389	10.6
Kuwait	210	27,529	150	3,803	25,721	10.2
Latvia	647	13,448	146	3,908	13,323	11.0
Lithuania	1,135	37,900	156	3,980	33,213	10.8
Morocco	18,526	657,196	184	3,894	600,010	10.6
Netherlands	6,599	186,869	141	3,349	168,143	10.2
New Zealand	1,778	56,372	220	4,940	55,115	10.0
Norway	2,236	60,750	145	4,108	58,011	9.8
Qatar	114	7,190	114	7,019	7,240	9.7
Russian Federation	47,611	1,331,118	206	4,464	1,211,412	10.8
Scotland	1,896	58,071	139	3,929	54,981	9.8
Singapore	177	49,363	177	5,041	49,376	10.4
Slovak Republic	1,998	56,648	184	4,963	53,646	10.4
Slovenia	428	17,576	148	4,351	17,025	9.8
Sweden	3,636	112,057	155	4,676	93,999	10.8
Tunisia	3,939	185,746	150	4,134	175,182	10.2
Ukraine	11,600	368,230	144	4,292	355,822	10.3
United States	72,670	4,049,655	257	7,896	3,367,262	10.3
Yemen	10,835	417,535	144	5,811	414,308	11.2
Benchmarking Participants						
Alberta, Canada	1,060	40,148	146	4,037	35,741	9.8
British Columbia, Canada	1,236	45,723	150	4,153	40,742	9.8
Dubai, UAE	136	13,234	97	3,064	13,597	10.0
Massachusetts, US	1,020	72,459	47	1,747	61,595	10.3
Minnesota, US	949	59,789	50	1,846	51,652	10.3
Ontario, Canada	3,646	152,833	188	3,496	127,754	9.8
Quebec, Canada	1,810	88,710	186	3,885	76,767	10.1

Exhibit 9.6 Population and Sample Sizes – Eighth Grade

Country	Population		Sample			Average Age at Time of Testing
	Schools	Students	Schools	Students	Est. Pop.	
Algeria	3,891	624,353	149	5,447	656,405	14.5
Armenia	1,332	55,289	148	4,689	50,218	14.9
Australia	2,417	270,116	228	4,069	255,699	13.9
Bahrain	74	11,667	74	4,230	11,370	14.1
Bosnia and Herzegovina	569	45,579	150	4,220	37,754	14.7
Botswana	214	40,115	150	4,208	38,859	14.9
Bulgaria	2,309	78,729	163	4,019	74,387	14.9
Chinese Taipei	888	316,997	150	4,046	307,288	14.2
Colombia	10,034	648,634	148	4,873	641,920	14.5
Cyprus	67	9,500	67	4,399	9,237	13.8
Czech Republic	2,669	124,325	147	4,845	115,466	14.4
Egypt	8,179	1,342,127	233	6,582	1,059,228	14.1
El Salvador	2,626	109,671	145	4,063	90,302	15.0
England	3,886	636,732	137	4,025	583,214	14.2
Georgia	2,059	46,061	135	4,178	52,447	14.2
Ghana	7,589	346,289	163	5,294	338,472	15.8
Hong Kong SAR	455	83,267	120	3,470	82,514	14.4
Hungary	2,968	118,049	144	4,111	107,073	14.6
Indonesia	29,701	2,799,024	149	4,203	3,026,953	14.3
Iran, Islamic Rep. of	29,956	1,475,368	208	3,981	1,262,265	14.2
Israel	805	97,132	146	3,294	83,931	14.0
Italy	5,824	602,185	170	4,408	551,089	13.9
Japan	10,708	1,201,082	146	4,312	1,153,745	14.5
Jordan	1,691	108,856	200	5,251	110,338	14.0
Korea, Rep. of	2,727	696,156	150	4,240	683,289	14.3
Kuwait	163	23,827	158	4,091	23,926	14.4
Lebanon	1,574	63,755	136	3,786	59,668	14.4
Lithuania	1,021	49,887	142	3,991	45,023	14.9
Malaysia	1,930	429,048	150	4,466	443,398	14.3
Malta	60	5,260	59	4,670	4,943	14.0
Morocco	1,636	368,656	131	3,060	359,911	14.8
Norway	1,070	62,348	139	4,627	58,806	13.8
Oman	722	56,569	146	4,752	50,834	14.3
Palestinian Nat'l Auth.	1,130	94,376	148	4,378	92,608	14.0
Qatar	67	7,332	66	7,184	7,429	13.9
Romania	6,099	251,054	149	4,198	203,652	15.0
Russian Federation	42,188	2,140,032	210	4,472	1,298,236	14.6
Saudi Arabia	6,271	332,479	165	4,243	370,822	14.4
Scotland	418	64,812	129	4,070	59,252	13.7
Serbia	1,310	81,275	147	4,045	77,540	14.9
Singapore	164	50,904	164	4,599	50,872	14.4
Slovenia	428	19,138	148	4,043	19,066	13.8
Sweden	1,531	125,478	159	5,215	117,344	14.8
Syrian Arab Republic	3,756	270,389	150	4,650	260,481	13.9
Thailand	9,481	844,336	150	5,412	802,663	14.3
Tunisia	804	176,555	150	4,080	169,108	14.5
Turkey	16,112	1,163,830	146	4,498	1,091,653	14.0
Ukraine	12,184	479,467	146	4,424	482,176	14.2
United States	46,112	4,219,262	239	7,377	3,445,599	14.3
Benchmarking Participants						
Basque Country, Spain	330	17,203	130	2,296	15,967	14.1
British Columbia, Canada	433	51,804	150	4,256	41,735	13.9
Dubai, UAE	116	11,178	88	3,195	11,328	14.2
Massachusetts, US	468	75,805	48	1,897	67,333	14.2
Minnesota, US	656	64,566	49	1,777	55,059	14.3
Ontario, Canada	2,854	159,230	176	3,448	143,755	13.8
Quebec, Canada	605	102,112	170	3,956	85,278	14.2

Note: In Bulgaria, the sample for the eighth grade science population is 3,079 students, 139 schools, and the estimated population is 61,237.

9.2.5 Calculating Sampling Weights

The method of estimation used to produce estimates of totals from TIMSS data was through a simple weighted sum of all the responding records for the variable of interest. Estimates of percentages or means then were taken as ratios of these estimated totals. The two-stage stratified cluster PPS design used in TIMSS generally results in differential probabilities of the selection of students, requiring a unique sampling weight for each participating classroom in the study (for Australia and Thailand at grade 8 only, sampling weights varied by student's gender within classrooms—see Section 9.3.7).

The TIMSS 2007 student sampling weight comprised a series of multiplicative components. A basic weight was formed from the inverse of the probability of selecting a student from the population. This basic weight was adjusted by multiplicative factors that account for nonresponding schools, classes, and students.

Sampling weights were calculated according to a three-step procedure involving selection probabilities for schools, classrooms, and students. The first step consisted of calculating a school weight, which also incorporated weighting factors from any additional front-end sampling stages, such as regions for the Russian Federation. A school-level participation adjustment then was made to the school weight to compensate for any sampled schools that did not participate and were not replaced. This adjustment was calculated independently for each explicit stratum.

In the second step, a classroom weight reflecting the probability of the sampled classroom(s) being selected from among all the classrooms in the school at the target grade level was calculated. This classroom weight was calculated independently for each participating school. If a sampled classroom in a school did not participate or if the participation rate among students in a classroom fell below 50 percent, a classroom-level participation adjustment was made to the classroom weight. Note that a classroom participation adjustment only could occur within "participating schools" (a school was considered as a "participating school" if and only if there was at least one sampled classroom with at least 50 percent of its students participating in the study). If one (or more) selected classroom in a school did not participate, the classroom participation adjustment was computed at the explicit stratum level rather than at the school level to reduce the risk of bias.

The third and final step consisted of calculating a student weight. For most TIMSS participants, because intact classrooms were sampled, each student in the sampled classrooms was certain of selection, and, therefore, the student weight was 1.0. In Singapore however, students were further sampled within classrooms, and a student weight reflecting the probability of the sampled students being selected within the classroom was calculated. A nonparticipation adjustment then was made to adjust for sampled students who did not take part in the testing. This adjustment was calculated independently for each sampled classroom.

The basic sampling weight attached to each student record was the product of the three intermediate weights: the first stage (school) weight, the second stage (classroom) weight, and the third stage (student) weight. The overall student sampling weight was the product of the three weights including nonparticipation adjustments.

9.2.6 The First Stage (School) Weight

Essentially, the first stage weight represented the inverse of the probability of a school being sampled on the first stage. The TIMSS 2007 sample design required that school selection probabilities be proportional to school size, generally defined as enrollment in the target grade. The basic first stage weight for the i^{th} sampled school was thus defined as:

$$BW_{sc}^{i} = \frac{M}{n \cdot m_i}$$

where n was the number of sampled schools, m_i was the measure of size for the i^{th} school, and

$$M = \sum_{i=1}^{N} m_i$$

where N was the total number of schools in the explicit stratum.

For the Russian Federation that included a preliminary sampling stage, the basic first stage weight also incorporated the probability of selection in this preliminary stage. The first stage weight in such cases was simply the product of the preliminary stage weight and the first stage weight, as described earlier.

In order to avoid ending up with some basic first stage weights being less than unity, the size of large schools (schools with sizes larger than the sampling interval given by M/n), was set equal to the sampling interval. As a result, these large schools were sampled with equal probability without having to use an explicit stratification approach as in previous TIMSS cycles.

In a similar way but for different reasons, the size of small schools (see Chapter 5) was set to a constant, with the result that these small schools could be sampled with equal probability without having to use explicit stratification.

Finally, because the Basque Country, Spain had school/type entities rather than schools as its first stage sampling units, the probability of school *i* being in the sample was given as follows:

$$P_{sc}^{i} = P_{sc1}^{i} + P_{sc2}^{i} + P_{sc3}^{i} - P_{sc1}^{i}P_{sc2}^{i} - P_{sc1}^{i}P_{sc3}^{i} - P_{sc2}^{i}P_{sc3}^{i} + P_{sc1}^{i}P_{sc2}^{i}P_{sc3}^{i}$$

where $P_{sc1}^{i}, P_{sc2}^{i}, P_{sc3}^{i},$ gives the probability of school *i* being in the sample for the Castilian, mixed, and Basque types, respectively. This probability was computed as shown at the beginning of this section. The sampling school weight for the i^{th} school then becomes $1/P_{sc}^{i}$.

9.2.7 School Nonparticipation Adjustment

First stage weights were calculated for all sampled and replacement schools that participated (i.e., those with at least one sampled classroom having at least half of its students participating in the study). A school-level participation adjustment was required to compensate for schools that were sampled but did not participate, and were not replaced. Sampled schools that were found to be ineligible[3] were removed from the calculation of this adjustment. The school-level participation adjustment was calculated separately for each explicit stratum, as follows:

$$A_{sc} = \frac{n_s + n_{r1} + n_{r2} + n_{nr}}{n_s + n_{r1} + n_{r2}}$$

where n_s was the number of originally sampled schools that participated, n_{r1} and n_{r2} the number of first and second replacement schools, respectively, that participated, and n_{nr} was the number of schools that did not participate.

3 A sampled school was ineligible if it was found to contain no eligible students (i.e., fourth grade students). Such schools usually were in the sampling frame by mistake or were schools that had recently closed.

In Bahrain, Cyprus, Kuwait (eighth grade), Malta, and Qatar, because all schools were included in the sample (i.e., census of all schools in the target grades), the following school-level adjustment was used:

$$A_{sc} = \frac{m_s + m_{nr}}{m_s}$$

where m_s was the sum of the measures of size (number of students) from schools that participated and m_{nr} the sum of the measures of size from schools that did not participate.

The final first stage weight for the i^{th} school corrected for nonparticipating schools, thus became:

$$FW_{sc}^{i} = A_{sc} \cdot BW_{sc}^{i}$$

9.2.8 The Second Stage (Classroom) Weight

The second stage weight represented the inverse of the probability of a classroom within a sampled school being selected. All participants except Singapore sampled classrooms within schools with equal probability. In Singapore, where student subsampling was involved, classrooms were sampled using PPS techniques. Procedures for calculating sampling weights are presented below for both approaches.

Equal probability weighting: For the i^{th} school, let C^i be the total number of classrooms and c^i the number of sampled classrooms in the study. Using equal probability sampling, the basic second stage weight assigned to all sampled classrooms in the i^{th} school was:

$$BW_{cl1}^{i} = \frac{C^i}{c^i}$$

For most TIMSS participants, c^i took the values 1, 2, or 3. Some TIMSS participants sampled all classrooms in a selected school.

Probability proportional to size weighting (Singapore only): For the i^{th} school, let $k^{i,j}$ be the size of the j^{th} classroom. Using PPS sampling, the

final second stage weight assigned to the j^{th} sampled classroom in the i^{th} school was

$$BW_{cl2}^{i,j} = \frac{K^i}{c^i \cdot k^{i,j}}$$

where c^i was the number of sampled classrooms in the i^{th} school, as defined earlier, and

$$K^i = \sum_{j=1}^{c^i} k^{i,j}$$

Singapore sampled two classrooms per school.

9.2.9 Classroom Nonparticipation Adjustment

Second stage weights were calculated for all sampled classrooms in the sampled and replacement schools that participated. A classroom-level participation adjustment was applied to compensate for classrooms that did not participate or where the student participation rate was below 50 percent. Sampled classrooms with student participation below 50 percent were given a weight of zero and considered to be nonparticipating. The classroom-level participation adjustment was calculated separately for each explicit stratum rather than by school to minimize the risk of bias. The adjustment was calculated as follows:

$$A_{cl} = \frac{\sum_{i}^{s+r1+r2} 1}{\sum_{i}^{s+r1+r2} \delta_i / c^i}$$

where c^i was the number of sampled classrooms in the i^{th} school, as defined earlier, and δ_i gives the number of participating classrooms in the i^{th} school.

When no subsampling of classrooms was involved, the final second stage weight assigned to all sampled classrooms in the i^{th} school became:

$$FW_{cl1}^{i,j} = A_{cl} \cdot BW_{cl1}^{i}$$

When classrooms were subsampled within schools, the final second stage weight assigned to the j^{th} sampled classroom in the i^{th} school became:

$$FW_{cl2}^{i,j} = A_{cl} \cdot BW_{cl2}^{i,j}$$

9.2.10 The Third Stage (Student) Weight

The third stage weight represented the inverse of the probability of a student in a sampled class being selected. In the usual case, when intact classrooms that included all students were sampled, as was the case for all TIMSS 2007 participants except Singapore, this probability was unity. However, countries that participated in TIMSS 2003 and participated in the bridging study assigned some portion of the tested students to the bridging sample. For these countries, the probability fell below unity. In all cases, the third stage weight was calculated independently for each sampled classroom. Procedures for calculating weights are presented below for each case.

Sampling intact classrooms (no bridging study): The basic third stage weight for the j^{th} classroom in the i^{th} school was:

$$BW_{st1}^{i,j} = 1.0$$

Subsampling students (due to bridging study but excluding Singapore): The basic third stage weight for students assigned to the regular TIMSS study for the j^{th} classroom in the i^{th} school was:

$$BW_{st2}^{ij} = \frac{n_{rg}^{i,j} + n_{bs}^{i,j}}{n_{rg}^{i,j}}$$

where $n_{rg}^{i,j}$ was the number of students assigned to the regular TIMSS study in school i and class j and $n_{bs}^{i,j}$ was the number of students assigned to the bridging study.[4] Students who tested for the bridging study were given a weight of zero.

4 Austria did not take part in the study in 2003. However, a portion of their students was assigned to a national study and, therefore, were treated the same way as the bridging study countries.

Subsampling students (Singapore only): The basic third stage weight for the j^{th} classroom in the i^{th} school was:

$$BW_{st3}^{ij} = \frac{k^{ij}}{s^{ij}} \cdot \frac{(n_{rg}^{i,j} + n_{bs}^{i,j})}{n_{rg}^{i,j}}$$

where $k^{i,j}$ was the size of the j^{th} classroom in the i^{th} school, as defined earlier, and $s^{i,j}$ was the number of sampled students per sampled classroom.

9.2.11 Adjustment for Student Nonparticipation

The student nonparticipation adjustment was calculated for each participating classroom and for each of the previously described scenarios.

First two scenarios (sampling intact classrooms or bridging study): The student nonparticipating adjustment, regardless of the participation status to the bridging study, for the j^{th} classroom in the i^{th} school was:

$$A_{st1}^{i,j} = A_{st2}^{i,j} = \frac{s_{rs}^{i,j} + s_{nr}^{i,j}}{s_{rs}^{i,j}}$$

where $s_{rs}^{i,j}$ was the number of responding students (students for which TIMSS scores were derived) in the j^{th} classroom of the i^{th} school, and $s_{nr}^{i,j}$ was the number of students from which a TIMSS score was expected but did not participate in the j^{th} classroom of the i^{th} school.

Third scenario (Singapore only): The student nonparticipating adjustment for the j^{th} classroom in the i^{th} school was:

$$A_{st3}^{i,j} = \frac{\left(s_{nl}^{i,j} + s_{rs}^{i,j} + s_{nr}^{i,j} + s_{ex}^{i,j}\right)}{\left(s_{rs}^{i,j} + s_{nr}^{i,j} + s_{ex}^{i,j}\right)} \cdot \frac{\left(s_{rs}^{i,j} + s_{nr}^{i,j}\right)}{\left(s_{rs}^{i,j}\right)}$$

where $s_{nl}^{i,j}$ was the number of students no longer at school at the time of testing in the j^{th} classroom of the i^{th} school, $s_{ex}^{i,j}$ was the number of excluded students in the j^{th} classroom of the i^{th} school and $s_{rs}^{i,j}$, $s_{nr}^{i,j}$ defined as before.

The third and final stage weight for students in the j^{th} classroom in the i^{th} school thus became

$$FW_{st}^{i,j} = A_{st\Delta}^{i,j} \cdot BW_{st\Delta}^{i,j}$$

where Δ equals 1 when there was no student subsampling, 2 for the bridging study countries except Singapore, and 3 for the Singapore data.

9.2.12 Overall Sampling Weight

The overall sampling weight was simply the product of the final first stage weight, the final second stage weight, and the final third stage weight. For example, for regular TIMSS 2007 study countries, this product is given by

$$W^{i,j} = FW_{sc}^{i} \cdot FW_{cl\Omega}^{i,j} \cdot FW_{st\Delta}^{i,j}$$

where Ω equals 1 when classes were sampled with equal probabilities and 2 otherwise, and Δ equals 1 when there was no student subsampling, 2 for the bridging study countries except Singapore, and 3 for the Singapore data.

It is important to note that with this weighting strategy, sampling weights varied by school and classroom, but participating students within the same classroom have the same sampling weights. However, this weighting strategy did not produce satisfying results for five "areas" (two states in Australia and three regions in Thailand[5]), with regard to the eighth grade student population. In these cases, the student population estimates at eighth grade by gender derived from the sample differed by roughly 10 percent from the actual population figures. A further multiplicative factor for each of these "areas" was thus added to the final weight. This factor was such that the student population estimate by gender would match the known totals for these "areas".

9.3 Calculating School and Student Participation Rates

Since nonparticipation by sampled schools, classrooms, or students can lead to bias in the study results, a variety of participation rates were computed to show the level of success each TIMSS participant achieved in securing participation from their sampled schools, classrooms, and students.

5 These are the states of Queensland and Victoria in Australia and the Bangkok, central, and northern parts of Thailand.

To monitor school participation, two school participation rates were computed: one based on originally sampled schools only and one based on sampled schools and first and second replacements. Classroom and student participation rates were also computed, as were overall participation rates.

9.3.1 Unweighted School Participation Rates

The two unweighted school participation rates that were computed were the following:

R_{unw}^{sc-s} = unweighted school participation rate for originally sampled schools only

R_{unw}^{sc-r} = unweighted school participation rate, including sampled, first, and second replacement schools.

Each unweighted school participation rate was defined as the ratio of the number of participating schools to the number of originally sampled schools, excluding any ineligible schools. A school was labeled as a "participating school" if at least one of its sampled classrooms had at least a 50 percent student participation rate. The rates were calculated as follows:

$$R_{unw}^{sc-s} = \frac{n_s}{n_s + n_{r1} + n_{r2} + n_{nr}}$$

$$R_{unw}^{sc-r} = \frac{n_s + n_{r1} + n_{r2}}{n_s + n_{r1} + n_{r2} + n_{nr}}$$

9.3.2 Unweighted Classroom Participation Rates

The unweighted classroom participation rate was computed as follows:

$$R_{unw}^{cl} = \frac{\sum_{i}^{s+r1+r2} c_{\star}^{i}}{\sum_{i}^{s+r1+r2} c^{i}}$$

where c^i was the number of sampled classrooms in the i^{th} school, and $c_{\star}^{i}$ was the number of participating sampled classrooms in the i^{th} school. Both summations were over all participating schools.

9.3.3 Unweighted Student Participation Rates

The unweighted student participation rate was computed where summations were done over all participating schools and classrooms with at least 50 percent of its students participating in the study, as follows:

$$R_{unw}^{st} = \frac{\sum_{i,j} s_{rs}^{i,j}}{\sum_{i,j} s_{rs}^{i,j} + \sum_{i,j} s_{nr}^{i,j}}$$

9.3.4 Unweighted Overall Participation Rates

Two unweighted overall participation rates were computed for each TIMSS participant. They were as follows:

R_{unw}^{ov-s} = unweighted overall participation rate for originally sampled schools only

R_{unw}^{ov-r} = unweighted overall participation rate, including sampled, first, and second replacement schools.

For each TIMSS participant, the overall participation rate was defined as the product of the unweighted school participation rate, unweighted classroom participation rate, and the unweighted student participation rate. They were calculated as follows:

$$R_{unw}^{ov-s} = R_{unw}^{sc-s} \cdot R_{unw}^{cl} \cdot R_{unw}^{st}$$

$$R_{unw}^{ov-r} = R_{unw}^{sc-r} \cdot R_{unw}^{cl} \cdot R_{unw}^{st}$$

9.3.5 Weighted School Participation Rates

Two weighted school-level participation rates were computed for each TIMSS participant. They were as follows:

R_{wtd}^{sc-s} = weighted school participation rate for originally sampled schools only

R_{wtd}^{sc-r} = weighted school participation rate, including sampled, first, and second replacement schools.

The weighted school participation rates were calculated as follows:

$$R_{wtd}^{sc-s} = \frac{\sum_{i,j}^{s} BW_{sc}^{i} \cdot FW_{cl\Omega}^{i,j} \cdot FW_{st\Delta}^{i,j}}{\sum_{i,j}^{s+r1+r2} FW_{sc}^{i} \cdot FW_{cl\Omega}^{i,j} \cdot FW_{st\Delta}^{i,j}}$$

$$R_{wtd}^{sc-r} = \frac{\sum_{i,j}^{s+r1+r2} BW_{sc}^{i} \cdot FW_{cl\Omega}^{i,j} \cdot FW_{st\Delta}^{i,j}}{\sum_{i,j}^{s+r1+r2} FW_{sc}^{i} \cdot FW_{cl\Omega}^{i,j} \cdot FW_{st\Delta}^{i,j}}$$

where both the numerator and denominator were summations over all responding students and the appropriate classroom- and student-level sampling weights were used. Ω equals 1 when classes were sampled with equal probabilities and 2 otherwise, and Δ equals 1 when there was no student subsampling, 2 for the bridging study countries except Singapore, and 3 for the Singapore data. Note that the basic school-level weight appears in the numerator, whereas the final school-level weight appears in the denominator.

The denominator remains unchanged in all two equations and is the weighted estimate of the total enrollment in the target population. The numerator, however, changes from one equation to the next. Only students from originally sampled schools and from classrooms with at least 50 percent of their students participating in the study were included in the first equation. Students from first and second replacement schools were added in the second equation.

9.3.6 Weighted Classroom Participation Rates

The weighted classroom participation rate was computed as follows:

$$R_{wtd}^{cl} = \frac{\sum_{i,j}^{s+r1+r2} BW_{sc}^{i} \cdot BW_{cl\Omega}^{i,j} \cdot FW_{st\Delta}^{i,j}}{\sum_{i,j}^{s+r1+r2} BW_{sc}^{i} \cdot FW_{cl\Omega}^{i,j} \cdot FW_{st\Delta}^{i,j}}$$

where both the numerator and denominator were summations over all responding students from classrooms with at least 50 percent of their students participating in the study, and the appropriate student-level

sampling weights were used. Note that the basic classroom-level weight appears in the numerator, whereas the final classroom-level weight appears in the denominator. Furthermore, the denominator in this formula was the same quantity that appears in the numerator of the weighted school-level participation rate for all participating schools, either sampled or replacement.

9.3.7 Weighted Student Participation Rates

The weighted student participation rate was computed as follows:

$$R_{wtd}^{st} = \frac{\sum_{i,j}^{s+r1+r2} BW_{sc}^{i} \cdot BW_{cl\Omega}^{i,j} \cdot BW_{st\Delta}^{i,j}}{\sum_{i,j}^{s+r1+r2} BW_{sc}^{i} \cdot BW_{cl\Omega}^{i,j} \cdot FW_{st\Delta}^{i,j}}$$

where both the numerator and denominator were summations over all responding students from participating schools. Note that the basic student-level weight appears in the numerator, whereas the final student-level weight appears in the denominator. Furthermore, the denominator in this formula is the same quantity that appears in the numerator of the weighted classroom-level participation rate for all participating schools, either sampled or replacement.

9.3.8 Weighted Overall Participation Rates

Three weighted overall participation rates were computed. They were as follows:

R_{wtd}^{ov-s} = weighted overall participation rate for originally sampled schools only

R_{wtd}^{ov-r} = weighted overall participation rate, including sampled, first and second replacement schools.

Each weighted overall participation rate was defined as the product of the appropriate weighted school participation rate, weighted classroom participation rate, and the weighted student participation rate. They were computed as follows:

$$R_{wtd}^{ov-s} = R_{wtd}^{sc-s} \cdot R_{wtd}^{cl} \cdot R_{wtd}^{st}$$

$$R_{wtd}^{ov-r} = R_{wtd}^{sc-r} \cdot R_{wtd}^{cl} \cdot R_{wtd}^{st}$$

Weighted school, classroom, student, and overall participation rates were computed for each TIMSS participant using these procedures.

9.3.9 Meeting TIMSS' Standards for Sampling Participation

TIMSS participants understood that the goal for sampling participation was 100 percent for all sampled schools, classrooms, and students. Guidelines for reporting achievement data for TIMSS participants securing less than full participation were modeled after IEA's previous studies for TIMSS and PIRLS. As summarized in Exhibit 9.7, countries were assigned to one of three categories on the basis of their sampling participation. Countries in Category 1 were considered to have met the TIMSS 2007 sampling requirement and to have an acceptable participation rate. Countries in Category 2 met the participation requirements only after including replacement schools. Countries that failed to meet the participation requirements even with the use of replacement schools were assigned to Category 3. One of the main goals for quality data in TIMSS 2007 was to have as many countries as possible achieve Category 1 status.

Exhibit 9.7 Categories of Sampling Participation

Category 1	Acceptable sampling **participation** rate without the use of replacement schools. In order to be placed in this category, a country had to have: • An unweighted school response rate without replacement of at least 85% (after rounding to nearest whole percent) AND an unweighted student response rate (after rounding) of at least 85% OR • A **weighted** school response rate **without** replacement of at least 85% (after rounding to nearest whole percent) AND a **weighted** student response rate (after rounding) of at least 85% OR • The product of the (unrounded) **weighted** school response rate **without** replacement and the (unrounded) **weighted** student response rate of at least 75% (after rounding to the nearest whole percent). Countries in this category would appear in the tables and figures in international reports without annotation, and will be ordered by achievement as appropriate.
Category 2	Acceptable sampling participation rate **only when replacement schools are included**. A country would be placed in this category 2 if: • It failed to meet the requirements for Category 1 but had a **weighted** school response rate without replacement of at least 50% (after rounding to the nearest percent) AND HAD EITHER • A **weighted** school response rate **with** replacement of at least 85% (after rounding to nearest whole percent) AND a **weighted** student response rate (after rounding) of at least 85% OR • The product of the (unrounded) **weighted** school response rate **with** replacement and the (unrounded) **weighted** student response rate of at least 75% (after rounding to the nearest whole percent). Countries in this category would be annotated with a "dagger" in the tables and figures in international reports, and ordered by achievement as appropriate.
Category 3	Unacceptable sampling response rate even when replacement schools are included. Countries that could provide documentation to show that they complied with TIMSS sampling procedures and requirements but did not meet the requirements for Category 1 or Category 2 would be placed in Category 3. Countries in this category would appear in a separate section of the achievement tables, below the other countries, in international reports. These countries would be presented in alphabetical order.

Exhibits 9.8 through 9.15 present the school, classroom, student, and overall participation rates and achieved sample sizes for each of the TIMSS 2007 participants. Almost all participants had excellent participation rates and belonged in Category 1. At the fourth grade however, all participants achieved the minimum acceptable participation rates, although Denmark, Scotland, the United States, along with the state of Minnesota, did so only after including replacement schools, and, therefore, their results were annotated with an obelisk in the achievement exhibits in the international reports (Category 2). Despite

efforts to secure full participation, the Netherlands' school participation at 48 percent fell below the minimum requirement of 50 percent before using replacements. However, given that this participation rate increased to 95 percent after using replacements, it was decided during the adjudication that the results for the Netherlands in the international reports would be annotated with a double-obelisk, indicating that they nearly satisfied the guidelines for sample participation rates.

At the eighth grade, England, Hong Kong SAR, Scotland, the United States, and the state of Minnesota met the sampling requirements only after including replacement schools, and, therefore, belonged in Category 2. Morocco with an overall participation rate of 55 percent belonged in Category 3. Mongolia did not provide the necessary documentation for sampling, data collection, and scoring activities. Accordingly, its achievement data were summarized in an appendix to the international reports.

Exhibit 9.8 School Participation Rates and Sample Sizes – Fourth Grade

Country	School Participation Before Replacement (Weighted Percentage)	School Participation After Replacement (Weighted Percentage)	Number of Schools in Original Sample	Number of Eligible Schools in Original Sample	Number of Schools in Original Sample That Participated	Number of Replacement Schools That Participated	Total Number of Schools That Participated
Algeria	99%	99%	150	150	149	0	149
Armenia	93%	100%	150	148	143	5	148
Australia	99%	100%	230	229	226	3	229
Austria	98%	99%	199	197	194	2	196
Chinese Taipei	100%	100%	150	150	150	0	150
Colombia	93%	99%	150	143	132	10	142
Czech Republic	89%	98%	150	147	132	12	144
Denmark	71%	91%	150	150	105	32	137
El Salvador	99%	100%	150	148	146	2	148
England	83%	90%	160	159	131	12	143
Georgia	92%	100%	152	144	131	13	144
Germany	96%	100%	250	247	239	7	246
Hong Kong SAR	81%	84%	150	150	122	4	126
Hungary	93%	99%	150	145	135	9	144
Iran, Islamic Rep. of	100%	100%	240	224	224	0	224
Italy	91%	100%	170	170	155	15	170
Japan	97%	99%	150	150	145	3	148
Kazakhstan	99%	100%	150	141	140	1	141
Kuwait	100%	100%	150	150	149	0	149
Latvia	93%	97%	150	150	140	6	146
Lithuania	99%	100%	163	156	154	2	156
Morocco	81%	81%	226	224	184	0	184
Netherlands	48%	95%	150	148	72	69	141
New Zealand	97%	100%	220	220	213	7	220
Norway	88%	97%	150	150	131	14	145
Qatar	100%	100%	114	114	114	0	114
Russian Federation	100%	100%	206	206	206	0	206
Scotland	77%	94%	150	148	114	25	139
Singapore	100%	100%	177	177	177	0	177
Slovak Republic	98%	100%	184	184	181	3	184
Slovenia	92%	99%	150	150	138	10	148
Sweden	98%	100%	160	155	151	4	155
Tunisia	100%	100%	150	150	150	0	150
Ukraine	96%	96%	150	150	144	0	144
United States	70%	89%	300	290	202	55	257
Yemen	99%	100%	150	144	143	1	144
Benchmarking Participants							
Alberta, Canada	99%	99%	150	148	146	0	146
British Columbia, Canada	98%	100%	150	150	147	3	150
Dubai, UAE	75%	75%	143	132	97	0	97
Massachusetts, US	92%	96%	50	49	45	2	47
Minnesota, US	53%	100%	50	50	30	20	50
Ontario, Canada	95%	96%	200	197	179	9	188
Quebec, Canada	97%	98%	200	192	185	1	186

Exhibit 9.9 School Participation Rates and Sample Sizes – Eighth Grade

Country	School Participation Before Replacement (Weighted Percentage)	School Participation After Replacement (Weighted Percentage)	Number of Schools in Original Sample	Number of Eligible Schools in Original Sample	Number of Schools in Original Sample That Participated	Number of Replacement Schools That Participated	Total Number of Schools That Participated
Algeria	99%	99%	150	150	149	0	149
Armenia	94%	100%	150	148	143	5	148
Australia	100%	100%	230	228	228	0	228
Bahrain	100%	100%	74	74	74	0	74
Bosnia and Herzegovina	100%	100%	150	150	150	0	150
Botswana	100%	100%	150	150	150	0	150
Bulgaria	94%	98%	170	166	158	5	163
Chinese Taipei	100%	100%	150	150	150	0	150
Colombia	96%	100%	150	148	142	6	148
Cyprus	100%	100%	67	67	67	0	67
Czech Republic	92%	100%	150	147	135	12	147
Egypt	99%	100%	237	233	231	2	233
El Salvador	99%	100%	150	145	143	2	145
England	78%	86%	160	160	126	11	137
Georgia	97%	100%	152	135	131	4	135
Ghana	100%	100%	163	163	163	0	163
Hong Kong SAR	73%	79%	152	152	112	8	120
Hungary	92%	99%	150	145	133	11	144
Indonesia	100%	100%	150	149	149	0	149
Iran, Islamic Rep. of	100%	100%	220	208	208	0	208
Israel	94%	97%	150	150	140	6	146
Italy	93%	100%	170	170	159	11	170
Japan	96%	97%	150	150	144	2	146
Jordan	100%	100%	200	200	200	0	200
Korea, Rep. of	100%	100%	150	150	150	0	150
Kuwait	97%	97%	163	163	158	0	158
Lebanon	81%	92%	150	148	120	16	136
Lithuania	98%	99%	150	144	141	1	142
Malaysia	100%	100%	150	150	150	0	150
Malta	100%	100%	60	59	59	0	59
Morocco	65%	65%	205	205	131	0	131
Norway	88%	93%	150	150	133	6	139
Oman	100%	100%	150	146	146	0	146
Palestinian Nat'l Auth.	100%	100%	155	148	147	1	148
Qatar	100%	100%	67	67	66	0	66
Romania	99%	99%	150	150	149	0	149
Russian Federation	100%	100%	210	210	210	0	210
Saudi Arabia	99%	99%	167	166	165	0	165
Scotland	74%	86%	150	150	109	20	129
Serbia	100%	100%	150	147	147	0	147
Singapore	100%	100%	164	164	164	0	164
Slovenia	92%	99%	150	150	138	10	148
Sweden	100%	100%	160	159	158	1	159
Syrian Arab Republic	100%	100%	150	150	150	0	150
Thailand	90%	100%	150	150	134	16	150
Tunisia	100%	100%	150	150	150	0	150
Turkey	100%	100%	150	146	146	0	146
Ukraine	98%	98%	150	150	146	0	146
United States	68%	83%	300	287	197	42	239
Benchmarking Participants							
Basque Country, Spain	100%	100%	130	130	130	0	130
British Columbia, Canada	98%	100%	150	150	147	3	150
Dubai, UAE	79%	79%	122	115	88	0	88
Massachusetts, US	93%	98%	50	49	45	3	48
Minnesota, US	61%	98%	50	50	32	17	49
Ontario, Canada	90%	94%	200	191	168	8	176
Quebec, Canada	93%	93%	191	183	170	0	170

Note: In Bulgaria, the figures shown above are for eighth grade mathematics. The figures for the eighth grade science population are as follows: 93%, 98%, 170, 142, 134, 5, and 139, respectively.

Exhibit 9.10 Student Participation Rates and Sample Sizes – Fourth Grade

Country	Within School Student Participation (Weighted Percentage)	Number of Sampled Students in Participating Schools	Number of Students Withdrawn from Class/ School	Number of Students Excluded	Number of Students Eligible	Number of Students Absent	Number of Students Assessed
Algeria	97%	4,366	22	0	4,344	121	4,223
Armenia	96%	4,253	0	0	4,253	174	4,079
Australia	95%	4,511	78	105	4,328	220	4,108
Austria	98%	5,158	18	156	4,984	125	4,859
Chinese Taipei	100%	4,260	17	93	4,150	19	4,131
Colombia	98%	5,320	349	40	4,931	130	4,801
Czech Republic	94%	4,583	41	17	4,525	290	4,235
Denmark	94%	3,907	59	89	3,759	240	3,519
El Salvador	98%	4,467	202	0	4,265	99	4,166
England	93%	4,784	128	33	4,623	307	4,316
Georgia	98%	4,384	69	68	4,247	139	4,108
Germany	97%	5,464	78	9	5,377	177	5,200
Hong Kong SAR	96%	3,965	13	23	3,929	138	3,791
Hungary	97%	4,221	22	26	4,173	125	4,048
Iran, Islamic Rep. of	99%	3,939	53	2	3,884	51	3,833
Italy	97%	4,912	20	256	4,636	166	4,470
Japan	97%	4,677	7	20	4,650	163	4,487
Kazakhstan	100%	4,063	22	39	4,002	12	3,990
Kuwait	85%	4,468	439	0	4,029	226	3,803
Latvia	95%	4,188	2	10	4,176	268	3,908
Lithuania	94%	4,345	15	122	4,208	228	3,980
Morocco	96%	4,282	215	0	4,067	173	3,894
Netherlands	97%	3,608	152	9	3,447	98	3,349
New Zealand	96%	5,347	104	86	5,157	217	4,940
Norway	95%	4,462	21	143	4,298	190	4,108
Qatar	97%	7,411	153	18	7,240	221	7,019
Russian Federation	98%	4,659	36	42	4,581	117	4,464
Scotland	94%	4,320	92	32	4,196	267	3,929
Singapore	96%	5,235	26	1	5,208	167	5,041
Slovak Republic	97%	5,269	47	64	5,158	195	4,963
Slovenia	95%	4,664	10	57	4,597	246	4,351
Sweden	97%	4,965	60	49	4,856	180	4,676
Tunisia	99%	4,242	50	10	4,182	48	4,134
Ukraine	97%	4,459	16	0	4,443	151	4,292
United States	95%	9,000	140	543	8,317	421	7,896
Yemen	98%	6,128	180	8	5,940	129	5,811
Benchmarking Participants							
Alberta, Canada	96%	4,557	105	222	4,230	193	4,037
British Columbia, Canada	96%	4,758	67	342	4,349	196	4,153
Dubai, UAE	91%	3,421	19	4	3,398	334	3,064
Massachusetts, US	96%	1,971	11	136	1,824	77	1,747
Minnesota, US	97%	2,034	23	101	1,910	64	1,846
Ontario, Canada	95%	3,903	34	194	3,675	179	3,496
Quebec, Canada	86%	4,645	34	78	4,533	648	3,885

Exhibit 9.11 Student Participation Rates and Sample Sizes - Eighth Grade

Country	Within School Student Participation (Weighted Percentage)	Number of Sampled Students in Participating Schools	Number of Students Withdrawn from Class/ School	Number of Students Excluded	Number of Students Eligible	Number of Students Absent	Number of Students Assessed
Algeria	96%	5,793	83	0	5,710	263	5,447
Armenia	96%	4,898	0	0	4,898	209	4,689
Australia	93%	4,549	84	37	4,428	359	4,069
Bahrain	97%	4,434	61	5	4,368	138	4,230
Bosnia and Herzegovina	98%	4,373	22	44	4,307	87	4,220
Botswana	99%	4,310	63	2	4,245	37	4,208
Bulgaria	96%	4,312	87	7	4,218	199	4,019
Chinese Taipei	99%	4,164	25	53	4,086	40	4,046
Colombia	98%	5,343	368	4	4,971	98	4,873
Cyprus	96%	4,755	41	139	4,575	176	4,399
Czech Republic	95%	5,182	41	12	5,129	284	4,845
Egypt	98%	6,906	151	1	6,754	172	6,582
El Salvador	98%	4,329	191	0	4,138	75	4,063
England	88%	4,768	153	15	4,600	575	4,025
Georgia	97%	4,533	139	48	4,346	168	4,178
Ghana	98%	5,678	270	0	5,408	114	5,294
Hong Kong SAR	96%	3,657	29	2	3,626	156	3,470
Hungary	97%	4,321	21	30	4,270	159	4,111
Indonesia	97%	4,419	95	0	4,324	121	4,203
Iran, Islamic Rep. of	98%	4,140	95	0	4,045	64	3,981
Israel	94%	3,708	12	183	3,513	219	3,294
Italy	96%	4,873	40	231	4,602	194	4,408
Japan	93%	4,656	31	6	4,619	307	4,312
Jordan	96%	5,733	184	88	5,461	210	5,251
Korea, Rep. of	99%	4,358	36	19	4,303	63	4,240
Kuwait	87%	4,721	381	18	4,322	231	4,091
Lebanon	93%	4,062	0	0	4,062	276	3,786
Lithuania	91%	4,537	35	96	4,406	415	3,991
Malaysia	98%	4,589	33	0	4,556	90	4,466
Malta	95%	5,053	18	106	4,929	259	4,670
Morocco	85%	4,758	173	0	4,585	649	3,936
Norway	93%	5,085	17	78	4,990	363	4,627
Oman	99%	4,894	57	36	4,801	49	4,752
Palestinian Nat'l Auth.	98%	4,572	70	29	4,473	95	4,378
Qatar	97%	7,558	128	17	7,413	229	7,184
Romania	97%	4,447	119	12	4,316	118	4,198
Russian Federation	97%	4,706	42	51	4,613	141	4,472
Saudi Arabia	95%	4,515	1	3	4,511	268	4,243
Scotland	90%	4,700	137	19	4,544	474	4,070
Serbia	98%	4,246	16	78	4,152	107	4,045
Singapore	95%	4,828	37	0	4,791	192	4,599
Slovenia	93%	4,414	10	42	4,362	319	4,043
Sweden	94%	5,712	87	58	5,567	352	5,215
Syrian Arab Republic	96%	5,025	199	0	4,826	176	4,650
Thailand	99%	5,579	89	0	5,490	78	5,412
Tunisia	98%	4,258	84	0	4,174	94	4,080
Turkey	98%	4,682	87	19	4,576	78	4,498
Ukraine	97%	4,598	27	0	4,571	147	4,424
United States	93%	8,447	202	272	7,973	596	7,377
Benchmarking Participants							
Basque Country, Spain	98%	2,481	46	83	2,352	56	2,296
British Columbia, Canada	94%	4,836	129	146	4,561	305	4,256
Dubai, UAE	88%	3,625	17	6	3,602	407	3,195
Massachusetts, US	94%	2,093	23	56	2,014	117	1,897
Minnesota, US	95%	1,988	21	82	1,885	108	1,777
Ontario, Canada	95%	3,842	43	171	3,628	180	3,448
Quebec, Canada	85%	4,739	59	45	4,635	679	3,956

Note: In Bulgaria, the figures shown above are for eighth grade mathematics. The figures for the eighth grade science population are as follows: 96%; 3,426; 69; 124; 3,233; 154; and 3,079, respectively.

Exhibit 9.12 Unweighted school, Class, and Student Participation Rates – Fourth Grade

Country	School Participation Before Replacement	School Participation After Replacement	Class Participation	Student Participation	Overall Participation Before Replacement	Overall Participation After Replacement
Algeria	99%	99%	100%	97%	97%	97%
Armenia	97%	100%	100%	96%	93%	96%
Australia	99%	100%	100%	95%	94%	95%
Austria	98%	99%	99%	97%	95%	96%
Chinese Taipei	100%	100%	100%	100%	100%	100%
Colombia	92%	99%	100%	97%	90%	97%
Czech Republic	90%	98%	100%	94%	84%	92%
Denmark	70%	91%	99%	94%	65%	85%
El Salvador	99%	100%	100%	98%	96%	98%
England	82%	90%	100%	93%	77%	84%
Georgia	91%	100%	100%	97%	88%	97%
Germany	97%	100%	100%	97%	94%	96%
Hong Kong SAR	81%	84%	100%	96%	78%	81%
Hungary	93%	99%	100%	97%	90%	96%
Iran, Islamic Rep. of	100%	100%	100%	99%	99%	99%
Italy	91%	100%	100%	96%	88%	96%
Japan	97%	99%	100%	96%	93%	95%
Kazakhstan	99%	100%	100%	100%	99%	100%
Kuwait	99%	99%	100%	85%	85%	85%
Latvia	93%	97%	100%	94%	87%	91%
Lithuania	99%	100%	100%	95%	93%	95%
Morocco	82%	82%	100%	96%	79%	79%
Netherlands	49%	95%	97%	97%	46%	90%
New Zealand	97%	100%	100%	96%	93%	96%
Norway	87%	97%	100%	96%	83%	92%
Qatar	100%	100%	100%	97%	97%	97%
Russian Federation	100%	100%	100%	97%	97%	97%
Scotland	77%	94%	100%	94%	72%	88%
Singapore	100%	100%	100%	97%	97%	97%
Slovak Republic	98%	100%	100%	96%	95%	96%
Slovenia	92%	99%	100%	95%	87%	93%
Sweden	97%	100%	100%	96%	94%	96%
Tunisia	100%	100%	100%	99%	99%	99%
Ukraine	96%	96%	100%	97%	93%	93%
United States	70%	89%	100%	95%	66%	84%
Yemen	99%	100%	100%	98%	97%	98%
Benchmarking Participants						
Alberta, Canada	99%	99%	100%	95%	94%	94%
British Columbia, Canada	98%	100%	100%	95%	94%	95%
Dubai, UAE	73%	73%	97%	90%	64%	64%
Massachusetts, US	92%	96%	100%	96%	88%	92%
Minnesota, US	60%	100%	100%	97%	58%	97%
Ontario, Canada	91%	95%	100%	95%	86%	91%
Quebec, Canada	96%	97%	99%	86%	82%	82%

Exhibit 9.13 Unweighted School, Class, and Student Participation Rates – Eighth Grade

Country	School Participation Before Replacement	School Participation After Replacement	Class Participation	Student Participation	Overall Participation Before Replacement	Overall Participation After Replacement
Algeria	99%	99%	100%	95%	95%	95%
Armenia	97%	100%	100%	96%	92%	96%
Australia	100%	100%	100%	92%	92%	92%
Bahrain	100%	100%	100%	97%	97%	97%
Bosnia and Herzegovina	100%	100%	100%	98%	98%	98%
Botswana	100%	100%	100%	99%	99%	99%
Bulgaria	95%	98%	100%	95%	91%	94%
Chinese Taipei	100%	100%	100%	99%	99%	99%
Colombia	96%	100%	100%	98%	94%	98%
Cyprus	100%	100%	100%	96%	96%	96%
Czech Republic	92%	100%	100%	94%	87%	94%
Egypt	99%	100%	100%	97%	97%	97%
El Salvador	99%	100%	100%	98%	96%	98%
England	79%	86%	100%	88%	69%	75%
Georgia	97%	100%	100%	96%	93%	96%
Ghana	100%	100%	100%	98%	98%	98%
Hong Kong SAR	74%	79%	100%	96%	71%	76%
Hungary	92%	99%	100%	96%	88%	96%
Indonesia	100%	100%	100%	97%	97%	97%
Iran, Islamic Rep. of	100%	100%	100%	98%	98%	98%
Israel	93%	97%	100%	94%	88%	91%
Italy	94%	100%	100%	96%	89%	95%
Japan	96%	97%	100%	93%	90%	91%
Jordan	100%	100%	100%	96%	96%	96%
Korea, Rep. of	100%	100%	100%	99%	99%	99%
Kuwait	97%	97%	100%	87%	84%	84%
Lebanon	81%	92%	100%	93%	76%	86%
Lithuania	98%	99%	100%	91%	89%	89%
Malaysia	100%	100%	100%	98%	98%	98%
Malta	100%	100%	100%	95%	94%	94%
Morocco	63%	63%	100%	86%	54%	54%
Norway	89%	93%	100%	93%	82%	86%
Oman	100%	100%	100%	99%	99%	99%
Palestinian Nat'l Auth.	99%	100%	100%	98%	97%	98%
Qatar	99%	99%	100%	97%	95%	95%
Romania	99%	99%	100%	97%	97%	97%
Russian Federation	100%	100%	100%	97%	97%	97%
Saudi Arabia	99%	99%	100%	94%	93%	93%
Scotland	73%	86%	100%	90%	65%	77%
Serbia	100%	100%	100%	97%	97%	97%
Singapore	100%	100%	99%	96%	95%	95%
Slovenia	92%	99%	100%	93%	85%	91%
Sweden	99%	100%	100%	94%	93%	94%
Syrian Arab Republic	100%	100%	100%	96%	96%	96%
Thailand	89%	100%	100%	99%	88%	99%
Tunisia	100%	100%	100%	98%	98%	98%
Turkey	100%	100%	100%	98%	98%	98%
Ukraine	97%	97%	100%	97%	94%	94%
United States	69%	83%	99%	93%	63%	77%
Benchmarking Participants						
Basque Country, Spain	100%	100%	100%	98%	98%	98%
British Columbia, Canada	98%	100%	100%	93%	91%	93%
Dubai, UAE	77%	77%	99%	89%	67%	67%
Massachusetts, US	92%	98%	100%	94%	87%	92%
Minnesota, US	64%	98%	100%	94%	60%	92%
Ontario, Canada	88%	92%	100%	95%	84%	88%
Quebec, Canada	93%	93%	96%	85%	76%	76%

Note: In Bulgaria, the figures shown above are for eighth grade mathematics. The figures for the eighth grade science population are as follows: 94%, 98%, 100%, 95%, 90%, and 93%, respectively.

Exhibit 9.14 Weighted School, Class, and Student Participation Rates – Fourth Grade

Country	School Participation Before Replacement	School Participation After Replacement	Class Participation	Student Participation	Overall Participation Before Replacement	Overall Participation After Replacement
Algeria	99%	99%	100%	97%	97%	97%
Armenia	93%	100%	100%	96%	90%	96%
Australia	99%	100%	100%	95%	94%	95%
Austria	98%	99%	99%	98%	96%	97%
Chinese Taipei	100%	100%	100%	100%	100%	100%
Colombia	93%	99%	100%	98%	91%	97%
Czech Republic	89%	98%	100%	94%	83%	92%
Denmark	71%	91%	99%	94%	66%	85%
El Salvador	99%	100%	100%	98%	97%	98%
England	83%	90%	100%	93%	77%	84%
Georgia	92%	100%	100%	98%	90%	98%
Germany	96%	100%	100%	97%	93%	96%
Hong Kong SAR	81%	84%	100%	96%	78%	81%
Hungary	93%	99%	100%	97%	90%	96%
Iran, Islamic Rep. of	100%	100%	100%	99%	99%	99%
Italy	91%	100%	100%	97%	88%	97%
Japan	97%	99%	100%	97%	94%	95%
Kazakhstan	99%	100%	100%	100%	99%	100%
Kuwait	100%	100%	100%	85%	85%	85%
Latvia	93%	97%	100%	95%	89%	92%
Lithuania	99%	100%	100%	94%	93%	94%
Morocco	81%	81%	100%	96%	77%	77%
Netherlands	48%	95%	98%	97%	46%	91%
New Zealand	97%	100%	100%	96%	93%	96%
Norway	88%	97%	100%	95%	83%	92%
Qatar	100%	100%	100%	97%	97%	97%
Russian Federation	100%	100%	100%	98%	98%	98%
Scotland	77%	94%	100%	94%	72%	88%
Singapore	100%	100%	100%	96%	96%	96%
Slovak Republic	98%	100%	100%	97%	95%	97%
Slovenia	92%	99%	100%	95%	87%	93%
Sweden	98%	100%	100%	97%	94%	97%
Tunisia	100%	100%	100%	99%	99%	99%
Ukraine	96%	96%	100%	97%	93%	93%
United States	70%	89%	100%	95%	66%	84%
Yemen	99%	100%	100%	98%	97%	98%
Benchmarking Participants						
Alberta, Canada	99%	99%	100%	96%	94%	94%
British Columbia, Canada	98%	100%	100%	96%	94%	96%
Dubai, UAE	75%	75%	98%	91%	67%	67%
Massachusetts, US	92%	96%	100%	96%	88%	92%
Minnesota, US	53%	100%	100%	97%	52%	97%
Ontario, Canada	95%	96%	100%	95%	91%	92%
Quebec, Canada	97%	98%	100%	86%	83%	84%

Exhibit 9.15 Weighted School, Class, and Student Participation Rates – Eighth Grade

Country	School Participation Before Replacement	School Participation After Replacement	Class Participation	Student Participation	Overall Participation Before Replacement	Overall Participation After Replacement
Algeria	99%	99%	100%	96%	95%	95%
Armenia	94%	100%	100%	96%	90%	96%
Australia	100%	100%	100%	93%	93%	93%
Bahrain	100%	100%	100%	97%	97%	97%
Bosnia and Herzegovina	100%	100%	100%	98%	98%	98%
Botswana	100%	100%	100%	99%	99%	99%
Bulgaria	94%	98%	100%	96%	90%	94%
Chinese Taipei	100%	100%	100%	99%	99%	99%
Colombia	96%	100%	100%	98%	94%	98%
Cyprus	100%	100%	100%	96%	96%	96%
Czech Republic	92%	100%	100%	95%	87%	95%
Egypt	99%	100%	100%	98%	97%	98%
El Salvador	99%	100%	100%	98%	97%	98%
England	78%	86%	100%	88%	69%	75%
Georgia	97%	100%	100%	97%	95%	97%
Ghana	100%	100%	100%	98%	98%	98%
Hong Kong SAR	73%	79%	100%	96%	70%	75%
Hungary	92%	99%	100%	97%	89%	96%
Indonesia	100%	100%	100%	97%	97%	97%
Iran, Islamic Rep. of	100%	100%	100%	98%	98%	98%
Israel	94%	97%	100%	94%	88%	91%
Italy	93%	100%	100%	96%	89%	96%
Japan	96%	97%	100%	93%	90%	91%
Jordan	100%	100%	100%	96%	96%	96%
Korea, Rep. of	100%	100%	100%	99%	99%	99%
Kuwait	97%	97%	100%	87%	84%	84%
Lebanon	81%	92%	100%	93%	76%	85%
Lithuania	98%	99%	100%	91%	89%	90%
Malaysia	100%	100%	100%	98%	98%	98%
Malta	100%	100%	100%	95%	94%	94%
Morocco	65%	65%	100%	85%	55%	55%
Norway	88%	93%	100%	93%	82%	86%
Oman	100%	100%	100%	99%	99%	99%
Palestinian Nat'l Auth.	100%	100%	100%	98%	98%	98%
Qatar	100%	100%	100%	97%	97%	97%
Romania	99%	99%	100%	97%	97%	97%
Russian Federation	100%	100%	100%	97%	97%	97%
Saudi Arabia	99%	99%	100%	95%	94%	94%
Scotland	74%	86%	100%	90%	66%	77%
Serbia	100%	100%	100%	98%	98%	98%
Singapore	100%	100%	99%	95%	95%	95%
Slovenia	92%	99%	100%	93%	85%	92%
Sweden	100%	100%	100%	94%	93%	94%
Syrian Arab Republic	100%	100%	100%	96%	96%	96%
Thailand	90%	100%	100%	99%	88%	99%
Tunisia	100%	100%	100%	98%	98%	98%
Turkey	100%	100%	100%	98%	98%	98%
Ukraine	98%	98%	100%	97%	95%	95%
United States	68%	83%	99%	93%	63%	77%
Benchmarking Participants						
Basque Country, Spain	100%	100%	100%	98%	98%	98%
British Columbia, Canada	98%	100%	100%	94%	92%	94%
Dubai, UAE	79%	79%	99%	88%	69%	69%
Massachusetts, US	93%	98%	100%	94%	88%	92%
Minnesota, US	61%	98%	100%	95%	58%	93%
Ontario, Canada	90%	94%	100%	95%	86%	89%
Quebec, Canada	93%	93%	97%	85%	77%	77%

Note: In Bulgaria, the figures shown above are for eighth grade mathematics. The figures for the eighth grade science population are as follows: 93%, 98%, 100%, 96%, 89%, and 94%, respectively.

9.4 Trends in Student Populations

Because an important goal of the TIMSS 2007 assessment was to measure changes in students' mathematics achievement since 1995, it was important to track any changes in population composition and coverage since then that might be related to student achievement. Exhibits 9.16 and 9.17 present, for each TIMSS participant, four attributes of the fourth grade populations sampled in 2007, 2003, and 1995 and the eighth grade populations sampled in 2007, 2003, 1999, and 1995: number of years of formal schooling, average student age at time of testing, percentage of students excluded from the assessment, and overall sampling participation rate (after replacement). Most countries and provinces were very similar with regard to these attributes across the three TIMSS cycles at fourth grade and four cycles at eighth grade, although there have been changes in some countries in the age and grade structure of the assessed populations, and in the exclusion rate.

Although Australia, since 2003, has tested only fourth grade students for the fourth grade population and only eighth grade students for the eighth grade population, in 1995 the younger assessment population contained fourth grade students from some states and fifth grade students from other states, and similarly the older population contained a mixture of eighth and ninth grade students. Because of this, Australian students were somewhat older, on average, in 1995. The Russian Federation and Slovenia have undergone structural changes in the age at which children enter schools that are reflected in their samples. In 2003, the Russian fourth grade sample contained third-grade students from some regions and fourth-grade students from others, whereas all students were in fourth grade in 2007. At the eighth grade, there was still a mixture of seventh and eighth grade students in 2007, although with proportionally more eighth grade students, and correspondingly a higher average age. Slovenia is in transition towards having all children begin school at an earlier age so that they all will have four years of primary schooling at the fourth grade instead of three years, as was the case in 2003. At eighth grade, the transition was not complete in 2007.

In general, the exclusion rates do not exceed the TIMSS 2007 guidelines of 5 percent, and have not changed very much across assessments for most countries. Also, in most cases, the exclusion rates have decreased. However, the student exclusion rate was higher in 2007 than in previous assessments at fourth grade in the United States, the state of Minnesota, and the provinces

of Alberta and Quebec, and at eighth grade in Serbia, the United States, and the Canadian provinces of British Columbia and Quebec.

Exhibit 9.16 Trends in Student Populations – Fourth Grade

Country	Years of Formal Schooling*			Average Age at Time of Testing			Overall Exclusion Rates			Overall Participation Rates (After Replacement)		
	2007	2003	1995	2007	2003	1995	2007	2003	1995	2007	2003	1995
Armenia	4	4		10.6	10.9		3.4%	2.9%		96%	90%	
Australia	4	4	4 or 5	9.9	9.9	10.2	4.0%	2.7%	1.8%	95%	85%	66%
Austria	4		4	10.3		10.5	5.0%		2.8%	97%		69%
Chinese Taipei	4	4		10.2	10.2		2.8%	3.1%		100%	99%	
Czech Republic	4		4	10.3		10.4	4.9%		4.1%	92%		86%
England	5	5	5	10.2	10.3	10.0	2.1%	1.9%	12.1%	84%	76%	83%
Hong Kong SAR	4	4	4	10.2	10.2	10.1	5.4%	3.8%	2.7%	81%	83%	83%
Hungary	4	4	4	10.7	10.5	10.4	4.4%	8.1%	3.8%	96%	93%	92%
Iran, Islamic Rep. of	4	4	4	10.2	10.4	10.5	3.0%	5.7%	1.3%	99%	98%	97%
Italy	4	4		9.8	9.8		5.3%	4.2%		97%	97%	
Japan	4	4	4	10.5	10.4	10.4	1.1%	0.8%	3.0%	95%	97%	92%
Latvia	4	4	4	11.0	11.1	10.5	4.6%	4.4%	2.1%	92%	88%	69%
Lithuania	4	4		10.8	10.9		5.4%	4.6%		94%	87%	
Morocco	4	4		10.6	11.0		1.4%	2.2%		77%	81%	
Netherlands	4	4	4	10.2	10.2	10.3	4.8%	5.2%	4.4%	91%	84%	59%
New Zealand	4.5 – 5.5	4.5 – 5.5	4.5 – 5.5	10.0	10.0	10.0	5.4%	4.0%	1.3%	96%	93%	95%
Norway	4	4	4	9.8	9.8	9.9	5.1%	4.4%	3.1%	92%	88%	91%
Russian Federation	4	3 or 4		10.8	10.6		3.6%	6.8%		98%	97%	
Scotland	5	5	5	9.8	9.7	9.7	4.5%	1.5%	6.7%	88%	77%	76%
Singapore	4	4	4	10.4	10.3	10.3	1.5%	0.0%	0.0%	96%	98%	98%
Slovenia	4	3 or 4	3	9.8	9.8	9.9	2.1%	1.3%	1.9%	93%	91%	77%
Tunisia	4	4		10.2	10.4		2.9%	0.9%		99%	99%	
United States	4	4	4	10.3	10.2	10.2	9.2%	5.1%	4.7%	84%	78%	80%
Benchmarking Participants												
Alberta, Canada	4		4	9.8		10.0	7.6%		–	94%		91%
Minnesota, US	4		4	10.3		10.3	8.3%		–	97%		–
Ontario, Canada	4	4	4	9.8	9.8	9.9	6.3%	4.8%	–	92%	90%	92%
Quebec, Canada	4	4	4	10.1	10.1	10.3	6.4%	3.6%	–	84%	91%	81%

* Represents years of schooling counting from the first year of ISCED Level 1.
A dash (–) indicates comparable data are not available.

Exhibit 9.17 Trends in Student Populations – Eighth Grade

Country	Years of Formal Schooling*				Average Age at Time of Testing			
	2007	2003	1999	1995	2007	2003	1999	1995
Armenia	8	8			14.9	14.9		
Australia	8	8		8 or 9	13.9	13.9		14.2
Bahrain	8	8			14.1	14.1		
Botswana	8	8			14.9	15.1		
Bulgaria	8	8	8	8	14.9	14.9	14.8	14.0
Chinese Taipei	8	8	8		14.2	14.2	14.2	
Colombia	8			8	14.5			14.5
Cyprus	8	8	8	8	13.8	13.8	13.8	13.7
Czech Republic	8		8	8	14.4		14.4	14.4
Egypt	8	8			14.1	14.4		
England	9	9	9	9	14.2	14.3	14.2	14.0
Ghana	8	8			15.8	15.5		
Hong Kong SAR	8	8	8	8	14.4	14.4	14.2	14.2
Hungary	8	8	8	8	14.6	14.5	14.4	14.3
Indonesia	8	8	8		14.3	14.5	14.6	
Iran, Islamic Rep. of	8	8	8	8	14.2	14.4	14.6	14.6
Israel	8	8	8		14.0	14.0	14.1	
Italy	8	8	8		13.9	13.9	14.0	
Japan	8	8	8	8	14.5	14.4	14.4	14.4
Jordan	8	8	8		14.0	13.9	14.0	
Korea, Rep. of**	8	8	8	8	14.3	14.6	14.4	14.2
Lebanon	8	8			14.4	14.6		
Lithuania**	8	8	8.5	8	14.9	14.9	15.2	14.3
Malaysia	8	8	8		14.3	14.3	14.4	
Norway	8	8		8	13.8	13.8		13.9
Palestinian Nat'l Auth.	8	8			14.0	14.1		
Romania	8	8	8	8	15.0	15.0	14.8	14.6
Russian Federation	7 or 8	7 or 8	7 or 8	7 or 8	14.6	14.2	14.1	14.0
Scotland	9	9		9	13.7	13.7		13.7
Serbia	8	8			14.9	14.9		
Singapore	8	8	8	8	14.4	14.3	14.4	14.5
Slovenia	7 or 8	7 or 8		7	13.8	13.8		13.8
Sweden	8	8		8	14.8	14.9		14.9
Thailand	8		8		14.3		14.5	
Tunisia	8	8	8		14.5	14.8	14.8	
United States	8	8	8	8	14.3	14.2	14.2	14.2
Benchmarking Participants								
Basque Country, Spain	8	8			14.1	14.1		
British Columbia, Canada	8		8		13.9		13.9	
Massachusetts, US	8		8		14.2		14.1	
Minnesota, US	8			8	14.3			14.3
Ontario, Canada	8	8	8	8	13.8	13.8	13.9	14.0
Quebec, Canada	8	8	8	8	14.2	14.2	14.3	14.5

Note: In Bulgaria, the figures refer to the eighth grade mathematics population. Trends are not reported for their science population.

* Represents years of schooling counting from the first year of ISCED Level 1.

** Lithuania tested the same cohort of students as other countries, but later in 1999, at the beginning of the next school year. Korea tested the same cohort of students as other countries, but later in 2003, at the beginning of the next school year.

A dash (–) indicates comparable data are not available.

Exhibit 9.17 Trends in Student Populations – Eighth Grade (Continued)

Country	Overall Exclusion Rates				Overall Participation Rates (After Replacement)			
	2007	2003	1999	1995	2007	2003	1999	1995
Armenia	3.3%	2.9%			96%	89%		
Australia	1.9%	1.3%		0.8%	93%	83%		70%
Bahrain	1.5%	0.0%			97%	98%		
Botswana	0.1%	3.0%			99%	96%		
Bulgaria	3.4%	0.5%	4.6%	0.6%	94%	92%	84%	63%
Chinese Taipei	3.3%	4.8%	1.6%		99%	99%	93%	
Colombia	1.6%			3.8%	98%			86%
Cyprus	2.5%	2.5%	0.8%	0.0%	96%	96%	97%	97%
Czech Republic	4.6%		5.2%	4.9%	95%		96%	92%
Egypt	0.5%	3.4%			98%	97%		
England	2.3%	2.1%	5.0%	11.3%	75%	46%	77%	77%
Ghana	0.9%	0.9%			98%	93%		
Hong Kong SAR	3.8%	3.4%	0.8%	2.0%	75%	80%	75%	81%
Hungary	3.9%	8.5%	4.3%	3.8%	96%	94%	93%	87%
Indonesia	3.4%	0.4%	0.0%		97%	99%	97%	
Iran, Islamic Rep. of	0.5%	6.5%	4.4%	0.3%	98%	98%	98%	98%
Israel	22.8%	22.5%	16.1%		91%	94%	94%	
Italy	5.0%	3.6%	6.7%		96%	97%	97%	
Japan	3.5%	0.6%	1.3%	0.6%	91%	93%	89%	90%
Jordan	2.0%	1.3%	3.0%		96%	96%	99%	
Korea, Rep. of**	1.6%	4.9%	4.0%	3.8%	99%	98%	100%	95%
Lebanon	1.4%	1.4%			85%	91%		
Lithuania**	4.2%	2.6%	4.5%	6.6%	90%	84%	89%	83%
Malaysia	3.3%	4.0%	4.6%		98%	98%	99%	
Norway	2.6%	2.3%		2.2%	86%	85%		93%
Palestinian Nat'l Auth.	1.0%	0.5%			98%	99%		
Romania	1.8%	0.5%	3.7%	2.8%	97%	98%	97%	89%
Russian Federation	2.3%	5.5%	1.7%	6.3%	97%	96%	97%	95%
Scotland	1.7%	0.0%		2.2%	77%	76%		73%
Serbia	6.8%	2.9%			98%	96%		
Singapore	1.8%	0.0%	0.0%	4.6%	95%	97%	98%	95%
Slovenia	1.9%	1.4%		2.6%	92%	91%		77%
Sweden	3.6%	2.8%		0.9%	94%	87%		90%
Thailand	3.4%		3.3%		99%		99%	
Tunisia	0.0%	1.8%	0.1%		98%	98%	98%	
United States	7.9%	4.9%	3.9%	2.1%	77%	73%	85%	78%
Benchmarking Participants								
Basque Country, Spain	4.2%	5.8%			98%	98%		
British Columbia, Canada	17.7%		3.6%		94%		93%	
Massachusetts, US	8.4%		5.0%		92%		93%	
Minnesota, US	7.5%			–	93%			–
Ontario, Canada	6.2%	6.0%	5.1%	–	89%	89%	93%	90%
Quebec, Canada	13.6%	4.8%	1.3%	–	77%	85%	92%	89%

References

IEA. (2006). *Windows within-school sampling software (WinW3S)* [Computer software and manual]. Hamburg: IEA Data Processing and Research Center.