CHAPTER 5

The Science Curriculum

The first part of Chapter 5 presents information about the curricular goals in the TIMSS 1999 countries, referred to as the intended curriculum. Data are provided about how the curriculum is supported and monitored within each country and the relationship between national testing and the curriculum. The second part of the chapter contains teachers' reports about the science topics actually studied in their classrooms, also known as the implemented curriculum.


In comparing achievement across countries, it is important to consider differences in students' curricular experiences and how they may affect the science they have studied. At the most fundamental level, students' opportunity to learn the content, skills, and processes tested in the TIMSS 1999 assessment depends to a great extent on the curricular goals and intentions inherent in each country's policies for science education. Just as important as what students are expected to learn, however, is what their teachers choose to teach them. The lessons provided by the teacher ultimately determine what science students are taught.

Chapter 5 presents information about the curricular goals in the TIMSS 1999 countries and teachers' reports about the science content studied. Teacher's instructional programs for their classes are usually guided by an "official curriculum" that describes the science education that should be provided. The official curriculum can be communicated by means of documents or statements of various sorts (often called guides, guide-lines, or frameworks) prepared by the education ministry or by national or regional education departments. These documents or statements, together with supporting material such as instructional guides or mandated textbooks, are referred to as the intended curriculum.

To collect information about the intended science curriculum at the eighth grade in each of the TIMSS 1999 countries, the National Research Coordinators responsible for implementing the study completed questionnaires and participated in interviews. As part of the process, information was gathered about factors related to supporting and monitoring the implementation of the official curriculum, including the availability of teacher tra9(1v4g,instructional g5.2934 00260sessm-]TJT*-0.0002 Tc[(aents,)cess,o

Science Subjects Offered Up To and Including Eighth Grade

The most striking difference among science curricula of the TIMSS 1999 countries in eighth and earlier grades is that the sciences are taught as separate subjects in some countries and integrated to form a general science course in others. Exhibit 5.1 shows how science instruction is organized in these grades in the TIMSS 1999 countries. By the eighth grade, Chinese Taipei, Indonesia, and most of the European countries were teaching some or all of earth science, biology, physics and chemistry as separate subjects, not necessarily contemporaneously. Elsewhere, the common practice was to integrate the sciences into a general science curriculum.

At lower grade levels, science topics in some countries were incorporated in broader curriculum areas, such as "knowledge about nature and society" in Slovenia. Additional areas of study are included in grade 8 in some countries. For instance, Belgium (Flemish) included "technological educa m ogit4T8 physics and chem is some-39. These m eightine topicm is istr moscs an8

1 Australia: Yes in 4 of 8 states/territories.

² Canada: Results shown are for the majority of provinces.

3 Geography is considered to be an integrated social studies and natural science course at grade 8; geography teachers were not sampled in the TIMSS studies.



Belgium (Flemish): Curricula were introduced as follows: 1997-98 (biology): 1997 (technological education), early 1990 (physics): 1997 (earth science); 1997-99 (applied sciences); 1989 (scientific

How Do Countries Support and Monitor Curriculum Implementation?

Education systems use different ways to achieve the best match between the intended and the implemented curriculum. For example, teachers



What Countries Have Public Examinations in Science?

Using public examinations as a way to select students for university or academic tracks in secondary school can be an important motivating factor for student achievement. Exhibit 5.4 shows information on public examinations and their purpose. Thirty-six countries reported having public examinations or awards, at one or more grades, that include testing achievement in science. Most countries held their examinations in the final year of schooling for certification and selection to higher education (often, university education). Certification also provides students not going on to full-time post-secondary education with evidence of educational attainment for prospective employers. In about one-third of the countries, public examinations were also reported to be used to select students for entry to different types of secondary school, or to assign them to different tracks or courses within secondary schools. Providing feedback to policy makers in the educational system, schools, or both was also an important use of assessments in some countries.

Two countries reported having no public examinations in science. Belgium (Flemish) and Chinese Taipei were the only countries where decisions about promotion from one grade to the next, certification, and qualification for entrance to university were made at the school level without reliance on system-wide public examinations.

5.4

What Countries Have System-Wide Assessments in Science?

Although national public examinations can provide information of interest to national and regional policy makers, their main purpose is to make decisions about individual students. In comparison, system-wide assessments are designed primarily to inform policy makers about matters such as national standards of achievement of the intended curriculum objectives, strengths and weaknesses in the curriculum or how it is being implemented, and whether educational achievement is improving or deteriorating.

Exhibit 5.5 summarizes information about national assessments in science. Such assessments were conducted in 23 of the participating countries. Seven of these – Malaysia, Morocco, the Netherlands, the Philippines, Singapore, Tunisia, and Turkey – reported using public examinations as system-wide assessments, and therefore the same examination is featured in Exhibits 5.4 and 5.5. Of the 23 countries that reported conducting system-wide assessments, nine reported testing all students in the grade and 11 reported testing a sample from the grade. One of these countries, the Netherlands, reported testing both the entire grade level and a sample. Australia and Canada reported state- and provincial-level testing both for the entire grade and for a sample. In addition, two countries, Indonesia and the Russian Federation, reported administering periodic sample-based assessments at various grades for system-level feedback and research purposes, respectively. Most countries tested from two to four grades; Korea tested at six grades.

Generally, the purpose of the system-wide assessments was to provide feedback to government policy makers and the public. Several countries that reported assessing all students in a grade used these results in a variety of ways, including providing feedback to individual schools. England and Hungary also used information about individual students for course placement or guidance.

In addition to collecting information about examinations and assessments, questionnaires and interviews were used to determine whether, and to what extent, explicit achievement standards were a feature of intended curricula (see Exhibit R_{2.1} in the reference section). About twothirds of the countries reported that such standards were incorporated in their curricula or related documents. However, the term "achievement standards" means different things in different countries and was unfamiliar to some. Some countries regard them as learning objectives, and others include in this category performance indicators that describe levels of required or desired performance. Exhibit R_{2.1} includes countries that reported learning objectives or performance objectives as a component of their curriculum documents.

		. _		
	<			_ •· • · · · •
		···· · · · · · · · · · · · · · · · · ·		
Australia				
Relaium (Elemish)				
Bulgaria				
Canada				
Chile				
Chinese Taipei				
C prus				
C ech Republic				
England				
Hong Kong, SAR				
Hungar				
Indonesia				
Iran, Islamic Rep.				
Israel				
Ital				
Japan	_			
Jordan				
Koroa Bon of				
Latvia (LSS)				
Lithuania				
Macedonia, Rep. of				
Mala sia				
Moldova				
Morocco				
New Zealand				
Philippines				
Romania				
Russian Federation				
Singapore				
Slovak Republic				
Slovenia				
South Africa				
Thailand				
Turnsia				
Turke				
United States				

- Public examinations are also used for system-wide assessment purposes in these countries: Malaysia, Morocco, Netherlands, Philippines, Singapore, Tunisia, and Turkey.
- 2 $\,$ Australia: System-wide assessments are administered in 3 of 8 states/territories.
- es in these countries: Malaysia, ³ Canada: System-wide assessments are administered in 5 of 10 provinces.



The Science Curriculum

• -	1	 22

At grade 8, students take the following sciences: earth science is included in geography 6%;

How Do Countries Deal with Individual Differences?

The challenge of maximizing opportunity to learn for students with widely differing abilities and interests is met differently in different countries. Exhibit 5.7 summarizes questionnaire and interview data on how countries dealt with this issue in organizing the intended curricula.

Some countries indicated using me	ore th	an on	le me	thod of	f dealing v	vith				
individual differences among stude	ents, a	and in	these	e cases	the catego	ory				
describing the main method was re	eporte	ed. Th	ne mo	st com	mon appr	oach,				
found in 25 countries, was to have	the sa	ame i	ntend	led cur	riculum fo	or all				
witses indicated ussue ountrief.	0	u	n	d	i	n	S	C)	m





- 1 Czech Republic: There is the same curriculum with different levels for different groups in physics and chemistry (2 levels); there is one curriculum for all students, and teachers adapt to students' needs, in life science and earth science.
- 2 England: While there is one "programme of study" for grades 6-8, the document identifies nine performance-levels describing the types and range of performance that pupils working at a particular level should demonstrate.

³ United States: Most state standards are designed for all students.



				-								
				_								_
-	-	-	-	-	-	-	-	-	-	-	-	-

1 Australia: Results shown are for the majority of states/territories.

² Belgium (Flemish) and Russian Federation: The single codes are derived from a combination of codes for individual sciences.

³ Canada: Results shown are for the majority of provinces.

What Science Content Do Teachers Emphasize at the Eighth Grade?

5.9

Teachers from countries in which eighth-grade science was taught as a general or integrated course were asked what subject matter they had emphasized with their classes. Their responses are shown in Exhibit 5.9. In six of the 21 countries, at least 80 percent of students were in classes that emphasized science as a general/integrated subject. In Canada, Italy, and the United States, earth science was emphasized in considerably more classrooms than in other countries. Biology was more likely than the other sciences to be emphasized in Italy and Tunisia. Countries where relatively high proportions of students had seen emphasis on physics, chemistry, or both were Cyprus, Iran, Israel, Jordan, Korea, and South Africa.

				٨	· · ·	1.3.2		$\propto 1_{\rm c}$		
Australia Canada Chile C prus Ecologia	r r s	83 (2.6) 55 (3.5) 71 (4.0) 17 (3.6)	0 (0.3) 14 (2.3) 1 (0.9) 1 (1.3)	5 (1.6) 6 (1.7) 22 (3.4) 17 (3.2)	1 (0.4) 1 (0.7) 1 (0.9) 39 (4.5)	4 (1.3) 1 (0.6) 0 (0.0) 13 (2.6)	2 (0.7) 19 (2.7) 2 (1.1) 6 (2.3)	4 (1.2) 3 (1.2) 2 (1.2) 6 (2.8)		
Hong Kong, SAR Iran, Islamic Rep. Israel Ital Japan	S	92 (2.6) 53 (4.6) 34 (4.4) 0 (0.0) 64 (4.6)	 0 (0.0) 0 (0.0) 1 (0.0) 20 (3.2) 1 (1.0)	3 (1.5) 13 (2.7) 21 (3.9) 49 (3.9) 7 (2.4)	 0 (0.0) 14 (3.1) 3 (1.3) 13 (2.6) 6 (2.1)	 1 (0.0) 3 (1.4) 7 (2.5) 3 (1.2) 11 (2.7)	4 (1.9) 16 (2.9) 28 (4.5) 11 (2.6) 6 (2.1)	 0 (0.0) 1 (0.8) 6 (2.1) 3 (1.4) 5 (1.9)		
Jordan Korea, Rep. of Mala sia New Zealand Philippines		30 (4.1) 49 (4.0) 100 (0.0) 94 (1.7) 88 (2.7)	3 (1.4) 2 (1.0) 0 (0.0) 1 (0.5) 6 (2.1)	12 (3.0) 10 (2.0) 0 (0.0) 2 (0.9) 3 (1.2)	19 (3.5) 5 (1.6) 0 (0.0) 1 (0.6) 0 (0.0)	14 (3.2) 5 (1.7) 0 (0.0) 0 (0.0) 1 (0.8)	21 (3.6) 26 (3.2) 0 (0.0) 2 (1.6) 2 (1.2)	1 (0.8) 4 (1.6) 0 (0.0) 1 (0.6) 1 (0.0)		
Singapore South Africa Thailand Tunisia Turke United States	r r	69 (4.1) 48 (5.0) 81 (3.2) 8 (2.4) 74 (3.1) 41 (4.7)	0 (0.0) 1 (0.8) 7 (2.0) 8 (2.1) 0 (0.3) 28 (4.8)	5 (2.0) 7 (2.5) 4 (1.6) 81 (3.4) 3 (1.3) 5 (1.5)	4 (1.8) 8 (2.8) 1 (0.8) 1 (0.0) 8 (2.1) 2 (0.8)	7 (2.3) 5 (2.3) 3 (1.3) 0 (0.0) 2 (1.0) 3 (1.0)	11 (2.5) 31 (4.0) 3 (1.4) 0 (0.0) 11 (2.7) 21 (3.1)	4 (1.6) 1 (0.9) 1 (1.0) 3 (1.5) 2 (0.9) 1 (0.4)		
-		58 (0.8)	5 (0.4)	14 (0.5)	6 (0.4)	4 (0.4)	11 (0.6)	2 (0.3); OI		

Background data provided by teachers.

() Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

A dash (-) indicates data are not available.

An "r" indicates teacher response data available for 70-84% of students. An "s" indicates teacher response data available for 50-69% of students.

The Science Curriculum



percent of students were expected to have been taught substantial percentages of the topics. In addition, if content within a topic area required different responses, National Research Coordinators chose the response that best represented the entire topic area and noted the discrepancy (see Exhibit A.11 cocho3otehnt ndix for detailsdc.rriculum



1.1..

- Classification of matter (elements, compounds, solutions, mixtures)
- Structure of matter (atoms, ions, molecules, cr stals)
- Formation of solutions (solvents, solutes, soluble/insoluble substances)
- Acids, bases, and salts
- Chemical reactivit and transformations (definition of chemical change, oxidation, combustion)
- Energ and chemical change (exothermic and endothermic reactions, reaction rates)
- Chemical bonding and compound formation (ionic, covalent)
- Chemical equations
- Atomic structure
- Atomic number and atomic mass
- Periodic table
- Valenc

and the second second

- Pollution (acid rain, global warming, o one la er, water pollution)
- Conservation of natural resources (land, water, forests, energ resources)
- Food suppl and production, population, and environmental effects of natural and man-made events

- Scientific method (formulating h potheses, making observations, drawing conclusions, generali ing)
- Experimental design (experimental control, materials, and procedures)
- Scientific measurements (reliabilit, replication, experimental error, accurac, scales)
- Using scientific apparatus and conducting routine experimental operations
- Gathering, organi ing, and representing data (units, tables, charts, graphs)
- Describing and interpreting data

Topics included in the curriculum and teacher questionnaires (intended and implemented curriculum).

Topics also included in the curriculum questionnaire (intended curriculum).

Background data provided by National Research Coordinators according to the national curriculum. NRCs indicated the percentage of students who should have been taught each of the topics listed in exhibit 5.10. The response categories were: all or almost all of the students (at least 90%): about half of the students; only the more able students (top track - about 25%); only the most advanced students (10% or less); not included in curriculum through grade 8. (See reference exhibits R2.3-R2.8 for detail by topic.)

A dash (-) indicates data are not available.



and the Netherlands, reported having taught "classification of matter" and "structure of matter" to 97 percent or more of their students. Most of these countries reported that over 90 percent of their students were taught "chemical reactivity and transformations" as well. Furthermore, in both Hungary and the Netherlands, 97 percent or more of the students were reported to have been taught all the topic areas. In contrast, in Belgium (Flemish) and Tunisia, teachers reported that fewer than 15 percent of their students were taught each of the chemistry topic areas.

Most students in most countries were taught environmental and resource issues topics (see Exhibit 5.16), especially "pollution" and "conservation," with 21 countries teaching these topics to 75 percent or more of their students. One country, Japan, reported teaching fewer than 30 percent of their students each of the topics in this area.

5.16

184

Chapter

Each of the scientific inquiry and the nature of science topics (see Exhibit 5.17) was taught to 75 percent or more of the students, on average internationally. Ninety percent or more of the students in four countries – England, the Netherlands, Romania, and Singapore – were taught all six topic areas. Teachers in all countries taught each topic to more than 60 percent of their students except in seven countries: Belgium (Flemish), Iran, Israel, Jordan, South Africa, Tunisia, and Turkey.

	Earth's physical features (layers, landforms, bodies of water, rocks, soil)	Earth's atmosphere (layers, composition, temperature,	Earth processes and history (weather and climate, physical cycle, plate tectonics, fossils)	Earth in the solar system and the universe (interactions between earth, sun, and moon; relationship to planets and stars)
	r	r	r	r
	r	r	r	r
		r	r	r
	S	S	s	S
			1	
	S	S	S	S
	S	s	S	s
	5	r	5	r
	s	r	s	S
Ital				
	s	r	s	r
	5		5	
			r	
				r
			r	
	s	s		s
		r		r
	r	r	r	r

r	r	r	r r r S	r r r S	r r s
r 100 s	r	r	s s	r	r S
100		r	r	r	r
r	r	r	r	r	r

	، مرابع ا مرابع مرابع ا مرابع ا مراب مراب مراب مراب مراب مراب مراب مراب			a e ú	1. s. 	. 1	fiifisf	
Australia	r 91 (2.4)	r 80 (3.2)	r 71 (3.2)	r 76 (3.3)	r 39 (4.1)	r 48 (4.4)	r 72 (3.2)	r 45 (4.0)
Beienteriku	s 58 (5.3) r 97 (1.7)	s 8(2.9) r 89(2.9)	s 35 (4.7) r 98 (1.0)	s 54 (5.4) r 97 (1.3)	s 5 (2.1) r 87 (3.3)	s 31 (4.0) r 84 (6.9)	s 38 (4.3) r 97 (1.4)	s 33 (4.5) r 96 (1.9)
	r 97 (1.3)	s 44 (3.4)	r 82 (2.6)	r 91 (2.1)	s 35 (3.8)	s 50 (4.0)	s 48 (3.3)	s 56 (3.1)
	96 (1.7)	85 (3.0)	92 (2.2)	96 (1.4)	r 52 (4.3)	r 61 (4.8)	r 57 (4.1)	52 (3.7)
	r 100 (0.0)	r 28 (5.4)	r 96 (2.5)	r 100 (0.0)	s 11 (3.9)	s 88 (3.4)	s 20 (3.2)	s 12 (3.9)
	96 (2.1)	96 (2.0)	94 (2.4)	98 (1.3)	10 (3.1)	81 (4.1)	71 (4.8)	100 (0.2)
	s 97 (1.4) 80 (3.4)	s 66 (4.1) 83 (3.0)	s 96 (1.7) 14 (2.8)	s 92 (2.8) 49 (4.0)	s 82 (3.6) 44 (3.7)	s 98 (1.1) 17 (3.2)	s 97 (1.8) 35 (4.1)	s 98 (1.1) 51 (3.6)
	r 87 (3.4)	r 34 (4.9)	87 (3.4)	84 (3.2)	r 58 (4.6)	r 50 (5.2)	83 (3.5)	r 41 (4.9)
	98 (1.2)	92 (2.3)	100 (0.2)	97 (1.5)	87 (3.1)	58 (4.0)	97 (1.5)	98 (1.2)
	93 (2.2) 100 (0.0)	79 (3.7) 99 (0.9)	85 (3.4) 100 (0.0)	91 (2.5) 96 (1.2)	90 (2.4) r 48 (4.8)	90 (2.4) 97 (1.5)	60 (4.5) 97 (1.2)	85 (3.6) 69 (3.8)
	94 (1.9)	89 (2.6)	r 40 (4.7)	r 35 (4.0)	r 7 (2.6)	r 11 (3.2)	r 76 (4.1)	r 19 (3.8)
	98 (1.2)	89 (2.6)	77 (3.1)	95 (1.5)	44 (4.0)	38 (4.0)	55 (3.9)	85 (2.9)
	99 (0.8)	43 (4.1) 99 (0.8)	92 (2.2)	99 (0.9) 94 (2.4)	99 (1.3) 97 (1.4)	99 (1.3) 98 (1.1)	90 (2.8) 88 (2.9)	20 (3.1) 99 (0.8)
	95 (1.9)	66 (4.1)	63 (4.3)	85 (3.1)	33 (3.9)	41 (4.0)	96 (1.7)	87 (2.6)
	98 (1.2)	55 (4.4)	71 (4.1)	77 (3.9)	83 (3.4)	90 (2.2)	8 (2.5)	71 (4.5)
	r 98 (1.2)	r 95 (2.1)	r 98 (1.3)	97 (1.5)	r 19 (3.8)	92 (2.3)	98 (1.1)	97 (0.9)
	83 (3.4)	29 (4.1)	81 (3.6)	80 (3.4)	87 (2.6)	89 (2.6)	36 (4.3)	76 (3.5)
	100 (0.0)	r 100 (0.0)	100 (0.0)	100 (0.0)	100 (0.0)	100 (0.0)	100 (0.0)	100 (0.0)
	94 (1.9) 95 (1.8)	74 (3.6) 77 (3.5)	78 (3.4) 94 (2.0)	78 (3.3) 89 (2.6)	24 (3.3) 58 (4.7)	69 (4.0) 70 (4.4)	34 (4.0) 63 (4.6)	51 (4.2) 85 (2.8)
	100 (0.0)	91 (2.5)	96 (1.8)	99 (0.7)	16 (3.5)	98 (1.2)	98 (1.5)	98 (1.1)
					 95 (2.4)			
	88 (2.8)	r 48 (4.5)	75 (3.7)	r 56 (4.9)	r 27 (4.3)	r 35 (4.4)	92 (2.0) 89 (2.5)	r 39 (5.2)
	r 76 (4.2)	r 76 (4.1)	r 53 (4.9)	r 60 (4.6)	r 34 (4.2)	r 27 (4.4)	r 49 (5.0)	r 26 (4.4)
	s 9 (3.1) 99 (0.5)	s 3 (1.8) 96 (1.9)	s 7 (2.6) 98 (1.4)	s 15 (4.0) 100 (0.0)	s 6 (2.5) r 46 (4.5)	s 9 (3.1) 93 (2.4)	s 12 (3.6) 96 (1.8)	s 13 (3.4) 99 (0.6)
	r 93 (1.7)	r 86 (2.6)	r 76 (3.4)	r 82 (3.0)	r 65 (3.8)	r 67 (3.3)	r 70 (3.2)	r 75 (3.4)
	91 (0.4)	71 (0.6)	75 (0.5)	83 (0.5)	52 (0.6)	68 (0.6)	67 (0.6)	65 (0.6)



TIMS

Australia Belgium (Flemish) Bulgaria Canada Chile	r r s s	r 45 (3.9) r 82 (3.7) s 89 (3.3) s 90 (2.2) 97 (1.3)	r 40 r s s
Chinese Taipei C prus C ech Republic England Finland	r S S	r 48 (4.4) s 89 (3.7) 92 (2.5) s 71 (5.1) 77 (4.0)	
Hong Kong, SAR Hungar Indonesia Iran, Islamic Rep. Israel	r	r 54 (5.3) 99 (1 85	
Ital Japan Jordan Korea, Rep. of Latvia (LSS)	r		
Lithuania Macedonia, Rep. of Mala sia Moldova Morocco	r		
Netherlands New Zealand Philippines Romania Russian Federation			
Singapore South Africa Thailar Tu			
Unit -			

nation

	-					
		2		• • •		
	1 1	. .		- • •	- /	1.4.2.4
	-	-				
	· · · · · · · · ·	·		<u>.</u>		,
	· · ·		• • •	- ·		
Australia	98 (0.7)	r 95 (1.2)	r 78 (3.5)	98 (1.2)	99 (0.5)	96 (2.0)
Belgium (Flemish)	r 86 (3.8)	r 46 (4.6)	r 64 (4.6)	r 66 (4.9)	r 91 (2.8)	r 90 (3.2)
Bulgaria	хх	хх	хх	хх	хх	хх
Canada	r 99 (0.5)	r 97 (1.7)	s 84 (2.8)	r 99 (0.8)	r 100 (0.2)	r 99 (0.7)
Chile	98 (1.2)	86 (3.1)	r 71 (3.6)	78 (3.2)	93 (2.0)	91 (1.9)
Chinese Taipei	85 (3.2)	71 (4.0)	83 (3.3)	90 (2.7)	68 (4.0)	69 (3.9)
C prus	r 100 (0.0)	r 93 (3.0)	r 85 (3.5)	r 93 (2.5)	s 88 (3.0)	r 92 (2.3)
C ech Republic	r 79 (4.4)	r 73 (4.9)	r 81 (4.4)	r 80 (4.8)	r 86 (3.7)	r 81 (4.8)
England	s 96 (1.6)	s 95 (1.9)	s 92 (2.2)	s 98 (0.9)	s 98 (0.8)	s 98 (0.9)
Finland	89 (2.8)	89 (2.5)	82 (2.9)	84 (2.7)	90 (2.6)	92 (2.2)
Hong Kong, SAR	85 (3.4)	68 (4.5)	63 (4.8)	88 (3.1)	81 (3.4)	r 80 (3.3)
Hungar	96 (1.7)	93 (1.9)	80 (3.5)	77 (3.7)	97 (1.7)	99 (0.7)
Indonesia	90 (2.8)	63 (4.1)	67 (4.6)	78 (4.2)	80 (3.8)	71 (4.0)
Iran, Islamic Rep.	r 64 (4.3)	77 (3.5)	r 54 (4.5)	83 (3.3)	r 57 (4.4)	r 60 (4.1)
Israel	r 91 (2.6)	91 (2.7)	r 55 (4.6)	r 84 (3.5)	82 (3.7)	88 (3.0)
Ital	100 (0.0)	94 (1.8)	84 (3.1)	84 (3.2)	95 (1.7)	94 (1.8)
Japan	90 (2.6)	96 (1.8)	77 (3.4)	99 (1.0)	97 (1.6)	95 (1.9)
Jordan	r 58 (4.7)	r 55 (4.8)	r 53 (5.0)	83 (3.2)	r 78 (4.0)	75 (4.2)
Korea, Rep. of	93 (2.1)	89 (2.6)	84 (3.1)	99 (0.7)	92 (2.1)	86 (2.9)
Latvia (LSS)	r 82 (3.8)	r 95 (2.1)	r 61 (5.3)	r 82 (3.9)	r 92 (2.9)	r 91 (2.8)
Lithuania						
Macedonia, Rep. of	s 87 (3.9)	ХХ	хх	хх	s 84 (4.8)	s 85 (4.7)
Mala sia	87 (3.2)	76 (4.2)	68 (4.0)	95 (2.3)	83 (3.3)	83 (3.4)
Moldova						
IVIOrocco						
Netherlands	92 (3.7)	96 (3.0)	99 (0.7)	100 (0.0)	100 (0.0)	100 (0.0)
New Zealand	99 (0.8)	96 (1.7)	85 (3.3)	97 (1.8)	99 (0.6)	99 (1.0)
Philippines	100 (0.4)	96 (1.7)	87 (2.9)	90 (2.7)	97 (1.4)	98 (1.1)
Romania Russian Federation	r 94 (2.5)	r 92 (3.0)	r 90 (3.0)	r 94 (2.3)	r 95 (2.2)	r 96 (2.1)
Russian Federation						
Singapore	94 (2.2)	r 93 (2.6)	r 91 (3.0)	9/ (1./)	95 (2.1)	96 (1.9)
South Africa	r 66 (4.1)	r 65 (4.1)	r 53 (4.8)	r /3 (4.2)	r 68 (4.8)	r 69 (3.9)
i nailand	90 (2.2)	89 (2.4)	/6 (4.0)	93 (2.0)	8/ (3.1)	82 (3.2)
Tunisia	r 85 (3.4)	r 84 (3.5)	r 47 (5.2)	r /3 (4.1)	r /U (3.8)	/9 (3.7)
lunited Chet	r 58 (4.3)	r /6 (3.4)	r 55 (4.0)	r 65 (4.4)	r 6/ (4.6)	r 59 (4.7)
United States	r 99 (0.6)	r 97 (1.2)	r 89 (2.5)	r 95 (1.4)	r 97 (1.4)	r 98 (1.1)
	88 (0.5)	84 (0.6)	75 (0.7)	87 (0.5)	87 (0.5)	87 (0.5); OUF

Can Meaningful Comparisons Between Intended and Implemented Curricula Be Made?

The TIMSS 1999 results indicate some discrepancies in a number of countries between the intended curriculum in science and the implemented curriculum as reported by teachers. There are many cases of topics intended to be taught to all, or almost all, students in a country for which teachers reported lower coverage. Interestingly, there are even more cases for which teachers reported greater topic coverage than would be expected from the intended curriculum. Such discrepancies are consistent with previous IEA studies.² However, considering the broad nature of the topic areas, care should be taken in interpreting the results. Further analysis will need to be done within each country to strengthen the match between the intended and implemented curricula.

² Livingstone, I.D., (1986), Second International Mathematics Study: Perceptions of the Intended and Implemented Mathematics Curriculum, Washington, D.C., Center for Statistics, U.S. Department of Education.