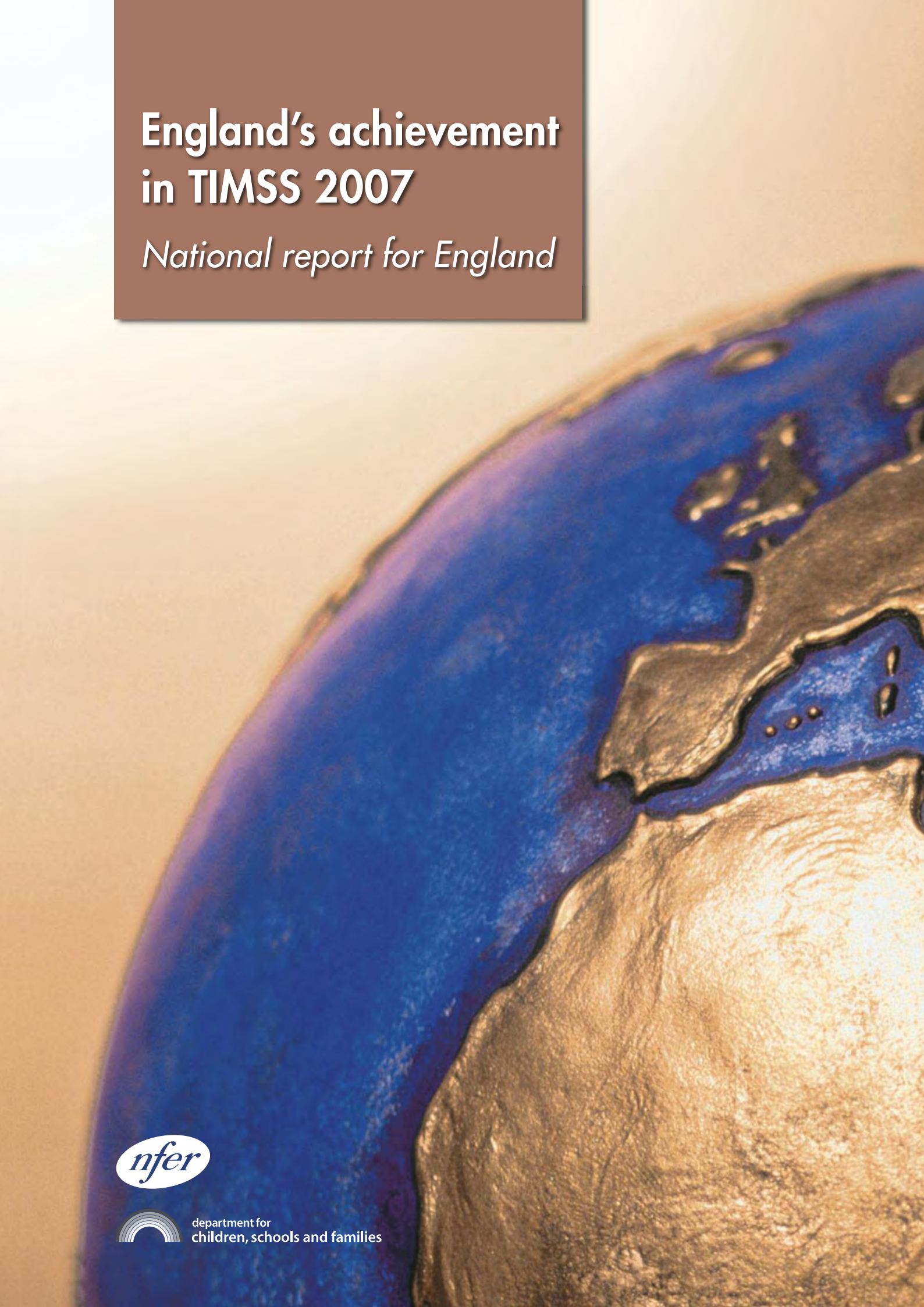
England's achievement in TIMSS 2007

National report for England



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National report for England

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1 Executive summary

1.1 The 2007 TIMSS survey

The 2007 Trends in International Mathematics and Science Study, TIMSS 2007, is the fourth in a series of comparative international surveys of mathematics and science achievement. TIMSS is administered on a four-yearly cycle, so the 2007 survey updates the picture of performance from 2003. England has participated in all of the TIMSS studies, so comparisons with all of the earlier ones can be made where appropriate. The 2007 study was similar in structure to that in 2003, with two grades tested: grade 4 pupils (year 5 in England) and grade 8 pupils (year 9 in England). TIMSS 2007 involved approximately 425,000 pupils in 59 countries around the world. England met the stringent sampling standards for both pupils and schools in both grades. Some 143 primary schools and 137 secondary schools participated.

1.2 England's overall performance in the 2007 TIMSS survey

Grade 4 science (year 5)

- England's score, 542, was one of the highest, and is statistically significantly higher than the TIMSS scale average of 500.
- Only three countries, Singapore (587), Chinese Taipei (557), and Hong Kong (554) had scores that were statistically significantly higher than England's.
- Seven other countries, Japan (548), the Russian Federation, Latvia, the United States, Hungary, Italy and Kazakhstan (533), performed at a similar level to England.
- England outscored all other countries including Germany, Australia, Austria, Sweden, New Zealand and Scotland.
- England's high level of performance in 2003 was maintained: the 2007 score of 542 was similar to the 540 achieved in 2003. Performance in 2003 was higher than in the earlier 1995 survey (528)
- In summary, England's performance in science at year 5 remains amongst the best in the world.

Grade 4 mathematics (year 5)

- England's score, 541, was again very high, and significantly higher than in 2003.
- Only four countries outscored England: Hong Kong (607), Singapore (599), Chinese Taipei (576), and Japan (568).
- There is a larger gap between England and the highest scoring Pacific Rim countries in grade 4 mathematics than in grade 4 science.

Erratum
Due to a labelling error in the international dataset, all findings related to the cognitive domains of 'Knowing' and 'Applying' have been inadvertently reversed in the national report for England. Findings reported as 'Knowing' actually relate to the 'Applying' domain, and findings reported as 'Applying' actually relate to the 'Knowing' domain. This applies to chapters 1, 5 and 6 of the national report and to the separate executive summary booklet.

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- Four countries produced scores not significantly different from England's: Kazakhstan (549), the Russian Federation, Latvia and the Netherlands (535).
- Countries outperformed by England included the United States, Germany, Denmark, Italy, Sweden, Scotland, Australia and New Zealand.
- England improved on its level of performance in 2003: the 2007 score of 541 was 10 points higher than the 531 achieved in 2003. This was continued improvement as the 2003 score was much higher than in the earlier 1995 survey (484).
- As in science, England's performance in mathematics at year 5 is amongst the best in the world and continues to improve.

Grade 8 science (year 9)

- England's score for grade 8 science, 542, was again one of the highest.
- Four countries, Singapore (567), Chinese Taipei (561), Japan (554) and Korea (553) outperformed England.
- Four countries, Hungary (539), the Czech Republic, Slovenia and Hong Kong (530) performed at a similar level to England.
- Countries outperformed by England included the Russian Federation, the United States, Italy, Sweden, Scotland and Australia.
- England maintained the high standard set in 2003 but did not improve on it. The scores for the two surveys, 542 in 2007 and 544 in 2003 were very similar.
- As at year 5 science, England's performance at year 9 was amongst the best in the world.

Grade 8 mathematics (year 9)

- In grade 8 mathematics England's score, 513, was high enough for only five countries to have significantly higher levels of performance.
- The countries that outscored England, all from the Pacific Rim, were Chinese Taipei (598), Korea (597), Singapore (593), Hong Kong (572) and Japan (570).
- England performed similarly to Hungary (517), the Russian Federation, the United States, Lithuania and the Czech Republic (504).
- The differences in scores between England's group and the top five countries is much larger in grade 8 mathematics than in science or grade 4 mathematics: 57 scale points behind Japan and 85 points lower than Chinese Taipei.
- Countries outscored by England included Australia, Sweden, Scotland, Italy and Norway.
- England's performance level has improved from that shown in 2003. The 2007 score, 513, was significantly higher than the 2003 score of 498, a 15 point increase.

Summary of overall performance

- The only countries to outscore England in any of the four assessments were Asian Pacific Rim countries.
- No European country outperformed England in any of the four assessments, and nor did the United States or Australia.
- England's performance in both grades and subjects was very strong.
- In mathematics England's scores have improved in both grades, a continued increase at grade 4 and the first upward trend at grade 8.
- In science the previous high standard has been maintained at both grades.

Exhibit 1.1, below, shows England's overall position in all four assessments compared with that of other participants.

Exhibit 1.1 Summary of England's standing in TIMSS 2007

TIMSS 2007	Grade 4 *Total 36 countries*				Grade 8 *Total 49 countries*			
	Science	***Scale Score***	**Mathematics**	***Scale Score***	**Science**	***Scale Score***	**Mathematics**	***Scale Score***
HIGHER	**3 countries**		**4 countries**		**4 countries**		**5 countries**	
Countries performing at a significantly higher level than England	Singapore	587	Hong Kong	607	Singapore	567	Chinese Taipei	598
	Chinese Taipei	557	Singapore	599	Chinese Taipei	561	Korea	597
	Hong Kong	554	Chinese Taipei	576	Japan	554	Singapore	593
			Japan	568	Korea	553	Hong Kong	572
							Japan	570
SIMILAR	**8 countries**		**5 countries**		**5 countries**		**6 countries**	
Countries performing at a similar level to England	Japan	548						
	Russian Federation	546	Kazakhstan	549				
	Latvia	542	Russian Federation	544			Hungary	517
	England	**542**	**England**	**541**	**England**	**542**	**England**	**513**
	United States	539	Latvia	537	Hungary	539	Russian Federation	512
	Hungary	536	Netherlands	535	Czech Republic	539	United States	508
	Italy	535			Slovenia	538	Lithuania	506
	Kazakhstan	533			Hong Kong	530	Czech Republic	504
LOWER	**25 countries**		**27 countries**		**40 countries**		**38 countries**	
Countries performing at a significantly lower level than England	*Including ...*		*Including ...*		*Including ...*		*Including ...*	
	Germany	528	United States	529	Russian Federation	530	Australia	496
	Australia	527	Germany	525	United States	520	Sweden	491
	Austria	526	Denmark	523	Australia	515	Scotland	487
	Sweden	525	Australia	516	Sweden	511	Italy	480
	New Zealand	504	Italy	507	Scotland	496	Norway	469
	Scotland	500	Sweden	503	Italy	495		
			Scotland	494				
			New Zealand	492				

TIMSS 2007 International Reports available at http://timssandpirls.bc.edu/TIMSS2007 www

1.3 England's performance at the international benchmarks

The international benchmarks are score levels which can be used to compare country performance at different attainment levels. The benchmark scores are

625 for the advanced benchmark
550 for the high benchmark
475 for the intermediate
400 for the low benchmark

These can be compared to the scale average of 500. A score of 625, advanced benchmark, represents a very high level of performance. England's performance at these bench marks can be summarised as:

Grade 4 science (year 5)

- Advanced Benchmark 14% | High Benchmark 48% | Intermediate Benchmark 81% | Low Benchmark 95%
- England's distribution was close to that of other countries with similar overall scores to England, such as Hungary, Japan and the United States.
- The proportions reaching each benchmark were similar to those in 2003, reflecting England's similar overall scores in the two surveys.

Grade 4 mathematics (year 5)

- Advanced Benchmark 16% | High Benchmark 48% | Intermediate Benchmark 79% | Low Benchmark 94%
- England's distribution was close to that of several other countries with similar overall scores to England, such as the Russian Federation, but ahead of the Netherlands and Latvia at the advanced and high benchmarks.
- The proportions reaching each benchmark in grade 4 mathematics and grade 4 science were very similar, as were England's overall scores.
- England's overall rise in score was reflected by increases in the proportions of pupils reaching the high and intermediate benchmarks but not the advanced benchmark. The improved performance was mainly from middle attainers.

Grade 8 science (year 9)

- Advanced Benchmark 17% | High Benchmark 48% | Intermediate Benchmark 79% | Low Benchmark 94%

- The proportion of pupils in England at the advanced benchmark was the equal of that of Japan and Korea, countries which outscored England overall. These two countries, however, had higher proportions than England at the other benchmarks.
- Compared with other countries with similar overall scores, the tendency was for England to do rather better at the advanced and high benchmarks, but not as well at the intermediate and low benchmarks.
- The proportions reaching each benchmark in grade 8 science were similar to both grade 4 science and grade 4 mathematics, reflecting England's similar overall scores of 541 or 542 in these three assessments.
- The proportions reaching each benchmark were similar to those in 2003, as suggested by England's similar overall scores in the two surveys.

Grade 8 Mathematics (year 9)

Advanced Benchmark	High Benchmark	Intermediate Benchmark	Low Benchmark
8%	35%	69%	90%

- The proportions of pupils reaching the four benchmarks were lower than for science and for grade 4 mathematics, reflected in England's overall score of 513 as opposed to 541/2 elsewhere.
- The proportions of pupils at the benchmarks were close to that of other countries with similar overall scores to England, for example Hungary, the United States and the Russian Federation.
- England's overall rise in score was reflected by increases in the proportions of pupils reaching the high and intermediate benchmarks but not the advanced benchmark. As in grade 4 mathematics, the improved performance was mainly from middle attainers.

Summary of performance at the international benchmarks

- The proportion of pupils reaching each international benchmark in England was usually very close to that of countries performing at a similar level overall, but behind that of the high scoring Pacific Rim countries.
- The proportion of pupils reaching each international benchmark in England was very similar for grade 4 mathematics and science and for grade 8 science, around 15 per cent for the advanced benchmark, 48 per cent for high, 80 per cent for intermediate and 94 per cent for low. This reflected England's very close overall scores in these three assessments. The proportions in grade 8 mathematics were lower, matching the lower overall score for this assessment.
- The improvement in performance in mathematics at both grades was accompanied by higher numbers of pupils reaching the high and intermediate benchmarks, but not the advanced benchmark. The improved overall performance was associated most strongly by improvement in the middle score range.

1.4 England's performance in the content and cognitive domains

In TIMSS 2007 items were designed to address different content areas of the TIMSS assessment framework, which vary by grade and subject. Items were also designed to make different cognitive demands on pupils - assessing knowing, applying or reasoning. These cognitive categories were the same for both grades and subjects.

England's performance in the separate areas was compared to England's mean score across the areas, in order to identify which were relative strengths or weaknesses in each case. A relative weakness in one area does not necessarily imply that performance in that area was low: it might still be well above the scale average of 500. This was so for England, in all but one case.

Grade 4 science (year 5)

- England's performance was strong in all content areas but was best in physical science, (physics and chemistry), 543, and this was ahead of that in life science (biology), 532. England's score in earth science was 538.
- The scores for knowing, applying and reasoning were quite similar, between 536 and 543.

Grade 4 mathematics (year 5)

- England's performance was strong in all content areas but was best in data display (547) and geometric shapes and measures (548). Performance in number was significantly lower, at 531, indicating a relative weakness in, for example, computation.
- The scores for knowing, applying and reasoning were again quite similar, between 537 and 544.

Grade 8 science (year 9)

- England's general performance was very high, but particular strengths were physics (545) and biology (541). The lowest performance was earth science (529). The score for chemistry was 534, lower than for physics.
- In the cognitive domains England scored at a high level in each one, but better in reasoning (547) than in knowing (538) and applying (530), a pattern not seen at grade 4.

Grade 8 mathematics (year 9)

- In grade 8 mathematics England showed a sharp profile of differences in the content areas. The score for data and chance, 547, was much higher than for number and geometry, both 510. Performance was weakest in algebra (492).
- In the cognitive domains England produced higher scores in reasoning (518) and knowing (514) than in applying (503). Better performance in items classified as testing reasoning than in those testing applying was also apparent at grade 8 science.

Summary of performance in the content and cognitive domains

Within England's high level of performance, relative strengths and weaknesses were:

- In grade 4 science England's performance in the different content areas was reasonably consistent, but at grade 8 greater differences were evident, pupils scoring highest in physics and lowest in earth science.
- Differences in mathematics content areas were more marked. In grade 4 the score for number was significantly lower than that for geometric shapes and measures or for data display. At grade 8, data display was England's real strength and algebra a large weakness.
- In the cognitive domains performance at grade 4 was reasonably consistent. In grade 8 science items assessing reasoning were England's strong point while in grade 8 mathematics scores for applying were lower than those for knowing and reasoning.
- Countries outscoring England overall showed varied profiles across both the content and cognitive domains in both subjects and grades. No one pattern of performance was associated with higher score levels than that of England.
- Similarly, countries scoring at a similar level to England displayed a range of different relative strengths and weaknesses in both the content and cognitive domains.

1.5 Gender differences

As well as looking at overall performance international studies such as TIMSS also allow us to look at patterns of performance by gender, and to compare these with those found in other countries.

At subject level

- England was one of only seven of the 26 countries which tested both grades to show no overall gender differences in mathematics or science at either grade. Japan, Chinese Taipei and Hong Kong, all high scoring Asian Pacific Rim countries, also shared this pattern.
- At grade 4 all but one of our Western European neighbours that participated in TIMSS 2007 showed at least one overall gender difference. These included Scotland, Germany, Austria, Italy and the Netherlands.
- At grade 8 a number of developed countries showed at least one overall gender difference. These included the United States, Italy, Korea, Australia, and Singapore.

Below subject level

- Below subject level (for example, in different content areas) gender differences were unusual in England but some were found. None of these differences was large enough to lead to an overall difference at subject level. The only differences found are summarised below.
- In grade 4 science girls outscored boys on life science while the reverse was true for earth science. Girls also outscored boys on items addressing reasoning.

- In grade 4 mathematics, girls outscored boys on items assessing geometric shapes and measures.
- In grade 8 science boys outperformed girls in physics and earth science. Boys also outscored girls on items assessing knowing and applying, but not reasoning.
- In grade 8 mathematics boys outperformed girls in number.

Trends over time

- In grade 4 science there were no changes over time by gender, matching the overall lack of change over this period.
- In grade 4 mathematics girls improved their performance from 2003 to 2007, building on their gain from 1995 to 2003. Boys consolidated their gain from 1995 to 2003.
- In grade 8 science there was no change over time by gender, matching the overall lack of trend over this period.
- In grade 8 mathematics boys improved their performance from 2003 to 2007, building on their gain from 1995 to 2003. Girls consolidated their gains from 1995 and 1999 to 2003.

Gender differences in TIMSS compared with those from other sources

- The lack of overall gender differences in mathematics and science in TIMSS 2007 is broadly in line with what is currently found in other national assessments.
- The overall gender differences in favour of boys found in the 2006 PISA assessment of scientific literacy in 15 year olds were not found in TIMSS, possibly because of differences in focus between the two assessments.

Summary of gender differences

- England was relatively unusual in showing no overall gender differences for mathematics and science in either grade.
- Girls improved their performance in grade 4 mathematics, while at grade 8 the boys improved on previous mathematics performance.

1.6 Attitudes

International Surveys also provide rich information on how pupils view different subjects and aspects of the schools they attend. Further, they allow the relationships between attitudes and performance to be investigated. It should be noted that highly positive attitudes are often a feature of developing countries.

Grade 4 science (year 5)

- Fifty-nine per cent of pupils had highly positive attitudes to science, fewer than in countries scoring at a higher level than England or at a similar level.

- The percentage of pupils with highly positive attitudes has fallen by 13 percentage points since the last comparable data, in 1995. Another high scoring country, Singapore, has also seen such a decline.
- Fifty-five per cent of pupils had a high level of self-confidence in learning science. This was comparable to, or higher than, other high scoring countries.
- Significantly more boys than girls showed a high level of confidence in learning science, although there were no differences in attainment.
- The level of high self-confidence in England has not changed since 2003 or the earlier surveys.

Grade 4 mathematics (year 5)

- Sixty-two per cent of pupils had highly positive attitudes to mathematics, similar to or lower than in most countries scoring at a higher level than England or at a similar level.
- As in science the percentage of pupils with highly positive attitudes to mathematics has fallen, by 14 percentage points, since the last comparable data, in 1995. As in science, Singapore has also seen such a decline.
- Sixty-four per cent of pupils had a high level of self-confidence in learning mathematics. As in science, this was comparable to, or higher than, other high scoring countries.
- The level of high self-confidence in England has increased by 5 percentage points since 2003.
- Significantly more boys than girls showed a high level of confidence in learning mathematics, although there were no differences in attainment.

Grade 8 science (year 9)

Comparisons with other countries in this section are with countries with integrated science data: that is, pupils were asked about science rather than separately about physics, chemistry or biology.

- Fifty-five per cent of pupils had highly positive attitudes to science. This is within the range shown by other high scoring countries.
- The percentage of pupils with highly positive attitudes has fallen by 21 percentage points since the last comparable data, in 1999. Several high scoring countries, including Singapore and Chinese Taipei, have also seen such a decline.
- Fifty-two per cent of pupils placed a high value on science. This is within the range shown by other high scoring countries.
- More pupils placed a high value on science in 2007 than had done so in 2003, seven per cent more.
- Fifty-three per cent of pupils had a high level of self-confidence in learning science. This was greater than the proportion in the highest scoring countries.

- Significantly more boys than girls showed a high level of confidence in learning science at grade 8, as they did at grade 4, although there were no differences in attainment.
- The level of high self-confidence in science in England has not changed since 2003.

Grade 8 mathematics (year 9)

- Forty per cent of pupils had highly positive attitudes to mathematics. Only three countries scoring at a higher level than England or at a similar level had significantly higher proportions of pupils in this category.
- As in science the percentage of pupils with highly positive attitudes to mathematics has fallen, by 25 percentage points since the last comparable data, in 1999. Six other countries scoring at a higher level than England or at a similar level also showed a decline, but none on as large a scale as England's.
- Seventy-four per cent of pupils placed a high value on mathematics, a much higher proportion than in science. This is higher than in four of the five countries which outperformed England, and at a similar level to countries performing like England.
- More pupils placed a high value on mathematics in 2007 than had done so in 2003, 10 percentage points more.
- Fifty-three per cent of pupils had a high level of self-confidence in learning mathematics. This is higher than in any of the five countries which outperformed England, and at a higher level than most of the countries performing at a similar level to England.
- The level of high self-confidence in England has increased by 6 percentage points since 2003.
- Significantly more boys than girls showed a high level of confidence in learning mathematics at grade 8, as they did at grade 4, although there were no differences in attainment.

Attitudes

- Between half and two thirds of pupils have a high level of enjoyment and confidence in their learning in mathematics and science, with the exception of mathematics at grade 8, where the comparable figure for enjoyment was only 40 per cent.
- England's profile, of high performance but relatively low enjoyment, was common in other high scoring countries.
- In each area, boys had higher levels of confidence than girls, despite no overall differences in attainment.
- At grade 8, pupils generally valued their learning in mathematics, despite their relative lack of enjoyment of it; they clearly recognise that it can be useful to them. The same is true of science to a lesser extent.

1.7 The teachers and schools

Salient findings derived from the reports of headteachers, teachers and pupils are summarised below:

Grade 4 (year 5)

- Teachers and headteachers continue to perceive school climate in a positive light. The percentage of pupils taught in schools concentrated at the high and medium parts of the scale is greater than the international average.
- There has been a significant increase in the percentage of pupils taught at schools where teachers' perception of school safety is high.
- Pupil and teacher perceptions of safety differed. Ratings of school safety from pupils were lower than those given by teachers. This occurred in several countries and was not confined to England.
- Schools in England are well-resourced compared with the international average, with almost all pupils taught at schools that are resourced at a high or medium level. This applies to both science and mathematics resources.

Grade 8 (year 9)

- There has been no significant change in headteachers' perceptions of school climate since 2003. Only four per cent of grade 8 pupils are taught at schools where the headteachers' rating of school climate is low.
- The percentage of pupils taught in schools where the teachers give a high rating of school climate has increased significantly since 2003.
- Teachers' perceptions of good school safety have increased since 2003. Nearly all pupils are now taught in schools where teachers' perceptions of safety are high or medium.
- There has also been a significant increase in the percentage of pupils who gave their schools a high rating for safety. As with grade 4, there is a discrepancy between the perceptions of teachers and pupils, but the difference is not as large in grade 8.
- Grade 8 headteachers, mathematics and science teachers indicate that their schools are well resourced compared with the international average.
- England's grade 8 science pupils are more likely to spend their lesson time doing practical science activities than many of their international counterparts. However, pupils in England do not necessarily relate the science they cover in lessons to their daily lives.
- Grade 8 mathematics pupils in England have a different view from their teachers about the amount of time they spend on practical mathematics activities. Reports from pupils suggest that a greater percentage of pupil time is spent on practical activities than is suggested by the teacher reports.
- Pupils of science and mathematics at grade 8 continue to be tested less frequently than pupils in other participating countries.

Summary: the teachers and schools

- Teachers' perceptions of the climate in their schools were positive.
- The views of teachers on school safety were also positive, but pupils' views were less so than those of their teachers.
- At both grades school staff reported that their schools were well resourced.

1.8 The pupils and the home

Important findings derived from the reports of headteachers, teachers and pupils are summarised below:

Grade 4 (year 5)

- The majority of grade 4 pupils in England have access to a number of books in the home. Over 40 per cent of grade 4 pupils report that they have at least 100 books in the home, nearly double the international average.
- As in 2003, the vast majority of pupils (95 per cent) have a computer in their home and 86 per cent of grade 4 pupils in England have internet connections in their home.
- There have been significant changes in computer use. The percentage of pupils who use a computer at home but not at school has increased, while the percentage of pupils who use a computer in school but not at home has decreased. It is possible that this apparent reduction in the use of computers in school may be a result of the use of whiteboards and other more integrated technology in the classroom.
- England's grade 4 pupils receive less homework in both science and mathematics than pupils in other countries. In addition, teachers in England place less emphasis on homework than teachers in other countries.

Grade 8 (year 9)

- The percentage of pupils reporting that they have more than 200 books in the home has decreased significantly since 2003. This, at 18 per cent, is still above the international average of 12 per cent, and higher than many other countries. The majority of grade 8 pupils in England continue to have access to a sizeable number of books in the home.
- As at grade 4, the vast majority of grade 8 pupils in England (98 per cent) have a computer at home and 92 per cent of pupils also reported having an internet connection at home. These are among the highest percentages internationally.
- There has been a significant decrease in the percentage of pupils reporting that they are using computers at home and in school. As at grade 4, it is possible that this is a result of better integration of other technology in the classroom.
- England's grade 8 pupils report receiving less homework than pupils in most of the other countries taking part in TIMSS 2007. Only five per cent of the pupils reported high ratings

on time spent doing mathematics homework and seven per cent reported high ratings on time spent doing science homework.

- There has been a significant decrease in the percentage of pupils taught in schools where the science teachers placed a high emphasis on homework. This reduction brings England's data closer to the international average. The amount of mathematics homework given has remained stable.

Summary: the pupils and the home

- Computers in the home were almost universal with around 90 per cent of pupils also having internet access.
- The amount of books in the home remains high, but grade 8 pupils reported having fewer books than in 2003.

1.9 Factors associated with attainment and attitudes

Attainment

The relationships between different variables and attainment have been explored, using a statistical technique called multi-level modelling. This allows us to predict how an outcome might change for one variable if the size of a related variable changes. For example, it allows us to describe relationships such as, the higher pupils' attainment was at the end of key stage 1, the higher their attainment was likely to be in TIMSS at grade 4 (year 5).

The multi-level modelling analysis describes associations, but cannot attribute causality. Being confident in mathematics, for example, is associated with achievement in grade 4 mathematics, but we cannot say if one causes the other, or if a third factor causes these two to be associated.

- Most of the factors associated with achievement are unsurprising, such as prior attainment, attitudes and measures of socio-economic status. These are generally in the expected direction for example higher prior attainment having a positive association with attainment in TIMSS.
- Other factors associated with achievement relate to activities in the classroom. There is a mixture of positive and negative findings, associated with higher or lower achievers respectively.
- Out-of-school activities such as watching television and playing computer games are associated negatively with achievement.
- At grade 4, being born in the UK was associated positively with attainment, but this effect did not continue into grade 8.

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Attitudes

Clear findings were:

- Enjoyment of science and confidence in science were strongly associated with each other, but this relationship was weaker in mathematics.
- Boys generally held more positive attitudes to their learning. Boys were more positive than girls about science, more confident about mathematics at both grades and enjoyed mathematics more at grade 4. Despite this, there were no overall differences in attainment in either subject at either grade.
- Activities such as reading a book for enjoyment, doing homework and playing a musical instrument were positively associated with attitudes to science and enjoyment of mathematics (but not to confidence in mathematics).
- Activities such as watching television/videos, playing computer games, playing/talking with friends, using the internet and listening to music were negatively associated with attitudes to science and enjoyment of mathematics (but not to confidence in mathematics).
- Independent working in the classroom was a positive predictor of attitudes to science and confidence in mathematics at grade 4, but a negative predictor of enjoyment of mathematics at grade 8.
- Pupils' perception of the extent of bullying in their school was a negative predictor of:
  - attitudes to science at grade 4
  - confidence in mathematics at grade 4 and at grade 8.
- Prior attainment was a significant positive predictor of:
  - attitudes to science at grade 8
  - confidence in mathematics at both grade 4 and grade 8.

2 Background to TIMSS 2007

2.1 Introduction to TIMSS

TIMSS 2007 is the fourth in a series of comparative international studies of mathematics and science achievement. TIMSS (Trends in International Mathematics and Science Study) is administered on a four-yearly cycle, the previous surveys having taken place in 1995, 1999 and 2003. The 1995 study was originally entitled the Third International Mathematics and Science Study, and followed earlier mathematics surveys in 1964 and 1980-1982 and science surveys in 1970 and 1984. The 2007 study was similar in structure to that in 2003, with two grades tested: grade 4 pupils (year 5 in England) and grade 8 pupils (year 9 in England).

TIMSS 2007 involved approximately 425,000 students in 59 countries around the world. Grade 4 was administered in 37 countries and seven benchmarking communities, and grade 8 in 50 countries and seven benchmarking communities. The benchmarking communities are states or provinces rather than complete countries, and included Canada's two largest provinces, Ontario and Quebec. Canada as a nation did not participate. The international reports outline findings for 36 countries at grade 4 and 49 countries at grade 8 (additionally, data for Mongolia are given in an appendix).

The international TIMSS surveys are conducted by the International Association for the Evaluation of Educational Achievement (IEA) and a further international TIMSS survey is planned for 2011. The countries which comprise the United Kingdom are regarded separately by the IEA, and, of the four, England and Scotland chose to participate in the 2007 survey. In both Scotland and England, the 2007 survey, like previous ones, was administered by the National Foundation for Educational Research, NFER.

The TIMSS 2007 participants are summarised in Exhibit 2.1.

Exhibit 2.1 TIMSS 2007 participants

Participants in TIMSS 2007 (G4)			
Algeria	Georgia	Lithuania	Slovak Republic
Armenia	Germany	Mongolia	Slovenia
Australia	Hong Kong SAR	Morocco	Sweden
Austria	Hungary	Netherlands	Tunisia
Chinese Taipei	Iran, Islamic Rep. of	New Zealand	Ukraine
Colombia	Italy	Norway	United States
Czech Republic	Japan	Qatar	Yemen
Denmark	Kazakhstan	Russian Federation	
El Salvador	Kuwait	Scotland	
England	Latvia	Singapore	

TIMSS 2007 International Reports available at http://timssandpirls.bc.edu/TIMSS2007

Exhibit 2.1 TIMSS 2007 participants *cont'd ...*

Benchmarking participants (G4)			
Alberta, Canada	Dubai, UAE	Minnesota, US	Quebec, Canada
British Columbia, Canada	Massachusetts, US	Ontario, Canada	
Participants in TIMSS 2007 (G8)			
Algeria	England	Lebanon	Scotland
Armenia	Georgia	Lithuania	Serbia
Australia	Ghana	Malaysia	Singapore
Bahrain	Hong Kong SAR	Malta	Slovenia
Bosnia and Herzegovina	Hungary	Mongolia	Sweden
Botswana	Indonesia	Morocco	Syrian Arab Republic
Bulgaria	Iran, Islamic Rep. of	Norway	Thailand
Chinese Taipei	Israel	Oman	Tunisia
Colombia	Italy	Palestinian Nat'l Auth.	Turkey
Cyprus	Japan	Qatar	Ukraine
Czech Republic	Jordan	Romania	United States
Egypt	Korea, Rep. of	Russian Federation	
El Salvador	Kuwait	Saudi Arabia	
Benchmarking participants (G8)			
Basque Country, Spain	Dubai, UAE	Minnesota, US	Quebec, Canada
British Columbia, Canada	Massachusetts, US	Ontario, Canada	

The countries involved in TIMSS 2007 are varied, ranging from highly developed countries through to developing ones. Their education systems vary, differing, for example, in the age at which children start school. How developed each participating country is, the age of the pupils tested and how long they had been in school at the time of testing are given in Exhibits 3.1 to 3.3 and 3.5 of this report. As a further example, the time spent teaching subjects varies. Exhibit 2.2 shows the number of teaching hours reported spent by teachers in England, the international average for the participating countries and the maximum and minimum reported by other countries.

Exhibit 2.2 Number of hours teachers reported spending on each subject

Hours	England	International average	Maximum	Minimum
Grade 4 science	70	67	139	33
Grade 4 mathematics	183	144	201	104
Grade 8 science	137	110	145	58
Grade 8 mathematics	113	120	158	72

As can be seen, time reported spent in England is close to the international average for grade 4 science and grade 8 mathematics, but higher than the international average for the other two assessments.

Detailed information on each participating country can be found in the TIMSS 2007 Encyclopedia. See Chapter 5 of the international report for time spent on each subject in each country.

The 2007 survey followed broadly the same structure as previous surveys. The TIMSS assessment frameworks for both subjects were revised and updated. The assessment framework for TIMSS has two dimensions for each subject: content domains and cognitive domains. These are outlined in Exhibit 2.3.

Exhibit 2.3 Summary of TIMSS assessment framework

Cognitive domains for both grades and subjects
Knowing, applying, reasoning
Content domains for mathematics
Grade 4: number; algebra; geometric shapes and measures; data display
Grade 8: number; algebra; geometry; data and chance
Content domains for Science
Grade 4: life science; physical science; earth science
Grade 8: biology; chemistry; physics; earth science

The content domains are familiar ones, but some of the content in science would be covered in England under other subject headings, geography for example. For grade 4 science, physics and chemistry are combined as physical science. In mathematics, calculators are allowed in the grade 8 assessment but not at grade 4.

Each pupil took a single test in two parts, 36 minutes for each part at grade 4, and 45 minutes for each part at grade 8. In addition, each pupil answered a questionnaire to provide details of their attitudes, experiences and background. There were also teacher questionnaires, one for the class teacher for grade 4 and separate ones for the mathematics and science teachers of the grade 8 students. Information on the school was obtained by a school questionnaire, answered by the headteacher.

Samples for England were drawn by Statistics Canada, assisted by the NFER. At each grade, the sample consisted of a main sample and two matched replacement samples. In most cases, each main sample school had a replacement in each of the two replacement samples. Each main sample school was approached and if that school refused to participate, its designated replacement from the first replacement sample was approached. If, in turn, the first replacement school also declined to participate, the second replacement was approached. Sample sizes were as shown in Exhibit 2.4.

Exhibit 2.4 Number of schools drawn in each sample

Grade	Main sample	First replacement sample	Second replacement sample
G4	160	158	156
G8	160	154	152

www
TIMSS 2007 International Reports available at http://timssandpirls.bc.edu/TIMSS2007

At grade 4, 131 of the main sample schools participated, with 12 schools from the replacement samples also taking part. This gave a total of 143 primary schools involved in TIMSS 2007, fully meeting the stringent TIMSS sampling requirements. At grade 8, 126 of the main sample schools participated, with 11 schools from the replacement samples taking part. Thus, a total of 137 secondary schools were involved in TIMSS 2007. This total met the TIMSS sampling requirements, once replacement schools were taken into account. Both samples were inspected and accepted by the IEA's sampling referee. Given the potential difficulty of gaining cooperation from schools in societies where schools are free to decide whether or not to participate, this was a pleasing outcome and thanks are due to all the participating schools, staff and pupils for their part in representing England in TIMSS 2007. The participation figures are summarised in Exhibit 2.5.

Exhibit 2.5 Number of schools participating in TIMSS 2007

Grade	Main sample	Replacement samples	Total
G4	131	12	143
G8	126	11	137

2.2 Summary

TIMSS 2007 provides further information on England's performance in mathematics and science compared with other countries. As the fourth in a linked series it provides information on trends in performance over time. There is a strong picture of performance in England as it participated in all the TIMSS surveys. Pupils in grade 4 (England's year 5) and grade 8 (year 9) were tested. Fifty-nine countries participated, as did pupils from 280 schools in England.

3 Pupils' achievements in mathematics and science

The international TIMSS reports, one for science and one for mathematics, give details of the findings from TIMSS 2007 from an international perspective. This national report focuses on England's performance in TIMSS 2007 and compares it with that of other countries, particularly those which are our European neighbours and our economic competitors. Throughout this report there are references to the chapters in the international reports where the reader can find further information on what is discussed here.

In this report, grade 4 (year 5) results are dealt with first, followed by those for grade 8 (year 9). For both age groups, science results are reported first, followed by those for mathematics.

3.1 Pupils' achievement in grade 4 science

Exhibit 3.1 shows how the 36 participating countries performed in grade 4 science. The countries are shown in order of average (mean) scale scores which range at grade 4 from 587 (Singapore) to 197 (Yemen) with a scale average score of 500. England's score, 542, is one of the highest, and is statistically significantly higher than the TIMSS scale average of 500. Only three countries, Singapore, Chinese Taipei and Hong Kong, have scores that are statistically, significantly higher than England's. England's score of 542 is not significantly different from those of seven other countries, Japan (548), the Russian Federation, Latvia, the United States, Hungary, Italy and Kazakhstan (533). The box in Exhibit 3.1 delineates this group of countries with performance similar to England's.

See Chapter 1 of the international mathematics and science reports for full details of significant differences in performance between countries other than England.

England outperformed all of the countries shown below Kazakhstan, including a number of our European neighbours - among them Germany, the Netherlands, Sweden and Scotland - and also Australia and New Zealand. England's very high level of performance in 2007 is similar to that in 2003 when only Singapore and Chinese Taipei outscored England in grade 4 science.

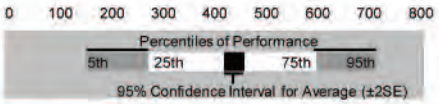
3.2 Pupils' achievement in grade 4 mathematics

The corresponding information for grade 4 mathematics is shown in Exhibit 3.2. England's score, 541, is again very high and only four countries outscored England: Hong Kong (607), Singapore, Chinese Taipei, and Japan (568). Four countries produced scores not significantly different from England's: Kazakhstan (549), the Russian Federation, Latvia and the Netherlands (535). A box separates these countries from the rest in Exhibit 3.2. England's score is again significantly higher than the TIMSS scale average of 500. Countries outperformed by England included the United States, Germany, Denmark, Italy, Sweden, Scotland, Australia and New Zealand.

Exhibit 3.1 TIMSS 2007 Distribution of Science Achievement

TIMSS2007 Science 4th Grade

Country	Science Achievement Distribution	Average Scale Score	Years of Formal Schooling*	Average Age at Time of Testing	Human Development Index**
Singapore		587 (4.1)	4	10.4	0.922
Chinese Taipei		557 (2.0)	4	10.2	0.932
Hong Kong SAR		554 (3.5)	4	10.2	0.937
Japan		548 (2.1)	4	10.5	0.953
Russian Federation		546 (4.8)	4	10.8	0.813
1 Latvia		542 (2.3)	4	11.0	0.855
England		542 (2.9)	5	10.2	0.946
2 † United States		539 (2.7)	4	10.3	0.951
Hungary		536 (3.3)	4	10.7	0.874
Italy		535 (3.2)	4	9.8	0.941
1 Kazakhstan		533 (5.6)	4	10.6	0.794
Germany		528 (2.4)	4	10.4	0.935
Australia		527 (3.3)	4	9.9	0.962
Slovak Republic		526 (4.8)	4	10.4	0.863
Austria		526 (2.5)	4	10.3	0.948
Sweden		525 (2.9)	4	10.8	0.956
‡ Netherlands		523 (2.6)	4	10.2	0.953
Slovenia		518 (1.9)	4	9.8	0.917
† Denmark		517 (2.9)	4	11.0	0.949
Czech Republic		515 (3.1)	4	10.3	0.891
1 Lithuania		514 (2.4)	4	10.8	0.862
New Zealand		504 (2.6)	4.5 - 5.5	10.0	0.943
† Scotland		500 (2.3)	5	9.8	0.946
# TIMSS Scale Avg.		500			
Armenia		484 (5.7)	4	10.6	0.775
Norway		477 (3.5)	4	9.8	0.968
Ukraine		474 (3.1)	4	10.3	0.788
Iran, Islamic Rep. of		436 (4.3)	4	10.2	0.759
1 Georgia		418 (4.6)	4	10.1	0.754
Colombia		400 (5.4)	4	10.4	0.791
El Salvador		390 (3.4)	4	11.0	0.735
Algeria		354 (6.0)	4	10.2	0.733
¿ Kuwait		348 (4.4)	4	10.2	0.891
Tunisia		318 (5.9)	4	10.2	0.766
Morocco		297 (5.9)	4	10.6	0.646
Qatar		294 (2.6)	4	9.7	0.875
Yemen		197 (7.2)	4	11.2	0.508
Benchmarking Participants					
2 Massachusetts, US		571 (4.3)	4	10.3	-
2 † Minnesota, US		551 (6.1)	4	10.3	-
2 Alberta, Canada		543 (3.8)	4	9.8	-
2 B. Columbia, Canada		537 (2.7)	4	9.8	-
2 Ontario, Canada		536 (3.7)	4	9.8	-
2 Quebec, Canada		517 (2.7)	4	10.1	-
¿ ‡ Dubai, UAE		460 (2.8)	4	10.0	-



Country average significantly higher than TIMSS scale average

Country average significantly lower than TIMSS scale average

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

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

** Taken from United Nations Development Programme's *Human Development Report 2007/2008*, p.229-232, except for Chinese Taipei taken from Directorate-General of Budget, Accounting and Statistics, Executive Yuan, *R.O.C. Statistical Yearbook 2007*. Data for England and Scotland are

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

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

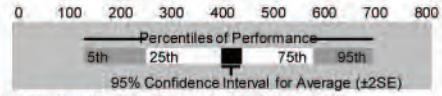
A dash (-) indicates comparable data are not available. Note: See Exhibit D.1 for percentiles of achievement in science.

England's score of 541 in grade 4 mathematics is very similar to that for grade 4 science, 542. However, it should be noted that the difference in England's mathematics score and that of Japan, the lowest scoring country to outperform England, is 27 scale points, while the comparable figure in science is 12 scale points. Thus, there is a larger gap between England and the highest scoring Pacific Rim countries in grade 4 mathematics than in grade 4 science.

Exhibit 3.2 TIMSS 2007 Distribution of Mathematics Achievement

TIMSS2007 Mathematics 4th Grade

Country	Average Scale Score	Years of Formal Schooling*	Average Age at Time of Testing	Human Development Index**
Hong Kong SAR	▲ 607 (3.6)	4	10.2	0.937
Singapore	▲ 599 (3.7)	4	10.4	0.922
Chinese Taipei	▲ 576 (1.7)	4	10.2	0.932
Japan	▲ 568 (2.1)	4	10.5	0.953
1 Kazakhstan	▲ 549 (7.1)	4	10.6	0.794
Russian Federation	▲ 544 (4.9)	4	10.8	0.813
England	▲ 541 (2.9)	5	10.2	0.946
1 Latvia	▲ 537 (2.3)	4	11.0	0.855
‡ Netherlands	▲ 535 (2.1)	4	10.2	0.953
1 Lithuania	▲ 530 (2.4)	4	10.8	0.862
2 † United States	▲ 529 (2.4)	4	10.3	0.951
Germany	▲ 525 (2.3)	4	10.4	0.935
† Denmark	▲ 523 (2.4)	4	11.0	0.949
Australia	▲ 516 (3.5)	4	9.9	0.962
Hungary	▲ 510 (3.5)	4	10.7	0.874
Italy	▲ 507 (3.1)	4	9.8	0.941
Austria	▲ 505 (2.0)	4	10.3	0.948
Sweden	503 (2.5)	4	10.8	0.956
Slovenia	502 (1.8)	4	9.8	0.917
TIMSS Scale Avg.	500			
Armenia	500 (4.3)	4	10.6	0.775
Slovak Republic	496 (4.5)	4	10.4	0.863
† Scotland	▼ 494 (2.2)	5	9.8	0.946
New Zealand	▼ 492 (2.3)	4.5 - 5.5	10.0	0.943
Czech Republic	▼ 486 (2.8)	4	10.3	0.891
Norway	▼ 473 (2.5)	4	9.8	0.968
Ukraine	▼ 469 (2.9)	4	10.3	0.788
1 Georgia	▼ 438 (4.2)	4	10.1	0.754
Iran, Islamic Rep. of	▼ 402 (4.1)	4	10.2	0.759
Algeria	▼ 378 (5.2)	4	10.2	0.733
Colombia	▼ 355 (5.0)	4	10.4	0.791
Morocco	▼ 341 (4.7)	4	10.6	0.646
El Salvador	▼ 330 (4.1)	4	11.0	0.735
Tunisia	▼ 327 (4.5)	4	10.2	0.766
¿ Kuwait	▼ 316 (3.6)	4	10.2	0.891
Qatar	▼ 296 (1.0)	4	9.7	0.875
Yemen	▼ 224 (6.0)	4	11.2	0.508
Benchmarking Participants				
2 Massachusetts, US	▲ 572 (3.5)	4	10.3	-
2 † Minnesota, US	▲ 554 (5.9)	4	10.3	-
2 Quebec, Canada	▲ 519 (3.0)	4	10.1	-
2 Ontario, Canada	▲ 512 (3.1)	4	9.8	-
2 Alberta, Canada	505 (3.0)	4	9.8	-
2 B. Columbia, Canada	505 (2.7)	4	9.8	-
¿ ‡ Dubai, UAE	▼ 444 (2.1)	4	10.0	-



▲ Country average significantly higher than TIMSS scale average
▼ Country average significantly lower than TIMSS scale average

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

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

** Taken from United Nations Development Programme's *Human Development Report 2007/2008*, p.229-232, except for Chinese Taipei taken from Directorate-General of Budget, Accounting and Statistics, Executive Yuan, *R.O.C. Statistical Yearbook 2007*. Data for England and Scotland are

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

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

A dash (-) indicates comparable data are not available. Note: See Exhibit D.1 for percentiles of achievement in mathematics.

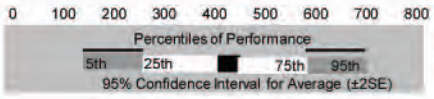
3.3 Pupils' achievement in grade 8 science

England's score for grade 8 science, 542, is again one of the highest. Exhibit 3.3 gives details of the performance of all 49 participating countries in grade 8. As in grade 4 science, the highest scoring country was Singapore, 567. Four countries, Singapore, Chinese Taipei, Japan and Korea (553), outperformed England. The score differences between England and these four Pacific Rim countries are not large: England was 11 scale

Exhibit 3.3 TIMSS 2007 Distribution of Science Achievement

TIMSS2007 Science 8th Grade

Country	Science Achievement Distribution	Average Scale Score	Years of Formal Schooling*	Average Age at Time of Testing	Human Development Index**
Singapore		▲ 567 (4.4)	8	14.4	0.922
Chinese Taipei		▲ 561 (3.7)	8	14.2	0.932
Japan		▲ 554 (1.9)	8	14.5	0.953
Korea, Rep. of		▲ 553 (2.0)	8	14.3	0.921
† England		▲ 542 (4.5)	9	14.2	0.946
Hungary		▲ 539 (2.9)	8	14.6	0.874
Czech Republic		▲ 539 (1.9)	8	14.4	0.891
Slovenia		▲ 538 (2.2)	7 or 8	13.8	0.917
† Hong Kong SAR		▲ 530 (4.9)	8	14.4	0.937
Russian Federation		▲ 530 (3.9)	7 or 8	14.6	0.802
2 † United States		▲ 520 (2.9)	8	14.3	0.951
1 Lithuania		▲ 519 (2.5)	8	14.9	0.862
Australia		▲ 515 (3.6)	8	13.9	0.962
Sweden		▲ 511 (2.6)	8	14.8	0.956
# TIMSS Scale Avg.		500		-	
† Scotland		496 (3.4)	9	13.7	0.946
Italy		495 (2.8)	8	13.9	0.941
Armenia		▼ 488 (5.8)	8	14.9	0.775
Norway		▼ 487 (2.2)	8	13.8	0.968
Ukraine		▼ 485 (3.5)	8	14.2	0.788
Jordan		▼ 482 (4.0)	8	14.0	0.773
Malaysia		▼ 471 (6.0)	8	14.3	0.811
Thailand		▼ 471 (4.3)	8	14.3	0.781
1 2 Serbia		▼ 470 (3.2)	8	14.9	0.810
3 Bulgaria		▼ 470 (5.9)	8	14.9	0.824
3 Israel		▼ 468 (4.3)	8	14.0	0.932
Bahrain		▼ 467 (1.7)	8	14.1	0.866
Bosnia Herzegovina		▼ 466 (2.8)	8 or 9	14.7	0.803
Romania		▼ 462 (3.9)	8	15.0	0.813
Iran, Islamic Rep. of		▼ 459 (3.6)	8	14.2	0.759
Malta		▼ 457 (1.4)	9	14.0	0.878
Turkey		▼ 454 (3.7)	8	14.0	0.775
Syrian Arab Republic		▼ 452 (2.9)	8	13.9	0.724
Cyprus		▼ 452 (2.0)	8	13.8	0.903
Tunisia		▼ 445 (2.1)	8	14.5	0.766
Indonesia		▼ 427 (3.4)	8	14.3	0.728
Oman		▼ 423 (3.0)	8	14.3	0.814
1 Georgia		▼ 421 (4.8)	8	14.2	0.754
¿ Kuwait		▼ 418 (2.8)	8	14.4	0.891
Colombia		▼ 417 (3.5)	8	14.5	0.791
Lebanon		▼ 414 (5.9)	8	14.4	0.772
Egypt		▼ 408 (3.6)	8	14.1	0.708
Algeria		▼ 408 (1.7)	8	14.5	0.733
Palestinian Nat'l Auth.		▼ 404 (3.5)	8	14.0	0.731
Saudi Arabia		▼ 403 (2.4)	8	14.4	0.812
El Salvador		▼ 387 (2.9)	8	15.0	0.735
Botswana		▼ 355 (3.1)	8	14.9	0.654
Qatar		▼ 319 (1.7)	8	13.9	0.875
Ghana		▼ 303 (5.4)	8	15.8	0.553
¶ Morocco		▼ 402 (2.9)	8	14.8	0.646
Benchmarking Participants					
2 Massachusetts, US		▲ 556 (4.6)	8	14.2	-
2 † Minnesota, US		▲ 539 (4.8)	8	14.3	-
2 Ontario, Canada		▲ 526 (3.6)	8	13.8	-
3 B. Columbia, Canada		▲ 526 (2.7)	8	13.9	-
3 Quebec, Canada		▲ 507 (3.1)	8	14.2	-
Basque Country, Sp.		498 (3.0)	8	14.1	-
¿ ‡ Dubai, UAE		▼ 489 (2.8)	8	14.2	-



▲ Country average significantly higher than TIMSS scale average
▼ Country average significantly lower than TIMSS scale average

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

*Represents years of schooling counting from the first year of ISCED Level 1. **Taken from United Nations Development Programme's Human Development Report 2007/2008, p.229-232, except for Chinese Taipei taken from Directorate-General of Budget, Accounting and Statistics, Executive Yuan, R.O.C. Statistical Yearbook 2007 and for Serbia taken from Human Development Analyses of Serbia 2007. Data for England and Scotland are for the United Kingdom.

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).
¶ Did not satisfy guidelines for sample participation rates (see Appendix A).
1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).
2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).
3 National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).
¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A dash (-) indicates comparable data are not available. Note: See Exhibit D.1 for percentiles of achievement in science.

points behind Korea, the nearest outperforming country, and 25 points lower than the highest-performing country, Singapore.

Four countries, Hungary (539), the Czech Republic, Slovenia and Hong Kong (530), performed at a similar level to England. Countries outperformed by England included the Russian Federation, the United States, Italy, Sweden, Scotland and Australia.

A comparison of England's standing in science when older students are tested is also available. In 2006 England participated in the Programme for International Student Assessment (PISA) study. This targets 15 year-olds and assesses scientific literacy rather than the curriculum-based approach of TIMSS. It might be expected, therefore, that different patterns of relative performance might come from the two studies. In PISA 2006 scientific literacy was the major domain assessed and we therefore focus on comparisons in science. As not all countries participate in both studies, comparisons between TIMSS and PISA performance are not always possible.

Exhibit 3.4 lists all the countries outscoring England in PISA 2006 scientific literacy and those performing at a similar level.

Exhibit 3.4 PISA scientific and literacy 2006 and TIMSS 2007 science compared

Group		PISA 2006 Scientific Literacy	Grade 8 TIMSS Science	Grade 4 TIMSS Science
Countries which Outscored England in PISA 2006 Scientific Literacy	Finland	+	•	•
	Hong Kong	+	=	+
	Canada	+	•	•
	Chinese Taipei	+	+	+
	Estonia	+	•	•
	Japan	+	+	=
	New Zealand	+	•	–
Countries which Performed at a Similar Level to England in PISA 2006 Scientific Literacy	Australia	=	–	–
	Netherlands	=	•	–
	Liechtenstein	=	•	•
	Korea	=	+	•
	Slovenia	=	=	–
	Germany	=	•	–
	Czech Republic	=	=	–
	Switzerland	=	•	•
	Macao-China	=	•	•
	Austria	=	•	–
	Belgium	=	•	•
	Republic of Ireland	=	•	•
	Hungary	=	=	=

Key

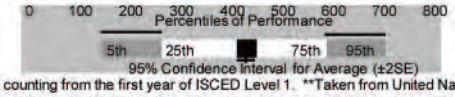
Other country has a higher level of performance than England	+
England has higher level of performance than other country	–
No significant difference in performance between England and other country	=
Other country did not administer this grade in TIMSS	•

Differences in country participation are apparent. Singapore, one of the highest scoring countries in TIMSS, did not participate in PISA. The highest scorer in PISA, Finland, does not participate in TIMSS and nor does Canada as a country. Examination of Exhibit 3.4

Exhibit 3.5 TIMSS 2007 Distribution of Mathematics Achievement

TIMSS2007 Mathematics 8th Grade

Country	Mathematics Achievement Distribution	Average Scale Score	Years of Formal Schooling*	Average Age at Time of Testing	Human Development Index**
Chinese Taipei		▲ 598 (4.5)	8	14.2	0.932
Korea, Rep. of		▲ 597 (2.7)	8	14.3	0.921
Singapore		▲ 593 (3.8)	8	14.4	0.922
† Hong Kong SAR		▲ 572 (5.8)	8	14.4	0.937
Japan		▲ 570 (2.4)	8	14.5	0.953
Hungary		▲ 517 (3.5)	8	14.6	0.874
† England		▲ 513 (4.8)	9	14.2	0.946
Russian Federation		▲ 512 (4.1)	7 or 8	14.6	0.802
2 † United States		▲ 508 (2.8)	8	14.3	0.951
1 Lithuania		▲ 506 (2.3)	8	14.9	0.862
Czech Republic		504 (2.4)	8	14.4	0.891
Slovenia		501 (2.1)	7 or 8	13.8	0.917
# TIMSS Scale Avg.		500			
Armenia		499 (3.5)	8	14.9	0.775
Australia		496 (3.9)	8	13.9	0.962
Sweden		▼ 491 (2.3)	8	14.8	0.956
Malta		▼ 488 (1.2)	9	14.0	0.878
† Scotland		▼ 487 (3.7)	9	13.7	0.946
1 2 Serbia		▼ 486 (3.3)	8	14.9	0.810
Italy		▼ 480 (3.0)	8	13.9	0.941
Malaysia		▼ 474 (5.0)	8	14.3	0.811
Norway		▼ 469 (2.0)	8	13.8	0.968
Cyprus		▼ 465 (1.6)	8	13.8	0.903
Bulgaria		▼ 464 (5.0)	8	14.9	0.824
3 Israel		▼ 463 (3.9)	8	14.0	0.932
Ukraine		▼ 462 (3.6)	8	14.2	0.788
Romania		▼ 461 (4.1)	8	15.0	0.813
Bosnia Herzegovina		▼ 456 (2.7)	8 or 9	14.7	0.803
Lebanon		▼ 449 (4.0)	8	14.4	0.772
Thailand		▼ 441 (5.0)	8	14.3	0.781
Turkey		▼ 432 (4.8)	8	14.0	0.775
Jordan		▼ 427 (4.1)	8	14.0	0.773
Tunisia		▼ 420 (2.4)	8	14.5	0.766
1 Georgia		▼ 410 (5.9)	8	14.2	0.754
Iran, Islamic Rep. of		▼ 403 (4.1)	8	14.2	0.759
Bahrain		▼ 398 (1.6)	8	14.1	0.866
Indonesia		▼ 397 (3.8)	8	14.3	0.728
Syrian Arab Republic		▼ 395 (3.8)	8	13.9	0.724
Egypt		▼ 391 (3.6)	8	14.1	0.708
Algeria		▼ 387 (2.1)	8	14.5	0.733
Colombia		▼ 380 (3.6)	8	14.5	0.791
Oman		▼ 372 (3.4)	8	14.3	0.814
Palestinian Nat'l Auth.		▼ 367 (3.5)	8	14.0	0.731
Botswana		▼ 364 (2.3)	8	14.9	0.654
¿ Kuwait		▼ 354 (2.3)	8	14.4	0.891
El Salvador		▼ 340 (2.8)	8	15.0	0.735
Saudi Arabia		▼ 329 (2.9)	8	14.4	0.812
Ghana		▼ 309 (4.4)	8	15.8	0.553
Qatar		▼ 307 (1.4)	8	13.9	0.875
¶ Morocco		▼ 381 (3.0)	8	14.8	0.646
Benchmarking Participants					
2 Massachusetts, US		▲ 547 (4.6)	8	14.2	-
2 † Minnesota, US		▲ 532 (4.4)	8	14.3	-
3 Quebec, Canada		▲ 528 (3.5)	8	14.2	-
2 Ontario, Canada		▲ 517 (3.5)	8	13.8	-
3 B. Columbia, Canada		▲ 509 (3.0)	8	13.9	-
Basque Country, Sp.		499 (3.0)	8	14.1	-
¿ ‡ Dubai, UAE		▼ 461 (2.4)	8	14.2	-



▲ Country average significantly higher than TIMSS scale average

▼ Country average significantly lower than TIMSS scale average

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

* Represents years of schooling counting from the first year of ISCED Level 1. **Taken from United Nations Development Programme's Human Development Report 2007/2008, p.229-232, except for Chinese Taipei taken from Directorate-General of Budget, Accounting and Statistics, Executive Yuan, R.O.C. Statistical Yearbook 2007 and for Serbia taken from Human Development Analyses of Serbia 2007. Data for England and Scotland are for the United Kingdom.

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

3 National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).

¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

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

A dash (-) indicates comparable data are not available. Note: See Exhibit D.1 for percentiles of achievement in mathematics.

shows that the relationship between these countries' performance and that of England usually varies with the age of the pupils tested. Only Chinese Taipei outscored England in all three assessments, while Hungary was the only country to have similar performance at the three ages tested. If only the grade 8 TIMSS performance and PISA are compared, just three further countries showed the same relationship to England in both assessments: Japan (ahead), Slovenia and the Czech Republic (similar).

For more details of England's performance in PISA 2006 www.nfer.ac.uk/pisa

3.4 Pupils' achievement in grade 8 mathematics

In grade 8 mathematics in TIMSS 2007, England's score, 513, was high enough for only five countries to have significantly higher levels of performance. See Exhibit 3.5. These countries, all from the Pacific Rim, were Chinese Taipei (598), Korea, Singapore, Hong Kong and Japan (570). England performed similarly to Hungary (517), the Russian Federation, the United States, Lithuania and the Czech Republic (504). The differences in scores between England's group and the top five countries is much larger in grade 8 mathematics than in science or grade 4 mathematics: 57 scale points behind Japan and 85 points lower than Chinese Taipei.

Countries outscored by England included Australia, Sweden, Scotland, Italy and Norway.

3.5 England's standing against other countries

Exhibit 3.6 summarises England's performance in TIMSS 2007 in all four assessments: science and mathematics at grades 4 and 8. The three sections deal with countries significantly outscoring England, countries performing at a statistically similar level to England and those performing at a lower level than England. In this last section, only countries with scale scores of 460 and above are shown, in order to simplify the presentation.

In all four assessments, only Pacific Rim countries outperformed England, while our European neighbours either performed at a similar level to England or, more frequently, at a lower level.

Exhibit 3.6 shows the scale scores of each country, as seen previously, and also the average percentage of items answered correctly in each country. For grade 4, the international average percentages correct were around 50 per cent, but were lower for grade 8, around 40 per cent. England's percentages were around 60 per cent for grade 4 and just over 50 per cent for grade 8. Exhibit 3.6 also shows how close the scores of some countries were. Countries performing similarly to England in grade 4 science, for example, all scored between 58 per cent and 60 per cent correct. The gap in performance between England's group of countries and the highest scoring countries in grade 8 mathematics is again apparent. The scaled scores cover a wider numerical range than the percentages and thus differentiate country performance more finely.

Exhibit 3.6 Summary of England's Standing in TIMSS 2007

TIMSS 2007	Grade 4 *Total 36 countries*				Grade 8 *Total 49 countries*			
	Science		Mathematics		Science		Mathematics	
		Scale Score / % Corr		Scale Score / % Corr		Scale Score / % Corr		Scale Score / % Corr
HIGHER	**3 countries**		**4 countries**		**4 countries**		**5 countries**	
Countries performing at a significantly higher level than England	Singapore	587 69	Hong Kong	607 77	Singapore	567 60	Chinese Taipei	598 71
	Chinese Taipei	557 63	Singapore	599 74	Chinese Taipei	561 59	Korea	597 71
	Hong Kong	554 62	Chinese Taipei	576 69	Japan	554 57	Singapore	593 70
			Japan	568 67	Korea	553 57	Hong Kong	572 66
							Japan	570 66
SIMILAR	**8 countries**		**5 countries**		**5 countries**		**6 countries**	
Countries performing at a similar level to England	Japan	548 60						
	Russian Federation	546 60	Kazakhstan	549 64				
			Russian Federation	544 62				
	Latvia	542 60					Hungary	517 53
	England	**542 59**	**England**	**541 61**	**England**	**542 54**	**England**	**513 52**
	United States	539 59	Latvia	537 60	Hungary	539 53	Russian Federation	512 51
	Hungary	536 58	Netherlands	535 59	Czech Republic	539 53		
	Italy	535 58			Slovenia	538 53	United States	508 50
	Kazakhstan	533 58			Hong Kong	530 52	Lithuania	506 49
							Czech Republic	504 49
LOWER	**25 countries**		**27 countries**		**40 countries**		**38 countries**	
Countries performing at a significantly lower level than England	*Including ...*		*Including ...*		*Including ...*		*Including ...*	
	Germany	528 56	Lithuania	530 58	Russian Federation	530 52	Slovenia	501 48
	Australia	527 57	United States	529 59			***TIMSS Scale Average***	***500***
	Slovak Republic	526 57	Germany	525 57	United States	520 49		
	Austria	526 56	Denmark	523 57	Lithuania	519 49	Armenia	499 48
	Sweden	525 56	Australia	516 55	Australia	515 48	Australia	496 47
	Netherlands	523 56	Hungary	510 54	Sweden	511 47	Sweden	491 46
	Slovenia	518 54	Italy	507 53	***TIMSS Scale Average***	***500***	Malta	488 46
	Denmark	517 54	Austria	505 52			Scotland	487 45
	Czech Republic	515 54	Sweden	503 51	Scotland	496 44	Serbia	486 45
	Lithuania	514 54	Slovenia	502 52	Italy	495 44	Italy	480 43
	New Zealand	504 52	***TIMSS Scale Average***	***500***	Armenia	488 44	Malaysia	474 42
	Scotland	500 51			Norway	487 42	Norway	469 40
	TIMSS Scale Average	***500***	Armenia	500 51	Ukraine	485 42	Cyprus	465 40
	International Average %	***49***	Slovak Republic	496 50	Jordan	482 44	Bulgaria	464 41
			Scotland	494 50	Malaysia	471 40	Israel	463 41
			New Zealand	492 49	Thailand	471 39	Ukraine	462 40
			International Average %	***48***	Serbia	470 40	Romania	461 40
					Bulgaria	470 42	***International Average %***	***39***
					International Average %	***40***		
	Armenia	484 48	Czech Republic	486 47				
	Norway	477 47	Norway	473 44	Israel	468 40		
	Ukraine	474 46	Ukraine	469 44	Bahrain	467 40		
	... and 10 more countries		*... and 10 more countries*		Bosnia and Herz.	466 39		
					Romania	462 38		
					... and 21 more countries			
	... and 10 more countries						*... and 23 more countries*	

Note: Only countries with scale scores of 460 or higher are shown.

How England performed against the other participants is summarised in Exhibit 3.7.

This shows, for the higher scoring participants, how their performance compared with England's. Three countries, Singapore, Chinese Taipei and Korea, outperformed England in all of the assessments in which they participated. Korea did not participate in the grade 4 assessments. Two further countries, Hong Kong and Japan, outperformed England in three of the four assessments, The dominance of the Pacific Rim Asian countries is confirmed; only these five such countries outperformed England in any assessment.

Exhibit 3.7 The Pattern of England's Performance in TIMSS 2007

		Grade 4 (Year 5)		Grade 8 (Year 9)	
Group	**Country**	**Science**	**Mathematics**	**Science**	**Mathematics**
Countries outperforming England in all assessments	Singapore	+	+	+	+
	Chinese Taipei	+	+	+	+
	Korea	•	•	+	+
Countries usually outperforming England	Hong Kong	+	+	=	+
	Japan	=	+	+	+
Countries performing at a similar level to England in some assessments but otherwise at a lower level than England (or not participating)	Russian Federation	=	=	–	=
	Hungary	=	–	=	=
	United States	=	–	–	=
	Czech Republic	–	–	=	=
	Latvia	=	=	•	•
	Kazakhstan	=	=	•	•
	Italy	=	–	–	–
	Slovenia	–	–	=	–
	Lithuania	–	–	–	=
	Netherlands	–	=	•	•
All other countries performed at a lower level than England in all assessments European and other developed countries with generally higher scores are shown	Australia	–	–	–	–
	Sweden	–	–	–	–
	Scotland	–	–	–	–
	Armenia	–	–	–	–
	Norway	–	–	–	–
	Ukraine	–	–	–	–
	Germany	–	–	•	•
	Denmark	–	–	•	•
	Slovak Republic	–	–	•	•
	Austria	–	–	•	•
	New Zealand	–	–	•	•
	Bulgaria	•	•	–	–
	Romania	•	•	–	–
	Malta	•	•	–	–
	Cyprus	•	•	–	–
	Serbia	•	•	–	–

Key

Other country has a higher level of performance than England	+
England has higher level of performance than other country	–
No significant difference in performance between England and other country	=
Other country did not administer this grade	•

The next group of countries shown are those with similar or lower performance than England, depending on which assessment is the focus of attention. Apart from the United States the countries are European (at least in part). All other countries were outperformed by England in all assessments. This group includes Australia, Sweden, Scotland, Norway, Germany, Denmark, Austria and New Zealand.

www TIMSS 2007 International Reports available at http://timssandpirls.bc.edu/TIMSS2007

3.6 Trends in performance over time

TIMSS 2007 provides a range of comparisons of performance over time. At grade 8, it is possible to compare 2007 performance with that in 2003, 1999 and 1995. At grade 4, comparisons from 2007 back to 2003 and 1995 are possible. This report concentrates on comparisons with 2003.

3.7 Trends in grade 4 science performance

Exhibit 3.8 shows the trend data for grade 4 science. England's performance in 2007 was very similar to that in 2003: 542 scale points in 2007 and 540 in the earlier survey. This difference is not statistically significant. England's 2003 performance was significantly higher than in 1995, as is the 2007 performance level. The gain made between 1995 and 2003 has been maintained but has not grown larger.

3.8 Trends in grade 4 mathematics performance

Exhibit 3.9 shows a significant improvement in England's grade 4 mathematics performance from 2003 to 207. The 10 scale point rise from 2003 to 2007 was from 531 to 541. Progress has continued to be made in grade 4 mathematics performance, as from 1995 to 2003 England's score rose from 484 to 531, an increase of 47 scale points - the largest increase for any participating country. In the period from 1995 to 2007 England's performance in grade 4 mathematics has risen from a level below the TIMSS scale average to a level in 2007 exceeded significantly by only four countries (see Exhibit 3.2).

3.9 Trends in grade 8 science performance

Exhibit 3.10 compares England's 2007 performance in grade 8 science with that in the three earlier surveys of this age group. The 2007 score, 542, is not significantly different from any of the previous scores. England has consistently performed at a high level in grade 8 science and continues to do so.

3.10 Trends in grade 8 mathematics performance

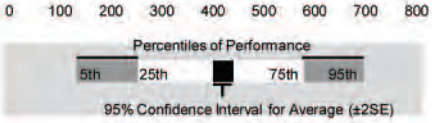
In the earlier three surveys, England's score in mathematics at grade 8 had been consistent at just under 500, the TIMSS scale average. Exhibit 3.11 shows that this has changed, with the 2007 score of 513 being significantly higher than each of the previous scores, in 1995, 1999 and 2003, and also significantly higher than the TIMSS scale average. The increase in mathematics score at grade 8, 15 points up from 2003 and 17 points up from 1999, is larger than the 2003 to 2007 increase in grade 4 mathematics. In TIMSS 2007 England performed significantly above the TIMSS scale average in both grades and subjects for the first time.[1]

Exhibit 3.8 Trends in Science Achievement – 1995 through 2007

TIMSS2007 4th Science Grade

Country		Average Scale Score	2003 to 2007 Difference	1995 to 2007 Difference
Singapore				
	2007	587 (4.1)		
	2003	565 (5.5)	22 (6.8) ▲	
	1995	523 (4.8)		63 (6.4) ▲
Chinese Taipei				
	2007	557 (2.0)		
	2003	551 (1.7)	5 (2.6) ▲	
Hong Kong SAR				
	2007	554 (3.5)		
†	2003	542 (3.1)	12 (4.6) ▲	
	1995	508 (3.3)		46 (4.8) ▲
Japan				
	2007	548 (2.1)		
	2003	543 (1.5)	4 (2.5)	
	1995	553 (1.8)		-5 (2.6) ▼
Russian Federation				
	2007	546 (4.8)		
2	2003	526 (5.2)	20 (7.0) ▲	
Latvia				
1	2007	542 (2.3)		
1	2003	530 (2.8)	12 (3.5) ▲	
1 ¶	1995	486 (4.9)		56 (5.4) ▲
England				
	2007	542 (2.9)		
†	2003	540 (3.6)	1 (4.4)	
3 †	1995	528 (3.1)		14 (4.2) ▲
United States				
2 †	2007	539 (2.7)		
†	2003	536 (2.5)	3 (3.5)	
	1995	542 (3.3)		-3 (4.3)
Hungary				
	2007	536 (3.3)		
2	2003	530 (3.0)	6 (4.5)	
	1995	508 (3.4)		28 (4.8) ▲
Italy				
	2007	535 (3.2)		
	2003	516 (3.8)	20 (4.9) ▲	
Australia				
	2007	527 (3.3)		
†	2003	521 (4.2)	7 (5.3)	
¶	1995	521 (3.8)		6 (4.9)
Austria				
	2007	526 (2.5)		
¶	1995	538 (3.6)		-12 (4.4) ▼
Netherlands				
‡	2007	523 (2.6)		
†	2003	525 (2.0)	-2 (3.1)	
¶	1995	530 (3.2)		-7 (4.0)
Slovenia				
	2007	518 (1.9)		
	2003	490 (2.5)	28 (3.2) ▲	
	1995	464 (3.1)		54 (3.6) ▲

Science Achievement Distribution



▲ 2007 average significantly higher

▼ 2007 average significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

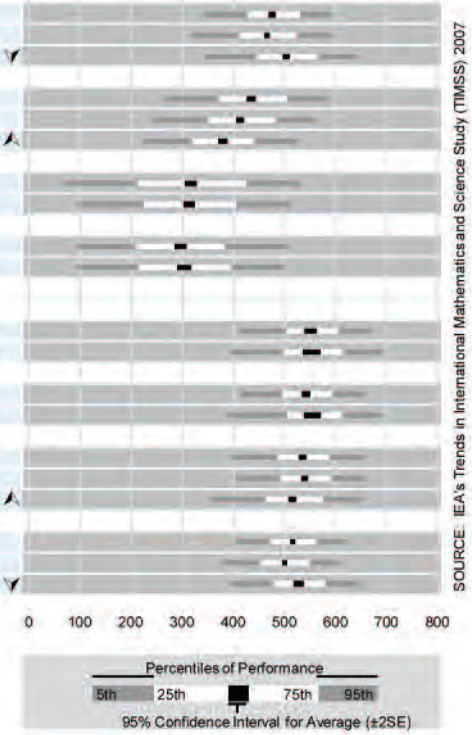
† Met guidelines for sample participation rates only after replacement schools were included.
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included.
¶ Did not satisfy guidelines for sample participation rates.
1 National Target Population does not include all of the International Target Population defined by TIMSS.
2 National Defined Population covers 90% to 95% of National Target Population.
3 National Defined Population covers less than 90% of National Target Population (but at least 77%).

Trend notes: Data are not shown for Kuwait, because comparable data from previous cycles are not available.
Data for Tunisia do not include private schools.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Exhibit 3.8 Trends in Science Achievement – 1995 through 2007 (continued)

TIMSS2007 Science 4th Grade

Country		Average Scale Score	2003 to 2007 Difference	1995 to 2007 Difference
Czech Republic				
	2007	515 (3.1)		
	1995	532 (3.0)		-17 (4.3) ▼
Lithuania				
1	2007	514 (2.4)		
1	2003	512 (2.6)	2 (3.7)	
New Zealand				
	2007	504 (2.6)		
	2003	523 (2.3)	-19 (3.5) ▼	
	1995	505 (5.3)		-1 (5.9)
Scotland				
†	2007	500 (2.3)		
†	2003	502 (2.9)	-2 (3.6)	
2 †	1995	514 (4.5)		-14 (5.0) ▼
Armenia				
	2007	484 (5.7)		
	2003	437 (4.3)	48 (7.1) ▲	
Norway				
	2007	477 (3.5)		
	2003	466 (2.6)	10 (3.5) ▲	
	1995	504 (3.7)		-27 (5.2) ▼
Iran, Islamic Rep. of				
	2007	436 (4.3)		
2	2003	414 (4.1)	22 (5.9) ▲	
	1995	380 (4.6)		55 (6.3) ▲
Tunisia				
	2007	317 (6.0)		
	2003	314 (5.7)	3 (8.1)	
Morocco				
	2007	297 (5.9)		
	2003	304 (6.7)	-7 (9.0)	
Benchmarking Participants				
Minnesota, US				
2 †	2007	551 (6.1)		
†	1995	553 (8.8)		-2 (10.7)
Alberta, Canada				
2	2007	543 (3.8)		
	1995	555 (8.4)		-13 (9.2)
Ontario, Canada				
2	2007	536 (3.7)		
	2003	540 (3.7)	-4 (5.0)	
2	1995	516 (3.7)		20 (5.2) ▲
Quebec, Canada				
2	2007	517 (2.7)		
	2003	500 (2.5)	17 (3.5) ▲	
	1995	529 (4.8)		-11 (5.5) ▼



▲ 2007 average significantly higher

▼ 2007 average significantly lower

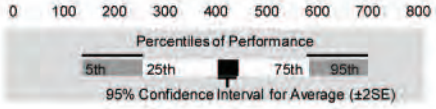
SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 3.9 Trends in Mathematics Achievement – 1995 through 2007

TIMSS2007 Mathematics 4th Grade

Country	Average Scale Score	2003 to 2007 Difference	1995 to 2007 Difference
Hong Kong SAR			
2007	607 (3.6)		
† 2003	575 (3.2)	32 (4.8) ▲	
1995	557 (4.0)		50 (5.4) ▲
Singapore			
2007	599 (3.7)		
2003	594 (5.6)	5 (6.7)	
1995	590 (4.5)		9 (5.9)
Chinese Taipei			
2007	576 (1.7)		
2003	564 (1.8)	12 (2.5) ▲	
Japan			
2007	568 (2.1)		
2003	565 (1.6)	4 (2.6)	
1995	567 (1.9)		1 (2.8)
Russian Federation			
2007	544 (4.9)		
2 2003	532 (4.7)	12 (6.8)	
England			
2007	541 (2.9)		
† 2003	531 (3.7)	10 (4.7) ▲	
3 † 1995	484 (3.3)		57 (4.4) ▲
Latvia			
1 2007	537 (2.3)		
1 2003	533 (3.1)	4 (3.8)	
1 ¶ 1995	499 (4.6)		38 (5.1) ▲
Netherlands			
‡ 2007	535 (2.1)		
† 2003	540 (2.1)	-5 (3.0)	
¶ 1995	549 (3.0)		-14 (3.7) ▼
Lithuania			
1 2007	530 (2.4)		
1 2003	534 (2.8)	-4 (3.7)	
United States			
2 † 2007	529 (2.4)		
† 2003	518 (2.4)	11 (3.4) ▲	
1995	518 (2.9)		11 (3.8) ▲
Australia			
2007	516 (3.5)		
† 2003	499 (3.9)	17 (5.3) ▲	
¶ 1995	495 (3.4)		22 (4.9) ▲
Hungary			
2007	510 (3.5)		
2 2003	529 (3.1)	-19 (4.8) ▼	
1995	521 (3.6)		-12 (5.1) ▼
Italy			
2007	507 (3.1)		
2003	503 (3.7)	4 (4.8)	
Austria			
2007	505 (2.0)		
¶ 1995	531 (2.9)		-25 (3.5) ▼

Mathematics Achievement Distribution



▲ 2007 average significantly higher

▼ 2007 average significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

† Met guidelines for sample participation rates only after replacement schools were included.
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included.
¶ Did not satisfy guidelines for sample participation rates.
1 National Target Population does not include all of the International Target Population defined by TIMSS.
2 National Defined Population covers 90% to 95% of National Target Population.
3 National Defined Population covers less than 90% of National Target Population (but at least 77%).

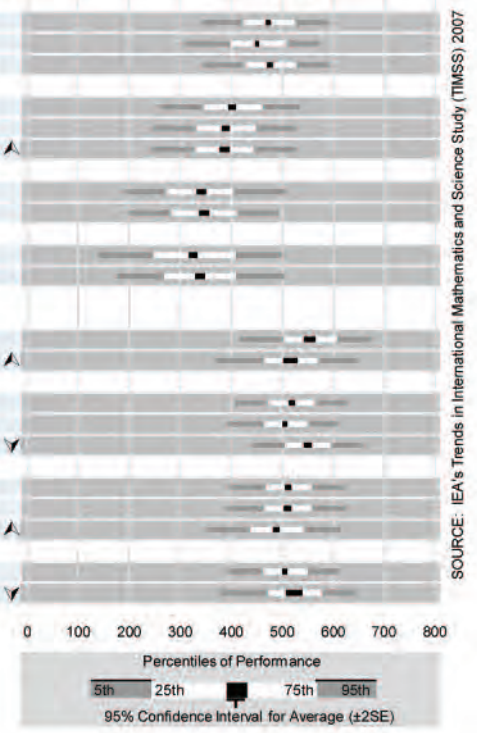
Trend notes: Data are not shown for Kuwait, because comparable data from previous cycles are not available.
Data for Tunisia do not include private schools.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

TIMSS 2007 International Reports available at http://timssandpirls.bc.edu/TIMSS2007

Exhibit 3.9 Trends in Mathematics Achievement – 1995 through 2007 (continued)

TIMSS2007 Mathematics 4th Grade

Country	Average Scale Score	2003 to 2007 Difference	1995 to 2007 Difference
Slovenia			
2007	502 (1.8)		
2003	479 (2.6)	23 (3.2) ▲	
1995	462 (3.1)		40 (3.6) ▲
Armenia			
2007	500 (4.3)		
2003	456 (3.5)	44 (5.5) ▲	
Scotland			
† 2007	494 (2.2)		
† 2003	490 (3.3)	4 (3.9)	
2 † 1995	493 (4.2)		1 (4.7)
New Zealand			
2007	492 (2.3)		
2003	496 (2.1)	-3 (3.2)	
1995	469 (4.4)		23 (5.0) ▲
Czech Republic			
2007	486 (2.8)		
1995	541 (3.1)		-54 (4.0) ▼
Norway			
2007	473 (2.5)		
2003	451 (2.3)	22 (3.5) ▲	
1995	476 (3.0)		-3 (4.1)
Iran, Islamic Rep. of			
2007	402 (4.1)		
2 2003	389 (4.2)	13 (5.7) ▲	
1995	387 (5.0)		15 (6.6) ▲
Morocco			
2007	341 (4.7)		
2003	347 (5.1)	-6 (6.7)	
Tunisia			
2007	326 (4.5)		
2003	339 (4.7)	-13 (6.5) ▼	
Benchmarking Participants			
Minnesota, US			
2 † 2007	554 (5.9)		
† 1995	516 (7.4)		38 (9.5) ▲
Quebec, Canada			
2 2007	519 (3.0)		
2003	506 (2.4)	13 (3.8) ▲	
1995	550 (4.2)		-31 (5.2) ▼
Ontario, Canada			
2 2007	512 (3.1)		
2003	511 (3.8)	0 (4.9)	
2 1995	489 (3.5)		23 (4.7) ▲
Alberta, Canada			
2 2007	505 (3.0)		
1995	523 (8.3)		-18 (8.8) ▼



▲ 2007 average significantly higher

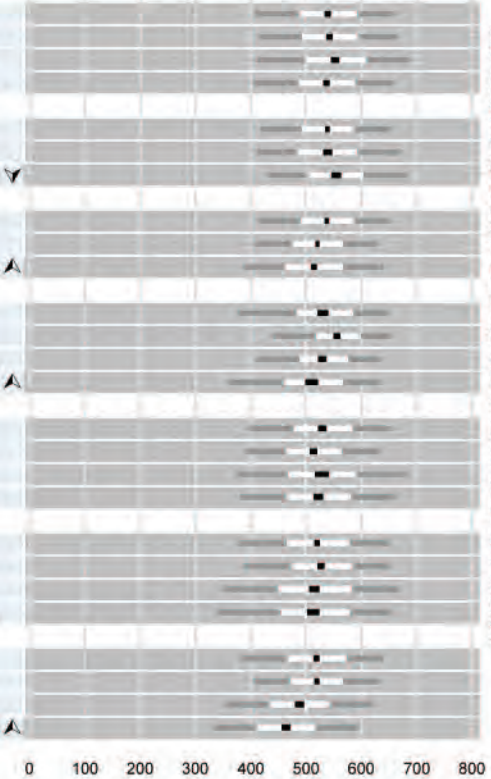
▼ 2007 average significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 3.10 Trends in Science Achievement – 1995 through 2007

TIMSS2007 Science 8th Grade

Country	Average Scale Score	2003 to 2007 Difference	1999 to 2007 Difference	1995 to 2007 Difference	Science Achievement Distribution
Singapore					
2007	567 (4.4)				
2003	578 (4.3)	-11 (6.2)			
1999	568 (8.0)		-1 (9.2)		
1995	580 (5.5)			-13 (7.1)	
Chinese Taipei					
2007	561 (3.7)				
2003	571 (3.5)	-10 (5.0) ▼			
1999	569 (4.4)		-8 (5.6)		
Japan					
2007	554 (1.9)				
2003	552 (1.7)	2 (2.6)			
1999	550 (2.2)		4 (3.0)		
1995	554 (1.8)			-1 (2.5)	
Korea, Rep. of					
2007	553 (2.0)				
¿ 2003	558 (1.6)	-5 (2.6) ▼			
1999	549 (2.6)		4 (3.4)		
1995	546 (2.0)			7 (2.9) ▲	
England					
† 2007	542 (4.5)				
¶ 2003	544 (4.1)	-2 (6.1)			
† 1999	538 (4.8)		3 (6.5)		
3 † 1995	533 (3.6)			8 (5.7)	
Hungary					
2007	539 (2.9)				
2 2003	543 (2.8)	-4 (4.0)			
1999	552 (3.7)		-13 (4.8) ▼		
1995	537 (3.1)			2 (4.2)	
Czech Republic					
2007	539 (1.9)				
1999	539 (4.2)		-1 (4.7)		
1995	555 (4.5)			-16 (4.9) ▼	
Slovenia					
2007	538 (2.2)				
2003	520 (1.8)	17 (2.8) ▲			
1995	514 (2.7)			24 (3.5) ▲	
Hong Kong SAR					
† 2007	530 (4.9)				
† 2003	556 (3.0)	-26 (5.9) ▼			
† 1999	530 (3.7)		1 (6.1)		
1995	510 (5.8)			20 (7.6) ▲	
Russian Federation					
2007	530 (3.9)				
2003	514 (3.7)	16 (5.3) ▲			
1999	529 (6.4)		0 (7.3)		
2 1995	523 (4.5)			7 (6.0)	
United States					
2 † 2007	520 (2.9)				
‡ 2003	527 (3.1)	-7 (4.3)			
1999	515 (4.6)		5 (5.3)		
† 1995	513 (5.6)			7 (6.3)	
Lithuania					
1 2007	519 (2.5)				
1 2003	519 (2.1)	-1 (3.3)			
1 ¿ 1999	488 (4.1)		30 (5.0) ▲		
1 2 1995	464 (4.0)			55 (4.8) ▲	



† Met guidelines for sample participation rates only after replacement schools were included.
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included.
¶ Did not satisfy guidelines for sample participation rates.
1 National Target Population does not include all of the International Target Population defined by TIMSS.
2 National Defined Population covers 90% to 95% of National Target Population.
3 National Defined Population covers less than 90% of National Target Population (but at least 77%).
¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

Trend notes: Data are not shown for Bulgaria, Kuwait, Morocco, Saudi Arabia, and Turkey, because comparable data from previous cycles are not available. Data for Indonesia do not include Islamic schools.

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

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 3.10 Trends in Science Achievement – 1995 through 2007 (continued)

TIMSS2007 Science 8th Grade

Country	Average Scale Score	2003 to 2007 Difference	1999 to 2007 Difference	1995 to 2007 Difference
Australia				
2007	515 (3.6)			
2003	527 (3.8)	-12 (5.3) ▼		
‡ 1995	514 (3.9)			1 (5.3)
Sweden				
2007	511 (2.6)			
2003	524 (2.7)	-14 (3.6) ▼		
1995	553 (4.4)			-42 (5.1) ▼
Scotland				
† 2007	496 (3.4)			
† 2003	512 (3.4)	-16 (4.8) ▼		
‡ 1995	501 (5.6)			-5 (6.5)
Italy				
2007	495 (2.8)			
2003	491 (3.1)	4 (4.1)		
2 1999	493 (3.9)		2 (4.8)	
Armenia				
2007	488 (5.8)			
2003	461 (3.5)	27 (6.7) ▲		
Norway				
2007	487 (2.2)			
2003	494 (2.2)	-7 (3.0) ▼		
1995	514 (2.4)			-28 (3.4) ▼
Jordan				
2007	482 (4.0)			
2003	475 (3.8)	7 (5.5)		
1999	450 (3.8)		31 (5.6) ▲	
Malaysia				
2007	471 (6.0)			
2003	510 (3.7)	-40 (7.0) ▼		
1999	492 (4.4)		-22 (7.5) ▼	
Thailand				
2007	471 (4.3)			
1999	482 (4.0)		-12 (5.9) ▼	
Serbia				
1 2 2007	470 (3.2)			
1 2003	468 (2.5)	3 (3.9)		
Israel				
3 2007	468 (4.3)			
3 2003	488 (3.1)	-20 (5.3) ▼		
3 1999	468 (4.9)		0 (6.5)	
Bahrain				
2007	467 (1.7)			
2003	438 (1.8)	29 (2.2) ▲		
Romania				
2007	462 (3.9)			
2003	470 (4.9)	-8 (6.2)		
1999	472 (5.8)		-10 (6.6)	
1995	471 (5.1)			-9 (6.5)
Iran, Islamic Rep. of				
2007	459 (3.6)			
2 2003	453 (2.3)	6 (4.2)		
1999	448 (3.8)		11 (5.2) ▲	
1995	463 (3.6)			-4 (5.2)

Science Achievement Distribution

0 100 200 300 400 500 600 700 800

▲ 2007 average significantly higher

▼ 2007 average significantly lower

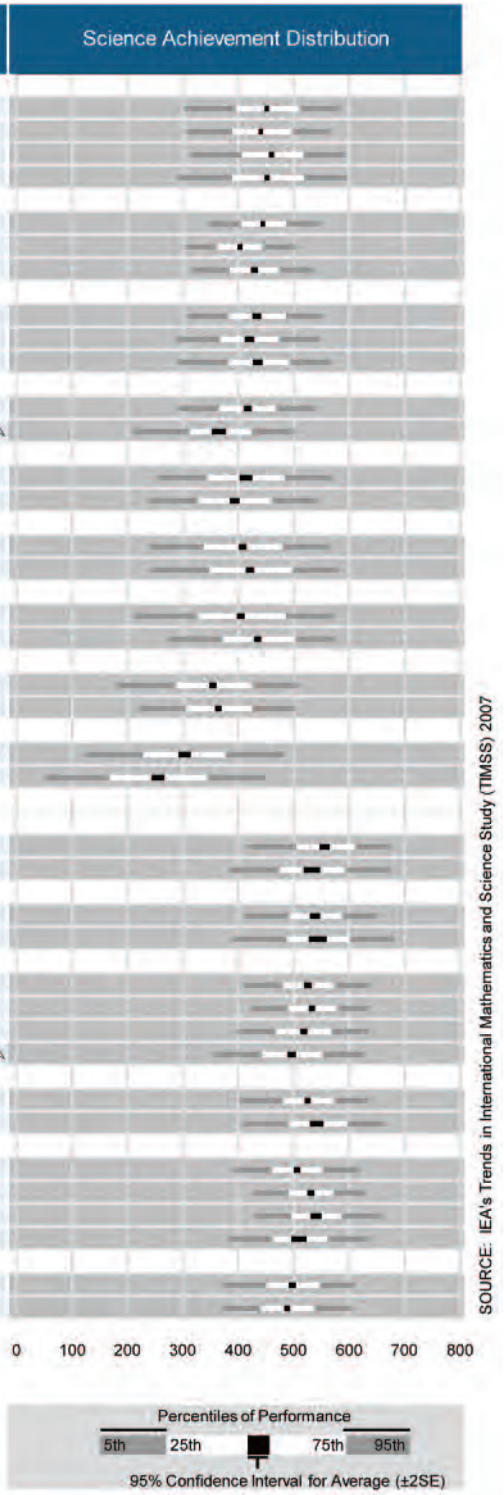
Percentiles of Performance
5th 25th 75th 95th
95% Confidence Interval for Average (±2SE)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 3.10 Trends in Science Achievement – 1995 through 2007 (continued)

TIMSS2007 Science 8th Grade

Country	Average Scale Score	2003 to 2007 Difference	1999 to 2007 Difference	1995 to 2007 Difference	Science Achievement Distribution
Cyprus					
2007	452 (2.0)				
2003	441 (2.0)	10 (2.6) ▲			
1999	460 (2.4)		-9 (3.3) ▼		
1995	452 (2.1)			0 (2.9)	
Tunisia					
2007	445 (2.1)				
2003	404 (2.1)	41 (2.8) ▲			
1999	430 (3.4)		15 (3.6) ▲		
Indonesia					
1 2007	433 (4.0)				
1 2003	420 (4.1)	13 (5.6) ▲			
1 1999	435 (4.5)		-2 (5.9)		
Colombia					
2007	417 (3.5)				
1995	365 (6.2)			52 (7.1) ▲	
Lebanon					
2007	414 (5.9)				
2003	393 (4.3)	20 (7.3) ▲			
Egypt					
2007	408 (3.6)				
2003	421 (3.9)	-13 (5.3) ▼			
Palestinian Nat'l Auth.					
2007	404 (3.5)				
2003	435 (3.2)	-31 (4.7) ▼			
Botswana					
2007	355 (3.1)				
2003	365 (2.8)	-10 (3.9) ▼			
Ghana					
2007	303 (5.4)				
2003	255 (5.9)	48 (7.9) ▲			
Benchmarking Participants					
Massachusetts, US					
2 2007	556 (4.6)				
1999	533 (7.4)		23 (8.6) ▲		
Minnesota, US					
2 † 2007	539 (4.8)				
† 1995	544 (7.9)			-5 (9.3)	
Ontario, Canada					
2 2007	526 (3.6)				
2 2003	533 (2.7)	-7 (4.5)			
1999	518 (3.1)		8 (4.9)		
1995	496 (3.7)			30 (5.2) ▲	
B. Columbia, Canada					
3 2007	526 (2.7)				
1999	542 (6.2)		-16 (6.8) ▼		
Quebec, Canada					
3 2007	507 (3.1)				
2003	531 (3.0)	-24 (4.2) ▼			
1999	540 (4.8)		-34 (5.7) ▼		
1995	510 (6.9)			-3 (7.4)	
Basque Country, Sp.					
2007	498 (3.0)				
2 2003	489 (2.7)	9 (3.9) ▲			



▲ 2007 average significantly higher

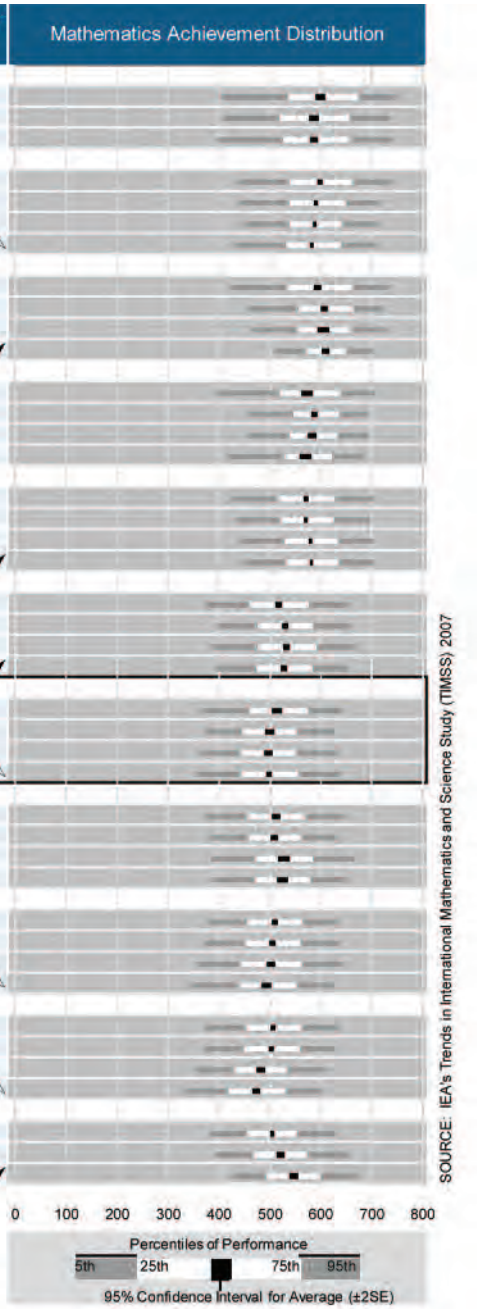
▼ 2007 average significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 3.11 Trends in Mathematics Achievement – 1995 through 2007 (continued)

TIMSS2007 Mathematics 8th Grade

Country	Average Scale Score	2003 to 2007 Difference	1999 to 2007 Difference	1995 to 2007 Difference
Chinese Taipei				
2007	598 (4.5)			
2003	585 (4.6)	13 (6.4) ▲		
1999	585 (4.0)		13 (5.9) ▲	
Korea, Rep. of				
2007	597 (2.7)			
¿ 2003	589 (2.2)	8 (3.1) ▲		
1999	587 (2.0)		10 (3.4) ▲	
1995	581 (2.0)			17 (3.4) ▲
Singapore				
2007	593 (3.8)			
2003	605 (3.6)	-13 (5.2) ▼		
1999	604 (6.3)		-12 (7.2)	
1995	609 (4.0)			-16 (5.6) ▼
Hong Kong SAR				
† 2007	572 (5.8)			
† 2003	586 (3.3)	-14 (6.6) ▼		
† 1999	582 (4.3)		-10 (7.2)	
1995	569 (6.1)			4 (8.4)
Japan				
2007	570 (2.4)			
2003	570 (2.1)	0 (3.1)		
1999	579 (1.7)		-9 (2.9) ▼	
1995	581 (1.6)			-11 (2.8) ▼
Hungary				
2007	517 (3.5)			
2 2003	529 (3.2)	-12 (4.7) ▼		
1999	532 (3.7)		-15 (5.0) ▼	
1995	527 (3.2)			-10 (4.7) ▼
England				
† 2007	513 (4.8)			
¶ 2003	498 (4.7)	15 (6.7) ▲		
† 1999	496 (4.1)		17 (6.4) ▲	
3 † 1995	498 (3.0)			16 (5.6) ▲
Russian Federation				
2007	512 (4.1)			
2003	508 (3.7)	4 (5.5)		
1999	526 (5.9)		-14 (7.2) ▼	
2 1995	524 (5.3)			-12 (6.7)
United States				
2 † 2007	508 (2.8)			
‡ 2003	504 (3.3)	4 (4.4)		
1999	502 (4.0)		7 (4.8)	
† 1995	492 (4.7)			16 (5.5) ▲
Lithuania				
1 2007	506 (2.3)			
1 2003	502 (2.5)	4 (3.4)		
1 ¿ 1999	482 (4.3)		24 (4.9) ▲	
1 2 1995	472 (4.1)			34 (4.7) ▲
Czech Republic				
2007	504 (2.4)			
1999	520 (4.2)		-16 (4.8) ▼	
1995	546 (4.5)			-42 (5.1) ▼



† Met guidelines for sample participation rates only after replacement schools were included.
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included.
¶ Did not satisfy guidelines for sample participation rates.
1 National Target Population does not include all of the International Target Population defined by TIMSS.
2 National Defined Population covers 90% to 95% of National Target Population.
3 National Defined Population covers less than 90% of National Target Population (but at least 77%).
¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

Trend notes: Data are not shown for Kuwait, Morocco, Saudi Arabia, and Turkey, because comparable data from previous cycles are not available. Data for Indonesia do not include Islamic schools.

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

Exhibit 3.11 Trends in Mathematics Achievement – 1995 through 2007 (continued)

TIMSS2007 8th Mathematics Grade

Country		Average Scale Score	2003 to 2007 Difference	1999 to 2007 Difference	1995 to 2007 Difference
Slovenia					
	2007	501 (2.1)			
	2003	493 (2.2)	9 (3.0) ▲		
	1995	494 (2.9)			7 (3.6)
Armenia					
	2007	499 (3.5)			
	2003	478 (3.0)	21 (4.6) ▲		
Australia					
	2007	496 (3.9)			
	2003	505 (4.6)	-8 (6.1)		
‡	1995	509 (3.7)			-13 (5.4) ▼
Sweden					
	2007	491 (2.3)			
	2003	499 (2.6)	-8 (3.4) ▼		
	1995	540 (4.3)			-48 (4.8) ▼
Scotland					
†	2007	487 (3.7)			
†	2003	498 (3.7)	-10 (5.2) ▼		
‡	1995	493 (5.7)			-6 (6.8)
Serbia					
1 2	2007	486 (3.3)			
1	2003	477 (2.6)	9 (4.1) ▲		
Italy					
	2007	480 (3.0)			
	2003	484 (3.2)	-4 (4.3)		
2	1999	479 (3.8)		0 (4.8)	
Malaysia					
	2007	474 (5.0)			
	2003	508 (4.1)	-34 (6.5) ▼		
	1999	519 (4.4)		-45 (6.7) ▼	
Norway					
	2007	469 (2.0)			
	2003	461 (2.5)	8 (3.2) ▲		
	1995	498 (2.2)			-29 (2.9) ▼
Cyprus					
	2007	465 (1.6)			
	2003	459 (1.7)	6 (2.3) ▲		
	1999	476 (1.8)		-11 (2.4) ▼	
	1995	468 (2.2)			-2 (2.9)
Bulgaria					
	2007	464 (5.0)			
	2003	476 (4.3)	-13 (6.5)		
	1999	511 (5.8)		-47 (7.7) ▼	
¶	1995	527 (5.8)			-63 (7.6) ▼
Israel					
3	2007	463 (3.9)			
3	2003	496 (3.4)	-32 (5.2) ▼		
3	1999	466 (3.9)		-3 (5.6)	
Romania					
	2007	461 (4.1)			
	2003	475 (4.8)	-14 (6.4) ▼		
	1999	472 (5.8)		-11 (7.2)	
	1995	474 (4.6)			-12 (6.2) ▼

Mathematics Achievement Distribution

0 100 200 300 400 500 600 700 800

▲ 2007 average significantly higher

▼ 2007 average significantly lower

Percentiles of Performance

5th 25th 75th 95th

95% Confidence Interval for Average (±2SE)

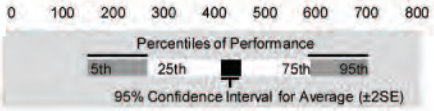
SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 3.11 Trends in Mathematics Achievement – 1995 through 2007 (continued)

TIMSS2007 Mathematics 8th Grade

Country		Average Scale Score	2003 to 2007 Difference	1999 to 2007 Difference	1995 to 2007 Difference
Lebanon					
	2007	449 (4.0)			
	2003	433 (3.1)	16 (4.9) ▲		
Thailand					
	2007	441 (5.0)			
	1999	467 (5.1)		-26 (7.1) ▼	
Jordan					
	2007	427 (4.1)			
	2003	424 (4.1)	3 (5.8)		
	1999	428 (3.6)		-1 (5.4)	
Tunisia					
	2007	420 (2.4)			
	2003	410 (2.2)	10 (3.2) ▲		
	1999	448 (2.4)		-28 (3.5) ▼	
Indonesia					
1	2007	405 (4.6)			
1	2003	411 (4.8)	-5 (6.6)		
1	1999	403 (4.9)		2 (6.4)	
Iran, Islamic Rep. of					
	2007	403 (4.1)			
2	2003	411 (2.4)	-8 (4.8)		
	1999	422 (3.4)		-19 (5.1) ▼	
	1995	418 (3.9)			-15 (5.6) ▼
Bahrain					
	2007	398 (1.6)			
	2003	401 (1.7)	-3 (2.2)		
Egypt					
	2007	391 (3.6)			
	2003	406 (3.5)	-16 (4.9) ▼		
Colombia					
	2007	380 (3.6)			
	1995	332 (5.6)			47 (6.7) ▲
Palestinian Nat'l Auth					
	2007	367 (3.5)			
	2003	390 (3.1)	-23 (4.6) ▼		
Botswana					
	2007	364 (2.3)			
	2003	366 (2.6)	-3 (3.3)		
Ghana					
	2007	309 (4.4)			
	2003	276 (4.7)	34 (6.2) ▲		

Mathematics Achievement Distribution



▲ 2007 average significantly higher

▼ 2007 average significantly lower

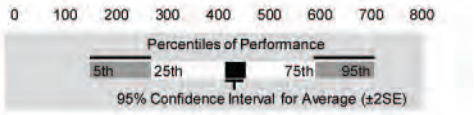
SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 3.11 Trends in Mathematics Achievement – 1995 through 2007 (continued)

TIMSS2007 8th Mathematics Grade

Country		Average Scale Score	2003 to 2007 Difference	1999 to 2007 Difference	1995 to 2007 Difference
Benchmarking Participants					
Massachusetts, US					
2	2007	547 (4.6)			
	1999	513 (5.9)		34 (7.5) ▲	
Minnesota, US					
2 †	2007	532 (4.4)			
†	1995	518 (7.3)			14 (8.6)
Quebec, Canada					
3	2007	528 (3.5)			
	2003	543 (3.0)	-15 (4.6) ▼		
	1999	566 (5.3)		-38 (6.3) ▼	
	1995	556 (5.9)			-28 (6.8) ▼
Ontario, Canada					
2	2007	517 (3.5)			
2	2003	521 (3.1)	-4 (4.6)		
	1999	517 (3.0)		1 (4.6)	
	1995	501 (2.9)			17 (4.6) ▲
B. Columbia, Canada					
3	2007	509 (3.0)			
	1999	522 (7.3)		-12 (8.0)	
Basque Country, Sp.					
	2007	499 (3.0)			
2	2003	487 (2.7)	11 (3.8) ▲		

Mathematics Achievement Distribution



▲ 2007 average significantly higher

▼ 2007 average significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

3.11 England's trends set in context

The preceding sections have looked at trends solely in terms of changes in England's level of performance. In this section, these trends are examined in the context of trends in performance of the other participating countries. Exhibit 3.12 looks at the patterns of change from 2003 to 2007. The bottom of the table summarises the trends for all countries with data for 2003 and 2007. For grade 4, in both science and mathematics, nearly all the trends show an increase in performance or no change. For grade 8, on the other hand, the pattern is different, with similar proportions of countries in each category showing an increase in performance, no change or a decrease in performance.

At the top of Exhibit 3.12, the high scoring Pacific Rim countries are shown. The trends apparent in these countries are a mixture, as is the case for England. The other countries in this Exhibit also show a mixture of trends. There is no clear upward or downward trend in TIMSS 2007 beyond the difference between grade 4 and grade 8 already noted.

Another aspect of analysing trends is to look at changes in the standing of England against other countries. An improvement in England's standing relative to another country may be caused by an improvement in England's performance, a decline in the other country's performance or a combination of the two. Exhibit 3.13 analyses such changes.

Exhibit 3.12 Overall Trends 2003 to 2007

Country	Grade 4 Mathematics	Grade 4 Science	Grade 8 Mathematics	Grade 8 Science
Singapore	=	▲	▼	=
Chinese Taipei	▲	▲	▲	▼
Hong Kong	▲	▲	▼	▼
Japan	=	=	=	=
Korea	–	–	▲	▼
England	▲	=	▲	=
United States	▲	=	=	=
Italy	=	▲	=	=
Hungary	▼	=	▼	=
Netherlands	=	=	–	–
Sweden	–	–	▼	▼
Norway	▲	▲	▲	▼
Russian Fed	=	▲	=	▲
Scotland	=	=	▼	▼
New Zealand	=	▼		
Australia	▲	=	=	▼

		Grade 4 Mathematics	Grade 4 Science	Grade 8 Mathematics	Grade 8 Science
Overall	**Up**	▲ 9	▲ 10	▲ 11	▲ 9
	No change	= 10	= 10	= 12	= 11
	Down	▼ 2	▼ 1	▼ 10	▼ 12
Total number of trend countries		**21**	**21**	**33**	**32**†

† No trend results were available for Bulgaria for Grade 8 science.

Countries are in three groups, which differ for each assessment. The first group are the countries which outscored England in 2007. In nearly all cases, these countries also outscored England in 2003. The two exceptions, Hong Kong in grade 4 science and Japan in grade 8 science, are changes from a similar level of performance to England in 2003 to a higher level of performance than England in 2007.

The second group of countries are those performing at a similar level to England in 2007. In grade 4 science, four countries have improved their performance relative to England, changing from significantly lower in 2003 to be at a similar level in 2007. In each of the other three assessments, one country shows a decline in performance relative to England. In grade 4 mathematics the Netherlands had previously outscored England but performed at a similar level in 2007. In grade 8 science Hong Kong had outscored England in 2003 but did not in 2007. Also in grade 8 science, one country, Slovenia, has improved relative to England, performing less well in 2003 but similarly in 2007. In grade 8 mathematics, Hungary, previously performing at a higher level than England, performed at a similar level in 2007.

Exhibit 3.13 Trends in Performance, Countries compared with England

TIMSS 2007	Grade 4				Grade 8			
	Science		**Mathematics**		**Science**		**Mathematics**	
HIGHER Countries performing at a significantly higher level than England in 2007; all also participated in TIMSS 2003	Singapore Chinese Taipei Hong Kong	= = s	Hong Kong Singapore Chinese Taipei Japan	= = = =	Singapore Chinese Taipei Japan Korea	= = s =	Chinese Taipei Korea Singapore Hong Kong Japan	= = = = =
SIMILAR Countries performing at a similar level to England in 2007; which also participated in TIMSS 2003	Japan Russian Federation Latvia **England** United States Hungary Italy	= s s = s s	Russian Federation **England** Latvia Netherlands	= = t	**England** Hungary Slovenia Hong Kong	 = s t	Hungary **England** Russian Federation United States Lithuania	t = = =
LOWER Countries performing at a significantly lower level than England which had performed similarly in 2003	None		Lithuania Hungary	t t	None		Slovenia Australia Sweden Scotland Malaysia Israel	t t t t t t

Key

s *Other country has improved its performance relative to England's since 2003*

= *No change in other country's performance relative to England's since 2003*

t *Other country's performance has declined relative to England's since 2003*

The final group of countries are those which had performed at a similar level to England in 2003 but at a lower level in 2007. These countries all declined relative to England in mathematics, rather than science. Two countries declined in this way at grade 4 and six at grade 8. These changes mirror the size of England's own improvements from 2003 to 2007 in mathematics, the larger change being at grade 8.

3.12 Does the choice of items in TIMSS affect England's standing?

For each TIMSS survey, countries are asked to identify any items in the survey that are not in their curriculum. Each country is then scored on every country's selection of items, allowing the effect of excluding items on the average percentage correct to be identified. The effect on a country's percentage correct is usually very small, and the relative country rankings would, as a result, be little different.

In grade 4 science, England scored an average of 59 per cent on the complete item set, and 60 per cent when items identified as not in England's curriculum were omitted from the analysis. Likewise, England's average percentage correct was little different when the

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items in line with other countries' curricula formed the basis of comparison. In grade 8 science England's score again rose by only one percentage point when Items identified as not in England's curriculum were omitted from the analysis, from 54 per cent to 55 per cent. Scored on other countries' selected items, England's score varied from 52 per cent to 57 per cent, in spite of some countries deselecting large numbers of items.

In grade 4 mathematics, the removal of four items did not change England's percentage correct, 61 per cent, while at grade 8 the increase was from 52 per cent to 53 per cent after omitting 10 items not regarded as in the national curriculum. In both cases England's score was very similar when other countries' item selections were used, except in isolated cases where a country had deselected large numbers of items.

See Appendix C of the international mathematics and science reports for full details of performance when countries deselect items not in their curricula.

3.13 Summary

England performed at a very high level in the four TIMSS 2007 assessments: mathematics and science at both grade 4 and grade 8. Only Asian Pacific Rim countries outperformed England, but not in every assessment. Three did so in grade 4 science, four in grade 4 mathematics and grade 8 science and five in grade 8 mathematics. Some of our European neighbours performed at a similar level to England in some assessments but none did so in all four assessments. The majority of countries participating in TIMSS 2007 were outperformed by England in all four assessments, including some of our European neighbours.

England's performance over time has continued to improve in grade 4 mathematics, and for the first time in TIMSS performance in grade 8 mathematics has improved. In science the previous high standards were maintained in both grades.

Footnote

[1] The 2003 data for England was based on a sample which did not fully meet the international sampling requirements. As a result, the data was weighted to make it representative using school national test and examination data. The England 2003 data has been accepted by the IEA as suitable for use in comparisons over time and has been used in the 2007 international reports.

4 Performance at the international benchmarks

The international benchmarks in the 2007 TIMSS study are points in the score range at which students' performance, what they can do, has been described. They are also used to compare the performance of the various countries by looking at the proportions of students in each country reaching each benchmark (performance level). They provide a way of comparing countries at different points in the performance spectrum. The benchmarks were defined at these scale points:

625 for the advanced benchmark
550 for the high benchmark
475 for the intermediate
400 for the low benchmark

These benchmarks are the same for both grades and subjects, and are also the same as in the 2003 study, allowing trends over time in benchmark performance to be established.

4.1 Grade 4 science: performance at the international benchmarks

Exhibit 4.1 gives brief descriptions of what pupils scoring at the international benchmark scores can do in grade 4 science. Exhibit 4.2 shows how many students reached each benchmark in each participating country. Students scoring 625 or higher achieve the advanced benchmark and those between 550 and 624 achieve the high benchmark and so on.

In Singapore, 36 per cent of pupils reached the advanced benchmark, while England's performance is similar to that of nearly all of the countries which performed at the same level overall, as outlined in Chapter 2. The 14 per cent reaching the advanced benchmark in England is similar, for example, to the proportions in the United States and Hungary. This is also true for the other benchmarks, where the proportion attaining each one is usually close to that of countries which performed at a similar overall level to England.

See Chapter 2 of the international mathematics and science reports for more detailed descriptions of the international benchmarks and sample items illustrating the different performance levels.

4.2 Grade 4 mathematics: performance at the international benchmarks

Exhibit 4.3 gives the descriptions of what pupils scoring at the international benchmark scores can do in grade 4 mathematics. Exhibit 4.4 shows the performance of each country. Singapore and Hong Kong stand out from the remaining countries, with around 40 per cent

Exhibit 4.1 TIMSS 2007 International Benchmarks of Science Achievement

TIMSS2007 Science 4th Grade

Advanced International Benchmark – 625

Students can apply knowledge and understanding of scientific processes and relationships in beginning scientific inquiry. Students communicate their understanding of characteristics and life processes of organisms as well as of factors relating to human health. They demonstrate understanding of relationships among various physical properties of common materials and have some practical knowledge of electricity. Students demonstrate some understanding of the solar system and Earth's physical features and processes. They show a developing ability to interpret the results of investigations and draw conclusions as well as a beginning ability to evaluate and support an argument.

High International Benchmark – 550

Students can apply knowledge and understanding to explain everyday phenomena. Students demonstrate some understanding of plant and animal structure, life processes, and the environment and some knowledge of properties of matter and physical phenomena. They show some knowledge of the solar system, and of Earth's structure, processes, and resources. Students demonstrate beginning scientific inquiry knowledge and skills, and provide brief descriptive responses combining knowledge of science concepts with information from everyday experience of physical and life processes.

Intermediate International Benchmark – 475

Students can apply basic knowledge and understanding to practical situations in the sciences. Students recognize some basic information related to characteristics of living things and their interaction with the environment, and show some understanding of human biology and health. They also show some understanding of familiar physical phenomena. Students know some basic facts about the solar system and have a developing understanding of Earth's resources. They demonstrate some ability to interpret information in pictorial diagrams and apply factual knowledge to practical situations.

Low International Benchmark – 400

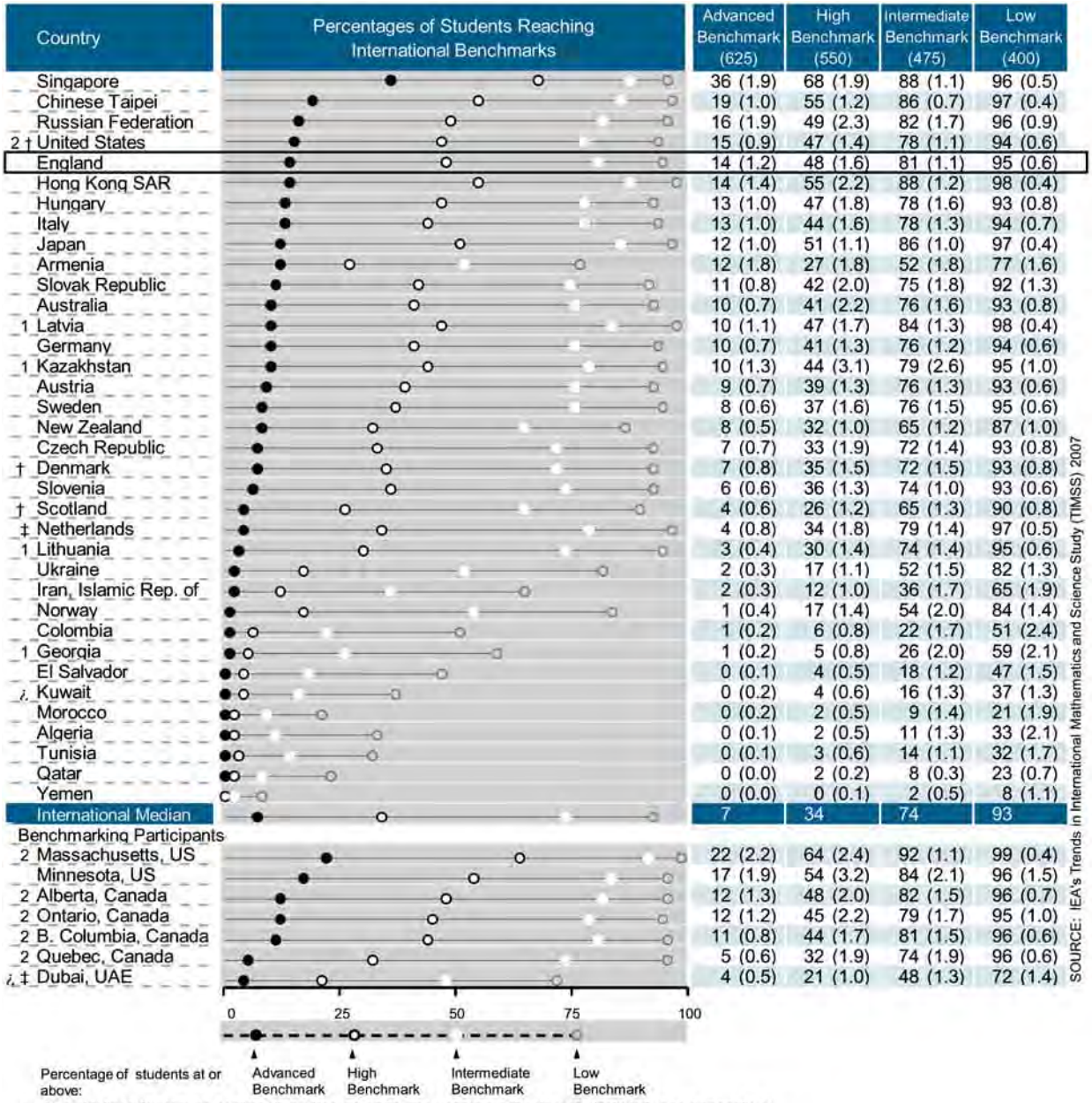
Students have some elementary knowledge of life science and physical science. Students can demonstrate knowledge of some simple facts related to human health and the behavioral and physical characteristics of animals. They recognize some properties of matter, and demonstrate a beginning understanding of forces. Students interpret labeled pictures and simple diagrams, complete simple tables, and provide short written responses to questions requiring factual information.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

of students reaching the advanced benchmark. England's performance, 16 per cent at the advanced benchmark, is similar to that of the Russian Federation, which performed overall at a similar level to England. The Netherlands and Latvia, however, have fewer pupils reaching the advanced and high benchmarks but more achieving the intermediate and low benchmarks.

Exhibit 4.2 Percentages of Students reaching the TIMSS 2007 International Benchmarks of Science Achievement

TIMSS2007 Science 4th Grade



Country	Advanced Benchmark (625)	High Benchmark (550)	Intermediate Benchmark (475)	Low Benchmark (400)
Singapore	36 (1.9)	68 (1.9)	88 (1.1)	96 (0.5)
Chinese Taipei	19 (1.0)	55 (1.2)	86 (0.7)	97 (0.4)
Russian Federation	16 (1.9)	49 (2.3)	82 (1.7)	96 (0.9)
2 † United States	15 (0.9)	47 (1.4)	78 (1.1)	94 (0.6)
England	14 (1.2)	48 (1.6)	81 (1.1)	95 (0.6)
Hong Kong SAR	14 (1.4)	55 (2.2)	88 (1.2)	98 (0.4)
Hungary	13 (1.0)	47 (1.8)	78 (1.6)	93 (0.8)
Italy	13 (1.0)	44 (1.6)	78 (1.3)	94 (0.7)
Japan	12 (1.0)	51 (1.1)	86 (1.0)	97 (0.4)
Armenia	12 (1.8)	27 (1.8)	52 (1.8)	77 (1.6)
Slovak Republic	11 (0.8)	42 (2.0)	75 (1.8)	92 (1.3)
Australia	10 (0.7)	41 (2.2)	76 (1.6)	93 (0.8)
1 Latvia	10 (1.1)	47 (1.7)	84 (1.3)	98 (0.4)
Germany	10 (0.7)	41 (1.3)	76 (1.2)	94 (0.6)
1 Kazakhstan	10 (1.3)	44 (3.1)	79 (2.6)	95 (1.0)
Austria	9 (0.7)	39 (1.3)	76 (1.3)	93 (0.6)
Sweden	8 (0.6)	37 (1.6)	76 (1.5)	95 (0.6)
New Zealand	8 (0.5)	32 (1.0)	65 (1.2)	87 (1.0)
Czech Republic	7 (0.7)	33 (1.9)	72 (1.4)	93 (0.8)
† Denmark	7 (0.8)	35 (1.5)	72 (1.5)	93 (0.8)
Slovenia	6 (0.6)	36 (1.3)	74 (1.0)	93 (0.6)
† Scotland	4 (0.6)	26 (1.2)	65 (1.3)	90 (0.8)
‡ Netherlands	4 (0.8)	34 (1.8)	79 (1.4)	97 (0.5)
1 Lithuania	3 (0.4)	30 (1.4)	74 (1.4)	95 (0.6)
Ukraine	2 (0.3)	17 (1.1)	52 (1.5)	82 (1.3)
Iran, Islamic Rep. of	2 (0.3)	12 (1.0)	36 (1.7)	65 (1.9)
Norway	1 (0.4)	17 (1.4)	54 (2.0)	84 (1.4)
Colombia	1 (0.2)	6 (0.8)	22 (1.7)	51 (2.4)
1 Georgia	1 (0.2)	5 (0.8)	26 (2.0)	59 (2.1)
El Salvador	0 (0.1)	4 (0.5)	18 (1.2)	47 (1.5)
¿ Kuwait	0 (0.2)	4 (0.6)	16 (1.3)	37 (1.3)
Morocco	0 (0.2)	2 (0.5)	9 (1.4)	21 (1.9)
Algeria	0 (0.1)	2 (0.5)	11 (1.3)	33 (2.1)
Tunisia	0 (0.1)	3 (0.6)	14 (1.1)	32 (1.7)
Qatar	0 (0.0)	2 (0.2)	8 (0.3)	23 (0.7)
Yemen	0 (0.0)	0 (0.1)	2 (0.5)	8 (1.1)
International Median	7	34	74	93
Benchmarking Participants				
2 Massachusetts, US	22 (2.2)	64 (2.4)	92 (1.1)	99 (0.4)
Minnesota, US	17 (1.9)	54 (3.2)	84 (2.1)	96 (1.5)
2 Alberta, Canada	12 (1.3)	48 (2.0)	82 (1.5)	96 (0.7)
2 Ontario, Canada	12 (1.2)	45 (2.2)	79 (1.7)	95 (1.0)
2 B. Columbia, Canada	11 (0.8)	44 (1.7)	81 (1.5)	96 (0.6)
2 Quebec, Canada	5 (0.6)	32 (1.9)	74 (1.9)	96 (0.6)
¿ ‡ Dubai, UAE	4 (0.5)	21 (1.0)	48 (1.3)	72 (1.4)

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).
1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).
2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).
¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 4.3 TIMSS 2007 International Benchmarks of Mathematics Achievement

TIMSS2007 Mathematics 4th Grade

Advanced International Benchmark – 625

Students can apply their understanding and knowledge in a variety of relatively complex situations and explain their reasoning. They can apply proportional reasoning in a variety of contexts. They demonstrate a developing understanding of fractions and decimals. They can select appropriate information to solve multi-step word problems. They can formulate or select a rule for a relationship. Students can apply geometric knowledge of a range of two- and three-dimensional shapes in a variety of situations. They can organize, interpret, and represent data to solve problems.

High International Benchmark – 550

Students can apply their knowledge and understanding to solve problems. Students can solve multi-step word problems involving operations with whole numbers. They can use division in a variety of problem situations. They demonstrate understanding of place value and simple fractions. Students can extend patterns to find a later specified term and identify the relationship between ordered pairs. Students show some basic geometric knowledge. They can interpret and use data in tables and graphs to solve problems.

Intermediate International Benchmark – 475

Students can apply basic mathematical knowledge in straightforward situations. Students at this level demonstrate an understanding of whole numbers. They can extend simple numeric and geometric patterns. They are familiar with a range of two-dimensional shapes. They can read and interpret different representations of the same data.

Low International Benchmark – 400

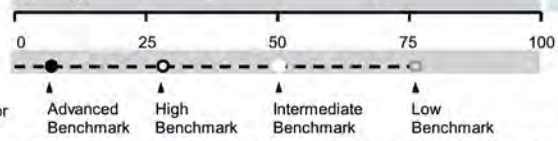
Students have some basic mathematical knowledge. Students demonstrate an understanding of adding and subtracting with whole numbers. They demonstrate familiarity with triangles and informal coordinate systems. They can read information from simple bar graphs and tables.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 4.4 Percentages of students reaching the TIMSS 2007 International Benchmarks of Mathematics Achievement

TIMSS2007 Mathematics 4th Grade

Country	Advanced Benchmark (625)	High Benchmark (550)	Intermediate Benchmark (475)	Low Benchmark (400)
Singapore	41 (2.1)	74 (1.7)	92 (0.9)	98 (0.3)
Hong Kong SAR	40 (2.2)	81 (1.6)	97 (0.5)	100 (0.1)
Chinese Taipei	24 (1.2)	66 (1.2)	92 (0.5)	99 (0.2)
Japan	23 (1.2)	61 (1.2)	89 (0.8)	98 (0.4)
1 Kazakhstan	19 (2.1)	52 (3.5)	81 (2.9)	95 (1.5)
England	16 (1.2)	48 (1.4)	79 (1.2)	94 (0.7)
Russian Federation	16 (1.8)	48 (2.3)	81 (1.7)	95 (0.7)
1 Latvia	11 (0.8)	44 (1.5)	81 (1.2)	97 (0.5)
2 † United States	10 (0.8)	40 (1.3)	77 (1.2)	95 (0.5)
1 Lithuania	10 (0.7)	42 (1.4)	77 (1.4)	94 (0.7)
Hungary	9 (0.8)	35 (1.4)	67 (1.7)	88 (1.2)
Australia	9 (0.8)	35 (1.9)	71 (1.7)	91 (1.0)
Armenia	8 (1.5)	28 (1.8)	60 (1.8)	87 (1.2)
† Denmark	7 (0.7)	36 (1.5)	76 (1.2)	95 (0.8)
‡ Netherlands	7 (0.7)	42 (1.6)	84 (1.3)	98 (0.4)
Germany	6 (0.5)	37 (1.3)	78 (1.2)	96 (0.5)
Italy	6 (0.7)	29 (1.6)	67 (1.6)	91 (1.0)
New Zealand	5 (0.5)	26 (1.0)	61 (1.1)	85 (1.0)
Slovak Republic	5 (0.7)	26 (1.4)	63 (1.8)	88 (1.5)
† Scotland	4 (0.5)	25 (1.1)	62 (1.4)	88 (0.9)
Slovenia	3 (0.4)	25 (1.1)	67 (0.9)	92 (0.6)
Austria	3 (0.3)	26 (1.0)	69 (1.4)	93 (0.8)
Sweden	3 (0.3)	24 (1.4)	68 (1.4)	93 (0.7)
Ukraine	2 (0.5)	17 (1.1)	50 (1.5)	79 (1.2)
Czech Republic	2 (0.4)	19 (1.4)	59 (1.6)	88 (1.1)
Norway	2 (0.3)	15 (1.0)	52 (1.6)	83 (1.1)
1 Georgia	1 (0.4)	10 (1.0)	35 (1.8)	67 (2.0)
Colombia	0 (0.1)	2 (0.4)	9 (1.1)	31 (2.0)
Morocco	0 (0.2)	2 (0.8)	9 (1.1)	26 (2.0)
Iran, Islamic Rep. of	0 (0.1)	3 (0.5)	20 (1.5)	53 (2.0)
Algeria	0 (0.1)	2 (0.4)	14 (1.4)	41 (2.2)
Tunisia	0 (0.1)	1 (0.2)	9 (0.7)	28 (1.6)
El Salvador	0 (0.0)	1 (0.2)	6 (0.5)	22 (1.6)
¿ Kuwait	0 (0.0)	0 (0.1)	5 (0.6)	21 (1.2)
Qatar	0 (0.0)	0 (0.1)	2 (0.2)	13 (0.4)
Yemen	0 (0.0)	0 (0.1)	1 (0.4)	6 (0.8)
International Median	5	26	67	90
Benchmarking Participants				
2 Massachusetts, US	22 (1.8)	63 (2.1)	92 (1.1)	99 (0.3)
2 † Minnesota, US	18 (2.1)	55 (3.2)	85 (2.2)	97 (1.2)
2 Quebec, Canada	5 (0.7)	34 (2.2)	74 (1.6)	96 (0.6)
2 B. Columbia, Canada	4 (0.5)	27 (1.3)	67 (1.7)	93 (0.9)
2 Ontario, Canada	4 (0.6)	29 (1.8)	71 (1.8)	94 (1.1)
2 Alberta, Canada	3 (0.6)	25 (1.8)	69 (1.9)	94 (1.0)
¿ ‡ Dubai, UAE	2 (0.3)	12 (0.7)	37 (1.2)	69 (1.3)



† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).
1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).
2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).
¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 4.5 TIMSS 2007 International Benchmarks of Science Achievement (Continued)

TIMSS2007 Science 8th Grade

Advanced International Benchmark – 625

Students can demonstrate a grasp of some complex and abstract concepts in biology, chemistry, physics, and Earth science. They have an understanding of the complexity of living organisms and how they relate to their environment. They show understanding of the properties of magnets, sound, and light, as well as demonstrating understanding of structure of matter and physical and chemical properties and changes. Students apply knowledge of the solar system and of Earth's features and processes, and apply understanding of major environmental issues. They understand some fundamentals of scientific investigation and can apply basic physical principles to solve some quantitative problems. They can provide written explanations to communicate scientific knowledge.

High International Benchmark – 550

Students can demonstrate conceptual understanding of some science cycles, systems, and principles. They have some understanding of biological concepts including cell processes, human biology and health, and the interrelationship of plants and animals in ecosystems. They apply knowledge to situations related to light and sound, demonstrate elementary knowledge of heat and forces, and show some evidence of understanding the structure of matter, and chemical and physical properties and changes. They demonstrate some understanding of the solar system, Earth's processes and resources, and some basic understanding of major environmental issues. Students demonstrate some scientific inquiry skills. They combine information to draw conclusions, interpret tabular and graphical information, and provide short explanations conveying scientific knowledge.

Intermediate International Benchmark – 475

Students can recognize and communicate basic scientific knowledge across a range of topics. They demonstrate some understanding of characteristics of animals, food webs, and the effect of population changes in ecosystems. They are acquainted with some aspects of sound and force and have elementary knowledge of chemical change. They demonstrate elementary knowledge of the solar system, Earth's processes, and resources and the environment. Students extract information from tables and interpret pictorial diagrams. They can apply knowledge to practical situations and communicate their knowledge through brief descriptive responses.

Low International Benchmark – 400

Students can recognize some basic facts from the life and physical sciences. They have some knowledge of the human body, and demonstrate some familiarity with everyday physical phenomena. Students can interpret pictorial diagrams and apply knowledge of simple physical concepts to practical situations.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

4.3 Grade 8 science: performance at the international benchmarks

Exhibit 4.5 describes the grade 8 science benchmarks. Exhibit 4.6 shows each country's performance against them. Singapore, with 32 per cent of students reaching the advanced benchmark, is the highest scoring country, followed by Chinese Taipei (25 per cent) and then Japan, England and Korea, all with 17 per cent. While similar proportions of pupils in England, Japan and Korea achieved the advanced benchmark, England was less successful in achieving the high benchmark. In England, 48 per cent reached this benchmark, against 55 per cent and 54 per cent respectively.

4.4 Grade 8 mathematics: performance at the international benchmarks

Exhibit 4.7 describes the grade 8 mathematics benchmarks. Exhibit 4.8 shows each country's performance against them. The large gap in performance between the five high scoring Pacific Rim countries and the remainder was commented on in Chapter 2. Performance at the international benchmarks reflects this gap in performance level. Three of these countries have at least 40 per cent of students reaching the advanced benchmark and the other two have 31 per cent and 26 per cent. The next highest achiever, Hungary, has 10 per cent, while England is one of two countries with eight per cent. Again, England's performance is similar to that of nearly all of the countries which performed at the same level overall.

4.5 Grade 4 science: trends in performance at the international benchmarks

As there was no overall change in performance in grade 4 science, little change in the proportions of pupils reaching the benchmarks would be expected. Exhibit 4.9 indicates that this is the case, with proportions at each benchmark similar to the 2003 values. For the high, intermediate and low benchmarks, performance in 2007 was, however, better than in the 1995 survey.

4.6 Grade 4 mathematics: trends in performance at the international benchmarks

In grade 4 mathematics, performance rose from 2003 levels. An upward trend in pupils reaching the international benchmarks would thus be expected. Exhibit 4.10 shows that, for the high and intermediate benchmarks, performance has improved since 2003, from 43 per cent to 48 per cent for the high benchmark, and from 75 per cent to 79 per cent for the intermediate benchmark. For all of the benchmarks, 2007 performance is ahead of that in 1995.

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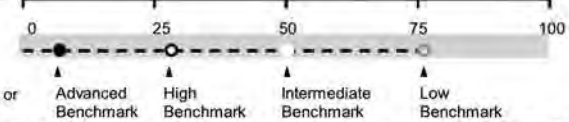
TIMSS 2007 International Reports available at http://timssandpirls.bc.edu/TIMSS2007

Exhibit 4.6 Percentages of Students reaching the TIMSS 2007 International Benchmarks of Science Achievement (Continued)

TIMSS2007 Science 8th Grade

Country	Advanced Benchmark (625)	High Benchmark (550)	Intermediate Benchmark (475)	Low Benchmark (400)
Singapore	32 (1.6)	61 (2.2)	80 (1.8)	93 (1.1)
Chinese Taipei	25 (1.5)	60 (1.9)	83 (1.2)	95 (0.6)
Japan	17 (0.9)	55 (1.1)	85 (0.8)	96 (0.4)
† England	17 (1.6)	48 (2.3)	79 (1.9)	94 (0.9)
Korea, Rep. of	17 (0.9)	54 (1.1)	85 (0.8)	97 (0.4)
Hungary	13 (1.1)	46 (1.6)	80 (1.3)	96 (0.7)
Czech Republic	11 (0.9)	44 (1.4)	82 (0.8)	97 (0.4)
Slovenia	11 (0.7)	45 (1.2)	81 (1.1)	97 (0.5)
Russian Federation	11 (1.0)	41 (2.1)	76 (1.6)	95 (0.7)
† Hong Kong SAR	10 (1.0)	45 (2.6)	77 (2.2)	92 (1.3)
2 † United States	10 (0.7)	38 (1.4)	71 (1.3)	92 (0.7)
Armenia	8 (1.7)	23 (2.0)	55 (2.4)	83 (1.3)
Australia	8 (1.4)	33 (1.8)	70 (1.7)	92 (0.8)
1 Lithuania	8 (0.6)	36 (1.4)	72 (1.4)	93 (0.8)
Sweden	6 (0.6)	32 (1.2)	69 (1.4)	91 (0.8)
Jordan	5 (0.6)	26 (1.5)	56 (1.8)	79 (1.4)
Malta	5 (0.3)	21 (0.6)	48 (0.7)	71 (0.6)
3 Bulgaria	5 (0.9)	22 (1.8)	51 (2.4)	76 (2.1)
† Scotland	5 (0.6)	26 (1.5)	61 (1.8)	87 (1.1)
3 Israel	5 (0.6)	21 (1.4)	51 (1.9)	75 (1.8)
Italy	4 (0.7)	24 (1.3)	62 (1.4)	88 (1.0)
Turkey	3 (0.5)	16 (1.2)	40 (1.7)	71 (1.5)
Ukraine	3 (0.4)	22 (1.4)	58 (1.8)	85 (1.3)
Thailand	3 (0.8)	17 (1.9)	48 (2.2)	80 (1.5)
Malaysia	3 (0.7)	18 (2.2)	50 (2.7)	80 (2.2)
Iran, Islamic Rep. of	2 (0.5)	14 (1.2)	41 (1.8)	76 (1.7)
Bahrain	2 (0.4)	17 (0.8)	49 (0.9)	78 (0.7)
1 2 Serbia	2 (0.3)	16 (1.1)	51 (1.6)	81 (1.1)
Romania	2 (0.3)	16 (1.2)	46 (1.9)	77 (1.6)
Norway	2 (0.2)	20 (1.0)	58 (1.4)	87 (0.9)
Bosnia Herzegovina	2 (0.3)	14 (1.0)	47 (1.7)	80 (1.2)
Cyprus	1 (0.3)	12 (0.8)	42 (1.1)	74 (1.0)
Palestinian Nat'l Auth.	1 (0.2)	9 (0.6)	28 (1.2)	54 (1.5)
Lebanon	1 (0.4)	8 (1.2)	28 (2.1)	55 (2.9)
Syrian Arab Republic	1 (0.2)	9 (0.8)	39 (1.6)	76 (1.5)
Egypt	1 (0.1)	7 (0.6)	27 (1.4)	55 (1.6)
Oman	1 (0.2)	8 (0.6)	32 (1.2)	61 (1.4)
Colombia	1 (0.1)	4 (0.5)	22 (1.5)	59 (2.1)
¿ Kuwait	0 (0.1)	6 (0.7)	28 (1.2)	60 (1.4)
1 Georgia	0 (0.1)	5 (0.7)	27 (1.9)	61 (2.4)
Indonesia	0 (0.1)	4 (0.6)	27 (1.8)	65 (2.0)
Tunisia	0 (0.1)	4 (0.5)	31 (1.3)	77 (1.2)
Saudi Arabia	0 (0.0)	2 (0.5)	18 (1.0)	52 (1.4)
Qatar	0 (0.0)	2 (0.2)	11 (0.5)	29 (0.6)
Ghana	0 (0.0)	1 (0.3)	6 (0.9)	19 (1.6)
El Salvador	0 (0.1)	1 (0.3)	11 (1.0)	42 (1.7)
Botswana	0 (0.0)	2 (0.3)	11 (0.7)	35 (1.3)
Algeria	0 (0.0)	1 (0.2)	14 (0.8)	55 (1.2)
¶ Morocco	0 (0.1)	3 (0.5)	18 (1.4)	51 (2.1)
International Median	3	17	49	78
Benchmarking Participants				
2 Massachusetts, US	20 (1.8)	56 (2.5)	84 (2.0)	96 (0.9)
2 † Minnesota, US	11 (1.7)	45 (2.6)	82 (2.3)	96 (1.0)
2 Ontario, Canada	7 (1.1)	37 (2.0)	77 (1.7)	96 (1.0)
3 B. Columbia, Canada	7 (0.9)	38 (1.6)	77 (1.2)	95 (0.6)
¿ ‡ Dubai, UAE	6 (0.8)	27 (1.8)	58 (1.6)	82 (1.1)
3 Quebec, Canada	4 (0.8)	27 (1.5)	68 (1.7)	94 (0.9)
Basque Country, Sp.	3 (0.6)	24 (1.6)	64 (1.7)	91 (1.0)



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).
¶ Did not satisfy guidelines for sample participation rates (see Appendix A).
1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).
2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).
3 National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).
¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Exhibit 4.7 TIMSS 2007 International Benchmarks of Mathematics Achievement (Continued)

TIMSS2007 8th Mathematics Grade

Advanced International Benchmark – 625

Students can organize and draw conclusions from information, make generalizations, and solve non-routine problems. They can solve a variety of ratio, proportion, and percent problems. They can apply their knowledge of numeric and algebraic concepts and relationships. Students can express generalizations algebraically and model situations. They can apply their knowledge of geometry in complex problem situations. Students can derive and use data from several sources to solve multi-step problems.

High International Benchmark – 550

Students can apply their understanding and knowledge in a variety of relatively complex situations. They can relate and compute with fractions, decimals, and percents, operate with negative integers, and solve word problems involving proportions. Students can work with algebraic expressions and linear equations. Students use knowledge of geometric properties to solve problems, including area, volume, and angles. They can interpret data in a variety of graphs and table and solve simple problems involving probability.

Intermediate International Benchmark – 475

Students can apply basic mathematical knowledge in straightforward situations. They can add and multiply to solve one-step word problems involving whole numbers and decimals. They can work with familiar fractions. They understand simple algebraic relationships. They demonstrate understanding of properties of triangles and basic geometric concepts. They can read and interpret graphs and tables. They recognize basic notions of likelihood.

Low International Benchmark – 400

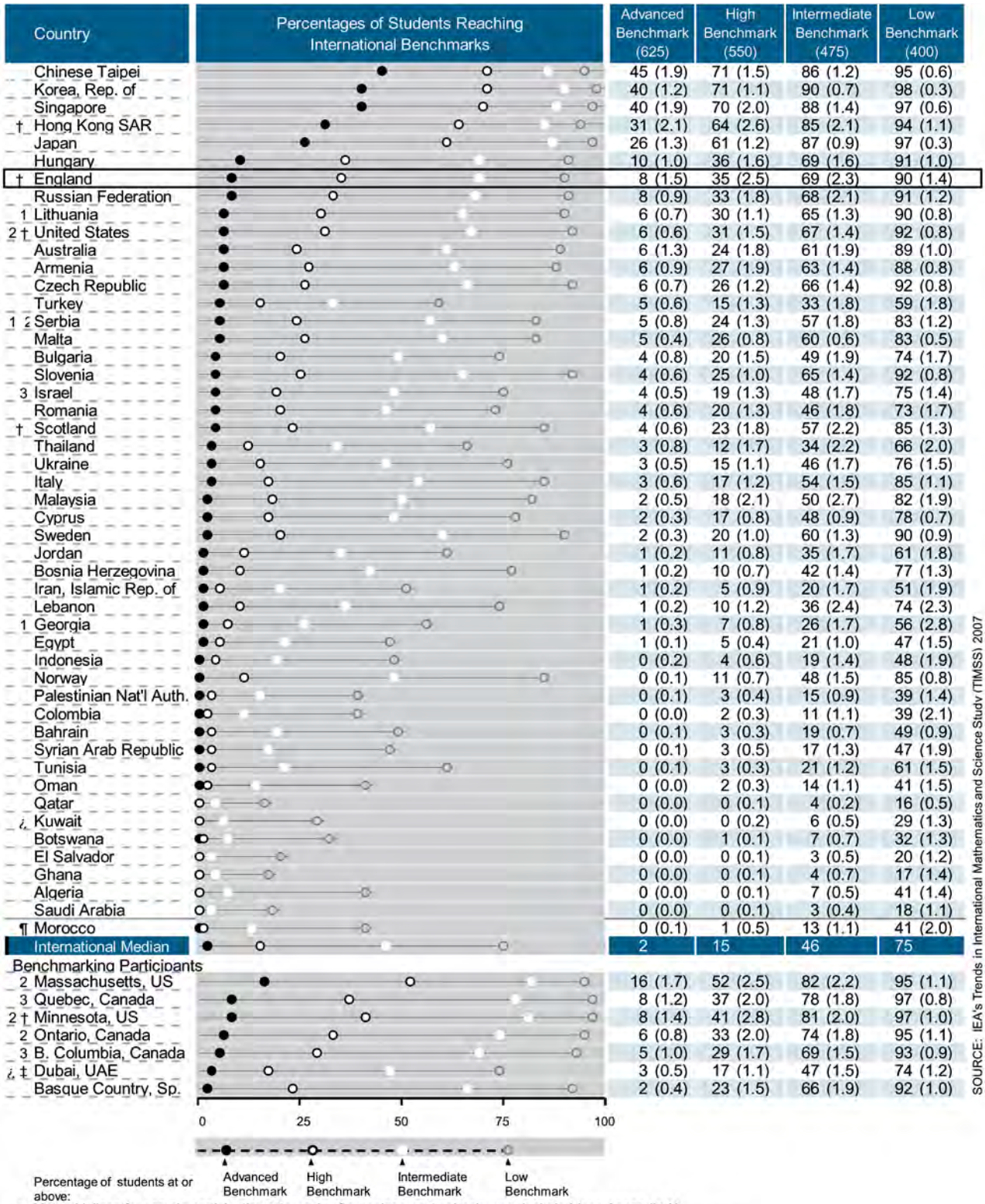
Students have some knowledge of whole numbers and decimals, operations, and basic graphs.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

www
TIMSS 2007 International Reports available at http://timssandpirls.bc.edu/TIMSS2007

Exhibit 4.8 Percentages of Students reaching the TIMSS 2007 International Benchmarks of Mathematics Achievement (Continued)

TIMSS2007 Mathematics 8th Grade



Country	Advanced Benchmark (625)	High Benchmark (550)	Intermediate Benchmark (475)	Low Benchmark (400)
Chinese Taipei	45 (1.9)	71 (1.5)	86 (1.2)	95 (0.6)
Korea, Rep. of	40 (1.2)	71 (1.1)	90 (0.7)	98 (0.3)
Singapore	40 (1.9)	70 (2.0)	88 (1.4)	97 (0.6)
† Hong Kong SAR	31 (2.1)	64 (2.6)	85 (2.1)	94 (1.1)
Japan	26 (1.3)	61 (1.2)	87 (0.9)	97 (0.3)
Hungary	10 (1.0)	36 (1.6)	69 (1.6)	91 (1.0)
† England	8 (1.5)	35 (2.5)	69 (2.3)	90 (1.4)
Russian Federation	8 (0.9)	33 (1.8)	68 (2.1)	91 (1.2)
1 Lithuania	6 (0.7)	30 (1.1)	65 (1.3)	90 (0.8)
2 † United States	6 (0.6)	31 (1.5)	67 (1.4)	92 (0.8)
Australia	6 (1.3)	24 (1.8)	61 (1.9)	89 (1.0)
Armenia	6 (0.9)	27 (1.9)	63 (1.4)	88 (0.8)
Czech Republic	6 (0.7)	26 (1.2)	66 (1.4)	92 (0.8)
Turkey	5 (0.6)	15 (1.3)	33 (1.8)	59 (1.8)
1 ¿ Serbia	5 (0.8)	24 (1.3)	57 (1.8)	83 (1.2)
Malta	5 (0.4)	26 (0.8)	60 (0.6)	83 (0.5)
Bulgaria	4 (0.8)	20 (1.5)	49 (1.9)	74 (1.7)
Slovenia	4 (0.6)	25 (1.0)	65 (1.4)	92 (0.8)
3 Israel	4 (0.5)	19 (1.3)	48 (1.7)	75 (1.4)
Romania	4 (0.6)	20 (1.3)	46 (1.8)	73 (1.7)
† Scotland	4 (0.6)	23 (1.8)	57 (2.2)	85 (1.3)
Thailand	3 (0.8)	12 (1.7)	34 (2.2)	66 (2.0)
Ukraine	3 (0.5)	15 (1.1)	46 (1.7)	76 (1.5)
Italy	3 (0.6)	17 (1.2)	54 (1.5)	85 (1.1)
Malaysia	2 (0.5)	18 (2.1)	50 (2.7)	82 (1.9)
Cyprus	2 (0.3)	17 (0.8)	48 (0.9)	78 (0.7)
Sweden	2 (0.3)	20 (1.0)	60 (1.3)	90 (0.9)
Jordan	1 (0.2)	11 (0.8)	35 (1.7)	61 (1.8)
Bosnia Herzegovina	1 (0.2)	10 (0.7)	42 (1.4)	77 (1.3)
Iran, Islamic Rep. of	1 (0.2)	5 (0.9)	20 (1.7)	51 (1.9)
Lebanon	1 (0.2)	10 (1.2)	36 (2.4)	74 (2.3)
1 Georgia	1 (0.3)	7 (0.8)	26 (1.7)	56 (2.8)
Egypt	1 (0.1)	5 (0.4)	21 (1.0)	47 (1.5)
Indonesia	0 (0.2)	4 (0.6)	19 (1.4)	48 (1.9)
Norway	0 (0.1)	11 (0.7)	48 (1.5)	85 (0.8)
Palestinian Nat'l Auth.	0 (0.1)	3 (0.4)	15 (0.9)	39 (1.4)
Colombia	0 (0.0)	2 (0.3)	11 (1.1)	39 (2.1)
Bahrain	0 (0.1)	3 (0.3)	19 (0.7)	49 (0.9)
Syrian Arab Republic	0 (0.1)	3 (0.5)	17 (1.3)	47 (1.9)
Tunisia	0 (0.1)	3 (0.3)	21 (1.2)	61 (1.5)
Oman	0 (0.0)	2 (0.3)	14 (1.1)	41 (1.5)
Qatar	0 (0.0)	0 (0.1)	4 (0.2)	16 (0.5)
¿ Kuwait	0 (0.0)	0 (0.2)	6 (0.5)	29 (1.3)
Botswana	0 (0.0)	1 (0.1)	7 (0.7)	32 (1.3)
El Salvador	0 (0.0)	0 (0.1)	3 (0.5)	20 (1.2)
Ghana	0 (0.0)	0 (0.1)	4 (0.7)	17 (1.4)
Algeria	0 (0.0)	0 (0.1)	7 (0.5)	41 (1.4)
Saudi Arabia	0 (0.0)	0 (0.1)	3 (0.4)	18 (1.1)
¶ Morocco	0 (0.1)	1 (0.5)	13 (1.1)	41 (2.0)
International Median	2	15	46	75
Benchmarking Participants				
2 Massachusetts, US	16 (1.7)	52 (2.5)	82 (2.2)	95 (1.1)
3 Quebec, Canada	8 (1.2)	37 (2.0)	78 (1.8)	97 (0.8)
2 † Minnesota, US	8 (1.4)	41 (2.8)	81 (2.0)	97 (1.0)
2 Ontario, Canada	6 (0.8)	33 (2.0)	74 (1.8)	95 (1.1)
3 B. Columbia, Canada	5 (1.0)	29 (1.7)	69 (1.5)	93 (0.9)
¿ ‡ Dubai, UAE	3 (0.5)	17 (1.1)	47 (1.5)	74 (1.2)
Basque Country, Sp.	2 (0.4)	23 (1.5)	66 (1.9)	92 (1.0)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).
¶ Did not satisfy guidelines for sample participation rates (see Appendix A).
1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).
2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).
3 National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).
¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Exhibit 4.9 Trends in Percentages of Students Reaching the TIMSS 2007 International Benchmarks of Science Achievement

TIMSS2007 Science 4th Grade

Country	Advanced International Benchmark (625)			High International Benchmark (550)		
	2007 Percent of Students	2003 Percent of Students	1995 Percent of Students	2007 Percent of Students	2003 Percent of Students	1995 Percent of Students
Singapore	36 (1.9)	25 (2.4) ▲	14 (1.6) ▲	68 (1.9)	61 (2.6) ▲	42 (2.2) ▲
Chinese Taipei	19 (1.0)	14 (1.0) ▲	◊ ◊	55 (1.2)	52 (1.1)	◊ ◊
Russian Federation	16 (1.9)	11 (1.4)	◊ ◊	49 (2.3)	39 (2.7) ▲	◊ ◊
United States	15 (0.9)	13 (0.8)	19 (1.2) ▼	47 (1.4)	45 (1.4)	50 (1.6)
England	14 (1.2)	15 (1.4)	15 (1.1)	48 (1.6)	47 (1.8)	42 (1.7) ▲
Hong Kong SAR	14 (1.4)	7 (0.8) ▲	5 (0.6) ▲	55 (2.2)	47 (2.2) ▲	30 (1.6) ▲
Hungary	13 (1.0)	10 (0.9) ▲	7 (0.7) ▲	47 (1.8)	42 (1.6)	32 (1.7) ▲
Italy	13 (1.0)	9 (1.1) ▲	- -	44 (1.6)	35 (1.9) ▲	- -
Japan	12 (1.0)	12 (0.6)	15 (0.8) ▼	51 (1.1)	49 (1.1)	54 (1.3)
Armenia	12 (1.8)	2 (0.4) ▲	◊ ◊	27 (1.8)	10 (1.0) ▲	◊ ◊
Australia	10 (0.7)	9 (1.0)	13 (1.1)	41 (2.2)	38 (1.7)	40 (1.3)
Latvia	10 (1.1)	7 (0.7) ▲	5 (1.4) ▲	47 (1.7)	39 (1.9) ▲	21 (2.1) ▲
Austria	9 (0.7)	◊ ◊	13 (1.4) ▼	39 (1.3)	◊ ◊	45 (1.8) ▼
New Zealand	8 (0.5)	9 (0.7)	11 (1.2) ▼	32 (1.0)	39 (1.3) ▼	35 (1.8)
Czech Republic	7 (0.7)	◊ ◊	12 (1.1) ▼	33 (1.9)	◊ ◊	42 (1.5) ▼
Slovenia	6 (0.6)	3 (0.4) ▲	2 (0.4) ▲	36 (1.3)	22 (1.3) ▲	14 (1.1) ▲
Scotland	4 (0.6)	5 (0.5)	12 (1.1) ▼	26 (1.2)	27 (1.5)	37 (1.8) ▼
Netherlands	4 (0.8)	3 (0.5)	6 (0.7) ▼	34 (1.8)	32 (1.5)	38 (2.1)
Lithuania	3 (0.4)	3 (0.5)	◊ ◊	30 (1.4)	30 (1.3)	◊ ◊
Iran, Islamic Rep. of	2 (0.3)	1 (0.2) ▲	0 (0.1) ▲	12 (1.0)	7 (0.7) ▲	3 (0.7) ▲
Norway	1 (0.4)	2 (0.3)	8 (0.9) ▼	17 (1.4)	15 (0.9)	32 (1.6) ▼
Morocco	0 (0.2)	0 (0.0)	◊ ◊	2 (0.5)	1 (0.3)	◊ ◊
Tunisia	0 (0.1)	0 (0.1)	◊ ◊	3 (0.5)	2 (0.3) ▲	◊ ◊
Benchmarking Participants						
Minnesota, US	17 (1.9)	◊ ◊	21 (2.8)	54 (3.2)	◊ ◊	54 (3.9)
Alberta, Canada	12 (1.3)	◊ ◊	21 (2.2) ▼	48 (2.0)	◊ ◊	57 (3.5) ▼
Ontario, Canada	12 (1.2)	13 (1.6)	10 (0.7)	45 (2.2)	47 (1.9)	37 (1.7) ▲
Quebec, Canada	5 (0.6)	3 (0.4) ▲	9 (1.3) ▼	32 (1.9)	25 (1.3) ▲	40 (3.7) ▼

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Country	Intermediate International Benchmark (475)			Low International Benchmark (400)		
	2007 Percent of Students	2003 Percent of Students	1995 Percent of Students	2007 Percent of Students	2003 Percent of Students	1995 Percent of Students
Singapore	88 (1.1)	86 (1.6)	71 (1.7) ▲	96 (0.5)	95 (0.9)	89 (0.9) ▲
Chinese Taipei	86 (0.7)	87 (0.7)	◊ ◊	97 (0.4)	98 (0.3) ▼	◊ ◊
Russian Federation	82 (1.7)	74 (2.4) ▲	◊ ◊	96 (0.9)	93 (1.1)	◊ ◊
United States	78 (1.1)	78 (1.0)	78 (1.1)	94 (0.6)	94 (0.5)	92 (0.7)
England	81 (1.1)	79 (1.3)	72 (1.3) ▲	95 (0.6)	94 (0.7)	90 (0.8) ▲
Hong Kong SAR	88 (1.2)	87 (1.2)	69 (1.7) ▲	98 (0.4)	98 (0.3)	91 (1.1) ▲
Hungary	78 (1.6)	76 (1.4)	67 (1.8) ▲	93 (0.8)	94 (0.7)	90 (1.0) ▲
Italy	78 (1.3)	70 (1.6) ▲	- -	94 (0.7)	91 (0.9) ▲	- -
Japan	86 (1.0)	84 (0.7) ▲	87 (0.7)	97 (0.4)	96 (0.4)	97 (0.4)
Armenia	52 (1.8)	38 (1.7) ▲	◊ ◊	77 (1.6)	66 (1.8) ▲	◊ ◊
Australia	76 (1.6)	74 (2.0)	72 (1.7) ▲	93 (0.8)	92 (1.1)	89 (1.1) ▲
Latvia	84 (1.3)	80 (1.5) ▲	55 (2.1) ▲	98 (0.4)	96 (0.6)	85 (1.4) ▲
Austria	76 (1.3)	◊ ◊	79 (1.5) ▼	93 (0.6)	◊ ◊	94 (0.7)
New Zealand	65 (1.2)	74 (1.2) ▼	66 (1.8)	87 (1.0)	92 (0.7) ▼	85 (1.7)
Czech Republic	72 (1.4)	◊ ◊	77 (1.2) ▼	93 (0.8)	◊ ◊	95 (0.6)
Slovenia	74 (1.0)	61 (1.4) ▲	45 (1.5) ▲	93 (0.6)	87 (0.9) ▲	79 (1.4) ▲
Scotland	65 (1.3)	66 (1.5)	68 (1.9)	90 (0.8)	90 (0.9)	88 (1.3)
Netherlands	79 (1.4)	83 (1.2) ▼	82 (1.6)	97 (0.5)	99 (0.4)	98 (0.7)
Lithuania	74 (1.4)	73 (1.6)	◊ ◊	95 (0.6)	95 (0.7)	◊ ◊
Iran, Islamic Rep. of	36 (1.7)	28 (1.5) ▲	15 (1.5) ▲	65 (1.9)	58 (1.7) ▲	42 (2.1) ▲
Norway	54 (2.0)	49 (1.4) ▲	65 (1.7) ▼	84 (1.4)	79 (1.5) ▲	88 (1.1) ▼
Morocco	9 (1.4)	9 (0.8)	◊ ◊	21 (1.9)	24 (1.6)	◊ ◊
Tunisia	14 (1.1)	10 (1.0) ▲	◊ ◊	31 (1.7)	27 (1.7) ▲	◊ ◊
Benchmarking Participants						
Minnesota, US	84 (2.1)	◊ ◊	82 (2.6)	96 (1.5)	◊ ◊	95 (2.1)
Alberta, Canada	82 (1.5)	◊ ◊	84 (3.2)	96 (0.7)	◊ ◊	94 (2.5)
Ontario, Canada	79 (1.7)	81 (1.4)	71 (1.7) ▲	95 (1.0)	96 (0.6)	90 (1.0) ▲
Quebec, Canada	74 (1.9)	66 (1.4) ▲	77 (2.5)	96 (0.6)	91 (0.8) ▲	94 (1.3)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Trend notes: Data are not shown for Kuwait, because comparable data from previous cycles are not available. Data for Tunisia do not include private schools.

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

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

A diamond (◊) indicates the country did not participate in the assessment.

Exhibit 4.10 Trends in Percentages of Students reaching the TIMSS 2007 International Benchmarks of Mathematics Achievement

TIMSS2007 Mathematics 4th Grade

Country	Advanced International Benchmark (625)			High International Benchmark (550)		
	2007 Percent of Students	2003 Percent of Students	1995 Percent of Students	2007 Percent of Students	2003 Percent of Students	1995 Percent of Students
Singapore	41 (2.1)	38 (2.9)	38 (2.2)	74 (1.7)	73 (2.4)	70 (1.6)
Hong Kong SAR	40 (2.2)	22 (1.7) ▲	17 (1.7) ▲	81 (1.6)	67 (2.0) ▲	56 (2.2) ▲
Chinese Taipei	24 (1.2)	16 (0.9) ▲	◊ ◊	66 (1.2)	61 (1.1) ▲	◊ ◊
Japan	23 (1.2)	21 (0.8)	22 (1.0)	61 (1.2)	60 (1.0)	61 (1.1)
England	16 (1.2)	14 (1.4)	7 (0.8) ▲	48 (1.4)	43 (1.8) ▲	24 (1.5) ▲
Russian Federation	16 (1.8)	11 (1.6)	◊ ◊	48 (2.3)	41 (2.6) ▲	◊ ◊
Latvia	11 (0.8)	9 (0.9)	6 (1.3) ▲	44 (1.5)	43 (2.1)	27 (2.1) ▲
United States	10 (0.8)	7 (0.7) ▲	9 (0.9)	40 (1.3)	35 (1.3) ▲	37 (1.6)
Lithuania	10 (0.7)	10 (1.1)	◊ ◊	42 (1.4)	44 (1.7)	◊ ◊
Hungary	9 (0.8)	10 (1.0)	11 (1.0)	35 (1.4)	41 (1.6) ▼	38 (1.8)
Australia	9 (0.8)	5 (0.7) ▲	6 (0.6) ▲	35 (1.9)	26 (1.7) ▲	27 (1.4) ▲
Armenia	8 (1.5)	2 (0.3) ▲	◊ ◊	28 (1.8)	13 (1.2) ▲	◊ ◊
Netherlands	7 (0.7)	5 (0.8)	12 (1.1) ▼	42 (1.6)	44 (1.5)	50 (1.9) ▼
Italy	6 (0.7)	6 (1.0)	- -	29 (1.6)	29 (1.8)	- -
New Zealand	5 (0.5)	5 (0.5)	4 (0.6)	26 (1.0)	27 (1.2)	19 (1.4) ▲
Scotland	4 (0.5)	3 (0.4)	7 (0.9) ▼	25 (1.1)	22 (1.4)	27 (1.7)
Slovenia	3 (0.4)	2 (0.4) ▲	2 (0.4) ▲	25 (1.1)	18 (1.0) ▲	14 (1.1) ▲
Austria	3 (0.3)	◊ ◊	10 (0.9) ▼	26 (1.0)	◊ ◊	42 (1.9) ▼
Czech Republic	2 (0.4)	◊ ◊	16 (1.2) ▼	19 (1.4)	◊ ◊	46 (1.6) ▼
Norway	2 (0.3)	1 (0.2) ▲	2 (0.4)	15 (1.0)	10 (1.0) ▲	16 (1.2)
Morocco	0 (0.2)	0 (0.0)	◊ ◊	2 (0.8)	1 (0.2)	◊ ◊
Iran, Islamic Rep. of	0 (0.1)	0 (0.1)	0 (0.2)	3 (0.5)	2 (0.3)	3 (0.7)
Tunisia	0 (0.1)	0 (0.1)	◊ ◊	1 (0.2)	1 (0.3)	◊ ◊
Benchmarking Participants						
Minnesota, US	18 (2.1)	◊ ◊	9 (1.9) ▲	55 (3.2)	◊ ◊	35 (3.0) ▲
Quebec, Canada	5 (0.7)	3 (0.4) ▲	13 (1.9) ▼	34 (2.2)	25 (1.5) ▲	50 (3.4) ▼
Ontario, Canada	4 (0.6)	5 (1.1)	4 (0.5)	29 (1.8)	29 (2.2)	22 (1.5) ▲
Alberta, Canada	3 (0.6)	◊ ◊	9 (1.7) ▼	25 (1.8)	◊ ◊	39 (3.8) ▼

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Trend notes: Data are not shown for Kuwait, because comparable data from previous cycles are not available. Data for Tunisia do not include private schools.

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

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

A diamond (◇) indicates the country did not participate in the assessment.

Exhibit 4.10 Trends in Percentages of Students reaching the TIMSS 2007 International Benchmarks of Mathematics Achievement (Continued)

TIMSS2007 Mathematics 4th Grade

Country	Intermediate International Benchmark (475)			Low International Benchmark (400)		
	2007 Percent of Students	2003 Percent of Students	1995 Percent of Students	2007 Percent of Students	2003 Percent of Students	1995 Percent of Students
Singapore	92 (0.9)	91 (1.3)	89 (1.0) ▲	98 (0.3)	97 (0.6)	96 (0.4) ▲
Hong Kong SAR	97 (0.5)	94 (0.7) ▲	87 (1.3) ▲	100 (0.1)	99 (0.2)	97 (0.6) ▲
Chinese Taipei	92 (0.5)	92 (0.7)	◊ ◊	99 (0.2)	99 (0.2)	◊ ◊
Japan	89 (0.8)	89 (0.7)	89 (0.7)	98 (0.4)	98 (0.3)	98 (0.2)
England	79 (1.2)	75 (1.6) ▲	54 (1.6) ▲	94 (0.7)	93 (0.8)	82 (1.1) ▲
Russian Federation	81 (1.7)	76 (2.0)	◊ ◊	95 (0.7)	95 (0.8)	◊ ◊
Latvia	81 (1.2)	80 (1.4)	61 (1.9) ▲	97 (0.5)	96 (0.8)	88 (1.1) ▲
United States	77 (1.2)	72 (1.2) ▲	71 (1.3) ▲	95 (0.5)	93 (0.5) ▲	92 (0.7) ▲
Lithuania	77 (1.4)	79 (1.3)	◊ ◊	94 (0.7)	96 (0.7)	◊ ◊
Hungary	67 (1.7)	76 (1.6) ▼	72 (1.5)	88 (1.2)	94 (0.8) ▼	91 (0.9) ▼
Australia	71 (1.7)	64 (1.9) ▲	61 (1.6) ▲	91 (1.0)	88 (1.3) ▲	86 (1.1) ▲
Armenia	60 (1.8)	43 (1.7) ▲	◊ ◊	87 (1.2)	75 (1.5) ▲	◊ ◊
Netherlands	84 (1.3)	89 (1.2) ▼	87 (1.4)	98 (0.4)	99 (0.4) ▼	99 (0.4)
Italy	67 (1.6)	65 (1.7)	- -	91 (1.0)	89 (1.1)	- -
New Zealand	61 (1.1)	62 (1.3)	51 (1.9) ▲	85 (1.0)	86 (1.0)	78 (1.7) ▲
Scotland	62 (1.4)	60 (1.6)	60 (1.9)	88 (0.9)	88 (1.2)	85 (1.2)
Slovenia	67 (0.9)	55 (1.5) ▲	45 (2.0) ▲	92 (0.6)	84 (1.0) ▲	77 (1.4) ▲
Austria	69 (1.4)	◊ ◊	77 (1.4) ▼	93 (0.8)	◊ ◊	94 (0.7)
Czech Republic	59 (1.6)	◊ ◊	79 (1.1) ▼	88 (1.1)	◊ ◊	95 (0.5) ▼
Norway	52 (1.6)	41 (1.3) ▲	53 (2.0)	83 (1.1)	75 (1.2) ▲	84 (1.2)
Morocco	9 (1.1)	8 (0.8)	◊ ◊	26 (2.0)	29 (2.2)	◊ ◊
Iran, Islamic Rep. of	20 (1.5)	17 (1.3)	15 (1.9) ▲	53 (2.0)	45 (2.2) ▲	44 (2.5) ▲
Tunisia	9 (0.8)	9 (1.0)	◊ ◊	28 (1.6)	28 (1.7)	◊ ◊
Benchmarking Participants						
Minnesota, US	85 (2.2)	◊ ◊	70 (3.3) ▲	97 (1.2)	◊ ◊	91 (2.2) ▲
Quebec, Canada	74 (1.6)	69 (1.4) ▲	87 (1.7) ▼	96 (0.6)	94 (0.8) ▲	98 (0.7) ▼
Ontario, Canada	71 (1.8)	70 (1.7)	59 (1.9) ▲	94 (1.1)	94 (0.9)	86 (1.3) ▲
Alberta, Canada	69 (1.9)	◊ ◊	74 (3.9)	94 (1.0)	◊ ◊	93 (2.7)

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

4.7 Grade 8 science: trends in performance at the international benchmarks

As in grade 4 science, there was no overall change in performance level from the 2003 level in grade 8. Little change in the proportions of students reaching the benchmarks would thus be expected, and Exhibit 4.11 confirms this. The proportions reaching the benchmarks in England are similar in all four TIMSS surveys of this age group: 1995, 1999, 2003 and 2007.

Exhibit 4.11 Trends in Percentages of Students reaching the TIMSS 2007 International Benchmarks of Science Achievement (Continued)

TIMSS2007 Science 8th Grade

Country	Advanced International Benchmark (625)				High International Benchmark (550)			
	2007 Percent of Students	2003 Percent of Students	1999 Percent of Students	1995 Percent of Students	2007 Percent of Students	2003 Percent of Students	1999 Percent of Students	1995 Percent of Students
Singapore	32 (1.6)	33 (1.6)	29 (3.2)	29 (3.2)	61 (2.2)	66 (2.3)	60 (3.5)	64 (2.8)
Chinese Taipei	25 (1.5)	26 (1.5)	27 (1.8)	◊ ◊	60 (1.9)	63 (1.9)	61 (2.1)	◊ ◊
Japan	17 (0.9)	15 (0.7)	16 (1.0)	18 (0.9)	55 (1.1)	53 (1.1)	52 (1.3)	54 (1.1)
England	17 (1.6)	15 (1.7)	17 (1.7)	15 (1.7)	48 (2.3)	48 (2.7)	45 (2.4)	43 (1.8)
Korea, Rep. of	17 (0.9)	17 (0.9)	19 (1.1)	17 (1.0)	54 (1.1)	57 (1.1)	50 (1.2) ▲	50 (1.2) ▲
Hungary	13 (1.1)	14 (1.1)	19 (1.3) ▼	12 (1.1)	46 (1.6)	46 (1.7)	53 (1.8) ▼	44 (1.7)
Czech Republic	11 (0.9)	◊ ◊	14 (1.4)	17 (1.8) ▼	44 (1.4)	◊ ◊	45 (2.2)	52 (2.5) ▼
Slovenia	11 (0.7)	6 (0.5) ▲	- -	8 (0.8) ▲	45 (1.2)	33 (1.3) ▲	- -	32 (1.5) ▲
Russian Federation	11 (1.0)	6 (0.8) ▲	15 (2.3)	11 (1.1)	41 (2.1)	32 (1.8) ▲	41 (2.8)	38 (2.3)
Hong Kong SAR	10 (1.0)	13 (1.2) ▼	7 (0.9)	7 (1.0) ▲	45 (2.6)	58 (1.9) ▼	40 (2.1)	33 (2.7) ▲
United States	10 (0.7)	11 (0.8)	12 (1.0) ▼	11 (1.1)	38 (1.4)	41 (1.7)	37 (1.9)	38 (2.0)
Armenia	8 (1.7)	1 (0.3) ▲	◊ ◊	◊ ◊	23 (2.0)	14 (1.3) ▲	◊ ◊	◊ ◊
Australia	8 (1.4)	9 (1.1)	- -	10 (1.1)	33 (1.8)	40 (2.0) ▼	- -	36 (1.7)
Lithuania	8 (0.6)	6 (0.6) ▲	5 (0.9) ▲	2 (0.5) ▲	36 (1.4)	34 (1.2)	22 (1.8) ▲	14 (1.5) ▲
Sweden	6 (0.6)	8 (0.8)	◊ ◊	19 (1.6) ▼	32 (1.2)	38 (1.6) ▼	◊ ◊	52 (2.4) ▼
Jordan	5 (0.6)	3 (0.5) ▲	4 (0.5) ▲	◊ ◊	26 (1.5)	21 (1.4) ▲	17 (1.0) ▲	◊ ◊
Scotland	5 (0.6)	6 (0.7)	◊ ◊	9 (1.4) ▼	26 (1.5)	32 (1.9) ▼	◊ ◊	30 (2.5)
Israel	5 (0.6)	5 (0.5)	5 (0.5)	- -	21 (1.4)	24 (1.3)	23 (1.4)	- -
Italy	4 (0.7)	4 (0.6)	6 (0.9) ▼	- -	24 (1.3)	23 (1.5)	26 (1.8)	- -
Thailand	3 (0.8)	◊ ◊	2 (0.5)	- -	17 (1.9)	◊ ◊	18 (2.1)	- -
Malaysia	3 (0.7)	4 (0.8)	5 (0.8)	◊ ◊	18 (2.2)	28 (2.2) ▼	24 (2.0)	◊ ◊
Iran, Islamic Rep. of	2 (0.5)	1 (0.2) ▲	1 (0.3)	1 (0.4)	14 (1.2)	9 (0.6) ▲	11 (1.3)	11 (1.3)
Bahrain	2 (0.4)	0 (0.1) ▲	◊ ◊	◊ ◊	17 (0.8)	6 (0.6) ▲	◊ ◊	◊ ◊
Serbia	2 (0.3)	2 (0.3)	◊ ◊	◊ ◊	16 (1.1)	16 (1.0)	◊ ◊	◊ ◊
Romania	2 (0.3)	4 (0.8)	5 (0.8) ▼	5 (0.8) ▼	16 (1.2)	20 (1.8)	21 (2.1) ▼	22 (1.8) ▼
Norway	2 (0.2)	2 (0.3)	◊ ◊	6 (0.6) ▼	20 (1.0)	21 (1.1)	◊ ◊	32 (1.5) ▼
Cyprus	1 (0.3)	0 (0.2) ▲	2 (0.4)	2 (0.4)	12 (0.8)	8 (0.6) ▲	14 (0.8)	15 (1.0) ▼
Palestinian Nat'l Auth.	1 (0.2)	1 (0.2)	◊ ◊	◊ ◊	9 (0.6)	10 (0.8)	◊ ◊	◊ ◊
Lebanon	1 (0.4)	0 (0.1)	◊ ◊	◊ ◊	8 (1.2)	4 (0.7) ▲	◊ ◊	◊ ◊
Egypt	1 (0.1)	1 (0.2) ▼	◊ ◊	◊ ◊	7 (0.6)	10 (0.7) ▼	◊ ◊	◊ ◊
Colombia	1 (0.1)	◊ ◊	◊ ◊	0 (0.2)	4 (0.5)	◊ ◊	◊ ◊	2 (0.4) ▲
Indonesia	0 (0.2)	0 (0.1)	1 (0.3) ▼	◊ ◊	5 (0.7)	4 (0.5)	8 (1.0)	◊ ◊
Tunisia	0 (0.1)	0 (0.0)	0 (0.1)	◊ ◊	4 (0.5)	1 (0.2) ▲	3 (0.5)	◊ ◊
Ghana	0 (0.0)	0 (0.0)	◊ ◊	◊ ◊	1 (0.3)	0 (0.1) ▲	◊ ◊	◊ ◊
Botswana	0 (0.0)	0 (0.1)	◊ ◊	◊ ◊	2 (0.3)	1 (0.5)	◊ ◊	◊ ◊
Benchmarking Participants								
Massachusetts, US	20 (1.8)	◊ ◊	15 (2.4)	◊ ◊	56 (2.5)	◊ ◊	43 (3.1) ▲	◊ ◊
Minnesota, US	11 (1.7)	◊ ◊	◊ ◊	17 (2.4) ▼	45 (2.6)	◊ ◊	◊ ◊	50 (3.8)
Ontario, Canada	7 (1.1)	7 (0.7)	7 (0.9)	5 (0.6)	37 (2.0)	41 (1.8)	34 (1.6)	26 (1.6) ▲
B. Columbia, Canada	7 (0.9)	◊ ◊	14 (2.2) ▼	◊ ◊	38 (1.6)	◊ ◊	47 (3.0) ▼	◊ ◊
Quebec, Canada	4 (0.8)	6 (1.0)	10 (2.2) ▼	7 (1.5)	27 (1.5)	39 (2.0) ▼	43 (3.7) ▼	30 (2.8)
Basque Country, Sp.	3 (0.6)	3 (0.6)	◊ ◊	◊ ◊	24 (1.6)	20 (1.5)	◊ ◊	◊ ◊

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Trend notes: Data are not shown for Bulgaria, Kuwait, Morocco, Saudi Arabia, and Turkey, because comparable data from previous cycles are not available. Data for Indonesia do not include Islamic schools.

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

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

A diamond (◊) indicates the country did not participate in the assessment.

Exhibit 4.11 Trends in Percentages of Students reaching the TIMSS 2007 International Benchmarks of Science Achievement (Continued)

TIMSS2007 Science 8th Grade

Country	Intermediate International Benchmark (475)				Low International Benchmark (400)			
	2007 Percent of Students	2003 Percent of Students	1999 Percent of Students	1995 Percent of Students	2007 Percent of Students	2003 Percent of Students	1999 Percent of Students	1995 Percent of Students
Singapore	80 (1.8)	85 (1.7) ▼	84 (2.4)	91 (1.3) ▼	93 (1.1)	95 (0.8) ▼	95 (1.2)	99 (0.2) ▼
Chinese Taipei	83 (1.2)	88 (1.1) ▼	86 (1.3)	◊ ◊	95 (0.6)	98 (0.4) ▼	96 (0.6)	◊ ◊
Japan	85 (0.8)	86 (0.8)	84 (0.9)	85 (0.7)	96 (0.4)	98 (0.3) ▼	97 (0.4)	97 (0.3)
England	79 (1.9)	81 (1.8)	76 (1.9)	75 (1.4)	94 (0.9)	96 (0.6)	94 (0.7)	93 (0.7)
Korea, Rep. of	85 (0.8)	88 (0.7) ▼	81 (1.0) ▲	81 (0.9) ▲	97 (0.4)	98 (0.4) ▼	96 (0.4) ▲	95 (0.5) ▲
Hungary	80 (1.3)	82 (1.1)	83 (1.3)	80 (1.5)	96 (0.7)	97 (0.6)	96 (0.8)	95 (0.7)
Czech Republic	82 (0.8)	◊ ◊	79 (1.7)	86 (1.3) ▼	97 (0.4)	◊ ◊	96 (0.8)	98 (0.5)
Slovenia	81 (1.1)	75 (1.3) ▲	- -	69 (1.6) ▲	97 (0.5)	96 (0.6)	- -	93 (0.7) ▲
Russian Federation	76 (1.6)	70 (1.8) ▲	73 (2.3)	71 (2.2)	95 (0.7)	93 (0.9)	92 (1.0) ▲	92 (1.1)
Hong Kong SAR	77 (2.2)	89 (1.4) ▼	80 (1.9)	70 (2.7) ▲	92 (1.3)	98 (0.7) ▼	96 (0.9) ▼	90 (1.7)
United States	71 (1.3)	75 (1.4)	67 (1.9)	68 (2.2)	92 (0.7)	93 (0.8)	87 (1.3) ▲	87 (1.6) ▲
Armenia	55 (2.4)	45 (1.9) ▲	◊ ◊	◊ ◊	83 (1.3)	77 (1.4) ▲	◊ ◊	◊ ◊
Australia	70 (1.7)	76 (1.9) ▼	- -	69 (1.6)	92 (0.8)	95 (0.8) ▼	- -	89 (1.0) ▲
Lithuania	72 (1.4)	74 (1.3)	57 (2.0) ▲	45 (2.2) ▲	93 (0.8)	95 (0.6) ▼	86 (1.7) ▲	79 (1.6) ▲
Sweden	69 (1.4)	75 (1.4) ▼	◊ ◊	83 (1.7) ▼	91 (0.8)	95 (0.7) ▼	◊ ◊	97 (0.7) ▼
Jordan	56 (1.8)	53 (1.8)	42 (1.4) ▲	◊ ◊	79 (1.4)	80 (1.3)	69 (1.6) ▲	◊ ◊
Scotland	61 (1.8)	70 (1.7) ▼	◊ ◊	61 (2.2)	87 (1.1)	92 (0.9) ▼	◊ ◊	86 (1.4)
Israel	51 (1.9)	57 (1.6) ▼	50 (2.1)	- -	75 (1.8)	85 (1.1) ▼	75 (2.0)	- -
Italy	62 (1.4)	59 (1.5)	59 (2.0)	- -	88 (1.0)	87 (1.1)	86 (1.2)	- -
Thailand	48 (2.2)	◊ ◊	54 (2.3) ▼	- -	80 (1.5)	◊ ◊	87 (1.2) ▼	- -
Malaysia	50 (2.7)	71 (2.0) ▼	59 (2.2) ▼	◊ ◊	80 (2.2)	95 (0.7) ▼	87 (1.4) ▼	◊ ◊
Iran, Islamic Rep. of	41 (1.8)	38 (1.3)	38 (1.8)	43 (2.2)	76 (1.7)	77 (1.3)	72 (1.8)	81 (1.8) ▼
Bahrain	49 (0.9)	33 (1.1) ▲	◊ ◊	◊ ◊	78 (0.7)	70 (1.2) ▲	◊ ◊	◊ ◊
Serbia	51 (1.6)	48 (1.3)	◊ ◊	◊ ◊	81 (1.1)	79 (1.0)	◊ ◊	◊ ◊
Romania	46 (1.9)	49 (2.2)	50 (2.6)	51 (2.2)	77 (1.6)	78 (1.9)	78 (2.0)	77 (1.7)
Norway	58 (1.4)	63 (1.3) ▼	◊ ◊	72 (1.3) ▼	87 (0.9)	91 (0.8) ▼	◊ ◊	94 (0.9) ▼
Cyprus	42 (1.1)	35 (1.0) ▲	45 (1.5)	43 (1.3)	74 (1.0)	71 (1.2) ▲	77 (1.1) ▼	72 (1.1)
Palestinian Nat'l Auth.	28 (1.2)	36 (1.4) ▼	◊ ◊	◊ ◊	54 (1.5)	66 (1.5) ▼	◊ ◊	◊ ◊
Lebanon	28 (2.1)	20 (1.5) ▲	◊ ◊	◊ ◊	55 (2.9)	48 (2.0) ▲	◊ ◊	◊ ◊
Egypt	27 (1.4)	33 (1.4) ▼	◊ ◊	◊ ◊	55 (1.6)	59 (1.6) ▼	◊ ◊	◊ ◊
Colombia	22 (1.5)	◊ ◊	◊ ◊	9 (1.3) ▲	59 (2.1)	◊ ◊	◊ ◊	35 (2.4) ▲
Indonesia	30 (2.1)	25 (1.8)	33 (1.7)	◊ ◊	68 (2.4)	61 (2.1) ▲	68 (2.5)	◊ ◊
Tunisia	31 (1.3)	12 (1.0) ▲	25 (1.6) ▲	◊ ◊	77 (1.2)	52 (1.5) ▲	68 (2.1) ▲	◊ ◊
Ghana	6 (0.9)	3 (0.4) ▲	◊ ◊	◊ ◊	19 (1.6)	13 (1.3) ▲	◊ ◊	◊ ◊
Botswana	11 (0.7)	10 (0.9)	◊ ◊	◊ ◊	35 (1.3)	35 (1.3)	◊ ◊	◊ ◊
Benchmarking Participants								
Massachusetts, US	84 (2.0)	◊ ◊	75 (3.2) ▲	◊ ◊	96 (0.9)	◊ ◊	93 (1.4)	◊ ◊
Minnesota, US	82 (2.3)	◊ ◊	◊ ◊	79 (3.1)	96 (1.0)	◊ ◊	◊ ◊	94 (1.4)
Ontario, Canada	77 (1.7)	81 (1.2)	72 (1.6) ▲	61 (1.9) ▲	96 (1.0)	97 (0.5)	95 (0.5)	88 (1.1) ▲
B. Columbia, Canada	77 (1.2)	◊ ◊	81 (2.6)	◊ ◊	95 (0.6)	◊ ◊	96 (1.1)	◊ ◊
Quebec, Canada	68 (1.7)	82 (1.5) ▼	83 (2.4) ▼	69 (3.5)	94 (0.9)	98 (0.4) ▼	98 (0.5) ▼	92 (2.6)
Basque Country, Sp.	64 (1.7)	58 (1.9) ▲	◊ ◊	◊ ◊	91 (1.0)	89 (0.9)	◊ ◊	◊ ◊

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 4.12 Trends in Percentages of Students reaching the TIMSS 2007 International Benchmarks of Mathematics Achievement (Continued)

TIMSS2007 Mathematics 8th Grade

Country	Advanced International Benchmark (625)				High International Benchmark (550)			
	2007 Percent of Students	2003 Percent of Students	1999 Percent of Students	1995 Percent of Students	2007 Percent of Students	2003 Percent of Students	1999 Percent of Students	1995 Percent of Students
Chinese Taipei	45 (1.9)	38 (2.0) ▲	37 (1.6) ▲	◊ ◊	71 (1.5)	66 (1.8) ▲	67 (1.5)	◊ ◊
Korea, Rep. of	40 (1.2)	35 (1.3) ▲	32 (0.9) ▲	31 (1.1) ▲	71 (1.1)	70 (1.0)	70 (1.0)	67 (1.0) ▲
Singapore	40 (1.9)	44 (2.0)	42 (3.5)	40 (2.9)	70 (2.0)	77 (2.0) ▼	77 (2.6) ▼	84 (1.8) ▼
Hong Kong SAR	31 (2.1)	31 (1.6)	28 (2.1)	23 (2.4) ▲	64 (2.6)	73 (1.8) ▼	70 (2.3)	65 (3.2)
Japan	26 (1.3)	24 (1.0)	29 (0.9)	29 (1.0)	61 (1.2)	62 (1.2)	66 (1.0) ▼	67 (0.8) ▼
Hungary	10 (1.0)	11 (1.0)	13 (1.2) ▼	10 (0.8)	36 (1.6)	41 (1.9) ▼	43 (1.9) ▼	40 (1.6)
England	8 (1.5)	5 (1.0)	6 (0.8)	6 (1.0)	35 (2.5)	26 (2.8) ▲	25 (2.0) ▲	27 (1.5) ▲
Russian Federation	8 (0.9)	6 (0.8) ▲	12 (1.6) ▼	9 (1.2)	33 (1.8)	30 (1.8)	39 (2.8)	38 (3.1)
Lithuania	6 (0.7)	5 (0.6)	3 (0.6) ▲	2 (0.5) ▲	30 (1.1)	28 (1.2)	18 (2.0) ▲	17 (1.5) ▲
United States	6 (0.6)	7 (0.7)	7 (1.0)	4 (0.7)	31 (1.5)	29 (1.6)	30 (1.6)	26 (2.0) ▲
Australia	6 (1.3)	7 (1.1)	- -	7 (1.0)	24 (1.8)	29 (2.4)	- -	33 (1.8) ▼
Armenia	6 (0.9)	2 (0.3) ▲	◊ ◊	◊ ◊	27 (1.9)	21 (1.3) ▲	◊ ◊	◊ ◊
Czech Republic	6 (0.7)	◊ ◊	9 (1.2) ▼	15 (2.0) ▼	26 (1.2)	◊ ◊	35 (2.1) ▼	47 (2.4) ▼
Serbia	5 (0.8)	4 (0.4)	◊ ◊	◊ ◊	24 (1.3)	21 (1.1)	◊ ◊	◊ ◊
Bulgaria	4 (0.8)	3 (0.7)	9 (2.1) ▼	17 (2.0) ▼	20 (1.5)	19 (1.8)	32 (3.0) ▼	40 (2.8) ▼
Slovenia	4 (0.6)	3 (0.5)	- -	4 (0.7)	25 (1.0)	21 (1.0) ▲	- -	22 (1.3)
Israel	4 (0.5)	6 (0.6) ▼	4 (0.5)	- -	19 (1.3)	27 (1.5) ▼	19 (1.3)	- -
Romania	4 (0.6)	4 (0.6)	4 (0.9)	4 (0.6)	20 (1.3)	21 (1.8)	20 (2.0)	21 (1.6)
Scotland	4 (0.6)	4 (0.6)	◊ ◊	5 (1.4)	23 (1.8)	25 (2.1)	◊ ◊	24 (2.7)
Thailand	3 (0.8)	◊ ◊	3 (0.7)	- -	12 (1.7)	◊ ◊	17 (1.9)	- -
Italy	3 (0.6)	3 (0.6)	4 (0.6)	- -	17 (1.2)	19 (1.5)	21 (1.5) ▼	- -
Malaysia	2 (0.5)	6 (1.0) ▼	10 (1.2) ▼	◊ ◊	18 (2.1)	30 (2.4) ▼	36 (2.4) ▼	◊ ◊
Cyprus	2 (0.3)	1 (0.2) ▲	2 (0.4)	3 (0.4)	17 (0.8)	13 (0.7) ▲	19 (0.9)	19 (1.0)
Sweden	2 (0.3)	3 (0.5)	◊ ◊	12 (1.1) ▼	20 (1.0)	24 (1.2) ▼	◊ ◊	46 (2.4) ▼
Jordan	1 (0.2)	1 (0.2) ▲	3 (0.5) ▼	◊ ◊	11 (0.8)	8 (1.0) ▲	12 (1.0)	◊ ◊
Iran, Islamic Rep. of	1 (0.2)	0 (0.2)	1 (0.2)	0 (0.2)	5 (0.9)	3 (0.4)	6 (0.9)	4 (0.6)
Lebanon	1 (0.2)	0 (0.1) ▲	◊ ◊	◊ ◊	10 (1.2)	4 (0.6) ▲	◊ ◊	◊ ◊
Indonesia	1 (0.2)	1 (0.2)	2 (0.3) ▼	◊ ◊	5 (0.8)	6 (0.7)	8 (0.9) ▼	◊ ◊
Egypt	1 (0.1)	1 (0.2)	◊ ◊	◊ ◊	5 (0.4)	6 (0.5)	◊ ◊	◊ ◊
Norway	0 (0.1)	0 (0.2)	◊ ◊	4 (0.4) ▼	11 (0.7)	10 (0.6)	◊ ◊	26 (1.3) ▼
Palestinian Nat'l Auth.	0 (0.1)	0 (0.1)	◊ ◊	◊ ◊	3 (0.4)	4 (0.4)	◊ ◊	◊ ◊
Colombia	0 (0.0)	◊ ◊	◊ ◊	0 (0.0) ▲	2 (0.3)	◊ ◊	◊ ◊	2 (0.7)
Bahrain	0 (0.1)	0 (0.0) ▲	◊ ◊	◊ ◊	3 (0.3)	2 (0.2)	◊ ◊	◊ ◊
Tunisia	0 (0.1)	0 (0.0)	0 (0.1)	◊ ◊	3 (0.3)	1 (0.3) ▲	5 (0.5) ▼	◊ ◊
Botswana	0 (0.0)	0 (0.0)	◊ ◊	◊ ◊	1 (0.1)	1 (0.2)	◊ ◊	◊ ◊
Ghana	0 (0.0)	0 (0.0)	◊ ◊	◊ ◊	0 (0.1)	0 (0.0)	◊ ◊	◊ ◊
Benchmarking Participants								
Massachusetts, US	16 (1.7)	◊ ◊	8 (1.3) ▲	◊ ◊	52 (2.5)	◊ ◊	33 (2.6) ▲	◊ ◊
Quebec, Canada	8 (1.2)	8 (1.4)	18 (4.4) ▼	14 (2.8) ▼	37 (2.0)	45 (2.2) ▼	60 (3.5) ▼	54 (4.2) ▼
Minnesota, US	8 (1.4)	◊ ◊	◊ ◊	7 (2.3)	41 (2.8)	◊ ◊	◊ ◊	36 (4.1)
Ontario, Canada	6 (0.8)	6 (0.7)	6 (0.8)	3 (0.4) ▲	33 (2.0)	34 (1.8)	32 (1.8)	26 (1.7) ▲
B. Columbia, Canada	5 (1.0)	◊ ◊	7 (2.0)	◊ ◊	29 (1.7)	◊ ◊	35 (4.3)	◊ ◊
Basque Country, Sp.	2 (0.4)	1 (0.3)	◊ ◊	◊ ◊	23 (1.5)	16 (1.5) ▲	◊ ◊	◊ ◊

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Trend notes: Data are not shown for Kuwait, Morocco, Saudi Arabia, and Turkey, because comparable data from previous cycles are not available. Data for Indonesia do not include Islamic schools.

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

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

A diamond (◊) indicates the country did not participate in the assessment.

Exhibit 4.12 Trends in Percentages of Students reaching the TIMSS 2007 International Benchmarks of Mathematics Achievement (Continued)

TIMSS2007 Mathematics 8th Grade

Country	Intermediate International Benchmark (475)				Low International Benchmark (400)			
	2007 Percent of Students	2003 Percent of Students	1999 Percent of Students	1995 Percent of Students	2007 Percent of Students	2003 Percent of Students	1999 Percent of Students	1995 Percent of Students
Chinese Taipei	86 (1.2)	85 (1.2)	85 (1.0)	◊ ◊	95 (0.6)	96 (0.6)	95 (0.5)	◊ ◊
Korea, Rep. of	90 (0.7)	90 (0.5)	91 (0.5)	89 (0.7)	98 (0.3)	98 (0.3)	99 (0.2) ▼	97 (0.4)
Singapore	88 (1.4)	93 (1.0) ▼	94 (1.2) ▼	98 (0.4) ▼	97 (0.6)	99 (0.2) ▼	99 (0.3) ▼	100 (0.0) ▼
Hong Kong SAR	85 (2.1)	93 (1.3) ▼	92 (1.3) ▼	88 (2.1)	94 (1.1)	98 (0.6) ▼	98 (0.6) ▼	96 (1.1)
Japan	87 (0.9)	88 (0.6)	90 (0.5) ▼	91 (0.5) ▼	97 (0.3)	98 (0.2) ▼	98 (0.2) ▼	98 (0.2) ▼
Hungary	69 (1.6)	75 (1.6) ▼	75 (1.5) ▼	74 (1.6) ▼	91 (1.0)	95 (0.8) ▼	93 (1.0)	94 (0.9) ▼
England	69 (2.3)	61 (2.9) ▲	60 (2.2) ▲	61 (1.5) ▲	90 (1.4)	90 (1.5)	88 (1.2)	87 (1.0)
Russian Federation	68 (2.1)	66 (1.8)	73 (2.7)	73 (2.4)	91 (1.2)	92 (0.9)	93 (1.4)	93 (1.1)
Lithuania	65 (1.3)	63 (1.4)	53 (2.3) ▲	50 (2.3) ▲	90 (0.8)	90 (0.8)	85 (1.8) ▲	81 (1.7) ▲
United States	67 (1.4)	64 (1.6)	62 (1.8)	61 (2.4) ▲	92 (0.8)	90 (1.0)	87 (1.1) ▲	86 (1.5) ▲
Australia	61 (1.9)	65 (2.3)	- -	68 (1.7) ▼	89 (1.0)	90 (1.4)	- -	90 (1.0)
Armenia	63 (1.4)	54 (1.5) ▲	◊ ◊	◊ ◊	88 (0.8)	82 (1.0) ▲	◊ ◊	◊ ◊
Czech Republic	66 (1.4)	◊ ◊	71 (2.1) ▼	82 (1.4) ▼	92 (0.8)	◊ ◊	94 (1.1)	98 (0.5) ▼
Serbia	57 (1.8)	52 (1.4) ▲	◊ ◊	◊ ◊	83 (1.2)	80 (0.9)	◊ ◊	◊ ◊
Bulgaria	49 (1.9)	51 (2.1)	67 (2.5) ▼	69 (2.4) ▼	74 (1.7)	82 (1.6) ▼	90 (1.2) ▼	90 (1.1) ▼
Slovenia	65 (1.4)	60 (1.3) ▲	- -	60 (1.8)	92 (0.8)	90 (0.9)	- -	90 (0.9)
Israel	48 (1.7)	60 (1.8) ▼	49 (1.9)	- -	75 (1.4)	86 (1.2) ▼	76 (2.0)	- -
Romania	46 (1.8)	52 (2.2) ▼	51 (2.6)	52 (2.2) ▼	73 (1.7)	79 (1.7) ▼	79 (2.1)	79 (1.6) ▼
Scotland	57 (2.2)	63 (2.4) ▼	◊ ◊	60 (2.6)	85 (1.3)	90 (1.1) ▼	◊ ◊	87 (1.4)
Thailand	34 (2.2)	◊ ◊	45 (2.6) ▼	- -	66 (2.0)	◊ ◊	79 (1.8) ▼	- -
Italy	54 (1.5)	56 (1.7)	53 (2.1)	- -	85 (1.1)	86 (1.2)	82 (1.6)	- -
Malaysia	50 (2.7)	66 (2.1) ▼	70 (2.1) ▼	◊ ◊	82 (1.9)	93 (0.9) ▼	93 (0.9) ▼	◊ ◊
Cyprus	48 (0.9)	45 (1.0) ▲	53 (1.2) ▼	51 (1.3)	78 (0.7)	77 (1.0)	82 (0.9) ▼	77 (1.0)
Sweden	60 (1.3)	64 (1.5) ▼	◊ ◊	81 (1.8) ▼	90 (0.9)	91 (1.0)	◊ ◊	96 (0.8) ▼
Jordan	35 (1.7)	30 (1.9) ▲	33 (1.6)	◊ ◊	61 (1.8)	60 (1.9)	61 (1.4)	◊ ◊
Iran, Islamic Rep. of	20 (1.7)	20 (1.1)	26 (1.9) ▼	24 (1.9) ▼	51 (1.9)	55 (1.4)	61 (1.6) ▼	59 (1.8) ▼
Lebanon	36 (2.4)	27 (1.8) ▲	◊ ◊	◊ ◊	74 (2.3)	68 (1.9)	◊ ◊	◊ ◊
Indonesia	22 (1.8)	24 (1.7)	23 (1.4)	◊ ◊	52 (2.2)	55 (2.4)	50 (2.1)	◊ ◊
Egypt	21 (1.0)	24 (1.2)	◊ ◊	◊ ◊	47 (1.5)	52 (1.7) ▼	◊ ◊	◊ ◊
Norway	48 (1.5)	44 (1.6)	◊ ◊	64 (1.3) ▼	85 (0.8)	81 (1.2) ▲	◊ ◊	90 (0.9) ▼
Palestinian Nat'l Auth.	15 (0.9)	19 (1.2) ▼	◊ ◊	◊ ◊	39 (1.4)	46 (1.5) ▼	◊ ◊	◊ ◊
Colombia	11 (1.1)	◊ ◊	◊ ◊	7 (0.9) ▲	39 (2.1)	◊ ◊	◊ ◊	20 (1.9) ▲
Bahrain	19 (0.7)	17 (0.7)	◊ ◊	◊ ◊	49 (0.9)	51 (1.1)	◊ ◊	◊ ◊
Tunisia	21 (1.2)	15 (1.1) ▲	34 (1.5) ▼	◊ ◊	61 (1.5)	55 (1.6) ▲	78 (1.2) ▼	◊ ◊
Botswana	7 (0.7)	7 (0.7)	◊ ◊	◊ ◊	32 (1.3)	32 (1.5)	◊ ◊	◊ ◊
Ghana	4 (0.7)	2 (0.5) ▲	◊ ◊	◊ ◊	17 (1.4)	9 (1.3) ▲	◊ ◊	◊ ◊
Benchmarking Participants								
Massachusetts, US	82 (2.2)	◊ ◊	69 (3.0) ▲	◊ ◊	95 (1.1)	◊ ◊	92 (1.7)	◊ ◊
Quebec, Canada	78 (1.8)	88 (1.1) ▼	93 (1.1) ▼	90 (2.6) ▼	97 (0.8)	99 (0.2) ▼	99 (0.4) ▼	99 (0.5) ▼
Minnesota, US	81 (2.0)	◊ ◊	◊ ◊	73 (3.4) ▲	97 (1.0)	◊ ◊	◊ ◊	94 (1.6)
Ontario, Canada	74 (1.8)	75 (1.7)	72 (1.6)	65 (1.7) ▲	95 (1.1)	97 (0.5)	96 (0.6)	91 (1.0) ▲
B. Columbia, Canada	69 (1.5)	◊ ◊	75 (3.0)	◊ ◊	93 (0.9)	◊ ◊	94 (1.4)	◊ ◊
Basque Country, Sp.	66 (1.9)	58 (2.2) ▲	◊ ◊	◊ ◊	92 (1.0)	91 (1.0)	◊ ◊	◊ ◊

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

4.8 Grade 8 mathematics: trends in performance at the international benchmarks

Like grade 4 mathematics, grade 8 mathematics performance rose from 2003 levels. Exhibit 4.12 indicates that, for the high and intermediate benchmarks, performance has improved since 2003, from 26 per cent to 35 per cent for the high benchmark, and from 61 per cent to 69 per cent for the intermediate benchmark. For the advanced and low benchmarks there has been no change from 2003 or earlier TIMSS surveys. This pattern of change, concentrated in the middle of the performance spectrum, is the same as for grade 4 mathematics.

4.9 Distributions of performance in 2007 and 2003

Another way of examining the performance in a country is to compare the distribution of scores for different surveys and to compare the distribution on each occasion with the normal distribution. Exhibits 4.13 to 4.16 do so for the four assessments. In each case England's distribution of performance in 2007 is compared with the 2003 distribution. In addition, both of these are compared with the normal distribution.

Exhibit 4.13 2007 and 2003 distributions of performance: grade 4 science

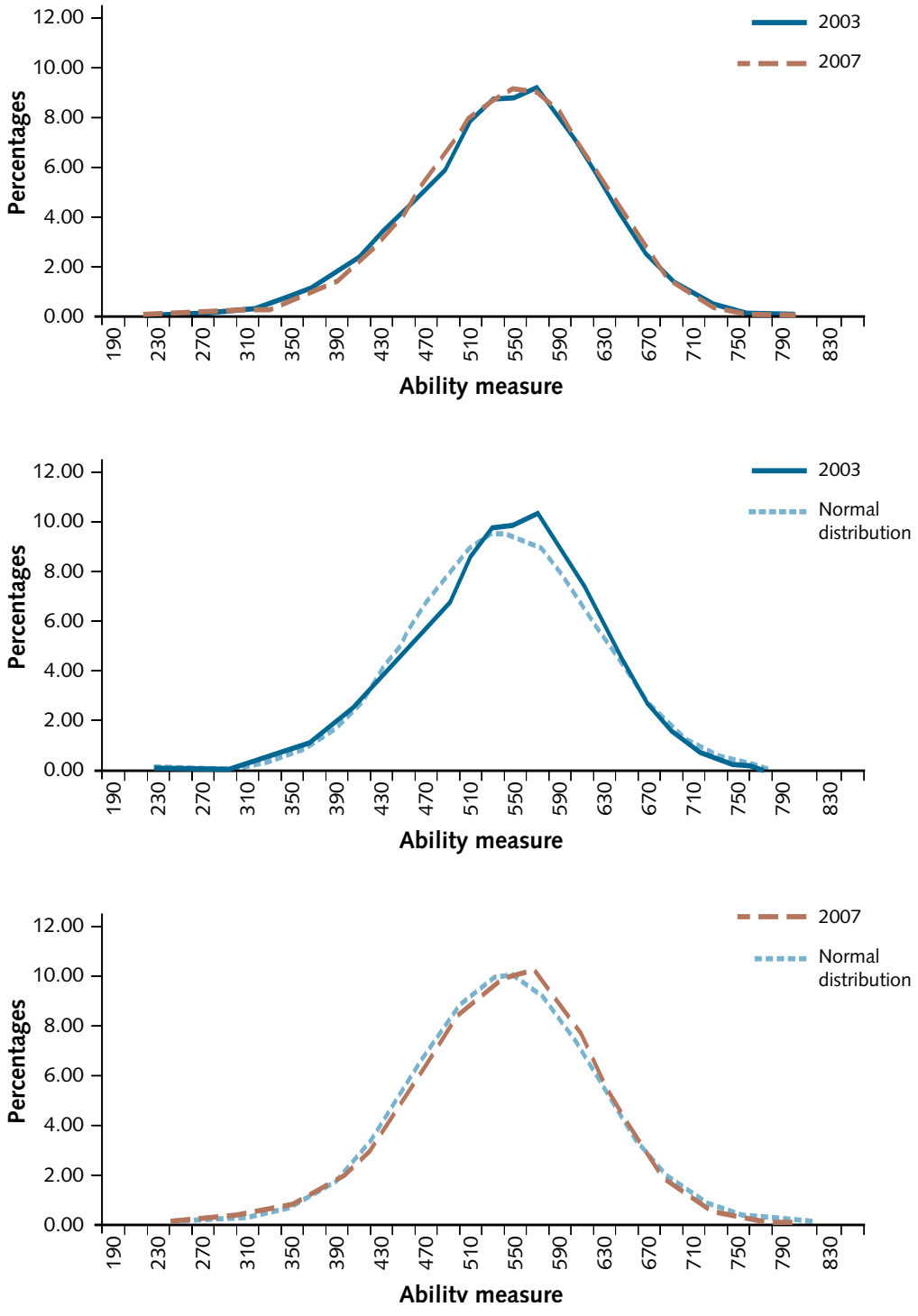
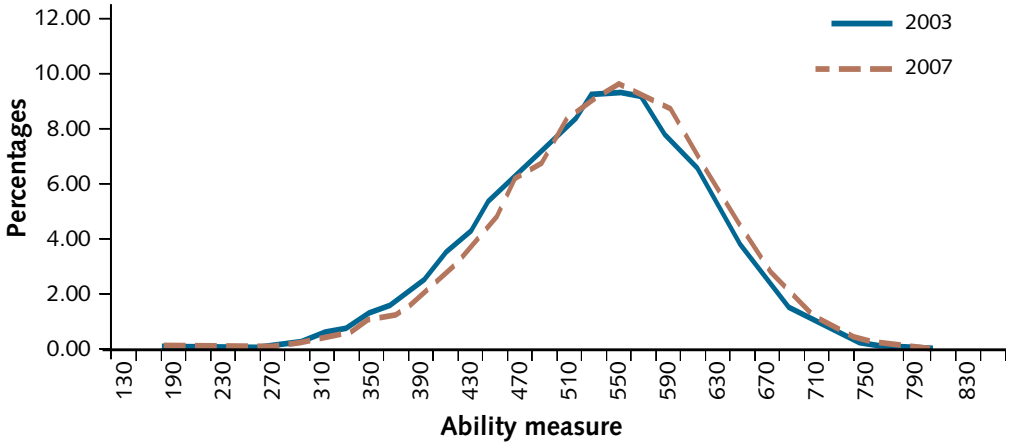
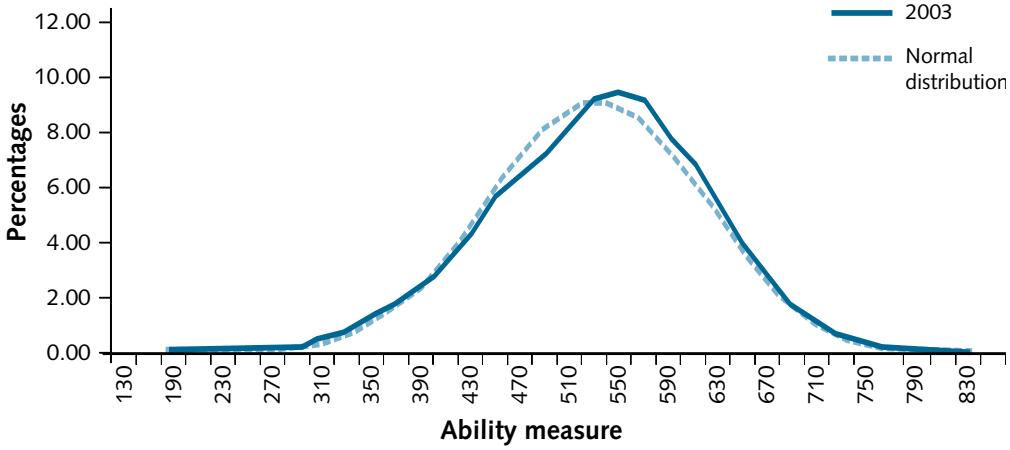
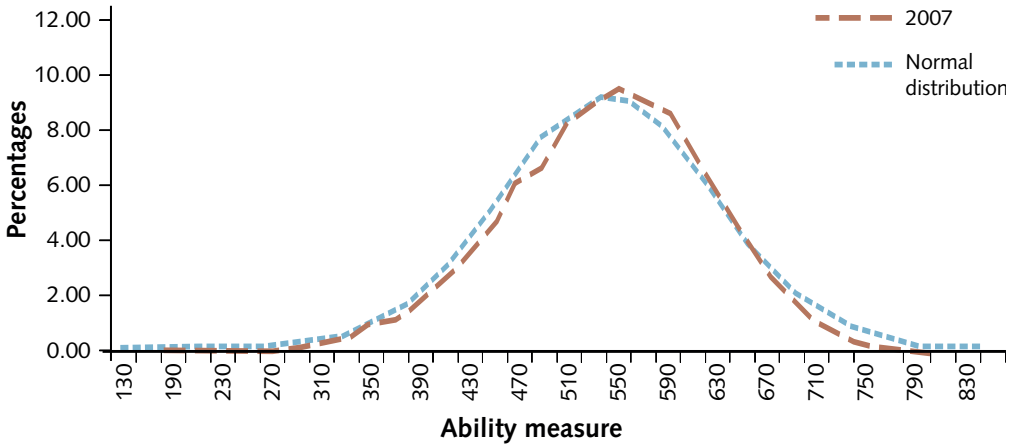


Exhibit 4.13 looks at grade 4 science and the three graphs show that the distributions in both 2007 and 2003 were very similar and that both are similar to the normal distribution. Performance overall was similar in the two surveys, but it does not necessarily follow that the distributions would be so similar. The same overall level of performance may be associated with a normal distribution, as here, or with, for example, a flatter distribution with more high and low scorers but fewer middle attainers.

Exhibit 4.14 2007 and 2003 distributions of performance: grade 4 mathematics







TIMSS 2007 International Reports available at http://timssandpirls.bc.edu/TIMSS2007

In Exhibit 4.14 the improvement from 2003 to 2007 in grade 4 mathematics is evident, the 2007 graph being partly to the right of the 2003 one. Both the 2003 and 2007 distributions have peaks slightly to the right of the normal distribution.

Exhibit 4.15, for grade 8 science, shows that the 2007 distribution is flatter than the 2003 one, with more high and low scorers but fewer pupils scoring in the middle score range.

Exhibit 4.15 2007 and 2003 distributions of performance: grade 8 science

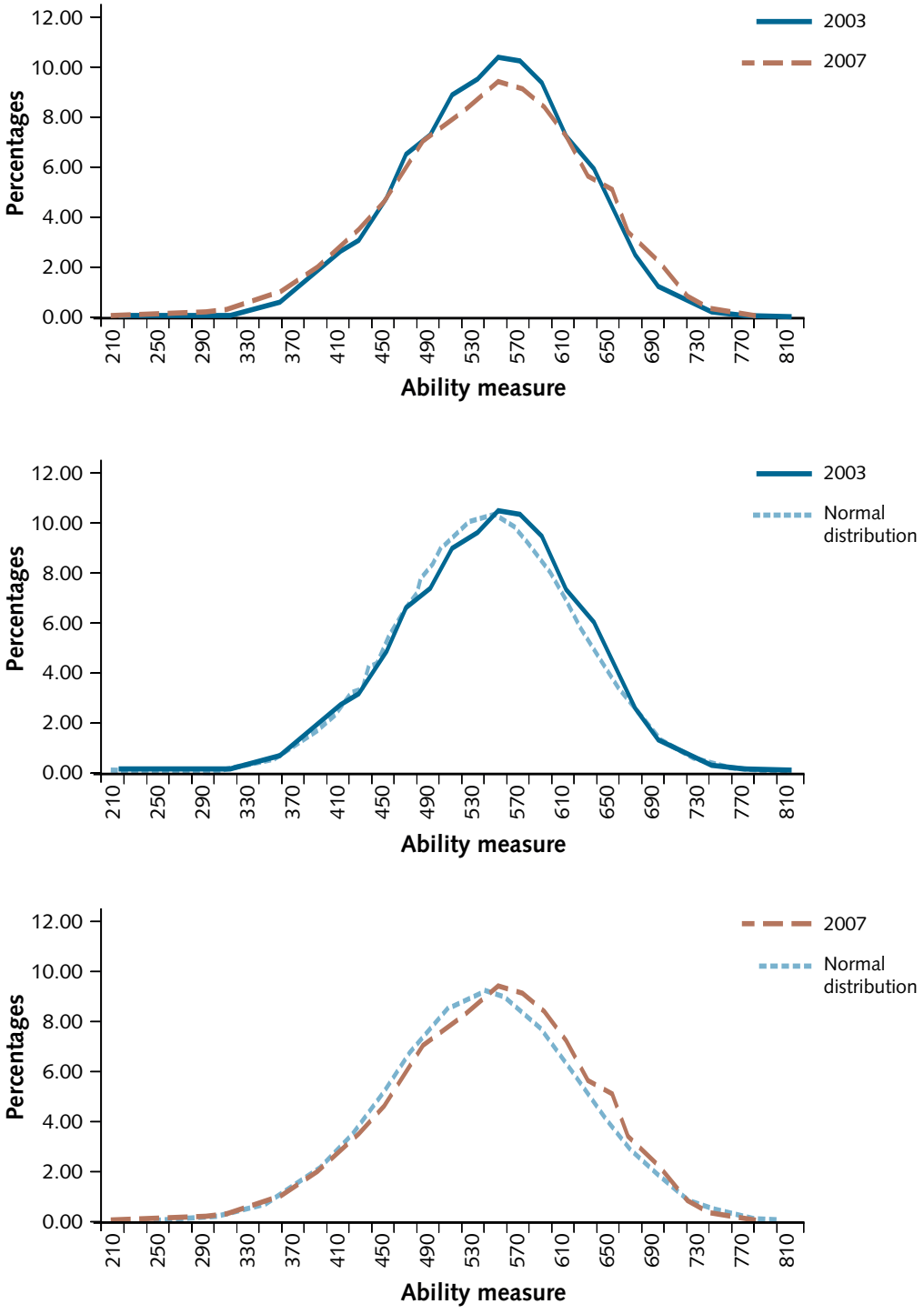
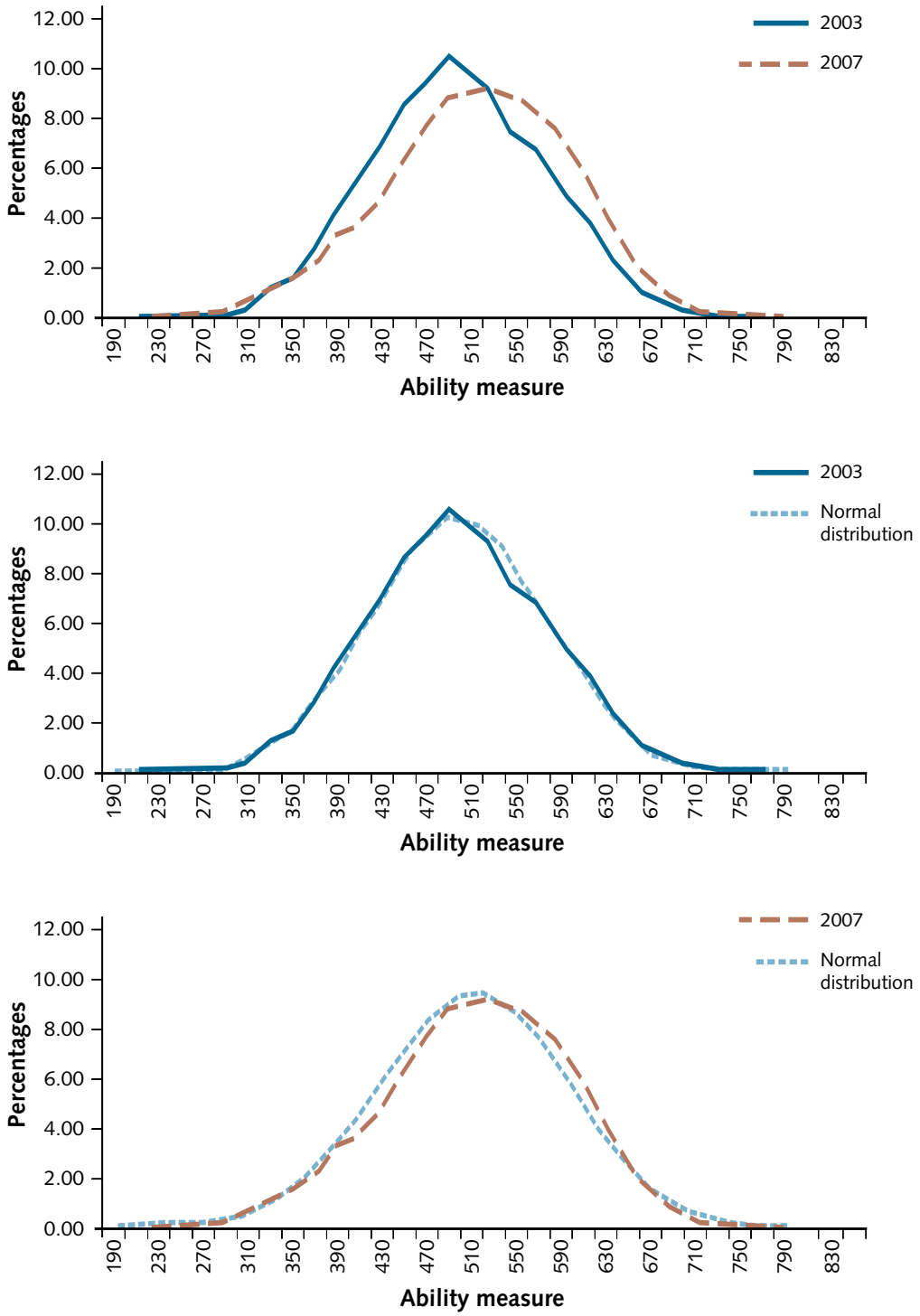


Exhibit 4.16 2007 and 2003 distributions of performance: grade 8 mathematics



For grade 8 mathematics, Exhibit 4.16 reflects the large rise in performance from 2003 to 2007, the 2007 distribution lying to the right of the 2003 one, but being somewhat flatter. To make these comparisons, data for the two years were compared to the normal distribution, examining means and variances. Since 2003 and 2007 have different means and variances, the two normal distributions can be shown to be not identical. It should be noted that comparison with the normal distribution does not suggest a long tail of low attainers in any of the four assessments.

4.10 Summary

The proportion of pupils reaching each international benchmark in England was usually very similar to that of countries performing at a similar level overall, but behind that of the high scoring Pacific Rim countries.

The improvement in performance in mathematics at both grades was reflected in higher numbers of pupils reaching the high and intermediate benchmarks, but the number reaching the advanced benchmark did not change significantly. The improved overall performance is associated most strongly by improvement in the middle score range.

5 Performance in the content and cognitive domains

In TIMSS 2007, as in previous surveys, the items have been written to match an assessment framework with content domains. In mathematics the content domains are number, algebra, geometric shapes and measures, and data display in grade 4. The actual content is quite similar to the national curriculum in England, and the structure is similar in that measures are combined with geometry. Grade 8 has content domains of number, algebra, geometry, and data and chance, again not unlike the national curriculum in England. The similarity can be shown by looking at number. At grade 8 the sub-domains are whole numbers; fractions and decimals; integers; ratio, proportion and percent. At grade 4 the equivalents are: whole numbers; fractions and decimals; number sentences with whole numbers; patterns and relationships.

In science at grade 4 the content is divided into life science, physical science and earth science. The use of earth science as a structural element is not mirrored in England and the chemistry and physics elements of the national curriculum are combined in TIMSS, unlike in England. At grade 8 the TIMSS domains are biology, chemistry, physics and earth science. Again, the main difference is earth science and TIMSS includes in earth science material that would be included in other subjects in England, notably geography.

For 2007, items were also classified in cognitive domains. These domains - knowing, applying and reasoning - are the same for both grades and subjects. In mathematics, knowing includes recall of definitions and facts and basic computation. Applying includes solving routine problems, while reasoning covers analysing, generalising, synthesising, justifying and solving non-routine problems.

In science, knowing is similar, involving recalling, for example, and using tools and procedures. Applying includes using models, interpreting information and explaining. Reasoning again includes analysing, generalising, synthesising, justifying and designing and planning.

See the TIMSS 2007 Assessment Frameworks at http://timss.bc.edu for more detailed descriptions of the content and cognitive domains.

5.1 Grade 4 science: performance in the content and cognitive domains

Exhibit 5.1 shows how the higher scoring countries in TIMSS performed in the content and cognitive domains. The lowest scoring countries are not shown so that the different patterns of performance are more obvious for countries scoring higher than England, at a similar level to England (boxed) and at a somewhat lower level.

In each domain, the difference between the country's score and the TIMSS scale average (of 500 in each case) is shown so that the relative strengths and weaknesses of each

Erratum
Due to a labelling error in the international dataset, all findings related to the cognitive domains of 'Knowing' and 'Applying' have been inadvertently reversed in the national report for England. Findings reported as 'Knowing' actually relate to the 'Applying' domain, and findings reported as 'Applying' actually relate to the 'Knowing' domain. This applies to chapters 1, 5 and 6 of the national report and to the separate executive summary booklet.

TIMSS 2007 International Reports available at http://timssandpirls.bc.edu/TIMSS2007

Exhibit 5.1 Average achievement in the science content and cognitive domains

TIMSS2007 Science 4th Grade

Country	Overall Scale Score	Average Scale Scores for Science Content Domains						Average Scale Scores for Science Cognitive Domains					
		Life Science		Physical Science		Earth Science		Knowing		Applying		Reasoning	
Singapore	587	582 (4.1)	82	585 (3.9)	85	554 (3.3)	54	579 (3.7)	79	587 (4.1)	87	568 (3.7)	68
Chinese Taipei	557	541 (2.1)	41	559 (2.5)	59	553 (1.9)	53	556 (2.1)	56	536 (2.5)	36	571 (2.4)	71
Hong Kong SAR	554	532 (3.5)	32	558 (3.5)	58	560 (3.2)	60	549 (3.0)	49	546 (3.2)	46	561 (4.4)	61
Japan	548	530 (2.0)	30	564 (2.3)	64	529 (2.7)	29	542 (2.7)	42	528 (2.2)	28	567 (2.1)	67
Russian Federation	546	539 (4.1)	39	547 (4.6)	47	536 (4.3)	36	546 (4.7)	46	542 (4.8)	42	542 (4.6)	42
1 Latvia	542	535 (2.1)	35	544 (2.4)	44	536 (2.2)	36	535 (2.4)	35	540 (2.2)	40	551 (2.7)	51
England	542	532 (2.7)	32	543 (2.7)	43	538 (2.9)	38	536 (2.7)	36	543 (2.9)	43	537 (2.7)	37
2 † United States	539	540 (2.5)	40	534 (2.3)	34	533 (2.6)	33	533 (2.8)	33	541 (2.3)	41	535 (2.6)	35
Hungary	536	548 (2.8)	48	529 (3.3)	29	517 (3.5)	17	531 (3.2)	31	540 (3.0)	40	529 (3.7)	29
Italy	535	549 (3.0)	49	521 (3.1)	21	526 (3.0)	26	539 (3.1)	39	530 (3.9)	30	526 (3.8)	26
1 Kazakhstan	533	528 (5.0)	28	528 (5.8)	28	534 (5.2)	34	536 (4.9)	36	534 (5.8)	34	519 (5.3)	19
Germany	528	529 (2.0)	29	524 (2.5)	24	524 (2.4)	24	526 (2.2)	26	527 (2.2)	27	525 (2.3)	25
Australia	527	528 (3.4)	28	522 (3.1)	22	534 (3.2)	34	523 (3.3)	23	529 (3.1)	29	530 (3.4)	30
Slovak Republic	526	532 (4.0)	32	513 (4.6)	13	530 (4.8)	30	527 (4.4)	27	527 (4.4)	27	513 (4.9)	13
Austria	526	526 (2.0)	26	514 (2.4)	14	532 (1.9)	32	526 (2.2)	26	529 (2.0)	29	513 (2.3)	13
Sweden	525	531 (2.5)	31	508 (2.7)	8	535 (2.7)	35	521 (2.9)	21	526 (2.5)	26	527 (3.5)	27
‡ Netherlands	523	536 (2.2)	36	503 (2.3)	3	524 (2.5)	24	525 (2.2)	25	518 (2.5)	18	525 (2.3)	25
Slovenia	518	511 (2.2)	11	530 (1.6)	30	517 (2.5)	17	525 (2.1)	25	511 (1.6)	11	527 (1.8)	27
† Denmark	517	527 (2.4)	27	502 (2.5)	2	522 (2.7)	22	515 (2.6)	15	516 (2.9)	16	525 (3.8)	25
Czech Republic	515	520 (2.9)	20	511 (2.8)	11	518 (2.6)	18	516 (3.1)	16	520 (2.7)	20	510 (2.9)	10
1 Lithuania	514	516 (1.8)	16	514 (1.4)	14	511 (2.5)	11	515 (2.8)	15	511 (1.7)	11	524 (2.4)	24
New Zealand	504	506 (2.5)	6	498 (2.5)	-2	515 (2.6)	15	500 (2.4)	0	511 (2.5)	11	505 (2.9)	5
† Scotland	500	504 (2.2)	4	499 (1.9)	-1	508 (2.5)	8	494 (2.4)	-6	511 (2.0)	11	501 (2.2)	1
TIMSS Scale Avg.	500	500		500		500		500		500		500	
Armenia	484	489 (5.9)	-11	492 (5.1)	-8	479 (5.5)	-21	487 (5.6)	-13	486 (5.2)	-14	484 (5.3)	-16
Norway	477	487 (2.5)	-13	469 (2.7)	-31	497 (2.9)	-3	478 (2.8)	-22	485 (2.4)	-15	480 (3.2)	-20
Ukraine	474	482 (2.5)	-18	475 (2.7)	-25	474 (3.1)	-26	477 (3.2)	-23	476 (2.4)	-24	478 (3.0)	-22

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

For each domain, three columns of figures appear: the scale score; the standard error in parentheses; and the difference between the scale score and the scale average.

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

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

Exhibit 5.2 Average achievement in the mathematics content and cognitive domains

TIMSS2007 Mathematics 4th Grade

Country	Overall Scale Score	Average Scale Scores for Mathematics Content Domains						Average Scale Scores for Mathematics Cognitive Domains					
		Number		Geometric Shapes and Measures		Data Display		Knowing		Applying		Reasoning	
Hong Kong SAR	607	606 (3.8)	106	599 (3.1)	99	585 (2.7)	85	599 (3.4)	99	617 (3.5)	117	589 (3.5)	89
Singapore	599	611 (4.3)	111	570 (3.6)	70	583 (3.2)	83	590 (3.7)	90	620 (4.0)	120	578 (3.8)	78
Chinese Taipei	576	581 (1.9)	81	556 (2.2)	56	567 (2.0)	67	569 (1.7)	69	584 (1.7)	84	566 (1.9)	66
Japan	568	561 (2.2)	61	566 (2.2)	66	578 (2.8)	78	566 (2.0)	66	565 (2.1)	65	563 (2.1)	63
1 Kazakhstan	549	556 (6.6)	56	542 (7.4)	42	522 (5.8)	22	547 (7.2)	47	559 (7.3)	59	539 (6.1)	39
Russian Federation	544	546 (4.4)	46	538 (5.1)	38	530 (4.9)	30	547 (4.8)	47	538 (4.5)	38	540 (4.8)	40
England	541	531 (3.2)	31	548 (2.7)	48	547 (2.5)	47	540 (3.1)	40	544 (3.6)	44	537 (3.1)	37
1 Latvia	537	536 (2.1)	36	532 (2.6)	32	536 (3.0)	36	540 (2.5)	40	530 (2.2)	30	537 (2.5)	37
‡ Netherlands	535	535 (2.2)	35	522 (2.3)	22	543 (2.3)	43	540 (2.0)	40	525 (2.2)	25	534 (2.4)	34
1 Lithuania	530	533 (2.3)	33	518 (2.4)	18	530 (2.9)	30	539 (2.4)	39	520 (2.8)	20	526 (2.5)	26
2 † United States	529	524 (2.7)	24	522 (2.5)	22	543 (2.4)	43	524 (2.6)	24	541 (2.6)	41	523 (2.2)	23
Germany	525	521 (2.2)	21	528 (2.0)	28	534 (3.1)	34	531 (2.2)	31	514 (2.0)	14	528 (2.5)	28
† Denmark	523	509 (2.9)	9	544 (2.6)	44	529 (3.4)	29	528 (2.5)	28	513 (2.7)	13	524 (2.1)	24
Australia	516	496 (3.7)	-4	536 (3.1)	36	534 (3.1)	34	523 (3.5)	23	509 (4.2)	9	516 (3.4)	16
Hungary	510	510 (3.7)	10	510 (3.3)	10	504 (3.5)	4	507 (3.5)	7	511 (3.4)	11	509 (3.8)	9
Italy	507	505 (3.2)	5	509 (3.0)	9	506 (3.4)	6	501 (2.9)	1	514 (3.2)	14	509 (3.1)	9
Austria	505	502 (2.2)	2	509 (2.4)	9	508 (2.6)	8	507 (1.8)	7	505 (2.0)	5	506 (2.1)	6
Sweden	503	490 (2.5)	-10	508 (2.3)	8	529 (2.7)	29	508 (2.2)	8	482 (2.5)	-18	519 (2.5)	19
Slovenia	502	485 (1.9)	-15	522 (1.8)	22	518 (2.5)	18	504 (1.9)	4	497 (1.8)	-3	505 (2.1)	5
TIMSS Scale Avg.	500	500		500		500		500		500		500	
Armenia	500	522 (4.0)	22	483 (4.7)	-17	458 (4.3)	-42	493 (4.1)	-7	518 (4.8)	18	489 (4.7)	-11
Slovak Republic	496	495 (3.9)	-5	499 (4.3)	-1	492 (4.2)	-8	498 (4.0)	-2	492 (3.9)	-8	499 (4.0)	-1
† Scotland	494	481 (2.6)	-19	503 (2.6)	3	516 (2.2)	16	500 (2.4)	0	489 (2.6)	-11	497 (2.2)	-3
New Zealand	492	478 (2.7)	-22	502 (2.3)	2	513 (2.6)	13	495 (2.3)	-5	482 (2.5)	-18	503 (2.8)	3
Czech Republic	486	482 (2.8)	-18	494 (2.8)	-6	493 (3.3)	-7	496 (2.7)	-4	473 (2.4)	-27	493 (3.4)	-7
Norway	473	461 (2.8)	-39	490 (3.0)	-10	487 (2.6)	-13	479 (2.8)	-21	461 (2.9)	-39	489 (2.7)	-11
Ukraine	469	480 (2.9)	-20	457 (2.8)	-43	462 (3.2)	-38	466 (3.1)	-34	472 (3.0)	-28	474 (3.2)	-26

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

For each domain, three columns of figures appear: the scale score; the standard error in parentheses; and the difference between the scale score and the scale

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

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

country are indicated. England's scale score was 543 for physical science, higher than the 532 for life science. For earth science England's score was 538. Looking at Exhibit 5.1, there are no obvious consistent patterns associated with particular levels of country performance. Countries scoring at a similar level to England, for example, show different patterns of strengths and weaknesses across the content domains.

In the cognitive domains, England's scores, 536 for knowing, 543 for applying and 537 for reasoning, are quite similar to each other. Again, no obvious patterns emerge relating the cognitive domains to performance levels. Among the highest scorers, Singapore's best score is for applying while, for Chinese Taipei, the highest is for reasoning. Again, countries scoring at a similar level to England show different patterns of strengths and weaknesses. Several of these countries have a flat profile like England, while others demonstrate marked strengths and weaknesses.

It is not possible to look at trends in the content and cognitive domains since those used in 2007 were not the same as earlier ones. The number of domains has been reduced to give better measurement properties as domains assessed by small numbers of items have been removed.

See Chapter 3 of the international mathematics and science reports for more information on performance in the content and cognitive domains

5.2 Grade 4 mathematics: performance in the content and cognitive domains

For grade 4 mathematics, the content domains are number, geometric shapes and measures, and data display. Exhibit 5.2 shows how the higher scoring countries in TIMSS performed in the content and cognitive domains.

England's scale scores for geometric shapes and measures and for data display were similar, 548 and 547 respectively. At 531, the score for number is rather lower, indicating a relative weakness. This profile is not shared by any of the countries performing at a similar level to England, but Japan, a higher scorer, also has a relative weakness in number. At the item level, the weakness is most evident in division and the completion of number sentences.

In the cognitive domains, England's scores, 540 for knowing, 544 for applying and 537 for reasoning, are quite similar to each other as for grade 4 science. Again, no obvious patterns emerged relating the cognitive domains to performance levels. Countries scoring at a similar level to England show different patterns of strengths and weaknesses. Again, Japan has a similar profile to England.

Exhibit 5.3 Average achievement in the science content and cognitive domains

TIMSS2007 8th Science Grade

Country	Overall Scale Score	Average Scale Scores for Science Content Domains								Average Scale Scores for Science Cognitive Domains					
		Biology		Chemistry		Physics		Earth Science		Knowing		Applying		Reasoning	
Singapore	567	564 (4.2)	64	560 (4.1)	60	575 (3.9)	75	541 (4.1)	41	567 (4.2)	67	554 (4.5)	54	564 (4.1)	64
Chinese Taipei	561	549 (3.4)	49	573 (4.2)	73	554 (3.7)	54	545 (2.9)	45	560 (3.4)	60	565 (3.5)	65	541 (3.5)	41
Japan	554	553 (1.9)	53	551 (1.9)	51	558 (1.9)	58	533 (2.5)	33	555 (2.0)	55	534 (2.2)	34	560 (2.0)	60
Korea, Rep. of	553	548 (1.9)	48	536 (2.4)	36	571 (2.4)	71	538 (2.2)	38	547 (2.0)	47	543 (2.0)	43	558 (2.0)	58
† England	542	541 (4.4)	41	534 (4.0)	34	545 (4.0)	45	529 (4.3)	29	538 (4.0)	38	530 (4.9)	30	547 (4.0)	47
Hungary	539	534 (2.7)	34	536 (3.5)	36	541 (3.2)	41	531 (2.9)	31	549 (3.0)	49	524 (3.0)	24	530 (3.0)	30
Czech Republic	539	531 (2.1)	31	535 (2.7)	35	537 (2.1)	37	534 (2.0)	34	539 (1.9)	39	533 (2.1)	33	534 (2.3)	34
Slovenia	538	530 (2.3)	30	539 (2.5)	39	524 (2.0)	24	542 (2.2)	42	533 (2.2)	33	533 (2.0)	33	538 (2.2)	38
† Hong Kong SAR	530	527 (4.6)	27	517 (4.6)	17	528 (4.8)	28	532 (4.5)	32	522 (4.9)	22	532 (4.5)	32	533 (5.0)	33
Russian Federation	530	525 (3.6)	25	535 (3.7)	35	519 (4.0)	19	525 (3.4)	25	527 (3.8)	27	534 (4.3)	34	520 (3.7)	20
2† United States	520	530 (2.8)	30	510 (2.7)	10	503 (2.7)	3	525 (3.1)	25	516 (2.7)	16	512 (2.9)	12	529 (2.9)	29
1 Lithuania	519	527 (2.3)	27	507 (2.3)	7	505 (2.9)	5	515 (2.5)	15	512 (2.2)	12	513 (2.4)	13	527 (2.5)	27
Australia	515	518 (3.4)	18	505 (3.6)	5	508 (4.2)	8	519 (3.8)	19	510 (3.2)	10	501 (3.1)	1	530 (3.6)	30
Sweden	511	515 (2.4)	15	499 (2.4)	-1	506 (2.7)	6	510 (3.0)	10	509 (2.7)	9	505 (2.3)	5	517 (2.6)	17
TIMSS Scale Avg.	500	500		500		500		500		500		500		500	
† Scotland	496	495 (3.2)	-5	497 (3.2)	-3	494 (3.7)	-6	498 (3.2)	-2	495 (3.1)	-5	480 (3.9)	-20	511 (3.6)	11
Italy	495	502 (3.0)	2	481 (2.9)	-19	489 (3.1)	-11	503 (3.1)	3	498 (2.9)	-2	494 (3.3)	-6	493 (2.6)	-7
Armenia	488	490 (5.9)	-10	478 (6.3)	-22	503 (5.6)	3	475 (5.8)	-25	502 (5.4)	2	493 (6.4)	-7	459 (6.5)	-41
Norway	487	487 (2.3)	-13	483 (2.2)	-17	475 (3.0)	-25	502 (2.5)	2	486 (2.3)	-14	486 (2.0)	-14	491 (2.8)	-9
Ukraine	485	477 (3.4)	-23	490 (3.3)	-10	492 (3.9)	-8	482 (4.0)	-18	488 (3.7)	-12	477 (3.8)	-23	488 (3.9)	-12
Jordan	482	478 (3.8)	-22	491 (4.1)	-9	479 (4.2)	-21	484 (3.6)	-16	485 (4.1)	-15	491 (4.5)	-9	471 (4.1)	-29
Thailand	471	478 (4.5)	-22	462 (4.1)	-38	458 (4.2)	-42	488 (3.8)	-12	472 (4.1)	-28	473 (4.4)	-27	473 (4.0)	-27
Malaysia	471	469 (5.8)	-31	479 (5.0)	-21	484 (5.7)	-16	463 (5.4)	-37	473 (5.9)	-27	458 (6.5)	-42	487 (4.9)	-13
1 2 Serbia	470	474 (3.2)	-26	467 (3.7)	-33	467 (3.0)	-33	466 (3.8)	-34	469 (3.6)	-31	485 (2.8)	-15	455 (3.5)	-45
3 Bulgaria	470	467 (6.0)	-33	472 (6.1)	-28	466 (5.6)	-34	480 (5.5)	-20	471 (6.1)	-29	489 (5.8)	-11	448 (6.1)	-52

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

For each domain, three columns of figures appear: the scale score; the standard error in parentheses; and the difference between the scale score and the scale average.

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).

1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

3 National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).

Exhibit 5.4 Average achievement in the mathematics content and cognitive domains

TIMSS2007 8th Mathematics Grade

Country	Overall Scale Score	Average Scale Scores for Mathematics Content Domains								Average Scale Scores for Mathematics Cognitive Domains					
		Number		Algebra		Geometry		Data and Chance		Knowing		Applying		Reasoning	
Chinese Taipei	598	577 (4.2)	77	617 (5.4)	117	592 (4.6)	92	566 (3.6)	66	592 (4.2)	92	594 (4.5)	94	591 (4.1)	91
Korea, Rep. of	597	583 (2.4)	83	596 (3.0)	96	587 (2.3)	87	580 (2.0)	80	595 (2.8)	95	596 (2.5)	96	579 (2.3)	79
Singapore	593	597 (3.5)	97	579 (3.7)	79	578 (3.4)	78	574 (3.9)	74	593 (3.6)	93	581 (3.4)	81	579 (4.1)	79
† Hong Kong SAR	572	567 (5.6)	67	565 (5.6)	65	570 (5.5)	70	549 (4.7)	49	569 (5.9)	69	574 (5.4)	74	557 (5.6)	57
Japan	570	551 (2.3)	51	559 (2.5)	59	573 (2.2)	73	573 (2.2)	73	565 (2.2)	65	560 (2.2)	60	568 (2.4)	68
Hungary	517	517 (3.6)	17	503 (3.6)	3	508 (3.6)	8	524 (3.3)	24	513 (3.1)	13	518 (3.3)	18	513 (3.2)	13
† England	513	510 (5.0)	10	492 (4.6)	-8	510 (4.4)	10	547 (5.0)	47	514 (4.9)	14	503 (4.0)	3	518 (4.3)	18
Russian Federation	512	507 (3.8)	7	518 (4.5)	18	510 (4.1)	10	487 (3.8)	-13	510 (3.7)	10	521 (3.9)	21	497 (3.6)	-3
2 † United States	508	510 (2.7)	10	501 (2.7)	1	480 (2.5)	-20	531 (2.8)	31	503 (2.9)	3	514 (2.6)	14	505 (2.4)	5
1 Lithuania	506	506 (2.7)	6	483 (2.7)	-17	507 (2.6)	7	523 (2.3)	23	511 (2.4)	11	508 (2.5)	8	486 (2.5)	-14
Czech Republic	504	511 (2.5)	11	484 (2.4)	-16	498 (2.7)	-2	512 (2.8)	12	504 (2.7)	4	502 (2.5)	2	500 (2.6)	0
Slovenia	501	502 (2.3)	2	488 (2.4)	-12	499 (2.4)	-1	511 (2.3)	11	503 (2.0)	3	500 (2.2)	0	496 (2.5)	-4
TIMSS Scale Avg.	500	500		500		500		500		500		500		500	
Armenia	499	492 (3.1)	-8	532 (2.5)	32	493 (4.1)	-7	427 (3.9)	-73	493 (3.8)	-7	507 (3.1)	7	489 (3.8)	-11
Australia	496	503 (3.7)	3	471 (3.7)	-29	487 (3.6)	-13	525 (3.2)	25	500 (3.4)	0	487 (3.3)	-13	502 (3.3)	2
Sweden	491	507 (1.8)	7	456 (2.4)	-44	472 (2.5)	-28	526 (3.0)	26	497 (2.0)	-3	478 (2.0)	-22	490 (2.6)	-10
Malta	488	496 (1.3)	-4	473 (1.4)	-27	495 (1.1)	-5	487 (1.4)	-13	492 (1.0)	-8	490 (1.6)	-10	475 (1.3)	-25
† Scotland	487	489 (3.7)	-11	467 (3.7)	-33	485 (3.9)	-15	517 (3.5)	17	489 (3.7)	-11	481 (3.3)	-19	495 (3.3)	-5
1 2 Serbia	486	478 (2.9)	-22	500 (3.2)	0	486 (3.6)	-14	458 (3.0)	-42	478 (3.3)	-22	500 (3.2)	0	474 (3.3)	-26
Italy	480	478 (2.8)	-22	460 (3.2)	-40	490 (3.1)	-10	491 (3.1)	-9	483 (2.9)	-17	476 (3.0)	-24	483 (2.8)	-17
Malaysia	474	491 (5.1)	-9	454 (4.3)	-46	477 (5.6)	-23	469 (4.1)	-31	478 (4.9)	-22	477 (4.8)	-23	468 (3.8)	-32
Norway	469	488 (2.0)	-12	425 (2.8)	-75	459 (2.3)	-41	505 (2.5)	5	477 (2.2)	-23	458 (1.8)	-42	475 (2.3)	-25

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

For each domain, three columns of figures appear: the scale score; the standard error in parentheses; and the difference between the scale score and the scale average.

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).

1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

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

5.3 Grade 8 science: performance in the content and cognitive domains

For grade 8 science, the four content domains are biology, chemistry, physics and earth science.

Exhibit 5.3 shows how the higher scoring countries in TIMSS performed in the content and cognitive domains.

England's highest score, 545, was for physics, and the lowest, 529, was for earth science. Biology, at 541, was similar to physics, and for chemistry the score was 534.

Looking at Exhibit 5.3, a range of profiles of performance is evident. High scoring countries, for example, do not all possess the same profile and overall scores similar to England's are accompanied by a variety of performance profiles. Countries scoring at a similar level to England also show different patterns of strengths and weaknesses.

In the cognitive domains, England's scores, 538 for knowing, 530 for applying and 547 for reasoning, are more varied than was seen at grade 4, with relative strength in reasoning. Two high scoring countries, Japan and Korea, also have a strength in reasoning.

5.4 Grade 8 mathematics: performance in the content and cognitive domains

For grade 8, the four mathematics content domains are number, algebra, geometry, and data and chance. Exhibit 5.4 shows how the higher scoring countries in TIMSS performed in these domains.

England's profile is quite differentiated with the highest performance, 547, in data and chance and its lowest, 492, in algebra. The scores for number and geometry were similar to each other, at 510. This relative weakness in algebra was shared by several of the countries performing at a similar level to England, but not by countries scoring at a higher level than England. At item level, the weakness can be seen to extend to basic algebraic manipulation.

In the cognitive domains, England's scores, 514 for knowing, 503 for applying and 518 for reasoning, indicate a relative weakness in applying. This profile is not shared by other countries performing at a similar level to England or at a higher level.

5.5 Summary

England's performance in the different content areas was reasonably consistent in grade 4 science, but at grade 8 pupils scored highest in physics and lowest in earth science. Differences in mathematics were more marked. In grade 4 the score for number was significantly lower than that for geometric shapes and measures or data display. At grade 8, data display was England's real strength and algebra a large weakness.

In the cognitive domains, performance at grade 4 was reasonably consistent. In grade 8 science, items assessing reasoning were England's strong point, while in grade 8 mathematics scores for applying were lower than those for knowing and reasoning.

One consistent message is apparent from comparing England's profile across the content and cognitive domains with those of countries performing at a higher level than England or at a similar level. There is no one profile that leads to a high score in TIMSS: successful countries have different profiles across the domains. This is true for both mathematics and science at both grades. It is apparent that various combinations of relative strengths and weaknesses lead to similar overall levels of performance. Curriculum differences are likely to be a cause of some particular strengths and weaknesses. In England, for example, data handling features prominently in the key stage 2 curriculum and is an area of strength for England in TIMSS.

For a comparison of England's key stage 2 science and mathematics curricula with those of other high scoring countries in TIMSS see Ruddock et al. (2008).

6 Gender differences

- *In England, no gender differences were found for mathematics or science overall at either grade.*
- *Only 7 other TIMSS 2007 countries had a similar pattern of gender equality across the board.*

Science and mathematics are subjects in which girls and boys are traditionally perceived as performing differently. Whilst eradication of such differences is often seen as desirable, they nevertheless persist in many countries. This chapter explores gender differences in TIMSS 2007 and compares these with outcomes from other national and international assessments.

6.1 Gender differences in TIMSS 2007

Gender differences in achievement were not uncommon among TIMSS 2007 countries, though they were by no means universal. Exhibit 6.1 summarises the gender differences found in achievement in the TIMSS 2007 countries. It shows that over half of the countries participating had no gender difference in grade 4 science, while just under half had no gender difference in grade 4 mathematics. At grade 8, approximately half of the participating countries had a difference in science at grade 8 and a similar proportion in mathematics at grade 8. Where gender differences existed, they more often favoured boys at grade 4 and girls at grade 8.

Exhibit 6.1 Number of countries showing gender differences in TIMSS 2007

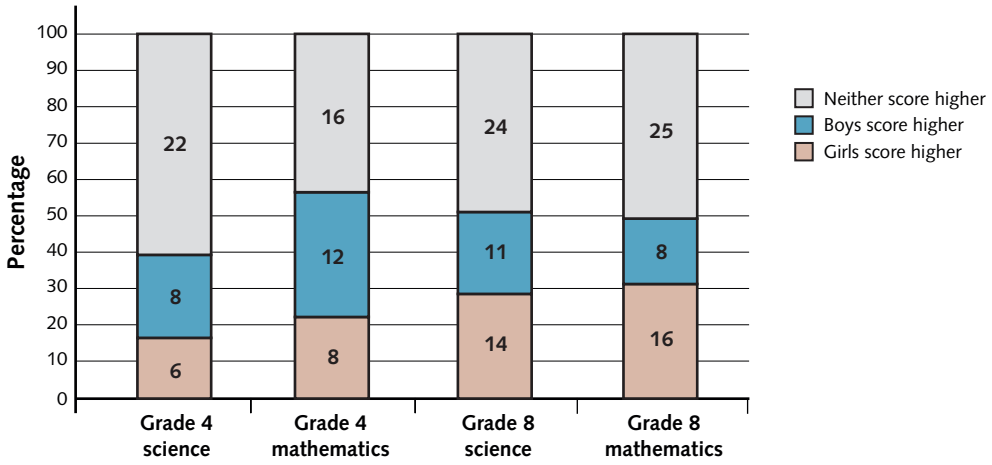


Exhibit 6.2 lists the countries in each category of gender difference. It shows that England was one of a small number of countries with no gender differences at all.

Of the 26 countries testing at both grades, only seven had no gender differences at either grade, in either subject: Japan, England, Chinese Taipei, Ukraine, Hong Kong, Iran and Morocco. Six of those participating at only grade 8 had no gender differences: Indonesia, Malta, Bosnia and Herzegovina, Serbia, Turkey and Israel; while the same was true for

Erratum
Due to a labelling error in the international dataset, all findings related to the cognitive domains of 'Knowing' and 'Applying' have been inadvertently reversed in the national report for England. Findings reported as 'Knowing' actually relate to the 'Applying' domain, and findings reported as 'Applying' actually relate to the 'Knowing' domain. This applies to chapters 1, 5 and 6 of the national report and to the separate executive summary booklet.

TIMSS 2007 International Reports available at http://timssandpirls.bc.edu/TIMSS2007

Exhibit 6.2 Gender differences in TIMSS 2007 (in order of size of difference)

Subject	Grade 4			Grade 8		
	Girls scored higher	**Boys scored higher**	**Neither scored higher**	**Girls scored higher**	**Boys scored higher**	**Neither scored higher**
Science	Algeria Georgia Armenia Qatar Tunisia Kuwait	Czech Republic Slovak Republic Netherlands Italy El Salvador Austria Germany Colombia	Slovenia Singapore Japan Kazakhstan Scotland Sweden Chinese Taipei Ukraine Norway Hungary Hong Kong England Russian Federation Lithuania New Zealand United States Australia Denmark Latvia Morocco Iran Yemen	Romania Bulgaria Cyprus Egypt Thailand Botswana Georgia Jordan Palestinian Nat'l Auth Saudi Arabia Kuwait Oman Bahrain Qatar	Korea, Rep of Italy Czech Republic Syrian Arab Rep United States Hungary Australia Tunisia El Salvador Ghana Colombia	Algeria Norway Lithuania Indonesia Ukraine Slovenia Malta Sweden Bosnia & Herzegovina Serbia Japan Chinese Taipei Hong Kong Turkey Scotland Russian Federation Lebanon Singapore Armenia England Israel Malaysia Iran Morocco
Mathematics	Singapore Russian Federation Kazakhstan Armenia Tunisia Yemen Qatar Kuwait	Slovenia United States Czech Republic Sweden Slovak Republic Norway Scotland Netherlands Germany Austria Italy Colombia	Lithuania England Ukraine Japan New Zealand Chinese Taipei Latvia Georgia Morocco Hungary Hong Kong Algeria Australia Denmark El Salvador Iran	Lithuania Malaysia Egypt Bulgaria Singapore Botswana Romania Cyprus Jordan Kuwait Saudi Arabia Thailand Bahrain Palestinian Nat'l Auth Qatar Oman	Algeria Lebanon Australia Syrian Arab Rep El Salvador Tunisia Ghana Colombia	Malta Turkey Hungary Chinese Taipei Bosnia & Herzegovina Slovenia Czech Republic Israel Scotland United States Sweden Norway Indonesia Korea, Rep of Armenia Japan Georgia Russian Federation Ukraine England Italy Serbia Iran Hong Kong Morocco

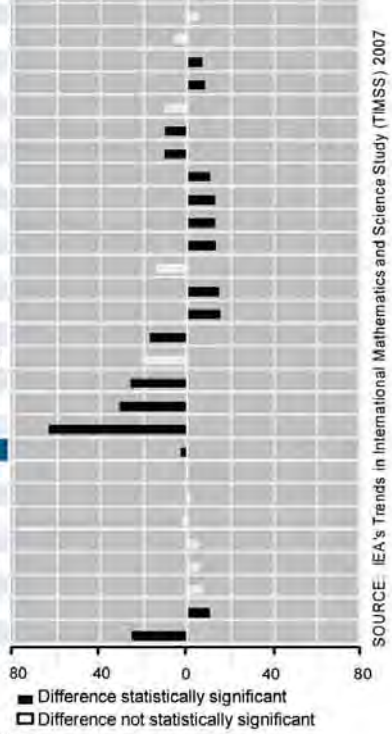
Highlighted countries are those which took part in all four areas of the attainment survey and had no gender differences in any part of the survey.

three participating at grade 4 only: New Zealand, Denmark and Latvia. All other countries had at least one area of gender difference. This group included Singapore, Australia, the United States, the Netherlands, Germany, Austria and Scotland.

Exhibit 6.3 TIMSS 2007 average science achievement by gender

TIMSS2007 Science 4th Grade

Country	Girls		Boys		Difference (Absolute Value)	Gender Difference	
	Percent of Students	Average Scale Score	Percent of Students	Average Scale Score		Girls Scored Higher	Boys Scored Higher
Slovenia	49 (0.8)	518 (2.4)	51 (0.8)	518 (2.4)	0 (2.8)		
Singapore	49 (0.8)	587 (4.3)	51 (0.8)	587 (4.4)	0 (3.0)		
Japan	49 (0.6)	548 (2.5)	51 (0.6)	547 (2.4)	1 (2.6)		
1 Kazakhstan	51 (1.3)	533 (5.5)	49 (1.3)	532 (6.3)	1 (3.6)		
† Scotland	51 (0.8)	500 (3.0)	49 (0.8)	501 (2.4)	2 (3.0)		
Sweden	50 (1.0)	526 (2.7)	50 (1.0)	524 (3.7)	2 (2.9)		
Chinese Taipei	48 (0.5)	556 (2.3)	52 (0.5)	558 (2.4)	2 (2.5)		
Ukraine	48 (0.9)	475 (3.4)	52 (0.9)	473 (3.5)	2 (3.1)		
Norway	50 (1.0)	475 (3.8)	50 (1.0)	478 (4.2)	2 (3.9)		
Hungary	51 (1.1)	535 (4.4)	49 (1.1)	538 (3.6)	3 (4.5)		
Hong Kong SAR	49 (1.1)	553 (3.6)	51 (1.1)	556 (4.3)	3 (3.7)		
England	49 (1.0)	543 (3.1)	51 (1.0)	540 (3.4)	3 (3.0)		
Russian Federation	50 (1.0)	548 (5.1)	50 (1.0)	544 (5.0)	4 (3.2)		
1 Lithuania	49 (1.0)	516 (2.7)	51 (1.0)	512 (2.9)	4 (3.0)		
New Zealand	50 (1.0)	506 (2.8)	50 (1.0)	502 (3.5)	4 (3.5)		
2 † United States	51 (0.6)	536 (3.0)	49 (0.6)	541 (3.1)	5 (2.7)		
Australia	51 (1.0)	525 (4.0)	49 (1.0)	530 (3.5)	5 (3.5)		
† Denmark	51 (1.2)	514 (3.2)	49 (1.2)	520 (3.6)	6 (3.9)		
1 Latvia	48 (1.0)	545 (2.8)	52 (1.0)	539 (3.0)	6 (3.6)		
Czech Republic	47 (1.1)	511 (3.7)	53 (1.1)	518 (3.4)	7 (3.3)		
Slovak Republic	49 (0.8)	521 (5.2)	51 (0.8)	530 (4.8)	8 (2.9)		
Morocco	49 (1.1)	302 (6.4)	51 (1.1)	292 (6.8)	10 (6.1)		
Algeria	50 (0.9)	359 (6.5)	50 (0.9)	349 (6.0)	10 (3.2)		
1 Georgia	47 (1.0)	423 (4.7)	53 (1.0)	413 (5.1)	10 (3.6)		
‡ Netherlands	48 (1.0)	518 (3.0)	52 (1.0)	528 (2.8)	11 (2.5)		
Italy	49 (0.7)	529 (3.2)	51 (0.7)	541 (3.7)	13 (2.6)		
El Salvador	49 (1.2)	383 (4.5)	51 (1.2)	396 (4.6)	13 (6.1)		
Austria	48 (1.0)	519 (2.7)	52 (1.0)	532 (2.9)	13 (2.6)		
Iran, Islamic Rep. of	49 (1.7)	443 (5.6)	51 (1.7)	429 (6.0)	14 (7.9)		
Germany	49 (0.6)	520 (2.6)	51 (0.6)	535 (2.9)	15 (2.7)		
Colombia	50 (1.1)	393 (5.5)	50 (1.1)	408 (6.0)	15 (3.7)		
Armenia	48 (0.9)	493 (7.3)	52 (0.9)	476 (5.2)	17 (5.3)		
Yemen	44 (2.7)	209 (9.9)	56 (2.7)	188 (8.1)	21 (10.8)		
Qatar	51 (0.2)	307 (2.9)	49 (0.2)	281 (2.8)	26 (2.7)		
Tunisia	47 (1.0)	335 (6.4)	53 (1.0)	304 (6.2)	31 (4.8)		
¿ Kuwait	52 (1.5)	379 (4.6)	48 (1.5)	315 (7.3)	64 (8.6)		
International Avg.	49 (0.2)	477 (1.2)	51 (0.2)	474 (1.2)	3 (0.7)		
Benchmarking Participants							
2 Quebec, Canada	51 (0.9)	516 (3.1)	49 (0.9)	518 (3.5)	2 (3.8)		
2 British Columbia, Canada	49 (0.7)	538 (2.9)	51 (0.7)	536 (3.1)	2 (2.7)		
2 † Minnesota, US	50 (1.5)	549 (6.9)	50 (1.5)	554 (6.3)	5 (5.2)		
2 Alberta, Canada	48 (1.1)	540 (3.7)	52 (1.1)	545 (4.6)	6 (3.5)		
2 Ontario, Canada	48 (1.1)	532 (4.1)	52 (1.1)	539 (4.3)	7 (4.0)		
2 Massachusetts, US	51 (1.0)	566 (4.3)	49 (1.0)	576 (4.7)	10 (2.8)		
¿ ‡ Dubai, UAE	47 (4.7)	473 (4.5)	53 (4.7)	448 (4.9)	26 (8.3)		



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).
1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).
2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).
¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

6.2 Achievement by gender in grade 4 science

Exhibit 6.3 shows achievement by gender in science at grade 4, for all participating countries. England's data is highlighted, illustrating that there was no statistically significant difference between the achievement of girls and boys in England in TIMSS 2007. This was true of most countries, with a few exceptions which included Germany, Austria, Italy and the Netherlands.

TIMSS 2007 International Reports available at http://timssandpirls.bc.edu/TIMSS2007

Exhibit 6.4 Trends in average science achievement by gender - 1995 through 2007

TIMSS2007 Science 4th Grade

Country	Girls			Boys		
	2007 Average Scale Score	2003 to 2007 Difference	1995 to 2007 Difference	2007 Average Scale Score	2003 to 2007 Difference	1995 to 2007 Difference
Armenia	493 (7.3)	52 (8.6) ▲	◊ ◊	476 (5.2)	44 (7.0) ▲	◊ ◊
Australia	525 (4.0)	3 (5.5)	6 (5.4)	530 (3.5)	11 (6.5)	6 (6.0)
Austria	519 (2.7)	◊ ◊	-11 (5.2) ▼	532 (2.9)	◊ ◊	-13 (5.1) ▼
Chinese Taipei	556 (2.3)	8 (3.1) ▲	◊ ◊	558 (2.4)	3 (3.3)	◊ ◊
Czech Republic	511 (3.7)	◊ ◊	-12 (5.1) ▼	518 (3.4)	◊ ◊	-22 (4.8) ▼
England	543 (3.1)	1 (4.5)	18 (4.7) ▲	540 (3.4)	2 (5.7)	10 (5.2)
Hong Kong SAR	553 (3.6)	9 (4.9)	52 (5.0) ▲	556 (4.3)	15 (5.3) ▲	41 (5.8) ▲
Hungary	535 (4.4)	8 (5.8)	34 (5.8) ▲	538 (3.6)	5 (4.9)	22 (5.3) ▲
Iran, Islamic Rep. of	443 (5.6)	17 (8.9)	66 (7.8) ▲	429 (6.0)	22 (7.6) ▲	46 (9.5) ▲
Italy	529 (3.2)	15 (5.3) ▲	- -	541 (3.7)	24 (5.3) ▲	- -
Japan	548 (2.5)	6 (3.1) ▲	1 (3.2)	547 (2.4)	2 (3.1)	-12 (3.2) ▼
Latvia	545 (2.8)	11 (4.0) ▲	58 (6.3) ▲	539 (3.0)	13 (4.8) ▲	54 (6.2) ▲
Lithuania	516 (2.7)	3 (4.0)	◊ ◊	512 (2.9)	-1 (4.1)	◊ ◊
Morocco	302 (6.4)	-3 (10.2)	◊ ◊	292 (6.8)	-11 (9.6)	◊ ◊
Netherlands	518 (3.0)	-3 (3.7)	-1 (4.5)	528 (2.8)	-1 (3.6)	-15 (4.8) ▼
New Zealand	506 (2.8)	-19 (4.2) ▼	-5 (5.6)	502 (3.5)	-19 (4.2) ▼	3 (7.8)
Norway	475 (3.8)	8 (5.0)	-21 (5.3) ▼	478 (4.2)	12 (5.1) ▲	-32 (6.4) ▼
Russian Federation	548 (5.1)	21 (7.8) ▲	◊ ◊	544 (5.0)	19 (7.0) ▲	◊ ◊
Scotland	500 (3.0)	3 (4.4)	-12 (5.4) ▼	501 (2.4)	-6 (4.6)	-15 (5.8) ▼
Singapore	587 (4.3)	21 (6.9) ▲	66 (7.3) ▲	587 (4.4)	22 (7.8) ▲	61 (6.9) ▲
Slovenia	518 (2.4)	27 (3.8) ▲	60 (4.1) ▲	518 (2.4)	28 (4.0) ▲	49 (4.8) ▲
Tunisia	334 (6.5)	18 (8.9) ▲	◊ ◊	302 (6.2)	-10 (8.6)	◊ ◊
United States	536 (3.0)	3 (3.9)	1 (4.7)	541 (3.1)	3 (4.1)	-7 (4.5)
Benchmarking Participants						
Alberta, Canada	540 (3.7)	◊ ◊	-12 (9.8)	545 (4.6)	◊ ◊	-13 (9.7)
Minnesota, US	549 (6.9)	◊ ◊	-8 (12.6)	554 (6.3)	◊ ◊	4 (11.2)
Ontario, Canada	532 (4.1)	-5 (5.7)	19 (5.8) ▲	539 (4.3)	-4 (6.3)	21 (6.0) ▲
Quebec, Canada	516 (3.1)	16 (4.1) ▲	-8 (6.1)	518 (3.5)	18 (4.7) ▲	-14 (7.2) ▼

▲ 2007 average significantly higher

▼ 2007 average significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Trend notes: Data are not shown for Kuwait, because comparable data from previous cycles are not available. Data for Tunisia do not include private schools.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A dash (-) indicates comparable data are not available.
A diamond (◊) indicates the country did not participate in the assessment.

At grade 4, there were 23 trend countries, that is, countries which participated in at least one earlier cycle of TIMSS as well as in TIMSS 2007. Exhibit 6.4 shows trends in achievement since 1995 for these countries. For England, it indicates that the significant gains made by girls between 1995 and the most recent previous TIMSS cycle, 2003, led to a level of achievement that has been maintained in 2007. The achievement of boys in England in grade 4 science has remained stable over the same period, 1995 to 2007.

Chapter 5 gave overall scores for pupils in each content domain, that is, in each area of study within a subject (see Chapter 5 for a description of each area). This showed that grade 4 pupils in England, while performing well in science, were strongest in the domain of physical science. Exhibit 6.5 shows that in this area of strength, boys and girls performed equally well. However, despite the lack of an overall gender difference in grade 4 science in England, there were gender differences in the other two domains. Girls scored seven scale points more than boys on life science items, while boys scored 10 scale points higher than girls on earth science items.

Internationally, England's pattern was somewhat unusual, since other countries with gender differences across the domains tended to show the same direction of difference each time (i.e. all their differences favoured girls or all their differences favoured boys).

Exhibit 6.5 Average achievement in the science content domains by gender

Country	Average Scale Scores for Science Content Domains					
	Life Science		Physical Science		Earth Science	
	Girls	Boys	Girls	Boys	Girls	Boys
Algeria	354 (7.3)	348 (6.5)	385 (5.7) ▲	370 (6.2)	370 (6.4)	360 (6.3)
Armenia	497 (7.3) ▲	482 (5.5)	499 (6.4) ▲	486 (4.4)	490 (6.3) ▲	468 (6.0)
Australia	528 (3.7)	529 (4.0)	520 (3.4)	525 (3.6)	531 (4.3)	538 (3.6)
Austria	522 (2.1)	529 (2.7) ▲	508 (2.8)	519 (2.9) ▲	524 (2.6)	540 (2.8) ▲
Chinese Taipei	541 (2.4)	541 (2.7)	560 (2.8)	559 (3.4)	548 (2.2)	558 (2.6) ▲
Colombia	400 (5.7)	417 (5.8) ▲	407 (5.4)	416 (5.5)	392 (5.9)	410 (6.8) ▲
Czech Republic	520 (3.1)	519 (3.4)	508 (3.4)	513 (3.1)	511 (3.0)	524 (2.7) ▲
† Denmark	527 (2.5)	527 (3.7)	500 (3.2)	505 (3.4)	515 (3.1)	529 (3.3) ▲
El Salvador	404 (4.8)	415 (4.3)	387 (5.0)	396 (4.7)	384 (4.4)	402 (4.7) ▲
England	536 (3.0) ▲	529 (3.4)	544 (2.8)	541 (3.5)	533 (3.2)	543 (3.5) ▲
1 Georgia	430 (4.1)	424 (3.9)	422 (4.3) ▲	406 (4.9)	438 (6.0) ▲	426 (5.5)
Germany	527 (2.2)	531 (2.3) ▲	517 (2.8)	530 (3.0) ▲	512 (2.8)	535 (3.1) ▲
Hong Kong SAR	531 (3.3)	534 (4.2)	557 (3.3)	559 (4.4)	557 (2.7)	562 (4.1) ▲
Hungary	549 (3.8)	546 (3.3)	527 (4.2)	531 (3.7)	513 (4.4)	521 (4.6)
Iran, Islamic Rep. of	449 (5.9)	436 (6.4)	462 (5.7)	446 (6.1)	439 (5.8)	428 (5.2)
Italy	544 (3.5)	554 (3.6) ▲	516 (3.2)	525 (3.6) ▲	518 (3.4)	533 (3.5) ▲
Japan	532 (2.1)	528 (2.9)	565 (2.6)	564 (2.7)	528 (4.2)	529 (2.9)
1 Kazakhstan	527 (4.6)	528 (6.0)	529 (5.4)	526 (6.9)	534 (5.0)	534 (6.5)
¿ Kuwait	384 (5.3) ▲	319 (8.7)	378 (5.9) ▲	311 (7.5)	391 (4.9) ▲	332 (7.2)
1 Latvia	542 (2.5) ▲	529 (2.8)	546 (3.2)	542 (2.8)	534 (2.9)	537 (3.1)
1 Lithuania	519 (2.1)	514 (2.4)	515 (1.9)	513 (2.1)	512 (3.4)	509 (3.2)
Morocco	300 (8.4) ▲	284 (7.0)	330 (6.8)	318 (7.3)	296 (7.5)	289 (7.8)
‡ Netherlands	532 (2.7)	539 (2.8) ▲	499 (2.9)	506 (2.7) ▲	513 (3.8)	533 (3.0) ▲
New Zealand	512 (3.0) ▲	501 (3.8)	500 (3.2)	497 (3.2)	512 (2.9)	518 (3.0) ▲
Norway	487 (3.6)	486 (3.0)	468 (3.5)	469 (3.0)	492 (3.6)	501 (3.4) ▲
Qatar	302 (2.1) ▲	279 (2.2)	319 (3.7) ▲	287 (3.7)	316 (1.9) ▲	293 (3.3)
Russian Federation	541 (5.0)	536 (4.5)	549 (5.1)	545 (4.8)	536 (4.9)	537 (4.5)
† Scotland	505 (2.9)	502 (2.7)	498 (2.4)	501 (2.5)	505 (2.8)	510 (3.6)
Singapore	583 (4.1)	581 (4.7)	587 (4.5)	583 (4.0)	550 (3.7)	557 (3.7) ▲
Slovak Republic	530 (4.3)	533 (4.6)	509 (5.0)	516 (5.1)	525 (5.2)	536 (4.9) ▲
Slovenia	513 (2.5) ▲	508 (2.6)	530 (2.1)	530 (2.2)	514 (2.5)	520 (3.8)
Sweden	535 (2.7) ▲	527 (3.2)	508 (2.5)	509 (4.0)	533 (3.3)	537 (3.5)
Tunisia	338 (5.8) ▲	310 (6.2)	361 (6.8) ▲	321 (7.1)	339 (7.1) ▲	313 (6.8)
Ukraine	483 (3.1)	481 (2.8)	476 (3.9)	474 (3.0)	474 (4.0)	474 (3.5)
2 † United States	538 (3.0)	541 (2.9)	532 (2.5)	536 (2.7)	531 (2.9)	536 (2.7) ▲
Yemen	+ +	+ +	+ +	+ +	+ +	+ +
International Avg.	487 (0.7) ▲	483 (0.8)	486 (0.7) ▲	482 (0.7)	483 (0.7)	485 (0.7)
Benchmarking Participants						
2 Alberta, Canada	538 (4.0)	544 (4.0)	533 (3.9)	536 (3.4)	537 (3.9)	551 (3.3) ▲
2 British Columbia, Canada	543 (3.8) ▲	534 (3.2)	530 (2.9)	531 (2.9)	534 (3.1)	540 (2.9) ▲
¿ ‡ Dubai, UAE	471 (4.2) ▲	446 (5.5)	480 (4.6) ▲	455 (5.8)	481 (4.4) ▲	462 (5.3)
2 Massachusetts, US	567 (3.8)	570 (4.6)	555 (5.0)	566 (5.4) ▲	549 (4.9)	567 (5.0) ▲
2 † Minnesota, US	543 (6.7)	547 (6.4)	545 (5.6)	545 (6.0)	545 (6.0)	549 (6.3)
2 Ontario, Canada	534 (4.1)	536 (4.3)	532 (4.5)	538 (3.4)	528 (3.8)	531 (3.5)
2 Quebec, Canada	524 (3.3)	520 (2.9)	512 (2.9)	515 (3.2)	516 (3.4)	530 (3.0) ▲

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ Average significantly higher than other gender

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).
1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).
2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).
¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A plus (+) sign indicates average achievement could not be accurately estimated.

The one exception was New Zealand which, like England, had girls performing better in life science and boys better in earth science.

England's gender differences in these domains were relatively small, however, and did not translate into an overall gender difference.

Among the cognitive domains (see Chapter 5 for details), only one gender difference arose in England: girls performed better than boys on the reasoning items, that is, on items

TIMSS 2007 International Reports available at http://timssandpirls.bc.edu/TIMSS2007

Exhibit 6.6 Average achievement in the science cognitive domains by gender

Country	Average Scale Scores for Science Cognitive Domains					
	Knowing		Applying		Reasoning	
	Girls	Boys	Girls	Boys	Girls	Boys
Algeria	383 (6.4)	375 (6.3)	354 (6.6)	346 (5.7)	368 (6.5) ▲	347 (6.2)
Armenia	496 (7.3) ▲	478 (5.4)	494 (6.5) ▲	479 (4.8)	491 (6.7) ▲	478 (5.0)
Australia	517 (4.2)	529 (4.0) ▲	527 (3.3)	531 (3.9)	534 (4.2)	526 (4.0)
Austria	519 (2.4)	532 (2.7) ▲	521 (2.3)	537 (2.8) ▲	514 (2.9)	513 (3.0)
Chinese Taipei	554 (3.2)	558 (2.1)	531 (3.1)	542 (2.6) ▲	578 (3.2) ▲	564 (2.9)
Colombia	395 (5.5)	412 (6.0) ▲	399 (5.8)	419 (5.9) ▲	405 (5.5)	413 (5.5) ▲
Czech Republic	509 (3.8)	522 (3.4) ▲	514 (3.2)	525 (2.8) ▲	517 (3.5) ▲	504 (3.9)
† Denmark	512 (3.1)	519 (3.0) ▲	511 (3.3)	521 (3.7) ▲	528 (5.4)	523 (3.9)
El Salvador	384 (4.8)	402 (4.8) ▲	401 (5.0)	419 (4.6) ▲	377 (5.7)	376 (5.9)
England	537 (3.0)	536 (3.1)	542 (3.5)	544 (3.3)	541 (3.0) ▲	534 (3.2)
1 Georgia	432 (4.5) ▲	416 (5.4)	435 (3.8)	434 (4.6)	400 (6.4) ▲	378 (5.4)
Germany	518 (2.6)	534 (2.5) ▲	519 (2.8)	536 (2.6) ▲	524 (2.5)	526 (2.6)
Hong Kong SAR	547 (3.4)	552 (3.5)	542 (3.3)	549 (3.8) ▲	564 (4.3)	558 (5.2)
Hungary	528 (4.1)	534 (3.5)	536 (3.8)	544 (3.6)	534 (5.0)	524 (4.3)
Iran, Islamic Rep. of	455 (5.7)	446 (5.8)	442 (5.4)	433 (6.5)	450 (5.4) ▲	423 (6.6)
Italy	533 (3.1)	545 (3.6) ▲	523 (4.0)	537 (4.3) ▲	523 (3.7)	528 (4.1) ▲
Japan	544 (3.6)	541 (2.6)	527 (2.7)	530 (2.8)	571 (3.1)	564 (2.9)
1 Kazakhstan	537 (5.1)	534 (5.8)	535 (5.5)	532 (6.9)	519 (5.7)	520 (6.3)
¿ Kuwait	370 (5.2) ▲	304 (6.8)	388 (4.4) ▲	330 (6.4)	367 (6.9) ▲	293 (8.2)
1 Latvia	537 (2.9)	533 (2.8)	541 (2.6)	538 (2.8)	560 (3.3) ▲	542 (4.4)
1 Lithuania	515 (2.8)	515 (3.7)	511 (2.2)	510 (2.3)	531 (2.5) ▲	518 (3.3)
Morocco	316 (7.6)	306 (6.9)	295 (6.6)	286 (7.1)	323 (6.3)	312 (8.0)
‡ Netherlands	520 (2.5)	530 (2.8) ▲	511 (3.0)	524 (3.0) ▲	526 (3.0)	525 (3.4)
New Zealand	498 (2.7)	501 (3.2)	513 (3.1)	508 (3.1)	514 (3.1) ▲	497 (4.0)
Norway	476 (3.3)	481 (3.3)	481 (3.1)	489 (2.9) ▲	485 (3.8) ▲	475 (3.8)
Qatar	296 (3.1) ▲	269 (3.4)	314 (2.9) ▲	293 (2.7)	308 (3.9) ▲	276 (2.8)
Russian Federation	547 (5.6)	546 (4.8)	543 (5.7)	540 (4.7)	548 (5.4) ▲	537 (4.9)
† Scotland	491 (2.7)	496 (3.2)	510 (2.8)	512 (2.5)	505 (2.6) ▲	496 (3.3)
Singapore	577 (3.7)	580 (4.2)	583 (4.6)	591 (4.5) ▲	575 (4.3) ▲	561 (4.4)
Slovak Republic	520 (4.8)	533 (4.5) ▲	522 (4.4)	532 (4.7) ▲	516 (5.3)	511 (4.9)
Slovenia	524 (2.7)	526 (2.7)	512 (2.2)	511 (2.1)	530 (2.9)	525 (2.4)
Sweden	521 (3.0)	521 (3.5)	526 (2.6)	525 (3.6)	532 (4.0) ▲	523 (3.9)
Tunisia	344 (6.4) ▲	316 (7.0)	331 (7.0) ▲	302 (6.2)	366 (5.9) ▲	334 (5.6)
Ukraine	475 (3.8)	479 (4.0)	476 (3.0)	476 (2.8)	483 (3.7) ▲	474 (3.5)
2 † United States	531 (3.1)	536 (3.2)	539 (2.6)	544 (2.8)	536 (3.0)	533 (2.8)
Yemen	+ +	+ +	+ +	+ +	+ +	+ +
International Avg.	485 (0.7)	484 (0.7)	484 (0.7)	485 (0.7)	490 (0.7) ▲	478 (0.7)
Benchmarking Participants						
2 Alberta, Canada	529 (3.8)	540 (4.4) ▲	543 (3.8)	554 (3.9) ▲	542 (4.5) ▲	532 (5.0)
2 British Columbia, Canada	532 (3.1)	534 (3.0)	539 (3.4)	540 (3.0)	541 (3.9) ▲	531 (3.6)
¿ ‡ Dubai, UAE	473 (5.2) ▲	454 (4.8)	475 (5.0) ▲	452 (5.3)	481 (5.4) ▲	445 (5.5)
2 Massachusetts, US	554 (4.8)	573 (5.6) ▲	560 (4.4)	573 (6.1) ▲	570 (7.0)	567 (7.9)
2 † Minnesota, US	540 (6.7)	549 (6.0)	548 (6.8)	552 (6.2)	551 (6.3)	547 (7.3)
2 Ontario, Canada	527 (4.1)	529 (3.9)	533 (4.2)	543 (4.1) ▲	543 (3.9)	539 (3.8)
2 Quebec, Canada	511 (3.1)	520 (3.3) ▲	514 (3.4)	518 (3.3)	533 (3.7) ▲	522 (3.7)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ Average significantly higher than other gender

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).
1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).
2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).
¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A plus (+) sign indicates average achievement could not be accurately estimated.

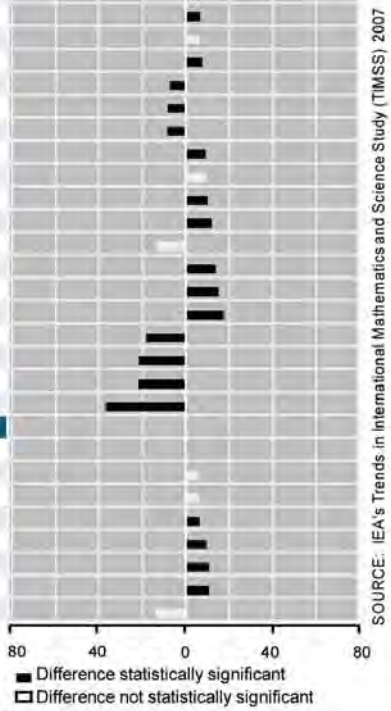
which required them to analyse, draw on knowledge synthesised from more than one conceptual area and make hypotheses and predictions.

This was also the case in several other countries and the international average for reasoning was significantly higher for girls than for boys (see Exhibit 6.6). Other countries where girls did better than boys in reasoning included Singapore, Chinese Taipei, Scotland and New Zealand.

Exhibit 6.7 TIMSS 2007 average mathematics achievement by gender

TIMSS2007 Mathematics 4th Grade

Country	Girls		Boys		Difference (Absolute Value)	Gender Difference	
	Percent of Students	Average Scale Score	Percent of Students	Average Scale Score		Girls Scored Higher	Boys Scored Higher
1 Lithuania	49 (1.0)	530 (2.8)	51 (1.0)	530 (3.2)	0 (3.6)		
England	49 (1.0)	541 (3.2)	51 (1.0)	542 (3.6)	0 (3.7)		
Ukraine	48 (0.9)	469 (3.3)	52 (0.9)	469 (3.4)	0 (3.4)		
Japan	49 (0.6)	568 (2.5)	51 (0.6)	568 (2.7)	0 (3.1)		
New Zealand	50 (1.0)	492 (2.4)	50 (1.0)	493 (3.1)	1 (3.0)		
Chinese Taipei	48 (0.5)	575 (2.0)	52 (0.5)	577 (2.0)	2 (2.1)		
1 Latvia	48 (1.0)	539 (2.9)	52 (1.0)	536 (3.0)	3 (3.7)		
1 Georgia	47 (1.0)	440 (4.2)	53 (1.0)	437 (4.9)	3 (3.7)		
Morocco	49 (1.1)	339 (5.0)	51 (1.1)	343 (5.4)	3 (4.6)		
Hungary	51 (1.1)	508 (4.6)	49 (1.1)	511 (3.8)	3 (4.7)		
Hong Kong SAR	49 (1.1)	605 (3.2)	51 (1.1)	609 (4.4)	4 (2.9)		
Algeria	50 (0.9)	380 (5.9)	50 (0.9)	375 (5.2)	5 (3.8)		
Slovenia	49 (0.8)	499 (2.4)	51 (0.8)	504 (2.1)	5 (2.6)		
Australia	51 (1.0)	513 (4.2)	49 (1.0)	519 (3.6)	6 (3.4)		
2 † United States	51 (0.6)	526 (2.7)	49 (0.6)	532 (2.7)	6 (2.4)		
Czech Republic	47 (1.1)	483 (3.3)	53 (1.1)	489 (3.0)	6 (2.8)		
Singapore	49 (0.8)	603 (3.8)	51 (0.8)	596 (4.1)	6 (2.7)		
Sweden	50 (1.0)	499 (2.4)	50 (1.0)	506 (3.1)	6 (2.4)		
Slovak Republic	49 (0.8)	493 (4.6)	51 (0.8)	499 (4.7)	6 (2.7)		
† Denmark	51 (1.2)	520 (2.9)	49 (1.2)	526 (3.2)	7 (3.7)		
Norway	50 (1.0)	470 (3.2)	50 (1.0)	477 (3.0)	7 (3.6)		
Russian Federation	50 (1.0)	548 (5.5)	50 (1.0)	540 (4.9)	7 (3.6)		
1 Kazakhstan	51 (1.3)	553 (6.7)	49 (1.3)	545 (7.9)	8 (3.7)		
Armenia	48 (0.9)	504 (5.7)	52 (0.9)	495 (3.7)	9 (4.1)		
† Scotland	51 (0.8)	490 (2.6)	49 (0.8)	499 (2.8)	9 (3.1)		
El Salvador	49 (1.2)	325 (4.6)	51 (1.2)	334 (5.5)	9 (5.8)		
‡ Netherlands	48 (1.0)	530 (2.7)	52 (1.0)	540 (2.4)	10 (2.7)		
Germany	49 (0.6)	519 (2.5)	51 (0.6)	531 (2.5)	12 (2.1)		
Iran, Islamic Rep. of	49 (1.7)	409 (5.2)	51 (1.7)	396 (5.5)	14 (7.0)		
Austria	48 (1.0)	498 (2.5)	52 (1.0)	512 (2.3)	14 (2.6)		
Italy	49 (0.7)	499 (3.2)	51 (0.7)	514 (3.6)	15 (2.5)		
Colombia	50 (1.1)	347 (5.2)	50 (1.1)	364 (5.5)	17 (3.9)		
Tunisia	47 (1.0)	337 (4.7)	53 (1.0)	319 (5.0)	18 (4.1)		
Yemen	44 (2.7)	236 (8.0)	56 (2.7)	214 (6.6)	22 (8.4)		
Qatar	51 (0.2)	307 (2.0)	49 (0.2)	285 (2.1)	22 (3.6)		
¿ Kuwait	52 (1.5)	333 (4.3)	48 (1.5)	297 (6.2)	37 (7.6)		
International Avg.	49 (0.2)	473 (0.7)	51 (0.2)	473 (0.7)	0 (0.7)		
Benchmarking Participants							
2 Ontario, Canada	48 (1.1)	509 (3.2)	52 (1.1)	514 (3.7)	6 (3.0)		
2 † Minnesota, US	50 (1.5)	551 (6.1)	50 (1.5)	557 (6.3)	6 (4.1)		
2 British Columbia, Canada	49 (0.7)	502 (3.1)	51 (0.7)	508 (3.0)	6 (2.7)		
2 Quebec, Canada	51 (0.9)	515 (3.5)	49 (0.9)	524 (3.3)	9 (3.1)		
2 Massachusetts, US	51 (1.0)	567 (3.7)	49 (1.0)	578 (4.2)	10 (3.6)		
2 Alberta, Canada	48 (1.1)	500 (3.2)	52 (1.1)	510 (3.2)	11 (2.5)		
¿ ‡ Dubai, UAE	47 (4.7)	452 (4.0)	53 (4.7)	438 (4.9)	14 (8.1)		



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).
1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).
2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).
¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

6.3 Achievement by gender in Grade 4 mathematics

Exhibit 6.7 shows achievement by gender in mathematics at grade 4, for all participating countries. England's data is highlighted, illustrating that there was no statistically significant difference between the achievement of girls and boys in England in TIMSS 2007.

Of the 36 countries participating at grade 4, only 16 showed no gender differences in mathematics. These included Hong Kong, Japan, Chinese Taipei, Australia and New

Exhibit 6.8 Trends in average mathematics achievement by gender - 1995 through 2007

TIMSS2007 Mathematics 4th Grade

Country	Girls			Boys		
	2007 Average Scale Score	2003 to 2007 Difference	1995 to 2007 Difference	2007 Average Scale Score	2003 to 2007 Difference	1995 to 2007 Difference
Armenia	504 (5.7)	42 (6.8) ▲	◊ ◊	495 (3.7)	45 (5.3) ▲	◊ ◊
Australia	513 (4.2)	16 (6.1) ▲	20 (5.7) ▲	519 (3.6)	19 (5.6) ▲	23 (5.4) ▲
Austria	498 (2.5)	◊ ◊	-27 (4.3) ▼	512 (2.3)	◊ ◊	-24 (4.4) ▼
Chinese Taipei	575 (2.0)	11 (2.7) ▲	◊ ◊	577 (2.0)	13 (2.9) ▲	◊ ◊
Czech Republic	483 (3.3)	◊ ◊	-54 (4.6) ▼	489 (3.0)	◊ ◊	-54 (4.6) ▼
England	541 (3.2)	11 (5.0) ▲	62 (5.3) ▲	542 (3.6)	9 (5.8)	53 (5.2) ▲
Hong Kong SAR	605 (3.2)	30 (4.6) ▲	47 (5.0) ▲	609 (4.4)	34 (5.6) ▲	52 (6.3) ▲
Hungary	508 (4.6)	-19 (6.0) ▼	-11 (6.1)	511 (3.8)	-19 (5.1) ▼	-13 (5.5) ▼
Iran, Islamic Rep. of	409 (5.2)	15 (8.4)	30 (7.9) ▲	396 (5.5)	10 (7.8)	2 (9.7)
Italy	499 (3.2)	1 (5.2)	- -	514 (3.6)	7 (5.2)	- -
Japan	568 (2.5)	5 (3.1)	5 (3.2)	568 (2.7)	2 (3.4)	-3 (3.6)
Latvia	539 (2.9)	4 (4.3)	33 (5.9) ▲	536 (3.0)	5 (4.9)	43 (6.3) ▲
Lithuania	530 (2.8)	-5 (4.4)	◊ ◊	530 (3.2)	-6 (4.5)	◊ ◊
Morocco	339 (5.0)	-4 (7.9)	◊ ◊	343 (5.4)	-7 (7.4)	◊ ◊
Netherlands	530 (2.7)	-8 (3.8) ▼	-13 (4.2) ▼	540 (2.4)	-4 (3.2)	-17 (4.2) ▼
New Zealand	492 (2.4)	-3 (3.6)	19 (4.9) ▲	493 (3.1)	-3 (3.9)	28 (6.9) ▲
Norway	470 (3.2)	21 (4.2) ▲	-4 (5.4)	477 (3.0)	23 (4.0) ▲	-1 (4.7)
Russian Federation	548 (5.5)	18 (7.7) ▲	◊ ◊	540 (4.9)	7 (6.8)	◊ ◊
Scotland	490 (2.6)	5 (4.1)	-3 (4.9)	499 (2.8)	3 (5.2)	6 (5.4)
Singapore	603 (3.8)	4 (6.8)	8 (6.7)	596 (4.1)	6 (7.4)	10 (6.2)
Slovenia	499 (2.4)	23 (3.8) ▲	42 (4.5) ▲	504 (2.1)	23 (4.1) ▲	38 (4.1) ▲
Tunisia	336 (4.8)	-6 (6.9)	◊ ◊	317 (5.0)	-19 (7.0) ▼	◊ ◊
United States	526 (2.7)	12 (3.6) ▲	10 (4.1) ▲	532 (2.7)	10 (3.9) ▲	12 (4.1) ▲
Benchmarking Participants						
Alberta, Canada	500 (3.2)	◊ ◊	-23 (10.1) ▼	510 (3.2)	◊ ◊	-13 (8.4)
Minnesota, US	551 (6.1)	◊ ◊	34 (10.6) ▲	557 (6.3)	◊ ◊	42 (9.9) ▲
Ontario, Canada	509 (3.2)	3 (4.8)	22 (4.7) ▲	514 (3.7)	-2 (6.0)	24 (5.7) ▲
Quebec, Canada	515 (3.5)	12 (4.4) ▲	-34 (6.7) ▼	524 (3.3)	15 (4.4) ▲	-28 (5.7) ▼

▲ 2007 average significantly higher

▼ 2007 average significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Trend notes: Data are not shown for Kuwait, because comparable data from previous cycles are not available. Data for Tunisia do not include private schoo
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A dash (-) indicates comparable data are not available.
A diamond (◊) indicates the country did not participate in the assessment.

Zealand. Countries with gender differences included Singapore (with girls doing better) and the Netherlands, Germany, Austria, Italy, and Scotland (with boys doing better).

Exhibit 6.8 shows trends in achievement since 1995 for the 23 trend countries at grade 4. Once again, England's data is highlighted, and shows that girls improved their performance from 1995 to 2003 and then again from 2003 to 2007. Since 1995, England's girls have made the largest gain seen across all trend countries. Similarly, England's boys also made strong gains between 1995 and 2007, improving more than boys in any other trend country. They improved greatly in the period from 1995 to 2003, then consolidated that gain in 2007.

Chapter 5 gave overall scores for pupils in each content domain, that is, in each area of study within a subject (see Chapter 5 for details of the knowledge and skills covered by each domain). This showed that grade 4 pupils in England, while performing well in mathematics overall, were strongest in the areas of geometric shapes and measures, and in data display (48 and 47 scale points above the scale average respectively), but performed less well in number (albeit still 31 scale points above the scale average).

Exhibit 6.9 Average achievement in the mathematics content domains by gender

TIMSS2007 Mathematics 4th Grade

Country	Average Scale Scores for Mathematics Content Domains					
	Number		Geometric Shapes and Measures		Data Display	
	Girls	Boys	Girls	Boys	Girls	Boys
Algeria	391 (5.5)	390 (5.1)	388 (4.2) ▲	378 (5.3)	364 (5.1)	359 (6.6)
Armenia	524 (5.1)	520 (3.9)	489 (5.9) ▲	478 (5.0)	468 (5.1) ▲	449 (4.5)
Australia	491 (3.9)	503 (4.3) ▲	535 (3.8)	536 (3.3)	536 (3.7) ▲	531 (3.1)
Austria	493 (2.4)	511 (2.7) ▲	507 (2.8)	511 (3.2)	503 (3.8)	513 (2.5) ▲
Chinese Taipei	578 (2.2)	584 (2.2) ▲	558 (2.5)	553 (2.6)	571 (2.0) ▲	562 (2.3)
Colombia	348 (4.6)	371 (4.7) ▲	354 (4.8)	369 (5.8) ▲	359 (6.7)	368 (6.4)
Czech Republic	477 (3.3)	486 (3.2) ▲	493 (3.6)	495 (3.1)	491 (4.2)	495 (4.1)
† Denmark	503 (3.0)	514 (4.1) ▲	546 (3.3)	540 (2.9)	527 (3.9)	531 (4.0)
El Salvador	308 (4.4)	325 (5.0) ▲	330 (5.4)	336 (5.2)	365 (4.2)	369 (4.8)
England	529 (3.6)	533 (4.0)	553 (3.0) ▲	543 (3.5)	548 (2.9)	545 (3.1)
1 Georgia	464 (4.0)	465 (4.3)	418 (4.9)	413 (5.8)	420 (4.9) ▲	409 (5.6)
Germany	513 (2.5)	529 (2.7) ▲	527 (2.6)	530 (2.6)	529 (3.6)	538 (3.4) ▲
Hong Kong SAR	602 (3.3)	610 (4.8) ▲	599 (3.0)	598 (4.0)	590 (2.9) ▲	581 (3.4)
Hungary	505 (5.0)	514 (3.7)	509 (4.8)	510 (3.4)	508 (4.6)	500 (3.8)
Iran, Islamic Rep. of	404 (4.3)	393 (5.3)	437 (3.9) ▲	421 (5.0)	409 (5.7) ▲	391 (6.1)
Italy	497 (3.4)	514 (3.5) ▲	505 (3.1)	513 (3.5) ▲	500 (4.1)	513 (4.2) ▲
Japan	558 (2.7)	564 (2.6) ▲	571 (3.1) ▲	561 (2.5)	583 (3.2) ▲	574 (3.2)
1 Kazakhstan	559 (5.9)	553 (7.9)	548 (7.3) ▲	537 (8.2)	526 (5.7)	517 (7.3)
¿ Kuwait	333 (4.5) ▲	307 (5.3)	335 (3.9) ▲	297 (5.8)	335 (5.7) ▲	299 (6.7)
1 Latvia	534 (2.7)	537 (2.9)	534 (3.6)	531 (3.3)	543 (3.6) ▲	529 (4.4)
1 Lithuania	530 (2.7)	536 (3.0)	522 (2.6) ▲	514 (2.9)	534 (3.0)	527 (4.1)
Morocco	349 (5.0)	357 (5.8)	365 (4.3)	365 (5.2)	314 (5.8)	317 (7.3)
‡ Netherlands	527 (3.4)	542 (2.2) ▲	520 (3.7)	525 (2.2)	544 (3.6)	541 (2.6)
New Zealand	474 (2.9)	482 (3.3) ▲	504 (2.7)	500 (2.8)	517 (3.1) ▲	509 (3.1)
Norway	454 (3.8)	467 (3.3) ▲	491 (3.5)	488 (3.7)	485 (3.2)	489 (3.5)
Qatar	300 (1.7) ▲	283 (1.9)	309 (2.2) ▲	283 (2.6)	337 (1.9) ▲	314 (2.4)
Russian Federation	548 (5.0)	545 (4.4)	542 (6.0)	535 (5.0)	537 (5.7) ▲	524 (5.2)
† Scotland	473 (2.8)	489 (3.4) ▲	504 (3.1)	502 (2.9)	513 (2.6)	518 (2.8)
Singapore	611 (4.4)	610 (4.8)	574 (3.6) ▲	567 (4.1)	589 (3.6) ▲	578 (4.0)
Slovak Republic	489 (4.4)	501 (4.0) ▲	498 (4.6)	501 (4.4)	491 (4.7)	493 (4.3)
Slovenia	477 (2.5)	492 (2.2) ▲	524 (2.5)	521 (2.3)	519 (2.6)	516 (3.1)
Sweden	484 (2.7)	496 (3.3) ▲	509 (2.3)	507 (3.0)	530 (2.9)	528 (3.6)
Tunisia	360 (5.0) ▲	346 (5.2)	343 (4.9) ▲	327 (5.1)	322 (5.3) ▲	295 (5.3)
Ukraine	478 (3.6)	482 (3.1)	457 (3.9)	457 (3.3)	470 (3.8) ▲	455 (3.8)
2 † United States	520 (2.8)	528 (3.1) ▲	522 (2.6)	523 (2.7)	543 (2.6)	544 (2.9)
Yemen	+ +	+ +	+ +	+ +	+ +	+ +
International Avg.	477 (0.6)	482 (0.7) ▲	483 (0.6) ▲	479 (0.7)	483 (0.6) ▲	478 (0.7)
Benchmarking Participants						
2 Alberta, Canada	481 (4.0)	497 (3.3) ▲	511 (2.8)	514 (3.4)	534 (4.1)	540 (3.6) ▲
2 British Columbia, Canada	486 (3.4)	499 (3.1) ▲	509 (3.6)	510 (3.4)	532 (3.1)	530 (3.0)
¿ ‡ Dubai, UAE	448 (3.8)	441 (4.8)	452 (5.4) ▲	430 (4.9)	471 (5.2)	452 (5.9)
2 Massachusetts, US	565 (4.0)	578 (4.9) ▲	564 (4.6)	565 (4.9)	566 (6.2)	576 (6.1)
2 † Minnesota, US	541 (6.3)	550 (7.1)	558 (5.8)	554 (6.7)	557 (4.7)	557 (6.3)
2 Ontario, Canada	483 (4.0)	495 (4.2) ▲	533 (3.6)	528 (4.0)	544 (4.0)	544 (4.1)
2 Quebec, Canada	504 (3.3)	518 (3.7) ▲	524 (3.4)	526 (4.1)	526 (4.8)	528 (3.9)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ Average significantly higher than other gender

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).
1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).
2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).
¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A plus (+) sign indicates average achievement could not be accurately estimated.

Girls and boys performed as well as each other in data display and in number (Exhibit 6.9). See Chapter 5 for details of the skills and knowledge covered by each of these domains.

England was unusual in having no gender difference in number (that is, in skills such as manipulating numbers, dealing with fractions and decimals and in identifying and using patterns and relationships in numbers). In just over half of the grade 4 countries, boys outperformed girls in number, and the international average showed a small overall

Exhibit 6.10 Average achievement in the mathematics cognitive domains by gender

TIMSS2007 Mathematics 4th Grade

Country	Average Scale Scores for Mathematics Cognitive Domains					
	Knowing		Applying		Reasoning	
	Girls	Boys	Girls	Boys	Girls	Boys
Algeria	378 (5.7)	373 (5.3)	387 (5.7)	381 (5.9)	390 (5.8)	384 (4.8)
Armenia	498 (4.8) ▲	488 (4.5)	523 (5.9) ▲	513 (4.7)	492 (6.3)	486 (4.5)
Australia	518 (4.0)	528 (3.7) ▲	506 (5.0)	512 (4.1)	515 (3.8)	517 (3.4)
Austria	499 (2.3)	515 (2.2) ▲	501 (2.8)	509 (2.3) ▲	501 (2.9)	511 (3.2) ▲
Chinese Taipei	568 (1.9)	570 (2.3)	583 (3.2)	585 (2.2)	564 (2.3)	568 (2.2)
Colombia	346 (5.6)	369 (5.3) ▲	353 (6.0)	365 (5.1) ▲	363 (5.6)	381 (5.0) ▲
Czech Republic	492 (3.3)	500 (3.0) ▲	471 (2.6)	475 (2.9)	489 (4.2)	496 (3.8)
† Denmark	524 (3.1)	531 (3.1)	509 (3.0)	516 (3.7)	522 (2.5)	527 (3.4)
El Salvador	332 (4.8)	345 (4.6) ▲	311 (4.8)	314 (5.6)	349 (4.8)	363 (5.6) ▲
England	540 (3.4)	541 (3.5)	544 (3.8)	544 (4.5)	538 (4.0)	537 (3.5)
1 Georgia	435 (4.8)	432 (5.2)	453 (4.1)	447 (4.6)	438 (4.1)	437 (4.8)
Germany	526 (2.6)	536 (2.4) ▲	509 (2.6)	520 (2.4) ▲	525 (2.8)	531 (3.1) ▲
Hong Kong SAR	597 (3.7)	602 (4.0)	614 (3.6)	619 (4.2)	588 (3.6)	589 (4.4)
Hungary	506 (4.6)	509 (3.8)	509 (4.7)	513 (3.7)	507 (5.5)	511 (3.6)
Iran, Islamic Rep. of	410 (4.1)	399 (6.1)	418 (4.5) ▲	402 (5.1)	419 (4.2) ▲	401 (5.4)
Italy	493 (3.7)	508 (3.5) ▲	507 (3.2)	521 (3.8) ▲	504 (3.6)	515 (3.3) ▲
Japan	566 (2.4)	566 (2.4)	564 (2.6)	566 (2.4)	562 (2.7)	564 (2.7)
1 Kazakhstan	551 (6.6)	544 (8.4)	562 (6.5)	555 (8.4)	542 (5.8)	535 (6.9)
¿ Kuwait	320 (5.2) ▲	289 (7.2)	346 (5.3) ▲	305 (6.6)	+ +	+ +
1 Latvia	540 (2.6)	540 (3.7)	531 (2.7)	528 (3.0)	538 (3.0)	537 (3.4)
1 Lithuania	539 (3.2)	539 (2.9)	520 (3.8)	520 (3.0)	528 (3.8)	524 (2.9)
Morocco	343 (5.1)	348 (6.0)	352 (6.1)	355 (5.3)	+ +	+ +
‡ Netherlands	535 (2.6)	544 (2.2) ▲	520 (2.6)	530 (2.5) ▲	531 (3.5)	537 (2.6)
New Zealand	494 (2.7)	497 (2.7)	482 (2.8)	482 (3.1)	503 (3.2)	503 (3.2)
Norway	474 (3.5)	484 (3.0) ▲	457 (3.3)	464 (3.4)	490 (3.6)	488 (3.2)
Qatar	306 (1.7) ▲	286 (1.6)	306 (1.6) ▲	279 (2.2)	+ +	+ +
Russian Federation	549 (5.8)	545 (4.8)	541 (5.2)	535 (4.2)	546 (5.3) ▲	535 (5.2)
† Scotland	495 (2.5)	504 (2.9) ▲	485 (2.9)	492 (3.1) ▲	494 (3.2)	500 (3.3)
Singapore	593 (3.8) ▲	586 (4.1)	622 (4.5)	619 (4.5)	581 (3.9) ▲	575 (4.1)
Slovak Republic	495 (4.2)	501 (4.4) ▲	490 (4.1)	495 (4.3)	498 (4.7)	501 (4.3)
Slovenia	500 (2.0)	507 (2.8) ▲	493 (2.0)	501 (2.9) ▲	505 (2.0)	505 (3.5)
Sweden	506 (2.1)	511 (2.9) ▲	478 (2.5)	486 (3.4) ▲	517 (2.9)	521 (3.2)
Tunisia	338 (5.0) ▲	321 (5.4)	353 (5.5) ▲	335 (5.2)	+ +	+ +
Ukraine	466 (3.2)	467 (4.1)	472 (3.7)	472 (3.5)	475 (3.5)	473 (3.6)
2 † United States	521 (2.7)	527 (3.0) ▲	537 (2.8)	545 (2.9) ▲	523 (2.4)	524 (2.6)
Yemen	+ +	+ +	+ +	+ +	+ +	+ +
International Avg.	480 (0.7)	481 (0.7) ▲	480 (0.7)	480 (0.7)	501 (0.7)	502 (0.7)
Benchmarking Participants						
2 Alberta, Canada	497 (3.5)	513 (3.1) ▲	488 (3.6)	500 (3.2) ▲	518 (3.7)	521 (3.1)
2 British Columbia, Canada	501 (2.9)	509 (3.0) ▲	493 (3.0)	502 (3.0) ▲	515 (2.9)	518 (3.2)
¿ ‡ Dubai, UAE	448 (4.4)	435 (4.5)	464 (4.9)	450 (5.1)	453 (5.2)	439 (5.3)
2 Massachusetts, US	562 (4.2)	570 (4.6)	575 (4.2)	587 (5.1) ▲	563 (4.3)	567 (4.6)
2 † Minnesota, US	544 (6.3)	551 (5.7)	560 (6.2)	570 (6.9) ▲	543 (5.0)	542 (5.6)
2 Ontario, Canada	512 (3.6)	518 (3.5)	493 (3.5)	502 (3.9) ▲	527 (3.3)	525 (3.6)
2 Quebec, Canada	512 (3.1)	523 (3.2) ▲	514 (3.9)	521 (3.6)	520 (3.7)	526 (3.2)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ Average significantly higher than other gender

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).
1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).
2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).
¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A plus (+) sign indicates average achievement could not be accurately estimated.

advantage for boys. Countries with a gender difference in number included the United States, New Zealand, Australia, Scotland, Hong Kong, Chinese Taipei and Japan.

Conversely, it was relatively common internationally for girls to outscore boys in the other two content domains (geometric shapes and measures, and data display), with the international average in each case showing a small advantage for girls. Thus, it is positive that England showed no gender difference in data display, when so many other countries

had such a difference: these countries included Singapore, New Zealand, Australia, Hong Kong, Chinese Taipei and Japan.

Just under a third of countries, like England, had a higher score for girls in geometric shapes and measures. These included Singapore and Japan. In England, the difference was 10 percentage points, sufficiently small that, as has already been noted, there was no overall gender difference in mathematics at this grade.

Exhibit 6.10 shows that, among the cognitive domains, there were no gender differences in England. A minority of the 36 participating countries had no gender differences at all. Those with no differences included Chinese Taipei, Japan, New Zealand and Hong Kong. In contrast, Singapore, the second highest scorer in mathematics at grade 4, had two significant differences with girls scoring more highly in knowing and in reasoning (see Chapter 5 for details of the skills covered by each of these domains). The even performance of boys and girls in England in these three cognitive domains is positive.

6.4 Achievement by gender in grade 8 science

Exhibit 6.11 shows achievement by gender in science at grade 8, for all participating countries. As was the case for the equivalent tables at grade 4, England's data is highlighted, illustrating that there was no statistically significant difference between the achievement of girls and boys in England in TIMSS 2007.

This was true for almost half of the 49 participating countries at grade 8. Those with gender differences in grade 8 science included Korea, Italy, the United States and Australia. In each of these countries, boys scored more highly than girls, although the reverse was true in some other countries.

At grade 8, there were 35 trend countries with science results (trend countries are those that participated in at least one earlier cycle of TIMSS as well as in TIMSS 2007). Exhibit 6.12 shows trends in achievement since 1995 for these countries. As was the case for science at grade 4, girls in England made significant gains between TIMSS 1999 and 2003, and the level of attainment they achieved in 2003 has been maintained in 2007. The achievement of boys in England in grade 8 science has remained stable over the same period, 1995 to 2007. The gender difference seen for grade 8 science in 2003 has been eradicated in 2007.

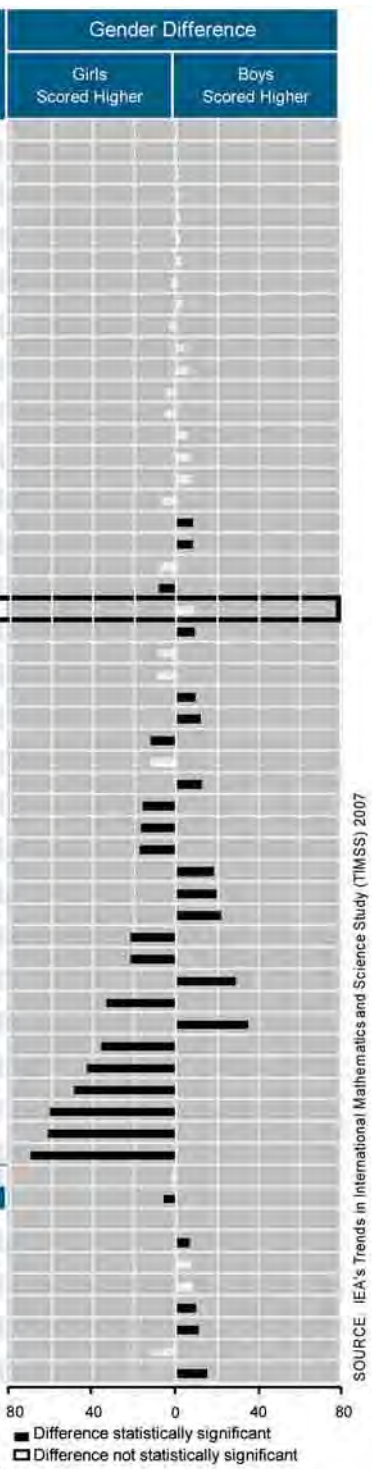
Chapter 5 gave overall scores for pupils in each content domain, that is, in each area of study within a subject. This showed that grade 8 pupils in England, while performing well in science overall, were strongest in the domains of physics and biology and relatively weaker in chemistry and earth science (albeit still scoring well above the scale average). Exhibit 6.13 shows that girls and boys scored equally well in biology and chemistry, but boys outscored girls in physics and earth science (by 15 and 13 scale points respectively). While statistically significant, these differences were not large enough to create a gender difference on science scores overall: as was seen earlier, overall scores for girls and boys in science at grade 8 were not significantly different.

www
TIMSS 2007 International Reports available at http://timssandpirls.bc.edu/TIMSS2007

Exhibit 6.11 TIMSS 2007 Average science achievement by gender

TIMSS2007 8th Science Grade

Country	Girls		Boys		Difference (Absolute Value)	Gender Difference	
	Percent of Students	Average Scale Score	Percent of Students	Average Scale Score		Girls Scored Higher	Boys Scored Higher
Algeria	49 (0.6)	408 (1.9)	51 (0.6)	408 (2.2)	1 (2.3)		
Norway	49 (0.7)	487 (2.4)	51 (0.7)	486 (3.0)	1 (3.2)		
1 Lithuania	50 (1.1)	518 (3.2)	50 (1.1)	519 (2.7)	1 (2.9)		
Indonesia	51 (1.0)	426 (3.8)	49 (1.0)	428 (3.6)	2 (3.2)		
Ukraine	52 (0.8)	484 (3.9)	48 (0.8)	486 (3.6)	2 (3.0)		
Slovenia	50 (0.8)	536 (2.6)	50 (0.8)	539 (2.7)	2 (3.0)		
Malta	51 (0.3)	456 (1.8)	49 (0.3)	458 (2.2)	2 (2.9)		
Sweden	48 (0.9)	512 (3.0)	52 (0.9)	510 (2.8)	2 (2.8)		
Bosnia and Herzegovina	49 (0.8)	464 (3.4)	51 (0.8)	467 (2.9)	3 (2.8)		
1 2 Serbia	49 (0.7)	472 (3.7)	51 (0.7)	469 (3.8)	3 (4.0)		
Japan	50 (1.0)	552 (2.8)	50 (1.0)	556 (2.5)	4 (3.8)		
Chinese Taipei	48 (1.3)	559 (3.7)	52 (1.3)	563 (4.4)	5 (3.5)		
† Hong Kong SAR	50 (1.3)	533 (4.5)	50 (1.3)	528 (6.6)	5 (5.6)		
Turkey	47 (0.8)	457 (4.0)	53 (0.8)	452 (4.0)	5 (3.0)		
† Scotland	51 (1.0)	493 (3.5)	49 (1.0)	498 (4.2)	5 (3.7)		
Russian Federation	52 (0.9)	527 (4.3)	48 (0.9)	533 (4.2)	6 (3.4)		
Lebanon	54 (1.8)	410 (6.2)	46 (1.8)	417 (6.7)	7 (4.9)		
Singapore	49 (0.9)	571 (4.7)	51 (0.9)	563 (5.2)	8 (4.4)		
Korea, Rep. of	48 (2.7)	549 (2.7)	52 (2.7)	557 (2.5)	8 (3.2)		
Italy	48 (0.7)	491 (3.3)	52 (0.7)	499 (3.1)	8 (3.1)		
Armenia	50 (0.9)	492 (7.1)	50 (0.9)	484 (5.2)	8 (4.8)		
Romania	49 (0.9)	466 (4.1)	51 (0.9)	458 (4.6)	8 (4.1)		
† England	51 (1.9)	537 (4.6)	49 (1.9)	546 (5.8)	9 (5.5)		
Czech Republic	48 (0.8)	534 (2.2)	52 (0.8)	543 (2.4)	9 (2.7)		
3 Israel	53 (1.6)	472 (4.9)	47 (1.6)	463 (5.2)	9 (5.2)		
Malaysia	53 (1.5)	475 (6.4)	47 (1.5)	466 (6.7)	9 (5.5)		
Syrian Arab Republic	52 (1.9)	448 (3.3)	48 (1.9)	457 (4.2)	9 (4.7)		
2 † United States	51 (0.7)	514 (3.0)	49 (0.7)	526 (3.2)	12 (2.3)		
3 Bulgaria	47 (1.4)	477 (6.2)	53 (1.4)	464 (6.8)	12 (5.9)		
Iran, Islamic Rep. of	46 (1.5)	466 (4.6)	54 (1.5)	453 (5.4)	12 (7.2)		
Hungary	50 (1.1)	533 (3.5)	50 (1.1)	545 (3.3)	12 (3.3)		
Cyprus	50 (0.6)	460 (2.8)	50 (0.6)	444 (2.4)	16 (3.2)		
Egypt	49 (2.7)	417 (4.8)	51 (2.7)	400 (4.6)	17 (6.3)		
Thailand	50 (1.3)	480 (4.5)	50 (1.3)	462 (4.9)	18 (4.2)		
Australia	48 (1.9)	505 (5.1)	52 (1.9)	524 (5.4)	18 (7.7)		
Tunisia	52 (0.8)	436 (2.3)	48 (0.8)	455 (2.6)	19 (2.4)		
El Salvador	52 (1.4)	377 (3.7)	48 (1.4)	399 (4.1)	22 (5.1)		
Botswana	53 (0.8)	365 (3.7)	47 (0.8)	343 (3.6)	22 (4.1)		
1 Georgia	50 (1.0)	432 (4.8)	50 (1.0)	410 (5.2)	22 (3.2)		
Ghana	45 (0.8)	288 (5.9)	55 (0.8)	316 (5.6)	29 (4.2)		
Jordan	48 (2.0)	499 (5.8)	52 (2.0)	466 (5.5)	34 (8.2)		
Colombia	51 (1.6)	400 (4.4)	49 (1.6)	435 (3.7)	35 (4.5)		
Palestinian Nat'l Auth.	51 (1.4)	422 (4.5)	49 (1.4)	386 (5.1)	36 (6.5)		
Saudi Arabia	48 (1.6)	426 (2.9)	52 (1.6)	383 (3.9)	43 (4.6)		
¿ Kuwait	54 (2.1)	441 (3.4)	46 (2.1)	391 (4.2)	49 (5.1)		
Oman	52 (2.0)	452 (3.6)	48 (2.0)	391 (4.6)	61 (5.9)		
Bahrain	49 (0.4)	499 (1.9)	51 (0.4)	437 (2.6)	62 (3.0)		
Qatar	50 (0.2)	354 (2.3)	50 (0.2)	284 (2.3)	70 (3.1)		
¶ Morocco	53 (1.3)	403 (3.7)	47 (1.3)	401 (3.6)	2 (4.5)		
International Avg.	50 (0.2)	469 (0.8)	50 (0.2)	463 (0.7)	6 (0.7)		
Benchmarking Participants							
3 British Columbia, Canada	51 (1.1)	523 (2.9)	49 (1.1)	529 (3.3)	7 (3.1)		
2 † Minnesota, US	52 (1.3)	535 (4.3)	48 (1.3)	542 (6.1)	7 (4.4)		
3 Quebec, Canada	49 (1.5)	503 (3.3)	51 (1.5)	511 (4.1)	8 (4.2)		
2 Ontario, Canada	50 (1.1)	521 (3.8)	50 (1.1)	531 (4.3)	10 (3.6)		
2 Massachusetts, US	50 (1.0)	551 (5.1)	50 (1.0)	561 (5.0)	11 (4.3)		
¿ ‡ Dubai, UAE	49 (4.8)	495 (5.1)	51 (4.8)	483 (6.1)	11 (9.9)		
Basque Country, Spain	48 (1.7)	490 (3.6)	52 (1.7)	505 (3.9)	15 (4.7)		



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).

‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).

2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).

3 National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).

¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.

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

Exhibit 6.12 Trends in average science achievement by gender – 1995 through 2007

Country	Girls				Boys			
	2007 Average Scale Score	2003 to 2007 Difference	1999 to 2007 Difference	1995 to 2007 Difference	2007 Average Scale Score	2003 to 2007 Difference	1999 to 2007 Difference	1995 to 2007 Difference
Armenia	492 (7.1)	25 (8.2) ▲	◊ ◊	◊ ◊	484 (5.2)	29 (6.2) ▲	◊ ◊	◊ ◊
Australia	505 (5.1)	-12 (6.9)	- -	-2 (6.4)	524 (5.4)	-14 (7.1)	- -	4 (7.6)
Bahrain	499 (1.9)	46 (3.3) ▲	◊ ◊	◊ ◊	437 (2.6)	14 (3.5) ▲	◊ ◊	◊ ◊
Botswana	365 (3.7)	1 (4.9)	◊ ◊	◊ ◊	343 (3.6)	-23 (4.9) ▼	◊ ◊	◊ ◊
Chinese Taipei	559 (3.7)	-12 (5.3) ▼	-2 (5.4)	◊ ◊	563 (4.4)	-8 (5.8)	-14 (7.2) ▼	◊ ◊
Colombia	400 (4.4)	◊ ◊	◊ ◊	48 (7.9) ▲	435 (3.7)	◊ ◊	◊ ◊	56 (9.3) ▲
Cyprus	460 (2.8)	16 (3.6) ▲	5 (4.2)	6 (4.0)	444 (2.4)	4 (3.6)	-22 (3.8) ▼	-7 (3.4) ▼
Czech Republic	534 (2.2)	◊ ◊	11 (5.3) ▲	-3 (6.1)	543 (2.4)	◊ ◊	-13 (5.4) ▼	-28 (5.3) ▼
Egypt	417 (4.8)	-5 (6.8)	◊ ◊	◊ ◊	400 (4.6)	-21 (7.2) ▼	◊ ◊	◊ ◊
England	537 (4.6)	0 (6.6)	15 (7.7) ▲	15 (6.1) ▲	546 (5.8)	-4 (7.7)	-8 (7.8)	3 (8.4)
Ghana	288 (5.9)	51 (8.7) ▲	◊ ◊	◊ ◊	316 (5.6)	45 (8.6) ▲	◊ ◊	◊ ◊
Hong Kong SAR	533 (4.5)	-19 (5.7) ▼	10 (6.3)	41 (8.0) ▲	528 (6.6)	-33 (7.6) ▼	-9 (8.3)	3 (9.1)
Hungary	533 (3.5)	3 (4.9)	-7 (5.3)	8 (5.1)	545 (3.3)	-10 (4.4) ▼	-20 (5.6) ▼	-3 (4.8)
Indonesia	432 (4.3)	18 (5.8) ▲	5 (7.7)	◊ ◊	435 (4.4)	9 (6.4)	-10 (6.5)	◊ ◊
Iran, Islamic Rep. of	466 (4.6)	12 (6.1)	36 (7.3) ▲	18 (7.4) ▲	453 (5.4)	0 (6.6)	-7 (7.0)	-22 (7.1) ▼
Israel	472 (4.9)	-7 (5.9)	11 (7.8)	- -	463 (5.2)	-35 (6.7) ▼	-12 (7.6)	- -
Italy	491 (3.3)	5 (4.3)	7 (5.3)	- -	499 (3.1)	3 (4.9)	-3 (6.4)	- -
Japan	552 (2.8)	4 (4.1)	9 (4.0) ▲	7 (3.4) ▲	556 (2.5)	-1 (3.7)	-1 (4.4)	-8 (3.4) ▼
Jordan	499 (5.8)	11 (7.3)	40 (7.7) ▲	◊ ◊	466 (5.5)	4 (7.9)	24 (8.1) ▲	◊ ◊
Korea, Rep. of	549 (2.7)	-3 (3.4)	11 (4.8) ▲	19 (3.7) ▲	557 (2.5)	-7 (3.1) ▼	-2 (4.1)	-2 (3.8)
Lebanon	410 (6.2)	18 (7.9) ▲	◊ ◊	◊ ◊	417 (6.7)	23 (9.0) ▲	◊ ◊	◊ ◊
Lithuania	518 (3.2)	2 (4.2)	40 (5.5) ▲	66 (5.4) ▲	519 (2.7)	-3 (3.6)	20 (5.7) ▲	42 (5.2) ▲
Malaysia	475 (6.4)	-30 (7.8) ▼	-13 (8.5)	◊ ◊	466 (6.7)	-49 (7.9) ▼	-32 (8.9) ▼	◊ ◊
Norway	487 (2.4)	-2 (3.3)	◊ ◊	-18 (3.5) ▼	486 (3.0)	-12 (4.2) ▼	◊ ◊	-37 (4.6) ▼
Palestinian Nat'l Auth.	422 (4.5)	-19 (5.8) ▼	◊ ◊	◊ ◊	386 (5.1)	-42 (7.3) ▼	◊ ◊	◊ ◊
Romania	466 (4.1)	1 (6.8)	-2 (7.6)	2 (6.7)	458 (4.6)	-16 (6.8) ▼	-18 (7.9) ▼	-20 (7.3) ▼
Russian Federation	527 (4.3)	18 (5.6) ▲	7 (8.3)	11 (6.2)	533 (4.2)	14 (5.9) ▲	-7 (7.5)	2 (6.6)
Scotland	493 (3.5)	-13 (5.3) ▼	◊ ◊	6 (6.2)	498 (4.2)	-19 (5.5) ▼	◊ ◊	-16 (7.9) ▼
Serbia	472 (3.7)	7 (4.7)	◊ ◊	◊ ◊	469 (3.8)	-2 (4.6)	◊ ◊	◊ ◊
Singapore	571 (4.7)	-5 (6.1)	14 (9.2)	-3 (8.1)	563 (5.2)	-16 (7.2) ▼	-14 (11.0)	-23 (8.7) ▼
Slovenia	536 (2.6)	19 (3.5) ▲	- -	32 (3.8) ▲	539 (2.7)	15 (3.6) ▲	- -	15 (4.3) ▲
Sweden	512 (3.0)	-9 (4.4)	◊ ◊	-34 (5.6) ▼	510 (2.8)	-19 (3.9) ▼	◊ ◊	-49 (5.6) ▼
Thailand	480 (4.5)	◊ ◊	-1 (6.4)	- -	462 (4.9)	◊ ◊	-22 (6.6) ▼	- -
Tunisia	436 (2.3)	43 (3.3) ▲	19 (4.0) ▲	◊ ◊	455 (2.6)	39 (3.7) ▲	13 (5.1) ▲	◊ ◊
United States	514 (3.0)	-5 (4.5)	9 (5.5)	9 (6.2)	526 (3.2)	-10 (4.6) ▼	1 (6.3)	6 (6.8)
Benchmarking Participants								
Basque Country, Spain	490 (3.6)	9 (4.7)	◊ ◊	◊ ◊	505 (3.9)	9 (5.1)	◊ ◊	◊ ◊
British Columbia, Canada	523 (2.9)	◊ ◊	-16 (7.0) ▼	◊ ◊	529 (3.3)	◊ ◊	-15 (7.8)	◊ ◊
Massachusetts, US	551 (5.1)	◊ ◊	24 (9.1) ▲	◊ ◊	561 (5.0)	◊ ◊	22 (9.4) ▲	◊ ◊
Minnesota, US	535 (4.3)	◊ ◊	◊ ◊	1 (9.2)	542 (6.1)	◊ ◊	◊ ◊	-11 (11.3)
Ontario, Canada	521 (3.8)	-4 (4.9)	13 (5.1) ▲	33 (5.2) ▲	531 (4.3)	-10 (5.1)	3 (5.5)	25 (6.4) ▲
Quebec, Canada	503 (3.3)	-19 (5.0) ▼	-33 (7.4) ▼	-3 (8.5)	511 (4.1)	-30 (5.2) ▼	-34 (6.3) ▼	-4 (8.6)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ 2007 average significantly higher

▼ 2007 average significantly lower

Trend notes: Data are not shown for Bulgaria, Kuwait, Morocco, Saudi Arabia, and Turkey, because comparable data from previous cycles are not available. Data for Indonesia do not include Islamic schools.

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

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

A diamond (◊) indicates the country did not participate in the assessment.

Internationally, it was not unusual for boys to score more highly than girls in physics: this occurred in 27 of the 49 participating countries, and the international average was higher for boys in physics. Similarly, 20 of the 49 countries showed a gender difference favouring boys on earth science.

It was also relatively common internationally for girls to outscore boys in biology and chemistry, and the international average was higher for girls in these domains. Thus, the lack of a gender difference in these domains in England was positive.

Other countries with the same pattern of gender performance as England across these content domains included Scotland and the high-scoring countries of Japan and Korea. Of the other highest scoring countries, Singapore had gender differences favouring girls in

Exhibit 6.13 Average achievement in the science content domains by gender

TIMSS2007 8th Science Grade

Country	Average Scale Scores for Science Content Domains							
	Biology		Chemistry		Physics		Earth Science	
	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys
Algeria	414 (2.3)	409 (2.7)	415 (2.9)	413 (2.1)	392 (2.6)	402 (2.9) ▲	413 (2.4)	413 (2.0)
Armenia	494 (7.4)	487 (5.2)	484 (7.9)	473 (5.7)	504 (7.1)	502 (5.2)	477 (7.3)	472 (5.4)
Australia	515 (5.0)	522 (5.1)	497 (4.3)	512 (5.6) ▲	492 (5.5)	522 (5.6) ▲	505 (5.6)	532 (5.2) ▲
Bahrain	507 (2.0) ▲	441 (2.8)	502 (3.5) ▲	436 (2.6)	488 (2.8) ▲	444 (3.5)	488 (2.8) ▲	443 (3.0)
Bosnia Herzegovina	466 (3.3)	463 (3.6)	470 (2.9)	466 (3.7)	458 (3.7)	468 (3.7) ▲	466 (3.7)	472 (3.8)
Botswana	374 (3.2) ▲	342 (4.0)	379 (4.2) ▲	363 (4.0)	352 (4.3)	350 (5.2)	371 (4.9) ▲	349 (4.4)
3 Bulgaria	475 (6.1) ▲	459 (7.1)	482 (6.5) ▲	464 (7.1)	467 (6.0)	465 (6.9)	483 (6.0)	476 (6.1)
Chinese Taipei	549 (3.3)	548 (4.1)	575 (4.4)	572 (5.1)	548 (3.6)	561 (4.5) ▲	541 (4.2)	549 (3.4)
Colombia	420 (4.6)	449 (4.0) ▲	408 (3.7)	432 (3.5) ▲	388 (4.6)	427 (3.8) ▲	388 (5.0)	427 (4.5) ▲
Cyprus	455 (3.5) ▲	438 (2.7)	463 (3.1) ▲	442 (3.3)	462 (3.9)	453 (3.5)	463 (2.5) ▲	452 (3.4)
Czech Republic	530 (2.2)	532 (3.4)	534 (3.4)	536 (2.8)	528 (2.8)	546 (2.4) ▲	525 (2.4)	542 (2.7) ▲
Egypt	417 (4.9) ▲	397 (4.4)	426 (5.3) ▲	401 (5.4)	415 (4.9)	412 (4.2)	432 (5.6)	421 (4.8)
El Salvador	392 (4.1)	405 (4.2) ▲	370 (4.7)	384 (4.2) ▲	363 (5.3)	399 (3.4) ▲	384 (4.5)	418 (3.7) ▲
† England	539 (4.6)	543 (5.4)	534 (4.3)	534 (5.2)	538 (4.2)	553 (5.4) ▲	523 (5.0)	536 (5.0) ▲
1 Georgia	434 (3.6) ▲	412 (5.2)	428 (4.8) ▲	407 (5.9)	425 (5.9) ▲	407 (6.4)	437 (4.5) ▲	413 (5.0)
Ghana	291 (6.0)	315 (5.0) ▲	327 (5.6)	355 (5.1) ▲	259 (7.6)	290 (6.2) ▲	279 (7.0)	307 (5.9) ▲
† Hong Kong SAR	531 (4.1)	523 (6.2)	522 (4.4)	513 (6.6)	525 (4.7)	532 (6.7)	532 (4.0)	532 (6.2)
Hungary	533 (3.2)	535 (3.0)	534 (3.9)	538 (4.1)	529 (4.2)	553 (3.6) ▲	523 (3.6)	540 (3.3) ▲
Indonesia	432 (3.6)	424 (3.8)	423 (4.3)	418 (3.9)	425 (3.5)	440 (4.2) ▲	439 (4.3)	444 (3.3)
Iran, Islamic Rep. of	456 (4.9)	443 (5.3)	474 (4.9) ▲	453 (5.7)	472 (4.8)	469 (5.3)	479 (6.0)	473 (5.1)
3 Israel	479 (4.7) ▲	465 (5.2)	475 (5.8) ▲	459 (5.3)	472 (5.3)	471 (5.7)	461 (5.0)	464 (4.8)
Italy	501 (3.3)	504 (3.3)	477 (3.0)	484 (3.5) ▲	481 (3.6)	497 (3.6) ▲	496 (3.6)	509 (3.8) ▲
Japan	554 (2.6)	551 (2.5)	554 (2.7)	549 (2.9)	552 (3.2)	565 (2.6) ▲	527 (4.3)	538 (2.6) ▲
Jordan	493 (5.4) ▲	464 (5.2)	514 (5.6) ▲	470 (5.8)	492 (5.9) ▲	467 (5.9)	496 (5.4) ▲	473 (4.9)
Korea, Rep. of	546 (2.8)	549 (2.2)	536 (2.9)	536 (2.7)	564 (2.9)	578 (2.9) ▲	530 (2.6)	546 (2.8) ▲
¿ Kuwait	442 (3.3) ▲	393 (4.2)	445 (4.5) ▲	386 (5.2)	455 (3.7) ▲	418 (4.3)	427 (3.9) ▲	390 (4.3)
Lebanon	404 (6.1)	407 (7.4)	449 (5.7)	444 (7.0)	424 (5.2)	439 (6.0) ▲	384 (6.0)	395 (8.3)
1 Lithuania	532 (2.9) ▲	522 (2.8)	512 (3.8) ▲	501 (2.6)	497 (3.6)	514 (3.4) ▲	508 (3.4)	522 (2.8) ▲
Malaysia	476 (6.2) ▲	462 (6.4)	485 (5.6) ▲	472 (5.7)	484 (6.4)	483 (6.3)	463 (5.7)	462 (6.1)
Malta	457 (1.9) ▲	448 (2.7)	462 (2.9)	460 (2.8)	461 (2.3)	479 (2.2) ▲	450 (2.2)	462 (2.3) ▲
Norway	492 (3.0) ▲	482 (2.6)	484 (2.2)	482 (3.7)	468 (2.7)	482 (4.4) ▲	499 (2.8)	505 (3.1) ▲
Oman	442 (4.1) ▲	383 (5.2)	450 (5.2) ▲	380 (4.8)	469 (4.5) ▲	416 (3.8)	461 (3.5) ▲	415 (4.0)
Palestinian Nat'l Auth.	419 (4.9) ▲	384 (6.1)	435 (5.0) ▲	391 (6.4)	428 (5.1) ▲	400 (5.7)	422 (4.5) ▲	395 (5.4)
Qatar	352 (2.1) ▲	284 (2.1)	355 (2.5) ▲	289 (3.0)	379 (1.7) ▲	314 (3.6)	342 (2.2) ▲	282 (2.3)
Romania	468 (3.9) ▲	451 (3.7)	470 (4.6) ▲	457 (4.4)	455 (4.3)	461 (4.6)	469 (3.8)	472 (4.1)
Russian Federation	526 (3.9)	524 (4.5)	533 (3.7)	536 (4.5)	509 (5.0)	530 (4.0) ▲	520 (3.5)	530 (4.0) ▲
Saudi Arabia	433 (3.6) ▲	384 (3.9)	411 (4.3) ▲	371 (3.8)	424 (2.8) ▲	393 (3.7)	442 (3.2) ▲	406 (3.4)
† Scotland	495 (3.4)	496 (4.1)	498 (4.0)	496 (4.0)	487 (4.4)	501 (4.7) ▲	491 (4.1)	505 (4.2) ▲
1 2 Serbia	479 (3.5) ▲	469 (4.1)	471 (4.3) ▲	463 (4.0)	465 (3.8)	470 (3.8)	463 (4.9)	469 (4.0)
Singapore	570 (4.4) ▲	558 (5.1)	567 (4.2) ▲	554 (5.0)	574 (4.4)	577 (4.6)	543 (4.2)	538 (5.2)
Slovenia	534 (2.9) ▲	526 (3.1)	539 (3.0)	539 (2.8)	520 (2.7)	529 (2.6) ▲	537 (2.5)	547 (3.1) ▲
Sweden	521 (2.8) ▲	509 (2.7)	502 (2.8)	497 (3.0)	501 (3.0)	511 (2.9) ▲	510 (3.5)	510 (3.6)
Syrian Arab Republic	456 (3.8)	463 (3.9)	447 (3.9)	452 (4.1)	441 (3.3)	453 (4.1) ▲	445 (3.6)	452 (5.2)
Thailand	489 (5.1) ▲	468 (4.8)	473 (4.6) ▲	451 (4.5)	460 (4.8)	455 (4.9)	493 (4.2) ▲	484 (4.4)
Tunisia	446 (3.1)	458 (2.8) ▲	450 (2.8)	467 (2.6) ▲	418 (3.2)	447 (3.4) ▲	440 (2.9)	456 (3.2) ▲
Turkey	467 (3.9) ▲	458 (3.7)	443 (5.2) ▲	428 (6.5)	446 (4.5)	445 (4.7)	463 (3.7)	470 (4.5)
Ukraine	481 (3.8) ▲	472 (4.0)	493 (4.1)	487 (3.3)	485 (4.4)	500 (5.1) ▲	476 (5.4)	489 (3.6) ▲
2 † United States	527 (3.2)	533 (2.9) ▲	508 (3.2)	512 (2.9)	491 (3.2)	514 (3.1) ▲	516 (3.5)	534 (3.7) ▲
¶ Morocco	400 (4.0) ▲	388 (4.3)	418 (4.4)	413 (4.1)	398 (4.2)	412 (3.8) ▲	392 (4.8)	404 (4.8) ▲
International Avg.	471 (0.6) ▲	460 (0.6)	471 (0.6) ▲	460 (0.6)	464 (0.6)	468 (0.6) ▲	466 (0.5)	466 (0.6)
Benchmarking Participants								
Basque Country, Sp.	493 (3.5)	503 (3.8) ▲	470 (3.8)	475 (5.4)	484 (4.7)	502 (4.5) ▲	501 (4.5)	526 (4.4) ▲
3 B. Columbia, Canada	536 (3.7)	533 (3.5)	501 (3.5)	508 (3.4)	509 (2.8)	525 (3.8) ▲	527 (3.1)	533 (3.8)
¿ ‡ Dubai, UAE	493 (5.3)	477 (6.7)	501 (5.3)	485 (6.0)	491 (4.5)	488 (6.0)	495 (5.4)	485 (6.2)
2 Massachusetts, US	562 (5.6)	563 (4.3)	539 (4.7)	542 (6.7)	525 (5.6)	544 (5.8) ▲	551 (4.4)	568 (4.5) ▲
2 † Minnesota, US	558 (4.8)	551 (6.9)	516 (5.5)	522 (5.9)	504 (5.2)	525 (5.7) ▲	542 (6.2)	547 (6.2)
2 Ontario, Canada	535 (4.1)	540 (4.5)	504 (3.7)	505 (4.0)	511 (5.1)	530 (4.6) ▲	523 (5.4)	536 (4.4) ▲
3 Quebec, Canada	512 (2.9)	513 (4.1)	494 (4.1)	499 (4.5)	486 (4.5)	497 (4.5)	506 (3.3)	520 (4.6) ▲

▲ Average significantly higher than other gender

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).
¶ Did not satisfy guidelines for sample participation rates (see Appendix A).
1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).
2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).
3 National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).
¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A plus (+) sign indicates average achievement could not be accurately estimated.

biology and chemistry and Chinese Taipei had a difference on physics in favour of boys, while Hong Kong had no gender differences in any content domain (one of only two countries in which this was the case). It is more common for gender differences to exist in science at grade 8 than at grade 4. However, the experience of Hong Kong shows that such differences, although common, are not inevitable.

Among the cognitive domains internationally, gender differences were also relatively common, although less so than for the content domains: only 13 countries had no gender differences across the cognitive domains (see Exhibit 6.14). Among these 13 countries, only one of the highest-scoring countries was represented: Japan. The international average was higher for girls in the case of all three cognitive domains at grade 8, although many countries showed differences in favour of boys.

In England, boys outscored girls on knowing and on applying. In contrast to grade 4 science, there were no significant differences on reasoning in England. This same pattern, of no significant difference on reasoning, was found in Australia and Korea, amongst others.

6.5 Achievement by gender in grade 8 mathematics

Exhibit 6.15 shows achievement by gender in mathematics at grade 8, for all participating countries. England's data is highlighted, illustrating that there was no statistically significant difference between the achievement of girls and boys in England in TIMSS 2007. Of the 49 countries participating at grade 8, approximately half showed no gender differences in mathematics. These included Scotland, the United States, Chinese Taipei, Korea and Hong Kong. Countries with gender differences included Singapore (with girls doing better) and Australia (with boys doing better).

Exhibit 6.16 shows trends in achievement since 1995 for the 36 trend countries with mathematics results at grade 8. Once again, England's data is highlighted, and shows that girls made strong gains between 1995 and 2007, the second largest gain of any other trend country in that period. Girls improved greatly in the period from 1995 to 2003 and then consolidated that gain in 2007. England's boys also made significant gains, improving on their 2003 score and showing the largest gain among the higher scoring countries.

Chapter 5 gave overall scores for pupils in each content domain, that is, in each area of study within a subject. This showed that grade 8 pupils in England, while performing well in mathematics overall, were strongest in the area of data and chance, and weakest in algebra (see Chapter 5 for more information). Girls and boys in England performed equally well in each of these areas (see Exhibit 6.17). They also performed equally well in geometry, negating the difference seen in geometric shapes and measures at grade 4 (although it is worth noting that the content of these areas across the grades varies; see Chapter 5 for details).

This pattern of equality of attainment in data and chance, in algebra and in geometry was unusual: the international average for each of these domains was higher for girls than for boys. In particular, it was common for girls to outscore boys in algebra, with 31 of the 49 countries having such a difference in algebra. While England has some room for

Exhibit 6.14 Average achievement in the science cognitive domains by gender

TIMSS2007 8th Science Grade

Country	Average Scale Scores for Science Cognitive Domains					
	Knowing		Applying		Reasoning	
	Girls	Boys	Girls	Boys	Girls	Boys
Algeria	410 (2.7)	411 (3.0)	409 (2.7)	410 (2.8)	416 (3.2)	411 (2.9)
Armenia	505 (6.7)	499 (5.2)	498 (8.3)	489 (5.6)	463 (8.5)	456 (5.4)
Australia	501 (4.3)	519 (4.9) ▲	488 (4.6)	512 (4.9) ▲	525 (5.2)	535 (5.2)
Bahrain	498 (2.4) ▲	440 (2.7)	499 (2.6) ▲	440 (3.2)	500 (1.9) ▲	438 (3.3)
Bosnia and Herzegovina	461 (3.4)	464 (3.1)	484 (3.9)	488 (4.2)	449 (3.8)	454 (3.4)
Botswana	364 (4.0) ▲	351 (3.4)	376 (3.5) ▲	344 (3.7)	377 (3.3) ▲	346 (4.0)
3 Bulgaria	480 (6.6) ▲	463 (7.1)	493 (6.2)	487 (6.7)	455 (6.9) ▲	441 (7.0)
Chinese Taipei	559 (3.8)	562 (3.9)	560 (3.4)	570 (4.4) ▲	540 (3.6)	542 (4.0)
Colombia	400 (3.5)	434 (3.5) ▲	401 (4.8)	437 (4.2) ▲	416 (3.8)	440 (3.8) ▲
Cyprus	465 (2.4) ▲	446 (3.1)	443 (3.6) ▲	434 (3.1)	469 (2.9) ▲	450 (2.9)
Czech Republic	534 (2.5)	544 (2.3) ▲	526 (2.4)	539 (2.8) ▲	533 (3.0)	535 (2.8)
Egypt	411 (4.6) ▲	▲ (5.0)	443 (4.5) ▲	425 (5.3)	403 (4.0) ▲	388 (4.7)
El Salvador	377 (4.2)	401 (3.5) ▲	382 (4.2)	408 (4.3) ▲	378 (3.9)	390 (5.4) ▲
† England	532 (4.0)	544 (5.3) ▲	525 (5.1)	537 (6.2) ▲	547 (4.3)	547 (5.1)
1 Georgia	433 (4.9) ▲	410 (5.1)	453 (4.8) ▲	427 (6.3)	404 (4.9) ▲	385 (5.7)
Ghana	271 (6.2)	307 (5.5) ▲	300 (7.1)	330 (5.9) ▲	+ +	+ +
† Hong Kong SAR	524 (4.6)	520 (6.6)	528 (3.8)	536 (6.2)	541 (4.7) ▲	525 (7.0)
Hungary	543 (3.4)	555 (3.4) ▲	516 (3.4)	532 (3.6) ▲	526 (3.7)	534 (3.2) ▲
Indonesia	423 (3.3)	426 (3.9)	426 (4.3)	425 (4.2)	437 (3.7)	440 (3.7)
Iran, Islamic Rep. of	459 (5.4)	450 (5.4)	474 (5.0)	464 (5.8)	471 (4.6) ▲	454 (5.6)
3 Israel	476 (4.5)	467 (5.5)	458 (5.4)	455 (6.0)	487 (5.0) ▲	475 (5.0)
Italy	493 (3.2)	503 (3.3) ▲	489 (4.1)	499 (3.6) ▲	488 (3.4)	497 (2.9) ▲
Japan	553 (2.8)	557 (2.5)	530 (3.5)	539 (3.2)	562 (2.8)	557 (2.7)
Jordan	501 (5.8) ▲	470 (5.7)	506 (6.7) ▲	477 (6.2)	489 (5.3) ▲	454 (5.7)
Korea, Rep. of	544 (2.8)	550 (2.3) ▲	535 (2.3)	550 (2.7) ▲	557 (2.5)	560 (2.6)
¿ Kuwait	440 (3.5) ▲	389 (4.6)	447 (3.1) ▲	409 (4.0)	437 (3.9) ▲	380 (5.2)
Lebanon	419 (6.1)	427 (6.8)	402 (6.0)	404 (7.2)	418 (5.5)	423 (7.2)
1 Lithuania	514 (2.9)	510 (2.4)	510 (3.0)	516 (2.8)	527 (3.4)	527 (2.5)
Malaysia	477 (6.4)	469 (6.6)	461 (7.0)	454 (7.5)	492 (5.4)	482 (5.8)
Malta	461 (2.3)	464 (2.7)	434 (2.3)	439 (2.1)	475 (2.4)	472 (2.1)
Norway	486 (2.5)	486 (2.9)	486 (3.1)	485 (2.6)	492 (2.7)	490 (3.6)
Oman	452 (3.8) ▲	392 (4.7)	455 (4.3) ▲	399 (5.4)	457 (4.3) ▲	397 (4.5)
Palestinian Nat'l Auth.	430 (5.1) ▲	394 (5.4)	422 (4.6) ▲	391 (5.2)	415 (5.1) ▲	375 (5.3)
Qatar	358 (1.9) ▲	285 (2.5)	361 (3.7) ▲	289 (2.6)	+ +	+ +
Romania	473 (3.8)	468 (4.1)	455 (4.7) ▲	447 (4.6)	466 (4.1) ▲	453 (4.2)
Russian Federation	523 (4.1)	531 (4.1) ▲	530 (4.7)	539 (4.4) ▲	520 (3.7)	521 (4.1)
Saudi Arabia	426 (3.6) ▲	383 (4.3)	432 (2.9) ▲	404 (3.7)	422 (3.5) ▲	371 (3.7)
† Scotland	492 (3.3)	498 (3.8)	474 (4.4)	487 (4.7) ▲	511 (3.6)	510 (4.5)
1 2 Serbia	471 (3.6)	468 (4.7)	487 (3.3)	483 (3.7)	458 (4.4)	451 (4.3)
Singapore	570 (4.4)	565 (4.9)	556 (4.8)	552 (5.2)	572 (4.2) ▲	556 (4.7)
Slovenia	532 (3.2)	535 (2.7)	529 (2.4)	537 (2.8) ▲	540 (2.7)	536 (3.2)
Sweden	510 (3.3)	507 (2.9)	504 (2.8)	505 (3.1)	521 (3.1) ▲	513 (3.1)
Syrian Arab Republic	439 (3.6)	451 (4.0) ▲	471 (3.4)	478 (4.5)	439 (3.3)	441 (4.0)
Thailand	480 (4.3) ▲	465 (4.7)	479 (4.8) ▲	466 (4.9)	484 (4.1) ▲	462 (4.6)
Tunisia	435 (2.7)	456 (2.5) ▲	432 (2.2)	450 (2.8) ▲	452 (3.5)	465 (2.9) ▲
Turkey	450 (4.2)	449 (4.1)	463 (4.0)	461 (3.9)	469 (3.9) ▲	457 (4.0)
Ukraine	485 (4.3)	490 (4.3)	475 (4.5)	479 (4.0)	488 (4.5)	487 (4.2)
2 † United States	510 (3.0)	522 (2.9) ▲	503 (3.4)	521 (3.1) ▲	528 (3.1)	530 (3.0)
¶ Morocco	400 (4.7)	400 (3.9)	397 (5.2)	394 (4.7)	415 (3.8)	410 (4.1)
International Avg.	468 (0.6) ▲	463 (0.6)	468 (0.6) ▲	464 (0.6)	477 (0.6) ▲	467 (0.7)
Benchmarking Participants						
Basque Country, Spain	490 (3.4)	508 (3.8) ▲	481 (4.0)	499 (3.9) ▲	495 (4.1)	502 (4.5)
3 British Columbia, Canada	518 (3.0)	524 (3.2) ▲	509 (3.1)	523 (3.5) ▲	536 (3.5)	533 (3.4)
¿ ‡ Dubai, UAE	493 (5.4)	484 (5.5)	500 (5.7)	489 (5.8)	491 (5.1)	475 (6.6)
2 Massachusetts, US	545 (4.2)	555 (5.1) ▲	538 (4.8)	551 (5.4) ▲	562 (4.7)	566 (4.3)
2 † Minnesota, US	531 (5.0)	538 (5.8)	522 (4.5)	531 (6.5)	548 (5.2)	542 (6.2)
2 Ontario, Canada	519 (4.2)	526 (4.3)	500 (3.6)	520 (3.8) ▲	541 (4.9)	544 (5.2)
3 Quebec, Canada	497 (3.3)	504 (4.1)	489 (2.8)	502 (4.2) ▲	523 (3.1)	523 (4.8)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

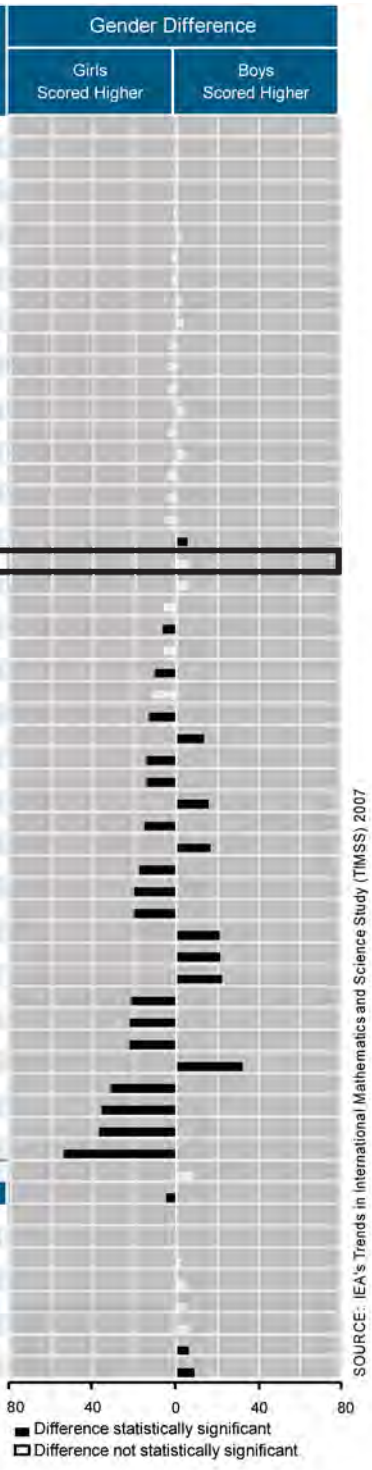
▲ Average significantly higher than other gender

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).
¶ Did not satisfy guidelines for sample participation rates (see Appendix A).
1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).
2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).
3 National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).
¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A plus (+) sign indicates average achievement could not be accurately estimated.

Exhibit 6.15 TIMSS 2007 average mathematics achievement by gender

TIMSS2007 Mathematics 8th Grade

Country	Girls		Boys		Difference (Absolute Value)	Gender Difference	
	Percent of Students	Average Scale Score	Percent of Students	Average Scale Score		Girls Scored Higher	Boys Scored Higher
Malta	51 (0.3)	488 (1.5)	49 (0.3)	488 (1.7)	0 (2.2)		
Turkey	47 (0.8)	432 (5.3)	53 (0.8)	432 (5.0)	1 (3.9)		
Hungary	50 (1.1)	517 (4.1)	50 (1.1)	517 (3.7)	1 (3.6)		
Chinese Taipei	48 (1.3)	599 (4.6)	52 (1.3)	598 (5.3)	1 (4.2)		
Bosnia and Herzegovina	49 (0.8)	456 (3.1)	51 (0.8)	455 (2.8)	1 (2.5)		
Slovenia	50 (0.8)	500 (2.7)	50 (0.8)	503 (2.6)	2 (3.2)		
Czech Republic	48 (0.8)	505 (2.5)	52 (0.8)	503 (2.8)	2 (2.4)		
3 Israel	53 (1.6)	465 (4.6)	47 (1.6)	462 (4.9)	3 (5.4)		
† Scotland	51 (1.0)	486 (3.8)	49 (1.0)	489 (4.4)	3 (3.5)		
2 † United States	51 (0.7)	507 (3.0)	49 (0.7)	510 (3.1)	4 (2.2)		
Sweden	48 (0.9)	493 (2.6)	52 (0.9)	490 (2.5)	4 (2.5)		
Norway	49 (0.7)	471 (2.1)	51 (0.7)	467 (2.6)	4 (2.5)		
Indonesia	51 (1.0)	399 (4.1)	49 (1.0)	395 (4.4)	4 (4.0)		
Korea, Rep. of	48 (2.7)	595 (3.3)	52 (2.7)	599 (3.1)	4 (3.4)		
Armenia	50 (0.9)	501 (4.4)	50 (0.9)	497 (3.5)	4 (3.7)		
Japan	50 (1.0)	568 (3.2)	50 (1.0)	572 (3.2)	4 (4.3)		
1 Georgia	50 (1.0)	412 (5.9)	50 (1.0)	408 (6.7)	4 (4.3)		
Russian Federation	52 (0.9)	514 (4.3)	48 (0.9)	509 (4.7)	5 (3.7)		
Ukraine	52 (0.8)	465 (3.9)	48 (0.8)	459 (3.9)	5 (2.9)		
Algeria	49 (0.6)	384 (2.4)	51 (0.6)	389 (2.2)	5 (1.8)		
† England	51 (1.9)	511 (5.0)	49 (1.9)	516 (6.1)	6 (5.7)		
Italy	48 (0.7)	477 (3.3)	52 (0.7)	483 (3.5)	6 (3.2)		
1 2 Serbia	49 (0.7)	489 (3.6)	51 (0.7)	483 (4.0)	6 (3.9)		
1 Lithuania	50 (1.1)	509 (3.0)	50 (1.1)	502 (2.3)	7 (2.6)		
Iran, Islamic Rep. of	46 (1.5)	407 (5.3)	54 (1.5)	400 (6.1)	7 (8.1)		
Malaysia	53 (1.5)	479 (5.6)	47 (1.5)	468 (5.3)	11 (4.4)		
† Hong Kong SAR	50 (1.3)	578 (5.0)	50 (1.3)	567 (8.0)	11 (6.7)		
Egypt	49 (2.7)	397 (5.0)	51 (2.7)	384 (4.6)	13 (6.4)		
Lebanon	54 (1.8)	443 (4.1)	46 (1.8)	456 (4.7)	13 (3.6)		
Bulgaria	50 (1.2)	471 (4.6)	50 (1.2)	456 (6.3)	15 (5.0)		
Singapore	49 (0.9)	600 (4.1)	51 (0.9)	586 (4.6)	15 (4.4)		
Australia	48 (1.9)	488 (5.5)	52 (1.9)	504 (5.4)	15 (7.7)		
Botswana	53 (0.8)	371 (2.4)	47 (0.8)	355 (3.2)	15 (3.3)		
Syrian Arab Republic	52 (1.9)	387 (4.3)	48 (1.9)	403 (5.1)	16 (5.6)		
Romania	49 (0.9)	470 (4.2)	51 (0.9)	452 (4.6)	18 (3.3)		
Cyprus	50 (0.6)	476 (2.2)	50 (0.6)	455 (2.4)	20 (3.2)		
Jordan	48 (2.0)	438 (6.4)	52 (2.0)	417 (5.6)	20 (8.8)		
El Salvador	52 (1.4)	331 (3.8)	48 (1.4)	351 (3.6)	21 (4.9)		
Tunisia	52 (0.8)	410 (2.8)	48 (0.8)	431 (2.7)	21 (2.4)		
Ghana	45 (0.8)	297 (5.0)	55 (0.8)	319 (4.4)	22 (3.6)		
¿ Kuwait	54 (2.1)	364 (2.7)	46 (2.1)	342 (4.0)	22 (4.8)		
Saudi Arabia	48 (1.6)	341 (3.6)	52 (1.6)	319 (4.0)	23 (5.0)		
Thailand	50 (1.3)	453 (5.3)	50 (1.3)	430 (5.5)	23 (4.7)		
Colombia	51 (1.6)	364 (4.2)	49 (1.6)	396 (4.1)	32 (4.3)		
Bahrain	49 (0.4)	414 (2.2)	51 (0.4)	382 (2.6)	32 (3.6)		
Palestinian Nat'l Auth.	51 (1.4)	385 (4.2)	49 (1.4)	349 (5.4)	36 (6.5)		
Qatar	50 (0.2)	325 (2.1)	50 (0.2)	288 (2.0)	38 (2.9)		
Oman	52 (2.0)	399 (3.6)	48 (2.0)	344 (5.0)	54 (5.6)		
¶ Morocco	53 (1.3)	377 (3.7)	47 (1.3)	385 (3.9)	9 (4.8)		
International Avg.	50 (0.2)	453 (0.7)	50 (0.2)	448 (0.7)	5 (0.6)		
Benchmarking Participants							
¿ ‡ Dubai, UAE	49 (4.8)	461 (5.2)	51 (4.8)	461 (5.9)	0 (10.1)		
3 Quebec, Canada	49 (1.5)	527 (3.5)	51 (1.5)	529 (4.6)	2 (4.2)		
2 † Minnesota, US	52 (1.3)	531 (4.4)	48 (1.3)	535 (5.1)	4 (3.7)		
Basque Country, Spain	48 (1.7)	496 (3.9)	52 (1.7)	501 (3.9)	4 (5.0)		
2 Massachusetts, US	50 (1.0)	544 (4.8)	50 (1.0)	550 (5.1)	5 (3.8)		
3 British Columbia, Canada	51 (1.1)	507 (3.3)	49 (1.1)	512 (3.4)	6 (2.9)		
2 Ontario, Canada	50 (1.1)	513 (4.1)	50 (1.1)	522 (4.0)	9 (4.1)		



SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).
¶ Did not satisfy guidelines for sample participation rates (see Appendix A).
1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).
2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).
3 National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).
¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.

Exhibit 6.16 Trends in Average Mathematics Achievement by gender - 1995 through 2007 (Continued)

Country	Girls				Boys			
	2007 Average Scale Score	2003 to 2007 Difference	1999 to 2007 Difference	1995 to 2007 Difference	2007 Average Scale Score	2003 to 2007 Difference	1999 to 2007 Difference	1995 to 2007 Difference
Armenia	501 (4.4)	18 (5.5) ▲	◊ ◊	◊ ◊	497 (3.5)	24 (4.9) ▲	◊ ◊	◊ ◊
Australia	488 (5.5)	-10 (8.0)	- -	-23 (6.9) ▼	504 (5.4)	-7 (7.9)	- -	-4 (7.2)
Bahrain	414 (2.2)	-3 (3.2)	◊ ◊	◊ ◊	382 (2.6)	-2 (3.6)	◊ ◊	◊ ◊
Botswana	371 (2.4)	3 (3.5)	◊ ◊	◊ ◊	355 (3.2)	-9 (4.3) ▼	◊ ◊	◊ ◊
Bulgaria	471 (4.6)	-5 (7.2)	-39 (7.5) ▼	-62 (7.6) ▼	456 (6.3)	-20 (7.7) ▼	-54 (9.4) ▼	-65 (8.9) ▼
Chinese Taipei	599 (4.6)	10 (6.8)	15 (6.1) ▲	◊ ◊	598 (5.3)	16 (7.4) ▲	11 (7.5)	◊ ◊
Colombia	364 (4.2)	◊ ◊	◊ ◊	44 (8.3) ▲	396 (4.1)	◊ ◊	◊ ◊	52 (9.2) ▲
Cyprus	476 (2.2)	8 (2.9) ▲	-3 (3.0)	5 (3.4)	455 (2.4)	4 (3.3)	-19 (3.6) ▼	-9 (4.0) ▼
Czech Republic	505 (2.5)	◊ ◊	-7 (4.7)	-34 (5.9) ▼	503 (2.8)	◊ ◊	-26 (6.4) ▼	-50 (5.4) ▼
Egypt	397 (5.0)	-9 (6.6)	◊ ◊	◊ ◊	384 (4.6)	-22 (6.8) ▼	◊ ◊	◊ ◊
England	511 (5.0)	12 (7.3)	24 (7.4) ▲	16 (6.4) ▲	516 (6.1)	18 (8.5) ▲	11 (7.9)	16 (8.2)
Ghana	297 (5.0)	31 (7.1) ▲	◊ ◊	◊ ◊	319 (4.4)	36 (6.6) ▲	◊ ◊	◊ ◊
Hong Kong SAR	578 (5.0)	-9 (6.3)	-5 (6.9)	19 (8.6) ▲	567 (8.0)	-18 (9.2) ▼	-14 (10.0)	-10 (10.8)
Hungary	517 (4.1)	-9 (5.5)	-12 (5.7) ▼	-10 (5.5)	517 (3.7)	-16 (5.1) ▼	-18 (5.7) ▼	-9 (5.2)
Indonesia	406 (4.7)	-5 (6.8)	6 (7.1)	◊ ◊	404 (5.3)	-6 (7.5)	-1 (7.3)	◊ ◊
Iran, Islamic Rep. of	407 (5.3)	-10 (6.8)	-1 (6.8)	2 (8.1)	400 (6.1)	-7 (7.4)	-32 (7.7) ▼	-29 (7.7) ▼
Israel	465 (4.6)	-27 (5.7) ▼	6 (6.3)	- -	462 (4.9)	-38 (6.7) ▼	-12 (6.9)	- -
Italy	477 (3.3)	-4 (4.5)	2 (5.6)	- -	483 (3.5)	-4 (5.3)	-2 (5.6)	- -
Japan	568 (3.2)	-1 (5.2)	-7 (4.0)	-9 (3.8) ▼	572 (3.2)	1 (4.8)	-10 (4.0) ▼	-13 (3.9) ▼
Jordan	438 (6.4)	-1 (7.9)	6 (8.0)	◊ ◊	417 (5.6)	6 (8.1)	-8 (8.2)	◊ ◊
Korea, Rep. of	595 (3.3)	9 (4.3) ▲	11 (4.6) ▲	24 (4.4) ▲	599 (3.1)	7 (4.0)	9 (3.8) ▲	11 (4.1) ▲
Lebanon	443 (4.1)	14 (5.5) ▲	◊ ◊	◊ ◊	456 (4.7)	18 (6.1) ▲	◊ ◊	◊ ◊
Lithuania	509 (3.0)	6 (4.2)	29 (5.5) ▲	37 (5.5) ▲	502 (2.3)	4 (3.8)	20 (5.3) ▲	31 (5.1) ▲
Malaysia	479 (5.6)	-33 (7.3) ▼	-43 (7.3) ▼	◊ ◊	468 (5.3)	-36 (7.0) ▼	-49 (8.0) ▼	◊ ◊
Norway	471 (2.1)	8 (3.4) ▲	◊ ◊	-26 (3.3) ▼	467 (2.6)	7 (4.0)	◊ ◊	-32 (3.9) ▼
Palestinian Nat'l Auth.	385 (4.2)	-9 (5.7)	◊ ◊	◊ ◊	349 (5.4)	-37 (7.2) ▼	◊ ◊	◊ ◊
Romania	470 (4.2)	-7 (6.6)	-4 (7.5)	-2 (6.1)	452 (4.6)	-21 (6.8) ▼	-18 (7.7) ▼	-22 (7.0) ▼
Russian Federation	514 (4.3)	4 (5.6)	-12 (7.4)	-10 (6.6)	509 (4.7)	3 (6.4)	-17 (7.9) ▼	-14 (7.8)
Scotland	486 (3.8)	-14 (5.8) ▼	◊ ◊	0 (6.6)	489 (4.4)	-7 (5.8)	◊ ◊	-12 (8.3)
Serbia	489 (3.6)	9 (4.7)	◊ ◊	◊ ◊	483 (4.0)	9 (5.0)	◊ ◊	◊ ◊
Singapore	600 (4.1)	-10 (5.3) ▼	-3 (7.3)	-10 (6.3)	586 (4.6)	-15 (6.3) ▼	-20 (8.8) ▼	-22 (6.6) ▼
Slovenia	500 (2.7)	6 (3.8)	- -	8 (4.0) ▲	503 (2.6)	11 (3.7) ▲	- -	5 (4.4)
Sweden	493 (2.6)	-6 (4.0)	◊ ◊	-48 (5.3) ▼	490 (2.5)	-10 (3.7) ▼	◊ ◊	-49 (5.4) ▼
Thailand	453 (5.3)	◊ ◊	-16 (7.8) ▼	- - ▲	430 (5.5)	◊ ◊	-35 (7.8) ▼	- -
Tunisia	410 (2.8)	11 (3.8) ▲	-25 (3.7) ▼	◊ ◊	431 (2.7)	8 (3.4) ▲	-29 (4.0) ▼	◊ ◊
United States	507 (3.0)	5 (4.5)	9 (4.9)	17 (5.6) ▲	510 (3.1)	3 (4.7)	5 (5.7)	15 (6.1) ▲
Benchmarking Participants								
Basque Country, Spain	496 (3.9)	6 (4.6)	◊ ◊	◊ ◊	501 (3.9)	16 (5.3) ▲	◊ ◊	◊ ◊
British Columbia, Canada	507 (3.3)	◊ ◊	-18 (7.8) ▼	◊ ◊	512 (3.4)	◊ ◊	-7 (9.1)	◊ ◊
Massachusetts, US	544 (4.8)	◊ ◊	34 (8.0) ▲	◊ ◊	550 (5.1)	◊ ◊	33 (7.9) ▲	◊ ◊
Minnesota, US	531 (4.4)	◊ ◊	◊ ◊	14 (8.8)	535 (5.1)	◊ ◊	◊ ◊	14 (9.4)
Ontario, Canada	513 (4.1)	-7 (5.3)	-1 (5.3)	13 (5.0) ▲	522 (4.0)	0 (5.3)	2 (5.1)	18 (5.3) ▲
Quebec, Canada	527 (3.5)	-13 (5.1) ▼	-39 (6.7) ▼	-33 (7.6) ▼	529 (4.6)	-17 (5.6) ▼	-36 (7.3) ▼	-24 (7.9) ▼

▲ 2007 average significantly higher

▼ 2007 average significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Trend notes: Data are not shown for Kuwait, Morocco, Saudi Arabia, and Turkey, because comparable data from previous cycles are not available. Data for Indonesia do not include Islamic schools.

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

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

A diamond (◊) indicates the country did not participate in the assessment.

improvement in algebra, it is positive that this international gender difference in algebra, seen in almost two-thirds of the participating countries, did not exist in England.

The only significant gender difference in England was in number, where boys outscored girls by 16 scale points. This was in spite of no gender difference in attainment in number at grade 4. This difference was not sufficiently large to affect the overall gender balance in attainment in grade 8 mathematics.

The difference in number was also not unusual: 20 of the 49 participating countries showed stronger performance from boys than girls in number. These countries included Australia, Japan, Korea, Scotland and the United States. Hong Kong and Singapore, two of the four highest scoring countries, had no gender difference in number, although they

Exhibit 6.17 Average achievement in the mathematics content domains by gender

TIMSS2007 8th Mathematics Grade

Country	Average Scale Scores for Mathematics Content Domains							
	Number		Algebra		Geometry		Data and Chance	
	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys
Algeria	398 (2.2)	408 (2.3) ▲	350 (2.8)	349 (3.8)	429 (2.5)	435 (2.5) ▲	369 (2.0)	373 (1.9) ▲
Armenia	492 (4.1)	492 (3.5)	538 (3.4) ▲	525 (2.8)	490 (5.1)	495 (4.6)	427 (5.4)	427 (4.1)
Australia	492 (5.3)	514 (5.6) ▲	466 (5.6)	475 (5.2)	481 (4.8)	493 (5.3) ▲	516 (4.8)	534 (4.8) ▲
Bahrain	392 (2.4) ▲	384 (3.2)	427 (2.9) ▲	380 (3.4)	429 (2.7) ▲	396 (3.1)	429 (3.1) ▲	408 (2.5)
Bosnia Herzegovina	447 (3.0)	454 (3.5) ▲	483 (3.5) ▲	467 (3.6)	452 (4.6)	450 (3.4)	435 (3.1)	440 (2.6)
Botswana	372 (3.4) ▲	361 (4.0)	404 (2.7) ▲	383 (2.7)	325 (4.3)	324 (4.1)	390 (3.3) ▲	376 (4.0)
Bulgaria	459 (4.4)	457 (6.0)	488 (5.0) ▲	464 (6.3)	476 (5.0) ▲	460 (6.1)	445 (4.6)	436 (6.4)
Chinese Taipei	574 (4.6)	579 (4.9)	622 (5.8)	613 (6.3)	593 (4.9)	591 (5.3)	567 (4.5)	564 (4.1)
Colombia	348 (4.0)	391 (4.1) ▲	381 (3.6)	400 (3.8) ▲	358 (4.2)	385 (4.5) ▲	391 (4.7)	420 (4.0) ▲
Cyprus	468 (2.2) ▲	461 (2.4)	481 (2.5) ▲	455 (2.9)	470 (4.0) ▲	445 (2.9)	474 (2.4) ▲	454 (2.5)
Czech Republic	507 (2.8)	515 (2.7) ▲	492 (2.6) ▲	476 (2.7)	497 (2.7)	498 (3.4)	512 (3.6)	511 (3.0)
Egypt	393 (4.3)	392 (4.5)	418 (5.1) ▲	401 (4.6)	411 (5.0)	402 (4.8)	391 (3.9) ▲	377 (4.2)
El Salvador	345 (4.0)	366 (4.0) ▲	326 (4.4)	337 (5.1) ▲	310 (4.9)	326 (4.4) ▲	348 (4.3)	377 (4.0) ▲
† England	502 (5.2)	518 (6.2) ▲	493 (4.8)	491 (6.0)	508 (4.5)	512 (5.7)	545 (5.2)	549 (6.2)
1 Georgia	417 (5.4)	424 (6.4)	429 (6.6) ▲	413 (7.1)	409 (6.8)	408 (7.3)	378 (4.7) ▲	367 (5.0)
Ghana	298 (4.6)	319 (4.1) ▲	345 (4.5)	369 (3.5) ▲	265 (5.5)	283 (5.4) ▲	311 (6.2)	328 (3.7) ▲
† Hong Kong SAR	570 (5.1)	564 (7.7)	573 (5.1) ▲	558 (7.5)	573 (4.6)	567 (7.5)	554 (4.2)	544 (6.7)
Hungary	511 (4.4)	523 (3.7) ▲	509 (4.0) ▲	498 (4.2)	508 (4.1)	507 (4.0)	523 (3.6)	525 (3.9)
Indonesia	398 (4.3)	401 (4.3)	410 (3.8) ▲	400 (4.6)	396 (4.9)	393 (5.1)	405 (4.4)	400 (3.8)
Iran, Islamic Rep. of	392 (5.2)	397 (5.8)	417 (5.2) ▲	401 (5.8)	429 (6.1)	418 (6.6)	417 (4.7)	413 (5.2)
3 Israel	464 (4.0)	474 (4.3) ▲	476 (4.3) ▲	463 (5.3)	439 (4.5)	433 (5.9)	465 (4.8)	466 (6.0)
Italy	469 (3.5)	485 (3.0) ▲	462 (3.6)	459 (3.6)	488 (3.5)	491 (3.6)	488 (3.4)	493 (3.7)
Japan	545 (3.3)	558 (3.1) ▲	560 (4.0)	559 (3.3)	573 (2.9)	572 (3.2)	573 (2.5)	573 (3.1)
Jordan	419 (6.3)	414 (5.7)	461 (6.5) ▲	436 (5.6)	447 (6.1) ▲	425 (5.1)	434 (5.3) ▲	417 (5.4)
Korea, Rep. of	575 (3.4)	591 (2.8) ▲	596 (4.1)	596 (3.9)	585 (2.7)	588 (3.3)	580 (2.5)	579 (2.5)
¿ Kuwait	346 (4.3)	347 (3.9)	367 (3.8) ▲	339 (5.5)	396 (3.6) ▲	371 (4.4)	378 (4.7) ▲	352 (3.8)
Lebanon	446 (3.8)	465 (4.1) ▲	461 (3.9)	469 (3.7)	459 (4.5)	465 (4.8)	402 (4.8)	414 (5.3) ▲
1 Lithuania	505 (3.0)	507 (3.5)	491 (3.6) ▲	474 (2.9)	510 (3.0)	503 (3.8)	525 (2.6)	521 (2.6)
Malaysia	495 (5.6)	485 (5.7)	461 (4.7) ▲	446 (4.6)	480 (6.4)	473 (6.6)	469 (4.5)	468 (4.6)
Malta	495 (2.1)	497 (2.0)	476 (1.5)	471 (2.6)	493 (2.1)	497 (2.9)	487 (2.3)	486 (1.9)
Norway	487 (2.5)	488 (2.5)	428 (3.0)	423 (3.4)	464 (2.5) ▲	453 (3.2)	510 (3.1) ▲	500 (3.4)
Oman	380 (3.1) ▲	344 (4.1)	421 (3.8) ▲	360 (4.8)	412 (3.7) ▲	362 (4.8)	411 (4.1) ▲	367 (4.3)
Palestinian Nat'l Auth.	376 (4.2) ▲	355 (4.8)	403 (4.0) ▲	362 (5.5)	403 (4.7) ▲	373 (5.2)	388 (3.6) ▲	352 (4.4)
Qatar	342 (2.1) ▲	327 (2.1)	331 (2.4) ▲	293 (2.8)	323 (2.8) ▲	280 (3.7)	329 (2.3) ▲	281 (2.5)
Romania	461 (4.0)	454 (4.1)	493 (4.7) ▲	464 (5.3)	475 (4.4) ▲	459 (4.9)	431 (4.3)	426 (4.5)
Russian Federation	504 (4.1)	509 (4.2)	527 (5.2) ▲	509 (4.9)	510 (4.4)	509 (4.7)	486 (4.4)	489 (4.2)
Saudi Arabia	314 (4.6)	305 (4.3)	350 (3.8) ▲	338 (3.8)	375 (4.2) ▲	344 (4.0)	362 (3.3) ▲	336 (3.1)
† Scotland	483 (3.7)	495 (4.6) ▲	470 (3.9)	464 (4.4)	485 (3.6)	486 (4.8)	515 (3.7)	518 (4.3)
1 2 Serbia	474 (3.4)	481 (3.8)	510 (3.8) ▲	491 (3.9)	491 (4.3) ▲	480 (4.4)	455 (3.9)	461 (3.6)
Singapore	601 (3.9)	593 (4.3)	589 (3.9) ▲	569 (4.5)	586 (3.7) ▲	571 (4.2)	581 (4.5) ▲	568 (4.3)
Slovenia	496 (2.8)	508 (2.6) ▲	493 (2.9) ▲	483 (2.8)	498 (3.1)	501 (2.5)	507 (2.5)	515 (3.4) ▲
Sweden	506 (2.3)	508 (1.9)	462 (2.8) ▲	452 (2.7)	475 (3.5)	469 (2.9)	526 (3.7)	525 (3.6)
Syrian Arab Republic	380 (4.3)	407 (4.6) ▲	403 (4.2)	408 (5.3)	413 (3.5)	422 (5.4)	383 (2.9)	392 (4.5)
Thailand	452 (5.5) ▲	435 (5.1)	446 (5.5) ▲	420 (5.4)	451 (6.0) ▲	433 (5.6)	464 (4.3) ▲	442 (4.4)
Tunisia	411 (3.0)	440 (2.7) ▲	420 (2.8)	427 (3.1) ▲	429 (3.0)	446 (3.2) ▲	400 (3.0)	423 (3.0) ▲
Turkey	423 (4.3)	435 (4.5) ▲	447 (5.8) ▲	434 (5.6)	415 (5.5) ▲	407 (5.4)	448 (4.7)	442 (4.9)
Ukraine	459 (4.1)	461 (3.8)	472 (4.4) ▲	455 (4.3)	468 (4.1)	466 (3.9)	459 (3.7)	456 (4.3)
2 † United States	506 (3.1)	515 (3.1) ▲	503 (2.9)	498 (3.2)	477 (2.7)	483 (2.8) ▲	527 (3.1)	535 (3.0) ▲
¶ Morocco	382 (4.0)	398 (5.0) ▲	364 (5.2)	361 (5.6)	391 (4.7)	403 (5.1)	373 (4.7)	369 (4.6)
International Avg.	448 (0.6)	453 (0.6) ▲	457 (0.6) ▲	444 (0.6)	454 (0.6) ▲	448 (0.6)	453 (0.5) ▲	449 (0.6)
Benchmarking Participants								
Basque Country, Sp.	503 (3.2)	515 (3.5) ▲	487 (3.4)	483 (4.0)	476 (4.1)	477 (4.9)	500 (4.6)	507 (5.5)
3 B. Columbia, Canada	514 (3.7)	526 (3.7) ▲	488 (3.2)	490 (3.6)	483 (4.2)	491 (3.8) ▲	527 (4.0)	532 (4.0)
¿ ‡ Dubai, UAE	453 (5.3)	463 (6.8)	475 (5.1)	474 (5.8)	455 (5.7)	447 (5.6)	457 (6.3)	457 (5.7)
2 Massachusetts, US	544 (6.0)	553 (5.5)	539 (5.1)	537 (5.6)	516 (4.9)	522 (5.2)	563 (5.2)	575 (6.1) ▲
2 † Minnesota, US	533 (5.6)	541 (4.7)	515 (5.0)	515 (4.9)	501 (5.7)	510 (5.9)	556 (6.3)	565 (5.8)
2 Ontario, Canada	517 (4.6)	532 (4.3) ▲	489 (4.1)	491 (4.4)	504 (4.5)	512 (5.3)	540 (4.6)	547 (4.8)
3 Quebec, Canada	531 (3.5)	537 (4.7)	507 (3.4)	502 (4.6)	520 (3.6)	526 (4.4)	529 (3.1)	537 (4.1) ▲

▲ Average significantly higher than other gender

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).
¶ Did not satisfy guidelines for sample participation rates (see Appendix A).
1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).
2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).
3 National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).
¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A plus (+) sign indicates average achievement could not be accurately estimated.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 6.18 Average achievement in the mathematics cognitive domains by gender

TIMSS2007 Mathematics 8th Grade

Country	Average Scale Scores for Mathematics Cognitive Domains					
	Knowing		Applying		Reasoning	
	Girls	Boys	Girls	Boys	Girls	Boys
Algeria	409 (2.0)	415 (2.5) ▲	369 (2.2)	373 (2.2)	+ +	+ +
Armenia	492 (4.5)	493 (4.0)	512 (4.1) ▲	502 (3.2)	493 (4.9)	486 (3.9)
Australia	491 (4.9)	508 (5.2) ▲	481 (4.9)	493 (4.9)	495 (4.8)	508 (4.9)
Bahrain	415 (2.3) ▲	391 (2.7)	414 (3.6) ▲	377 (2.7)	426 (3.9) ▲	401 (4.2)
Bosnia and Herzegovina	439 (3.3)	442 (2.8)	483 (3.3) ▲	474 (2.9)	454 (3.8)	451 (2.9)
Botswana	356 (3.3) ▲	346 (3.1)	385 (2.7) ▲	367 (2.8)	+ +	+ +
Bulgaria	463 (4.4) ▲	452 (6.3)	485 (4.3) ▲	468 (6.0)	465 (4.4) ▲	445 (6.1)
Chinese Taipei	592 (4.3)	593 (4.9)	596 (4.5)	592 (5.6)	591 (4.4)	592 (5.1)
Colombia	366 (4.7)	402 (4.2) ▲	349 (3.9)	379 (4.3) ▲	405 (3.6)	427 (4.3) ▲
Cyprus	474 (2.6) ▲	456 (2.5)	478 (2.2) ▲	458 (2.2)	472 (3.1) ▲	450 (2.9)
Czech Republic	502 (2.8)	507 (3.0) ▲	506 (2.7) ▲	499 (2.7)	505 (2.9) ▲	495 (2.8)
Egypt	398 (5.0)	389 (4.7)	403 (5.4) ▲	382 (4.8)	401 (4.6)	392 (4.7)
El Salvador	336 (4.0)	358 (4.3) ▲	323 (4.5)	349 (4.0) ▲	+ +	+ +
† England	510 (5.1)	519 (6.1)	501 (4.2)	506 (5.3)	519 (4.5)	516 (5.6)
1 Georgia	401 (5.4)	401 (6.5)	429 (6.0)	424 (6.5)	393 (6.1)	385 (6.8)
Ghana	287 (5.0)	305 (4.3) ▲	298 (5.6)	326 (4.8) ▲	+ +	+ +
† Hong Kong SAR	573 (4.9)	564 (8.1)	580 (4.8) ▲	567 (7.3)	563 (5.0)	551 (7.9)
Hungary	511 (4.0)	516 (3.4)	521 (3.8)	516 (3.7)	514 (3.8)	511 (3.7)
Indonesia	401 (4.6)	396 (4.2)	400 (4.4)	393 (4.8)	406 (3.8)	404 (4.0)
Iran, Islamic Rep. of	404 (5.3)	400 (6.2)	409 (5.4)	399 (5.9)	430 (4.7)	424 (5.4)
3 Israel	457 (4.5)	455 (5.5)	475 (4.1)	471 (4.7)	467 (4.7)	458 (5.0)
Italy	477 (3.1)	488 (3.2) ▲	475 (3.4)	477 (3.5)	484 (3.4)	483 (3.4)
Japan	562 (3.2)	569 (2.9)	560 (2.8)	560 (3.3)	568 (3.4)	567 (3.5)
Jordan	431 (6.2) ▲	414 (5.6)	444 (6.5) ▲	421 (5.8)	450 (5.6) ▲	432 (4.7)
Korea, Rep. of	592 (3.7)	598 (3.4)	597 (3.7)	596 (2.8)	577 (3.1)	580 (2.7)
¿ Kuwait	370 (3.0) ▲	351 (4.3)	355 (4.0) ▲	338 (4.3)	+ +	+ +
Lebanon	444 (4.6)	453 (5.4) ▲	458 (4.1)	471 (4.6) ▲	423 (4.4)	437 (5.5) ▲
1 Lithuania	513 (2.9)	510 (2.6)	514 (3.2) ▲	501 (2.4)	489 (3.2) ▲	482 (2.7)
Malaysia	481 (5.6)	475 (5.2)	485 (5.5) ▲	468 (5.0)	470 (4.4)	465 (4.2)
Malta	491 (1.5)	494 (1.9)	492 (1.8)	489 (2.2)	473 (1.6)	476 (2.2)
Norway	480 (2.3)	475 (2.7)	460 (2.3)	457 (2.4)	479 (2.5) ▲	472 (2.8)
Oman	391 (3.6) ▲	342 (5.3)	401 (4.2) ▲	341 (5.6)	420 (4.4) ▲	372 (5.0)
Palestinian Nat'l Auth.	386 (4.0) ▲	355 (5.2)	386 (4.8) ▲	344 (5.5)	396 (4.5) ▲	366 (5.6)
Qatar	324 (2.5) ▲	285 (2.5)	322 (2.1) ▲	292 (1.9)	+ +	+ +
Romania	469 (4.5) ▲	455 (4.5)	480 (4.8) ▲	461 (4.5)	458 (4.9) ▲	440 (5.4)
Russian Federation	509 (4.1)	510 (4.2)	525 (4.4) ▲	517 (4.4)	501 (4.2)	493 (4.2)
Saudi Arabia	352 (3.2) ▲	320 (3.5)	316 (4.0) ▲	300 (3.4)	+ +	+ +
† Scotland	487 (3.8)	491 (4.3)	480 (3.4)	482 (3.9)	496 (3.5)	494 (3.9)
1 2 Serbia	480 (3.7)	477 (4.0)	507 (4.1) ▲	493 (3.5)	478 (3.7) ▲	469 (4.2)
Singapore	600 (3.9) ▲	586 (4.4)	590 (3.8) ▲	573 (4.2)	586 (4.6) ▲	571 (4.9)
Slovenia	498 (2.3)	508 (2.4) ▲	500 (2.5)	499 (2.6)	499 (3.1)	493 (2.9)
Sweden	499 (2.7)	495 (2.7)	478 (2.2)	478 (2.6)	494 (2.9) ▲	487 (2.9)
Syrian Arab Republic	393 (3.8)	410 (4.7) ▲	387 (4.7)	400 (5.5) ▲	389 (3.5)	403 (4.7) ▲
Thailand	456 (5.2) ▲	437 (5.0)	448 (5.3) ▲	424 (5.1)	466 (4.9) ▲	447 (4.7)
Tunisia	413 (2.8)	435 (2.7) ▲	411 (2.8)	431 (3.8) ▲	417 (3.2)	434 (2.2) ▲
Turkey	425 (4.9)	425 (4.9)	441 (5.1)	438 (5.3)	441 (4.7)	440 (4.7)
Ukraine	464 (4.0)	464 (4.0)	477 (4.2) ▲	465 (3.7)	449 (4.2) ▲	440 (4.2)
2 † United States	499 (3.2)	506 (3.1) ▲	514 (2.8)	514 (2.8)	504 (2.7)	505 (2.6)
¶ Morocco	385 (4.1)	394 (4.4)	361 (5.9)	369 (5.1)	381 (5.4)	386 (4.5)
International Avg.	452 (0.6) ▲	450 (0.6)	454 (0.6) ▲	447 (0.6)	471 (0.6) ▲	465 (0.7)
Benchmarking Participants						
Basque Country, Spain	490 (3.6)	499 (3.7) ▲	502 (3.4)	501 (3.7)	495 (4.2)	497 (4.4)
3 British Columbia, Canada	505 (3.3)	514 (3.4) ▲	502 (3.2)	507 (3.1) ▲	508 (3.7)	513 (3.4)
¿ ‡ Dubai, UAE	458 (5.4)	453 (5.7)	469 (5.6)	469 (5.2)	462 (5.7)	467 (5.9)
2 Massachusetts, US	539 (5.0)	546 (5.1)	545 (5.0)	548 (5.2)	541 (4.8)	545 (4.5)
2 † Minnesota, US	525 (5.2)	534 (5.2) ▲	532 (4.7)	532 (4.9)	525 (4.0)	522 (5.2)
2 Ontario, Canada	513 (4.3)	524 (4.0) ▲	504 (3.6)	506 (3.9)	517 (3.6)	526 (3.5) ▲
3 Quebec, Canada	525 (3.3)	533 (4.3)	523 (3.0)	516 (3.9)	522 (3.5)	526 (4.0)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ Average significantly higher than other gender

† Met guidelines for sample participation rates only after replacement schools were included (see Appendix A).
‡ Nearly satisfied guidelines for sample participation rates only after replacement schools were included (see Appendix A).
¶ Did not satisfy guidelines for sample participation rates (see Appendix A).
1 National Target Population does not include all of the International Target Population defined by TIMSS (see Appendix A).
2 National Defined Population covers 90% to 95% of National Target Population (see Appendix A).
3 National Defined Population covers less than 90% of National Target Population (but at least 77%, see Appendix A).
¿ Kuwait and Dubai, UAE tested the same cohort of students as other countries, but later in 2007, at the beginning of the next school year.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A plus (+) sign indicates average achievement could not be accurately estimated.

had differences in other domains (one and three content domains respectively). The highest scoring country in mathematics at grade 8, Chinese Taipei, had no gender differences in any content domain, one of only two countries to achieve this degree of equality across the mathematics content domains at this grade.

Chapter 5 showed that England's pupils performed most strongly in knowing and reasoning, and were relatively weaker in applying (see Chapter 5 for details of the scope of each of these cognitive domains). Exhibit 6.18 shows that England's girls and boys at grade 8 performed equally well in all three of these areas, with no gender differences seen. This mirrors the equality seen for the three cognitive domains at grade 4.

The same equality at grade 8 applied to only 13 of the 49 TIMSS 2007 countries, including Chinese Taipei, Japan, Korea and Scotland. Singapore, in contrast, had a significant difference in favour of girls on all three cognitive domains. Once again, the even performance of England's boys and girls in these three cognitive domains is positive.

6.6 Gender differences in TIMSS compared with other assessments

The gender differences referred to in the preceding sections are summarised in Exhibits 6.19 and 6.20. Exhibit 6.19 shows that England's boys had an advantage in earth science at both grades and in two other content domains at grade 8, one in mathematics, one in science. Girls had an advantage in two domains at grade 4, again, in one domain in each subject. Overall, however, Exhibit 6.19 indicates the extent of the equality of achievement existing across the domains of mathematics and science overall (see Chapter 5 for details of the content of each domain).

Exhibit 6.20 shows that there were no gender differences at all in the cognitive domains in mathematics. Some differences existed in science, however, one at grade 4 and two at grade 8.

Exhibit 6.19 Gender difference in TIMSS 2007 in England, content domains

Grade 4 (year 5)	Difference	Grade 8 (year 9)	Difference
Mathematics overall	–	**Mathematics overall**	–
Number	–	Number	Boys (+16 scale points)
		Algebra	–
Geometric shapes and measures	Girls (+10 scale points)	Geometry	–
Data display	–	Data and chance	–
Science overall	–	**Science overall**	–
Life science	Girls (+7 scale points)	Biology	–
Physical science	–	Chemistry	–
		Physics	Boys (+15 scale points)
Earth science	Boys (+10 scale points)	Earth science	Boys (+13 scale points)

Exhibit 6.20 Gender difference in TIMSS 2007 in England, cognitive domains

Grade 4 (year 5)	Difference	Grade 8 (year 9)	Difference
Mathematics	-	Mathematics	-
Knowing	-	Knowing	-
Applying	-	Applying	-
Reasoning	-	Reasoning	-
Science	-	Science	-
Knowing	-	Knowing	Boys (+12 scale points)
Applying	-	Applying	Boys (+12 scale points)
Reasoning	Girls (+7 scale points)	Reasoning	-

Traditionally, there has been a common perception that boys do better than girls in mathematics and science. Conversely, recent trends have encouraged a view that girls often achieve more highly than boys in England's school system. These TIMSS results appear to challenge both perceptions. How do these findings compare with gender analysis in other assessments? This section compares the TIMSS 2007 gender findings with analysis of GCSE results, with outcomes from end-of-key-stage assessments and with results from PISA 2006, an international survey of reading, mathematical and scientific literacy.

PISA is a survey of achievement among 15 year-olds. The three-yearly survey assesses all three subjects, one as the main focus in each cycle and the others as minor domains. In PISA 2006, the main focus was science. Thus, the assessments included more science items than mathematics or reading items and can provide a more robust overview of scientific literacy than they can of the other areas. It is important to note that, because the PISA focus was on scientific *literacy* rather than science attainment, the PISA and TIMSS surveys are not directly comparable in terms of content. However, in terms of investigating gender differences, together they are indicative of the degree of equality to be found in England.

Gender differences from PISA 2006 are summarised in Exhibit 6.21.

Exhibit 6.21 Gender difference in PISA 2006 in England

Students aged 15	Difference
Mathematics overall	boys (+17 scale points)
Science overall	boys (+11 scale points)
Explaining phenomena scientifically	boys (+22 scale points)
Identifying scientific issues	-
Using scientific evidence	-

Note: no breakdown of mathematics gender differences are given because mathematics was a minor domain of the PISA 2006 survey. Source: Bradshaw et al. (2007).

Exhibit 6.21 shows that, in the PISA 2006 results, the results for England followed the traditional pattern of boys outperforming girls in both subjects. The overall difference for science was caused by the difference in explaining phenomena scientifically. This included skills such as applying scientific knowledge, identifying or describing scientific phenomena and predicting changes. This is consistent with the TIMSS 2007 finding that boys did better than girls at knowing and applying.

No breakdown of the PISA results by content domain was available, so it is not possible to say how the PISA results relate to the TIMSS content domains, where boys did better on physics and earth science. However, it is notable that the PISA difference was sufficiently strong to cause a gender effect overall at age 15 (year 11) in England, whereas TIMSS 2007 had no such overall difference at grade 8 (year 9).

The TIMSS grade 8 results relate to year 9 pupils, while PISA results relate to 15 year-olds (for PISA 2006 in England, this meant Year 11 pupils as a result of the timing of the survey). Year 11 is when pupils in England take their GCSEs. How do GCSE results compare? There are several GCSE options. This analysis will look at the most commonly taken GCSE courses in mathematics and science.

In 2007, the year in which the TIMSS assessments were taken, the results for these courses were as set out in Exhibit 6.22.

Exhibit 6.22 Gender differences in key stage 4 GCSE results in England (A* to C grades), 2007

GCSE	Boys (%)	Girls (%)	Difference
Mathematics full course	57	58	girls (+1 percentage point)
Science double award	57	59	girls (+2 percentage points)
Science single award	20	24	girls (+4 percentage points)
Biology	90	90	none
Chemistry	91	92	girls (+1 percentage point)
Physics	88	86	boys (+2 percentage points)

Source: JCQ (2008)

Exhibit 6.22 shows gender differences that are, in the main, small and unlikely to be statistically significant. A possible exception was the 2007 single award in science, favouring girls. This was taken by fewer candidates than the science double award and is perhaps less representative than the double award of general science performance. The minor differences for the other awards suggest broadly equivalent performance between boys and girls, and this is true for both combined and separate science courses, and for mathematics. These findings correspond to the TIMSS 2007 findings of no overall differences in mathematics or science.

Similar findings obtain for the key stage 3 tests of 2007, taken by pupils at a similar time to the TIMSS 2007 assessments. In these tests, the percentage of girls achieving a level 5 or above was one percentage point higher than for boys for each of mathematics and science (see Exhibit 6.23), small differences which might not be statistically significant.

Exhibit 6.23 Gender differences in key stage 3 test results in England, 2007

Key stage 3 test	Boys (% reaching level 5 or higher)	Girls (% reaching level 5 or higher)	Difference
Mathematics	75	76	girls (+1 percentage point)
Science	72	73	girls (+1 percentage point)

Source: DCSF (2007b)

In the previous TIMSS cycle, TIMSS 2003, one significant gender difference was found in England: boys did better than girls at science in grade 8, and this difference was found in four of the five content domains addressed in TIMSS 2003 (chemistry, physics, Earth science and environmental science; there were no gender differences in life science in TIMSS 2003). This contrasted with GCSE results from that year which, again, showed minimal differences between boys and girls (see Sturman, 2008). This may have been because GCSEs, like the key stage tests, compared pupils at the level of their grade, while TIMSS compared pupils at the level of their score. Thus, patterns that might be hidden at the grade level may show up at score level. Given this fact, it is positive that the TIMSS 2007 results showed no overall gender differences. The fact that they showed some differences at domain level (and that some differences existed in PISA 2006 and in some GCSE science awards) suggests that there is still some work to do in eradicating gender differences altogether in mathematics and science in England. However, it is clear that good progress continues to be made in promoting equality of achievement at the secondary school level.

What of achievement at primary level? None of the other international surveys address mathematics and science at primary level, and so the only comparator for the grade 4 TIMSS results is the key stage 2 test results. The 2007 key stage 2 outcomes, from tests taken by pupils one year ahead of those in the TIMSS 2007 survey, are summarised in Exhibit 6.24. As was the case with the key stage 3 results, the differences between boys and girls are small and unlikely to be significant. As such, these results, too, mirror those found in TIMSS 2007, of no significant difference between the achievement of boys and girls overall in mathematics and science.

Exhibit 6.24 Gender differences in key stage 2 test results in England, 2007

Key stage 2 test	Boys (% reaching level 4 or higher)	Girls (% reaching level 4 or higher)	Difference
Mathematics	78	76	boys (+2 percentage points)
Science	87	88	girls (+1 percentage point)

Source: DCSF (2007a)

Summary

This chapter has highlighted some positive news for England. Its pupils at grade 4 and grade 8 are achieving well in science and mathematics and there are no gender differences in attainment overall. While some gender differences are found in some of the content domains, these are relatively small and do not affect the overall equality of achievement.

These TIMSS results are broadly in line with gender findings from England's national assessments (GCSEs and key stage tests taken in 2007). They sit less comfortably with the PISA 2006 results in scientific literacy, which found rather more gender differences. It is not clear why this should be, although differences in the nature of the assessments might account for it.

What is clear is that England's pupils are making excellent progress towards equality of achievement. While it is also clear from the PISA findings and from the content and cognitive domain analyses that small pockets of difference remain to be addressed, the overall picture is positive. Girls have made good gains since TIMSS 2003, contributing to England's improved achievement overall in TIMSS 2007 and towards eradicating overall differences in attainment compared with boys. Future progress needs to build on this solid foundation.

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7 Pupils' attitudes

- *Most pupils are highly confident in science and mathematics.*
- *Boys are more confident than girls.*
- *Most enjoy science and mathematics at grade 4, and science at grade 8.*
- *Nearly three-quarters of grade 8 pupils value their learning in mathematics, and over half in science.*

Pupils' attitudes underpin their learning. Attitudes can support or hinder learning, and so TIMSS explores the relationship between attitudes and outcomes. This chapter looks at pupils' attitudes in England and relates them to achievement. It also compares pupils' attitudes in England with those seen in other TIMSS 2007 countries.

Attitudes in TIMSS 2007, as in previous TIMSS cycles, were measured by means of a pupil questionnaire, completed shortly after each pupil took their achievement test. This asked pupils questions on a range of topics, including their feelings about their school, their learning in mathematics and science and, in the case of grade 8 (year 9), the relevance of their mathematics and science learning to their future.

Exhibit 7.1 below summarises the attitudinal themes explored in the pupil questionnaires.

Exhibit 7.1 Attitudinal themes in the pupil questionnaires

Grade 4 themes (year 5)		Grade 8 themes (year 9)	
Q6	Series of statements about enjoyment of and confidence in mathematics	Q8	Series of statements about enjoyment of and confidence in mathematics
		Q9	Series of statements about the value pupils place on mathematics
Q8	Series of statements about enjoyment of and confidence in science	Q11	Series of statements about enjoyment of and confidence in science
		Q12	Series of statements about the value pupils place on science
Q11	Statements about pupils' perceptions of school climate (enjoyment of school, pupils' desire to do well, teacher desire for pupils to do well)	Q15	Statements about pupils' perceptions of school climate (enjoyment of school, pupils' desire to do well, teacher desire for pupils to do well)
Q12	Statements about bullying and exclusion by fellow pupils	Q16	Statements about bullying and exclusion by fellow pupils

Findings in relation to each of these themes are explored in the sections below. Pupils' attitudes to their science and mathematics learning are discussed in this chapter, and their views of their schools in Chapter 8.

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7.1 Pupils' attitudes towards grade 4 science

Fifty-nine per cent of England's grade 4 pupils had a highly positive attitude to science. This is as measured by their responses to three statements about their enjoyment of science (answers are given on a four point scale from 'agree a lot' to 'disagree a lot'). The international analysis of pupils' attitudes uses responses to these statements to create an index of 'Positive Affect Toward Science' (PATS). Pupils were categorised into three bands: High PATS, medium PATS and low PATS (see Exhibit 7.2 for details of how the index was created). Exhibit 7.2 shows the percentage of pupils in each band for each participating country. The countries are listed in order of overall achievement in science at grade 4 (as indicated in Chapter 3). Countries performing at a similar level of overall achievement to England are indicated by a box.

Exhibit 7.2 shows that, despite the large percentage of pupils in the high positive attitude category in England, the proportion has dropped 13 percentage points since TIMSS 1995, while the percentages in the medium and low categories have increased (by four and nine percentage points, respectively). This is despite the high overall achievement of England's grade 4 pupils in science: pupils are doing well in science but with relatively low levels of enjoyment. In spite of this, in England as in most countries, it is clear that enjoyment is related to achievement to some degree: Exhibit 7.2 shows that, as enjoyment of science decreases, so too does achievement. This could be because those who enjoy science more do better at it, or the reverse might be true: that those who do better at it enjoy it more.

The comparison has been made with 1995 and not with the more recent grade 4 TIMSS cycle of 2003, because the comparable index was not available in 2003. In that cycle, international outcomes were reported only on responses to the statement 'I enjoy science'. In England in 2003, 68 per cent of pupils agreed with that statement a lot or a little, slightly higher than the proportion in the highly positive category in 2007.

England is not alone in having high achievement and relatively low levels of enjoyment. Singapore was the highest scoring country of all in science at grade 4 and, like England, also experienced a drop in numbers in the high positive attitude category and an increase in the medium and low categories since 1995.

Those countries with the very highest proportions of grade 4 pupils having highly positive attitudes towards science (above 80 per cent) were predominantly, though not exclusively, less well developed countries.

Despite the change in levels of enjoyment of science since 1995, grade 4 pupils' levels of confidence in science have remained stable. Exhibit 7.3 shows that 55 per cent of England's grade 4 pupils have a high level of self-confidence in their ability to learn in science, a small but not statistically significant increase on the equivalent index in 1995 (the most recent equivalent index available). Once again, higher levels of achievement are associated with being in a higher confidence band although, as was the case with enjoyment, the reasons for this could lie in either direction: that high confidence might arise from, or alternatively might follow from, high attainment.

Exhibit 7.2 Index of students' positive affect toward science (PATS) with trends

TIMSS2007 Science 4th Grade

Country	High PATS			Medium PATS			Low PATS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 1995	2007 Percent of Students	Average Achievement	Difference in Percent from 1995	2007 Percent of Students	Average Achievement	Difference in Percent from 1995
Singapore	75 (0.7)	598 (4.0)	-9 (1.1) ▼	15 (0.5)	557 (6.0)	3 (0.8) ▲	11 (0.5)	553 (5.8)	5 (0.6) ▲
Chinese Taipei	75 (1.4)	564 (2.0)	◊ ◊	14 (0.7)	539 (4.2)	◊ ◊	11 (0.9)	534 (4.5)	◊ ◊
Hong Kong SAR	79 (1.0)	562 (3.4)	-2 (2.1)	11 (0.6)	528 (5.2)	-1 (1.0)	10 (0.8)	522 (5.4)	3 (1.6) ▲
Japan	81 (0.9)	553 (2.1)	1 (1.4)	12 (0.6)	534 (4.1)	-1 (0.9)	7 (0.5)	523 (6.1)	1 (0.8)
Russian Federation	78 (1.0)	552 (4.5)	◊ ◊	13 (0.8)	540 (7.2)	◊ ◊	9 (0.5)	521 (8.1)	◊ ◊
Latvia	71 (1.1)	544 (2.5)	5 (1.8) ▲	16 (0.7)	538 (4.2)	-7 (1.3) ▼	13 (0.9)	541 (5.3)	2 (1.3)
England	59 (1.2)	548 (3.4)	-13 (1.9) ▼	17 (0.7)	538 (4.7)	4 (1.1) ▲	24 (1.1)	533 (4.1)	9 (1.5) ▲
United States	75 (0.8)	545 (2.5)	-1 (1.3)	13 (0.4)	529 (4.1)	0 (0.8)	12 (0.6)	521 (4.4)	1 (0.9)
Hungary	69 (1.3)	544 (3.3)	-1 (2.0)	14 (0.6)	522 (6.7)	-4 (1.0) ▼	18 (1.1)	527 (5.5)	5 (1.5) ▲
Italy	78 (0.8)	541 (3.3)	- -	12 (0.6)	522 (4.1)	- -	10 (0.5)	516 (5.2)	- -
Kazakhstan	90 (1.1)	535 (5.7)	◊ ◊	6 (0.9)	517 (12.8)	◊ ◊	4 (0.5)	515 (10.3)	◊ ◊
Germany	81 (0.8)	536 (2.5)	◊ ◊	11 (0.6)	514 (5.4)	◊ ◊	8 (0.5)	501 (4.7)	◊ ◊
Australia	78 (1.3)	534 (3.6)	4 (1.7) ▲	11 (0.8)	513 (5.8)	-1 (1.0)	11 (0.8)	505 (5.1)	-2 (1.1) ▼
Slovak Republic	76 (1.1)	531 (4.4)	◊ ◊	12 (0.7)	514 (7.3)	◊ ◊	12 (0.8)	525 (6.5)	◊ ◊
Austria	75 (0.9)	530 (2.6)	6 (1.7) ▲	13 (0.6)	518 (4.1)	-4 (1.1) ▼	12 (0.7)	510 (4.2)	-2 (1.3)
Sweden	73 (1.0)	531 (3.2)	◊ ◊	14 (0.7)	512 (4.0)	◊ ◊	13 (0.6)	509 (4.1)	◊ ◊
Netherlands	66 (1.5)	528 (2.8)	3 (2.2)	11 (0.6)	514 (4.1)	-4 (1.1) ▼	23 (1.3)	515 (4.0)	1 (1.8)
Slovenia	69 (1.0)	523 (2.2)	-7 (1.8) ▼	14 (0.6)	510 (4.0)	-3 (1.2) ▼	17 (0.9)	509 (3.2)	10 (1.1) ▲
Denmark	59 (1.9)	525 (3.2)	◊ ◊	20 (1.1)	510 (4.3)	◊ ◊	21 (1.5)	507 (4.1)	◊ ◊
Czech Republic	64 (1.4)	521 (3.4)	-9 (1.9) ▼	15 (0.7)	504 (5.8)	0 (1.0)	21 (1.1)	509 (3.6)	9 (1.4) ▲
Lithuania	81 (1.0)	517 (2.6)	◊ ◊	12 (0.7)	500 (4.6)	◊ ◊	7 (0.6)	510 (4.6)	◊ ◊
New Zealand	75 (0.8)	513 (2.6)	0 (1.5)	14 (0.5)	482 (5.7)	1 (1.0)	11 (0.5)	480 (5.3)	-1 (1.1)
Scotland	70 (1.3)	505 (2.5)	- -	14 (0.7)	498 (4.6)	- -	16 (1.1)	483 (4.9)	- -
Armenia r	77 (1.4)	493 (5.0)	◊ ◊	12 (1.1)	493 (17.4)	◊ ◊	11 (0.8)	490 (14.7)	◊ ◊
Norway	71 (1.2)	484 (3.4)	1 (1.9)	14 (0.8)	468 (4.9)	-2 (1.2)	15 (0.9)	463 (6.8)	1 (1.4)
Ukraine	83 (0.9)	483 (3.0)	◊ ◊	10 (0.6)	456 (6.3)	◊ ◊	7 (0.6)	457 (7.0)	◊ ◊
Iran, Islamic Rep. of r	86 (1.1)	452 (4.2)	3 (1.7)	8 (0.7)	393 (8.2)	-6 (1.3) ▼	6 (0.7)	377 (10.4)	3 (0.8) ▲
Georgia	82 (1.0)	428 (4.4)	◊ ◊	12 (0.7)	402 (7.3)	◊ ◊	6 (0.8)	414 (7.1)	◊ ◊
Colombia	88 (0.8)	410 (5.4)	◊ ◊	8 (0.7)	378 (12.6)	◊ ◊	4 (0.5)	390 (14.4)	◊ ◊
El Salvador	79 (0.9)	399 (3.7)	◊ ◊	15 (0.7)	365 (5.3)	◊ ◊	6 (0.5)	371 (8.8)	◊ ◊
Algeria	87 (0.9)	365 (5.6)	◊ ◊	9 (0.5)	309 (10.6)	◊ ◊	4 (0.6)	305 (15.0)	◊ ◊
Kuwait	85 (0.9)	370 (4.5)	- -	8 (0.6)	289 (8.3)	- -	7 (0.5)	300 (10.8)	- -
Tunisia	86 (1.0)	348 (5.5)	◊ ◊	10 (0.7)	238 (9.5)	◊ ◊	4 (0.5)	212 (15.1)	◊ ◊
Morocco	83 (1.1)	315 (6.0)	◊ ◊	11 (0.9)	262 (14.4)	◊ ◊	5 (0.6)	220 (13.1)	◊ ◊
Qatar	79 (0.5)	319 (2.7)	◊ ◊	12 (0.4)	257 (4.8)	◊ ◊	10 (0.3)	262 (5.5)	◊ ◊
Yemen r	74 (1.8)	226 (8.3)	◊ ◊	17 (1.2)	167 (7.6)	◊ ◊	9 (0.9)	161 (11.1)	◊ ◊
International Avg.	77 (0.2)	485 (0.7)		13 (0.1)	456 (1.2)		11 (0.1)	452 (1.3)	
Benchmarking Participants									
Massachusetts, US	77 (1.5)	576 (4.7)	◊ ◊	12 (0.9)	563 (6.9)	◊ ◊	11 (1.2)	552 (6.8)	◊ ◊
Minnesota, US	79 (1.9)	554 (6.6)	7 (3.1) ▲	11 (1.0)	549 (8.7)	-3 (1.6)	10 (1.2)	542 (8.6)	-4 (2.0) ▼
Alberta, Canada	75 (1.2)	547 (3.7)	2 (2.5)	13 (0.7)	533 (6.2)	-1 (1.4)	12 (0.7)	526 (6.4)	-1 (2.1)
British Columbia, Canada	72 (1.2)	542 (2.9)	◊ ◊	14 (0.7)	530 (4.6)	◊ ◊	14 (0.9)	522 (5.0)	◊ ◊
Ontario, Canada	71 (1.4)	541 (4.0)	-4 (1.9)	14 (0.9)	531 (6.7)	0 (1.2)	15 (1.1)	523 (5.0)	3 (1.4) ▲
Quebec, Canada	78 (1.2)	522 (2.9)	9 (4.0) ▲	10 (0.8)	497 (5.2)	-5 (2.1) ▼	12 (0.8)	502 (6.1)	-5 (3.4)
Dubai, UAE	84 (1.0)	474 (3.4)	◊ ◊	9 (0.6)	440 (11.2)	◊ ◊	8 (0.7)	415 (10.7)	◊ ◊

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on students' responses to three statements about science: 1) I enjoy learning science; 2) Science is boring (Reversed); 3) I like science. Average is computed across the three items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a lot or a little on average across the three statements are assigned to the high level. Students disagreeing a little or a lot on average across the three statements are assigned to the low level. All other students are assigned to the middle level.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A dash (-) indicates comparable data are not available.
An "r" indicates data are available for at least 70 but less than 85% of the students.
A diamond (◊) indicates the country did not participate in the assessment.

Although the three highest scoring countries had higher percentages of pupils enjoying science than was the case in England, it is notable that they had fewer, or a roughly similar, proportion of pupils in the high confidence band as in England. In particular, levels of pupil confidence in Singapore were low: Singapore had only 41 per cent of its grade 4 pupils in the high confidence band, despite their very high achievement in science. This was an increase on Singapore's percentage in the corresponding band in 1995, but was, nevertheless, lower than in any other participating country. The proportion of pupils in the highest confidence band ranged from 41 per cent in Singapore to 79 per cent in Austria. It is clear that high achievement and high confidence are not automatically correlated.

Exhibit 7.3 Index of students' self-confidence in learning science (SCS) with trends

TIMSS2007 Science 4th Grade

Country	High SCS			Medium SCS			Low SCS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Singapore	41 (0.9)	621 (4.0)	9 (1.3) ▲	38 (0.7)	568 (4.9)	-3 (1.1) ▼	21 (0.6)	556 (5.0)	-6 (1.0) ▼
Chinese Taipei	58 (1.2)	572 (2.3)	8 (1.6) ▲	33 (0.9)	538 (2.9)	-4 (1.2) ▼	9 (0.7)	533 (4.4)	-4 (1.0) ▼
Hong Kong SAR	52 (1.3)	571 (3.4)	-8 (1.9) ▼	38 (1.0)	539 (4.1)	6 (1.5) ▲	11 (0.7)	528 (5.4)	2 (0.8) ▲
Japan	53 (1.2)	562 (2.4)	8 (1.6) ▲	35 (1.0)	537 (2.8)	-6 (1.3) ▼	12 (0.6)	521 (4.2)	-2 (0.9)
Russian Federation	63 (1.2)	563 (4.1)	0 (1.8)	27 (1.1)	523 (6.9)	0 (1.6)	10 (0.7)	520 (7.8)	0 (1.1)
Latvia	57 (1.3)	558 (2.8)	3 (2.0)	32 (1.0)	526 (3.2)	-4 (1.6) ▼	11 (0.8)	515 (4.9)	1 (1.3)
England	55 (1.1)	561 (3.4)	2 (1.6)	31 (0.8)	524 (3.6)	-2 (1.2)	14 (0.8)	512 (4.8)	0 (1.1)
United States	69 (0.7)	556 (2.4)	14 (1.2) ▲	22 (0.5)	508 (3.8)	-17 (1.0) ▼	8 (0.4)	493 (4.7)	3 (0.5) ▲
Hungary	65 (1.2)	561 (2.9)	-5 (1.6) ▼	26 (1.0)	498 (5.0)	3 (1.3) ▲	10 (0.6)	494 (6.1)	2 (0.8) ▲
Italy	69 (0.9)	548 (3.4)	0 (1.4)	25 (0.7)	514 (3.6)	-1 (1.2)	6 (0.4)	496 (6.6)	0 (0.6)
Kazakhstan	71 (1.7)	542 (5.3)	◊ ◊	23 (1.3)	506 (6.8)	◊ ◊	6 (1.0)	520 (11.0)	◊ ◊
Germany	76 (0.8)	544 (2.5)	◊ ◊	18 (0.6)	491 (4.7)	◊ ◊	5 (0.4)	469 (6.5)	◊ ◊
Australia	63 (1.0)	543 (3.0)	-3 (1.6)	28 (0.7)	509 (4.4)	1 (1.3)	9 (0.7)	483 (6.7)	2 (0.8) ▲
Slovak Republic	69 (1.2)	546 (3.5)	◊ ◊	24 (1.0)	492 (7.2)	◊ ◊	7 (0.5)	476 (8.9)	◊ ◊
Austria	79 (0.9)	539 (2.4)	◊ ◊	16 (0.7)	479 (4.1)	◊ ◊	5 (0.5)	477 (7.2)	◊ ◊
Sweden	76 (0.9)	534 (3.0)	◊ ◊	20 (0.7)	498 (4.5)	◊ ◊	4 (0.4)	484 (8.1)	◊ ◊
Netherlands	67 (1.3)	535 (2.7)	-4 (1.8) ▼	25 (1.1)	504 (3.8)	3 (1.4) ▲	8 (0.6)	490 (5.5)	1 (0.9)
Slovenia	65 (1.1)	533 (2.4)	-12 (1.4) ▼	28 (0.9)	497 (3.2)	10 (1.2) ▲	7 (0.5)	472 (6.8)	3 (0.7) ▲
Denmark	68 (1.4)	531 (2.8)	◊ ◊	26 (1.1)	494 (4.3)	◊ ◊	7 (0.6)	485 (6.3)	◊ ◊
Czech Republic	56 (1.3)	534 (3.3)	◊ ◊	30 (1.1)	497 (3.8)	◊ ◊	14 (0.7)	482 (5.0)	◊ ◊
Lithuania	70 (0.9)	527 (2.4)	1 (1.2)	25 (0.8)	491 (3.7)	-1 (1.2)	5 (0.5)	460 (9.3)	0 (0.6)
New Zealand	51 (1.1)	530 (2.7)	15 (1.5) ▲	37 (1.0)	486 (4.0)	-22 (1.4) ▼	12 (0.6)	464 (4.9)	7 (0.7) ▲
Scotland	62 (1.2)	514 (2.6)	5 (1.8) ▲	26 (1.0)	485 (3.9)	-4 (1.5) ▼	11 (0.8)	468 (4.3)	-1 (1.0)
Armenia s	59 (1.8)	503 (5.3)	0 (2.2)	31 (1.5)	486 (11.8)	-3 (1.8)	10 (0.7)	472 (17.3)	3 (1.0) ▲
Norway	67 (1.3)	492 (3.1)	3 (1.7)	26 (1.0)	454 (4.8)	-3 (1.4) ▼	7 (0.5)	436 (8.4)	0 (0.7)
Ukraine	57 (1.3)	498 (3.3)	◊ ◊	33 (1.0)	454 (3.6)	◊ ◊	9 (0.6)	447 (6.4)	◊ ◊
Iran, Islamic Rep. of	74 (1.3)	461 (3.8)	22 (2.0) ▲	21 (1.2)	393 (5.8)	-21 (1.9) ▼	5 (0.6)	359 (13.9)	-1 (0.8)
Georgia	65 (1.4)	439 (4.1)	◊ ◊	28 (1.1)	403 (6.3)	◊ ◊	7 (0.6)	393 (9.0)	◊ ◊
Colombia	58 (1.4)	430 (5.2)	◊ ◊	37 (1.3)	376 (6.6)	◊ ◊	5 (0.6)	366 (13.0)	◊ ◊
El Salvador	45 (1.3)	420 (3.9)	◊ ◊	49 (1.1)	372 (3.8)	◊ ◊	6 (0.5)	360 (9.0)	◊ ◊
Algeria	51 (1.4)	378 (5.6)	◊ ◊	43 (1.2)	341 (7.7)	◊ ◊	6 (0.5)	315 (15.0)	◊ ◊
Kuwait	65 (1.4)	388 (4.5)	◊ ◊	31 (1.4)	310 (6.3)	◊ ◊	4 (0.5)	285 (13.9)	◊ ◊
Tunisia	58 (1.6)	374 (6.5)	-2 (2.3)	37 (1.4)	283 (6.2)	3 (2.0)	5 (0.6)	222 (10.8)	-2 (0.8) ▼
Morocco r	49 (1.6)	332 (7.2)	-3 (2.5)	42 (1.5)	281 (7.7)	3 (2.3)	8 (0.9)	259 (15.1)	0 (1.5)
Qatar	62 (0.7)	336 (2.4)	◊ ◊	33 (0.7)	264 (3.7)	◊ ◊	6 (0.3)	233 (6.7)	◊ ◊
Yemen r	46 (1.8)	233 (8.3)	◊ ◊	45 (1.5)	194 (7.4)	◊ ◊	9 (0.7)	179 (12.5)	◊ ◊
International Avg.	61 (0.2)	497 (0.7)		30 (0.2)	453 (0.9)		8 (0.1)	437 (1.5)	
Benchmarking Participants									
Massachusetts, US	75 (1.4)	582 (4.1)	◊ ◊	18 (1.1)	547 (6.7)	◊ ◊	6 (0.7)	517 (7.1)	◊ ◊
Minnesota, US	75 (2.1)	564 (5.7)	◊ ◊	19 (1.5)	519 (10.5)	◊ ◊	5 (0.9)	502 (10.6)	◊ ◊
Alberta, Canada	72 (1.1)	555 (3.6)	◊ ◊	22 (0.8)	517 (4.5)	◊ ◊	6 (0.6)	493 (8.1)	◊ ◊
British Columbia, Canada	69 (1.0)	551 (2.8)	◊ ◊	24 (0.7)	513 (4.0)	◊ ◊	7 (0.6)	495 (6.0)	◊ ◊
Ontario, Canada	67 (1.3)	553 (3.6)	0 (1.9)	25 (1.3)	507 (6.0)	1 (1.7)	8 (0.8)	500 (6.4)	-1 (1.1)
Quebec, Canada	72 (1.1)	530 (2.9)	3 (1.6)	21 (0.9)	489 (3.8)	-2 (1.4)	7 (0.5)	480 (6.2)	-1 (0.7)
Dubai, UAE r	69 (1.4)	488 (3.4)	◊ ◊	25 (1.1)	427 (4.8)	◊ ◊	6 (0.6)	387 (12.5)	◊ ◊

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on students' responses to four statements about science:1) I usually do well in science; 2) Science is harder for me than for many of my classmates (Reversed); 3) I am just not good at science (Reversed); 4) I learn things quickly in science. Average is computed across the four items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a little or a lot on average across the four statements are assigned to the high level. Students disagreeing a little or a lot on average are assigned to the low level. All other students are assigned to the middle level.

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

In England, there was a gender difference in levels of confidence in the high and medium categories: more boys were found in the high category (four percentage points more) and more girls in the medium category (also four percentage points more). There were no differences in the low confidence category (see Exhibit 7.4). These differences, though small, were statistically significant and suggest, given that there was no significant difference in overall achievement in science at grade 4, either a slight tendency for boys to over-estimate their ability or for girls to under-estimate theirs. This gender difference is revisited in Chapter 10.

A similar pattern was found in Singapore and Chinese Taipei, two of the three highest scoring countries. In these countries, as in England, boys were over-represented in the

Exhibit 7.4 Index of students' self-confidence in learning science (SCS) by gender

TIMSS2007 Science 4th Grade

Country	High SCS Percent of Students		Medium SCS Percent of Students		Low SCS Percent of Students	
	Girls	Boys	Girls	Boys	Girls	Boys
Singapore	36 (1.1)	47 (1.3) ▲	40 (0.9) ▲	35 (1.3)	24 (0.9) ▲	19 (1.0)
Chinese Taipei	54 (1.6)	61 (1.4) ▲	35 (1.3) ▲	31 (1.0)	11 (0.8) ▲	8 (0.9)
Hong Kong SAR	52 (1.7)	51 (1.6)	38 (1.4)	37 (1.4)	10 (0.9)	11 (0.9)
Japan	49 (1.6)	58 (1.6) ▲	38 (1.4) ▲	32 (1.3)	13 (0.9) ▲	10 (0.8)
Russian Federation	66 (1.8) ▲	61 (1.4)	26 (1.6)	28 (1.4)	8 (0.7)	11 (1.2) ▲
Latvia	60 (1.6) ▲	55 (1.8)	31 (1.5)	33 (1.4)	10 (1.0)	13 (1.1) ▲
England	53 (1.5)	57 (1.2) ▲	33 (1.1) ▲	29 (1.0)	14 (1.0)	14 (1.0)
United States	68 (0.9)	71 (1.0) ▲	23 (0.7) ▲	21 (0.7)	9 (0.5) ▲	8 (0.6)
Hungary	65 (1.7)	64 (1.3)	26 (1.4)	26 (1.0)	10 (0.8)	10 (0.8)
Italy	69 (1.2)	69 (1.1)	26 (1.1)	25 (0.9)	5 (0.5)	6 (0.6)
Kazakhstan	73 (2.2) ▲	69 (1.9)	21 (1.7)	24 (1.6)	6 (1.0)	7 (1.1)
Germany	76 (1.1)	77 (1.1)	18 (0.8)	18 (0.9)	6 (0.6) ▲	5 (0.4)
Australia	64 (1.7)	62 (1.4)	28 (1.4)	28 (1.2)	8 (0.9)	10 (1.0) ▲
Slovak Republic	69 (1.5)	69 (1.4)	24 (1.3)	23 (1.2)	7 (0.7)	7 (0.6)
Austria	78 (1.1)	80 (1.2)	16 (1.0)	16 (1.0)	5 (0.6)	5 (0.5)
Sweden	77 (1.1)	75 (1.3)	19 (0.9)	20 (1.0)	4 (0.5)	5 (0.6)
Netherlands	66 (1.6)	68 (1.4)	26 (1.5)	24 (1.3)	8 (0.8)	8 (0.8)
Slovenia	66 (1.2)	65 (1.4)	28 (1.1)	28 (1.2)	6 (0.7)	7 (0.7)
Denmark	66 (1.7)	69 (1.7)	26 (1.3)	25 (1.4)	8 (0.9)	5 (0.7)
Czech Republic	59 (1.6) ▲	54 (1.5)	29 (1.2)	31 (1.3)	12 (0.8)	15 (0.9) ▲
Lithuania	73 (1.0) ▲	67 (1.5)	24 (1.0)	26 (1.3)	3 (0.5)	6 (0.8) ▲
New Zealand	50 (1.3)	51 (1.4)	38 (1.2)	37 (1.3)	12 (0.7)	12 (0.7)
Scotland	61 (1.6)	63 (1.4)	28 (1.4) ▲	25 (1.3)	10 (1.1)	12 (0.8)
Armenia r	60 (1.9)	57 (2.2)	29 (1.6)	34 (1.9) ▲	11 (1.0)	9 (1.1)
Norway	68 (1.7)	66 (1.6)	26 (1.5)	25 (1.2)	6 (0.7)	9 (0.8) ▲
Ukraine	59 (1.6)	56 (1.5)	32 (1.4)	34 (1.3)	8 (0.8)	10 (0.8)
Iran, Islamic Rep. of	76 (1.9)	72 (1.8)	20 (1.8)	22 (1.6)	4 (0.8)	5 (0.8)
Georgia	66 (1.7)	64 (1.6)	27 (1.3)	30 (1.5)	7 (1.0)	6 (0.7)
Colombia	58 (1.8)	58 (1.6)	37 (1.7)	37 (1.6)	5 (0.8)	5 (0.7)
El Salvador	42 (1.6)	47 (1.6) ▲	51 (1.4) ▲	47 (1.5)	6 (0.7)	6 (0.7)
Algeria	53 (1.6) ▲	49 (2.0)	42 (1.6)	43 (1.7)	5 (0.5)	8 (0.8) ▲
Kuwait	68 (1.7) ▲	61 (2.3)	28 (1.6)	34 (2.2) ▲	4 (0.6)	5 (0.7)
Tunisia	61 (2.0) ▲	55 (1.7)	35 (1.8)	38 (1.6)	4 (0.7)	6 (0.8) ▲
Morocco	50 (1.8)	49 (2.0)	43 (1.8)	42 (1.9)	7 (0.7)	9 (1.5)
Qatar r	65 (0.8) ▲	58 (0.9)	30 (0.8)	35 (1.0) ▲	5 (0.4)	7 (0.4) ▲
Yemen r	48 (2.6)	44 (2.1)	44 (2.4)	45 (1.8)	8 (0.9)	11 (0.9) ▲
International Avg.	62 (0.3) ▲	61 (0.3)	30 (0.2)	30 (0.2)	8 (0.1)	9 (0.1) ▲
Benchmarking Participants						
Massachusetts, US	73 (1.9)	78 (1.7) ▲	20 (1.6)	17 (1.4)	7 (0.9)	5 (0.8)
Minnesota, US	76 (2.4)	75 (2.2)	19 (1.8)	20 (2.0)	5 (0.9)	6 (1.2)
Alberta, Canada	71 (1.3)	72 (1.4)	23 (1.2)	21 (1.0)	6 (0.7)	7 (0.7)
British Columbia, Canada	68 (1.3)	69 (1.3)	25 (1.2)	24 (1.0)	7 (0.9)	6 (0.7)
Ontario, Canada	65 (1.7)	68 (1.6)	27 (1.5)	24 (1.6)	8 (1.0)	8 (0.9)
Quebec, Canada	73 (1.4)	71 (1.4)	20 (1.2)	22 (1.2)	7 (0.7)	7 (0.8)
Dubai, UAE r	70 (2.0)	69 (1.7)	25 (1.6)	24 (1.2)	5 (0.7)	7 (0.8)

▲ Percent significantly higher than other gender

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on students' responses to four statements about science:1) I usually do well in science; 2) Science is harder for me than for many of my classmates (Reversed); 3) I am just not good at science (Reversed); 4) I learn things quickly in science. Average is computed across the four items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a little or a lot on average across the four statements are assigned to the high level. Students disagreeing a little or a lot on average are assigned to the low level. All other students are assigned to the middle level.

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

An "r" indicates data are available for at least 70 but less than 85% of the students.

high confidence category and under-represented in the medium category. However, in both of these countries, there were also significantly fewer boys in the low confidence category. Hong Kong, the other highest scoring country, had no gender differences on the confidence index, mirroring its lack of any gender difference in achievement.

Among the countries achieving in grade 4 science at a similar level to England, only Hungary and Italy had no gender differences in levels of confidence. See Chapter 6 for more information about gender differences.

7.2 Pupils' attitudes towards grade 4 mathematics

Proportions of grade 4 pupils with a positive attitude to mathematics were similar to those with a positive attitude to science. Exhibit 7.5 shows that 62 per cent gave responses which put them in the category of having a highly positive attitude to mathematics. As with science, this was measured by their responses to three statements about their enjoyment of mathematics (answers are given on a four point scale from 'agree a lot' to 'disagree a lot'). Responses were collated to create an index of 'Positive Affect Toward Mathematics' (PATM). Pupils were categorised into three bands: High PATM, medium PATM and low PATM (see Exhibit 7.5 for details of how the index was created). Exhibit 7.5 shows the percentage of pupils in each band for each participating country. The countries are listed in order of overall achievement in mathematics at grade 4 (as indicated in Chapter 3). Countries performing overall at a similar level to England are indicated by a box.

Exhibit 7.5 shows that, despite the large percentage of pupils in the high positive attitude category in England, the proportion has dropped 14 percentage points since TIMSS 1995 (the most recent equivalent index available), a similar decrease to that seen for science at grade 4. The percentages in the medium and low categories have increased correspondingly, by seven percentage points each. This is despite the high overall achievement of England's grade 4 pupils in mathematics. As with science, it would appear that pupils are doing well in mathematics despite having relatively low levels of enjoyment of it.

In spite of this, it is clear that enjoyment is related to achievement to some extent: Exhibit 7.5 also shows that, as mathematics achievement decreases, so also does enjoyment of mathematics. This could be because those who enjoy mathematics more do better at it, or the reverse might be true: that those who do better at it enjoy it more.

It is notable that the difference in achievement in England between those in the high and medium positive attitude categories is minimal, while there is a greater difference between the medium and low categories. Few other countries share this trend. Sweden also has a minimal difference between the percentage in the high and medium positive categories and a lower percentage in the low category. Norway and Scotland have small differences between the high and medium categories, and a relatively small difference also between the medium and low categories. In contrast, Denmark has small differences between the high and medium categories, but a slightly higher proportion in the low category. Other countries have larger gaps between the attainment of their pupils in the high and medium categories in terms of positive attitude.

Similar trends in enjoyment arose in some of the highest scoring countries: the two highest scoring countries in grade 4 mathematics, Hong Kong and Singapore, also had a decrease in the proportion of their pupils in the high positive attitude category since 1995, indicating a decrease in levels of enjoyment of mathematics. These two countries, along with Japan, also had an increase in the proportion of pupils in the low positive attitude category. Comparisons are not available for Chinese Taipei, the remaining country which outscored England, because it did not participate in 1995. However, these trends make it clear that England is not alone in having high attainment but relatively low levels of

Exhibit 7.5 Index of students' positive affect toward mathematics (PATM) with trends

TIMSS2007 Mathematics 4th Grade

Country	High PATM			Medium PATM			Low PATM		
	2007 Percent of Students	Average Achievement	Difference in Percent from 1995	2007 Percent of Students	Average Achievement	Difference in Percent from 1995	2007 Percent of Students	Average Achievement	Difference in Percent from 1995
Hong Kong SAR	67 (1.3)	619 (3.5)	-5 (1.8) ▼	15 (0.7)	588 (4.2)	-2 (1.2)	19 (1.1)	579 (5.1)	7 (1.5) ▲
Singapore	71 (0.8)	610 (3.5)	-15 (1.1) ▼	14 (0.6)	575 (5.9)	5 (0.8) ▲	15 (0.6)	575 (5.6)	11 (0.7) ▲
Chinese Taipei	50 (1.2)	595 (2.4)	◊ ◊	21 (0.8)	563 (3.2)	◊ ◊	29 (0.9)	555 (2.9)	◊ ◊
Japan	62 (1.4)	584 (2.4)	-1 (1.8)	21 (0.8)	547 (3.3)	-1 (1.2)	17 (1.0)	543 (4.4)	3 (1.2) ▲
Kazakhstan	89 (0.9)	554 (6.5)	◊ ◊	8 (0.7)	518 (16.0)	◊ ◊	3 (0.4)	493 (11.1)	◊ ◊
Russian Federation	80 (1.3)	552 (5.0)	◊ ◊	13 (1.0)	524 (6.9)	◊ ◊	8 (0.5)	511 (8.7)	◊ ◊
England	62 (1.4)	548 (3.1)	-14 (1.8) ▼	17 (0.8)	544 (4.7)	7 (1.0) ▲	21 (1.1)	524 (4.1)	7 (1.5) ▲
Latvia	65 (1.1)	544 (3.0)	-6 (1.7) ▼	17 (0.8)	528 (4.8)	-1 (1.2)	17 (0.9)	527 (3.4)	7 (1.2) ▲
Netherlands	56 (1.4)	540 (2.7)	-5 (2.0) ▼	17 (0.9)	531 (3.6)	3 (1.2) ▲	27 (1.3)	528 (3.4)	3 (1.9)
Lithuania	74 (1.2)	541 (2.3)	◊ ◊	14 (0.8)	498 (4.8)	◊ ◊	12 (0.8)	505 (5.0)	◊ ◊
United States	66 (0.8)	535 (2.7)	-8 (1.4) ▼	16 (0.5)	526 (3.0)	3 (0.8) ▲	18 (0.6)	517 (2.5)	5 (1.0) ▲
Germany	70 (0.9)	534 (2.7)	◊ ◊	16 (0.6)	520 (3.7)	◊ ◊	14 (0.7)	509 (3.6)	◊ ◊
Denmark	55 (1.8)	526 (3.0)	◊ ◊	24 (1.0)	521 (3.4)	◊ ◊	21 (1.4)	523 (3.1)	◊ ◊
Australia	66 (1.4)	525 (3.6)	-7 (1.7) ▼	16 (0.8)	512 (4.6)	3 (1.0) ▲	18 (1.1)	494 (5.1)	4 (1.2) ▲
Hungary	64 (1.3)	522 (3.5)	-4 (2.1)	15 (0.7)	498 (6.4)	-3 (1.1) ▼	21 (1.1)	492 (5.8)	7 (1.6) ▲
Italy	75 (0.9)	514 (3.3)	- -	13 (0.6)	494 (4.9)	- -	12 (0.7)	490 (4.4)	- -
Austria	62 (1.0)	513 (2.0)	-5 (1.7) ▼	16 (0.7)	499 (4.1)	1 (1.1)	22 (0.9)	492 (2.9)	4 (1.3) ▲
Sweden	67 (1.2)	505 (2.8)	◊ ◊	16 (0.7)	501 (3.2)	◊ ◊	17 (1.0)	497 (4.1)	◊ ◊
Slovenia	71 (1.1)	508 (2.0)	-10 (1.6) ▼	13 (0.6)	487 (3.8)	-1 (1.1)	16 (0.9)	490 (4.0)	11 (1.1) ▲
Armenia r	79 (1.4)	509 (4.3)	◊ ◊	12 (0.9)	492 (10.0)	◊ ◊	9 (0.9)	507 (12.9)	◊ ◊
Slovak Republic	68 (1.2)	505 (4.7)	◊ ◊	14 (0.7)	484 (4.1)	◊ ◊	18 (1.0)	482 (5.6)	◊ ◊
Scotland	59 (1.3)	497 (2.7)	- -	18 (0.8)	496 (3.5)	- -	24 (1.1)	490 (3.9)	- -
New Zealand	66 (1.0)	499 (2.6)	-5 (1.6) ▼	18 (0.8)	485 (3.8)	3 (1.2) ▲	17 (0.8)	484 (3.3)	3 (1.2) ▲
Czech Republic	64 (1.3)	495 (3.1)	-9 (1.8) ▼	15 (0.7)	479 (4.3)	-1 (1.0)	21 (1.0)	471 (3.4)	10 (1.3) ▲
Norway	68 (1.2)	478 (3.1)	-4 (2.1)	15 (0.6)	470 (5.1)	1 (1.1)	18 (1.0)	462 (3.7)	3 (1.6) ▲
Ukraine	86 (0.7)	479 (2.9)	◊ ◊	8 (0.5)	449 (5.8)	◊ ◊	5 (0.5)	442 (8.3)	◊ ◊
Georgia	90 (0.9)	450 (3.7)	◊ ◊	6 (0.6)	415 (9.0)	◊ ◊	4 (0.5)	415 (10.2)	◊ ◊
Iran, Islamic Rep. of r	83 (1.0)	418 (4.1)	-1 (1.6)	9 (0.8)	370 (6.6)	-5 (1.4) ▼	8 (0.7)	355 (9.9)	6 (0.8) ▲
Algeria	84 (1.0)	389 (5.0)	◊ ◊	10 (0.6)	343 (7.7)	◊ ◊	5 (0.6)	339 (12.3)	◊ ◊
Colombia	86 (0.8)	365 (4.6)	◊ ◊	9 (0.6)	338 (10.0)	◊ ◊	5 (0.5)	355 (15.9)	◊ ◊
Morocco	87 (1.0)	356 (4.8)	◊ ◊	8 (0.7)	301 (10.0)	◊ ◊	5 (0.6)	301 (17.1)	◊ ◊
El Salvador	77 (0.9)	340 (4.0)	◊ ◊	16 (0.8)	306 (6.4)	◊ ◊	7 (0.5)	320 (9.4)	◊ ◊
Tunisia	85 (0.9)	349 (4.3)	◊ ◊	10 (0.6)	282 (7.0)	◊ ◊	5 (0.6)	273 (12.6)	◊ ◊
Kuwait	78 (1.1)	332 (3.5)	- -	12 (0.7)	295 (7.4)	- -	10 (0.7)	306 (7.6)	- -
Qatar	81 (0.5)	314 (1.3)	◊ ◊	10 (0.4)	267 (3.8)	◊ ◊	9 (0.3)	286 (3.9)	◊ ◊
Yemen r	73 (1.4)	240 (6.5)	◊ ◊	19 (1.0)	215 (8.1)	◊ ◊	8 (0.6)	211 (9.6)	◊ ◊
International Avg.	72 (0.2)	483 (0.6)		14 (0.1)	457 (1.1)		14 (0.1)	454 (1.3)	
Benchmarking Participants									
Massachusetts, US	67 (1.6)	579 (4.6)	◊ ◊	16 (1.1)	570 (5.9)	◊ ◊	17 (1.1)	553 (4.2)	◊ ◊
Minnesota, US	64 (2.4)	561 (6.9)	-8 (3.4) ▼	19 (1.4)	550 (7.0)	4 (2.0)	18 (1.5)	536 (7.1)	4 (2.2)
Quebec, Canada	72 (1.3)	528 (3.1)	-10 (2.4) ▼	13 (0.9)	503 (5.9)	3 (1.4) ▲	15 (0.8)	494 (4.1)	7 (1.9) ▲
Ontario, Canada	59 (1.5)	519 (3.6)	-21 (1.9) ▼	18 (0.9)	512 (4.2)	6 (1.1) ▲	24 (1.4)	495 (4.6)	15 (1.5) ▲
Alberta, Canada	66 (1.2)	513 (3.3)	-12 (2.2) ▼	16 (0.7)	498 (4.1)	5 (1.1) ▲	17 (1.0)	486 (4.4)	7 (1.9) ▲
British Columbia, Canada	64 (1.3)	514 (3.2)	◊ ◊	18 (0.8)	496 (3.1)	◊ ◊	19 (0.9)	490 (4.1)	◊ ◊
Dubai, UAE	81 (1.0)	452 (2.3)	◊ ◊	10 (0.7)	442 (7.2)	◊ ◊	9 (0.8)	431 (8.3)	◊ ◊

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Index based on students' responses to three statements about mathematics: 1) I enjoy learning mathematics; 2) Mathematics is boring (Reversed); 3) I like mathematics. Average is computed across the three items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a lot or a little on average across the three statements are assigned to the high level. Students disagreeing a little or a lot on average across the three statements are assigned to the low level. All other students are assigned to the middle level.

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

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

An "r" indicates data are available for at least 70 but less than 85% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

enjoyment. Japan and Hong Kong have similar proportions of pupils as England in the highly positive category, while Singapore has a few more. Chinese Taipei has only half of its grade 4 pupils in the high category for positive attitude to mathematics, the lowest percentage of all countries.

Similar trends also applied in those countries attaining at a similar level to England in grade 4 mathematics. In those countries where trend data was available (Latvia and the Netherlands), there was a decrease in the proportion of pupils holding highly positive attitudes and an increase in one of the lower attitudinal categories. Latvia's distribution was similar to England's, while the Netherlands had fewer pupils in the high category and

more in the low category. Trend data was not available for the remaining two countries performing at a similar level (Kazakhstan and the Russian Federation). They both had more grade 4 pupils than England in the highly positive category.

Across all participating countries, the proportion of pupils in the high category for a positive attitude towards mathematics at grade 4 ranged from 50 to 90 per cent. As was the case for science, those countries with the highest proportions of grade 4 pupils having highly positive attitudes towards mathematics were predominantly less well developed countries.

The comparison was made with 1995 and not with the more recent grade 4 TIMSS cycle of 2003, because the comparable index was not available in 2003. In that cycle, outcomes were reported only on responses to the statement 'I enjoy mathematics'. In England in 2003, 70 per cent of pupils agreed with that statement a lot or a little, a few more than the proportion in the highly positive category in 2007.

Despite the change in levels of enjoyment in mathematics since 1995, grade 4 pupils in England have gained confidence in their abilities in mathematics. Exhibit 7.6 shows that 64 per cent of grade 4 pupils had a high level of self-confidence in learning mathematics in 2007, a statistically significant increase on the equivalent index in 2003. This was accompanied by a decrease in the medium category of confidence, while the proportion in the low category remained stable. Once again, higher levels of achievement were associated with being in a higher confidence band and this effect was more pronounced than for the enjoyment index, suggesting that attainment may be more strongly associated with levels of confidence than it is with levels of enjoyment. This hypothesis will be explored further in Chapter 10.

It would appear, however, that any link between high levels of confidence and high attainment might not apply in all countries. Across all participating countries, the percentage of pupils in the high self-confidence category ranged from 35 to 77 per cent. England was, therefore, towards the top end of this range. In contrast, the four highest attaining countries were near the lower end (see Exhibit 7.6), with between 36 and 46 per cent of their grade 4 pupils having high levels of confidence in their abilities in mathematics. For two of these countries, this represented an increase since 2003 (Japan and Hong Kong) and for one, it represented a drop (Chinese Taipei). In Singapore, the proportion in the high confidence category remained stable, but there was an increase in the low confidence category. While England's attainment remains some way behind that in these four Pacific Rim countries, it is nevertheless positive that England's pupils retain a higher, and arguably more realistic, level of confidence in their abilities.

Of the four countries attaining at a similar level to England in mathematics at grade 4, two have similar proportions of pupils in the high confidence band: the Netherlands and Kazakhstan. The other two have lower proportions with high confidence. Among these, England is the only one of four trend countries to have an increase in the proportion of pupils in this high band.

Exhibit 7.7 shows that, as was true for grade 4 science, there are more boys than girls in the high confidence band for grade 4 mathematics in England (10 percentage points

Exhibit 7.6 Index of students' self-confidence in learning mathematics (SCM) with trends

TIMSS2007 Mathematics 4th Grade

Country	High SCM			Medium SCM			Low SCM		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Hong Kong SAR	46 (1.0)	634 (3.7)	6 (1.5) ▲	38 (1.0)	588 (3.6)	-3 (1.3) ▼	16 (0.7)	574 (4.6)	-3 (1.1) ▼
Singapore	46 (1.2)	639 (3.0)	-3 (2.0)	35 (0.8)	580 (3.8)	-1 (1.3)	19 (0.8)	544 (4.9)	3 (1.2) ▲
Chinese Taipei	36 (1.0)	612 (2.1)	-5 (1.3) ▼	37 (0.8)	566 (2.7)	-2 (1.2)	27 (0.8)	542 (2.7)	7 (1.1) ▲
Japan	45 (1.1)	602 (2.4)	6 (1.4) ▲	36 (0.9)	553 (2.9)	-5 (1.2) ▼	20 (0.7)	522 (3.1)	-1 (1.1)
Kazakhstan	66 (1.7)	563 (6.5)	◊ ◊	24 (1.7)	524 (7.9)	◊ ◊	10 (1.1)	516 (12.4)	◊ ◊
Russian Federation	54 (1.2)	570 (5.0)	1 (1.9)	31 (1.0)	522 (5.5)	-1 (1.4)	15 (1.1)	505 (6.5)	-1 (1.3)
England	64 (1.0)	566 (3.0)	5 (1.5) ▲	26 (0.8)	507 (3.7)	-4 (1.3) ▼	10 (0.7)	483 (5.0)	-1 (0.9)
Latvia	50 (0.9)	568 (2.6)	1 (1.6)	36 (0.8)	515 (2.7)	1 (1.4)	15 (0.8)	493 (4.1)	-2 (1.2)
Netherlands	66 (1.0)	551 (2.5)	0 (1.4)	22 (0.9)	511 (3.1)	-1 (1.3)	12 (0.7)	489 (4.2)	1 (0.9)
Lithuania	57 (0.8)	562 (2.2)	-4 (1.5) ▼	33 (0.8)	495 (2.9)	3 (1.3) ▲	9 (0.6)	466 (6.6)	2 (0.9)
United States	67 (0.8)	551 (2.4)	13 (1.1) ▲	22 (0.6)	493 (2.8)	-17 (0.9) ▼	10 (0.4)	478 (3.1)	3 (0.5) ▲
Germany	70 (0.9)	548 (2.1)	◊ ◊	21 (0.7)	493 (3.5)	◊ ◊	10 (0.5)	468 (4.5)	◊ ◊
Denmark	70 (1.1)	540 (2.5)	◊ ◊	23 (1.0)	493 (3.5)	◊ ◊	7 (0.6)	469 (5.8)	◊ ◊
Australia	64 (1.3)	542 (2.8)	0 (1.6)	26 (0.9)	480 (3.8)	1 (1.2)	10 (0.8)	457 (6.7)	-1 (1.1)
Hungary	62 (1.0)	543 (3.0)	-2 (1.3)	27 (0.8)	468 (4.6)	0 (1.1)	11 (0.5)	447 (6.0)	1 (0.7)
Italy	66 (0.9)	525 (3.2)	5 (1.4) ▲	27 (0.8)	481 (3.9)	-2 (1.2)	7 (0.4)	457 (5.4)	-3 (0.7) ▼
Austria	70 (0.8)	524 (1.9)	◊ ◊	22 (0.8)	470 (2.6)	◊ ◊	8 (0.5)	445 (5.5)	◊ ◊
Sweden	77 (0.9)	514 (2.4)	◊ ◊	19 (0.8)	467 (4.5)	◊ ◊	5 (0.4)	459 (5.2)	◊ ◊
Slovenia	68 (0.9)	522 (2.0)	-8 (1.3) ▼	25 (0.8)	467 (2.9)	7 (1.2) ▲	6 (0.4)	431 (4.5)	1 (0.6)
Armenia s	52 (1.4)	517 (3.8)	8 (1.8) ▲	35 (1.3)	500 (9.9)	-9 (1.7) ▼	13 (0.7)	489 (5.9)	0 (1.0)
Slovak Republic	59 (1.1)	526 (3.5)	◊ ◊	28 (0.9)	484 (4.6)	◊ ◊	12 (0.7)	445 (8.2)	◊ ◊
Scotland	67 (1.1)	511 (2.4)	3 (1.4) ▲	24 (1.0)	472 (3.5)	-2 (1.3)	9 (0.6)	450 (5.3)	-1 (0.8)
New Zealand	52 (0.7)	527 (2.3)	13 (1.3) ▲	37 (0.7)	465 (2.6)	-19 (1.2) ▼	11 (0.5)	438 (4.8)	7 (0.6) ▲
Czech Republic	56 (1.0)	512 (2.5)	◊ ◊	31 (1.0)	460 (3.3)	◊ ◊	12 (0.6)	442 (4.9)	◊ ◊
Norway	69 (0.8)	490 (2.7)	5 (1.2) ▲	24 (0.8)	441 (3.8)	-3 (1.2) ▼	7 (0.4)	429 (7.1)	-1 (0.7)
Ukraine	55 (1.0)	505 (2.8)	◊ ◊	34 (0.9)	443 (4.0)	◊ ◊	11 (0.7)	432 (5.4)	◊ ◊
Georgia	68 (1.3)	464 (3.9)	◊ ◊	25 (1.1)	412 (5.2)	◊ ◊	7 (0.7)	413 (11.7)	◊ ◊
Iran, Islamic Rep. of r	66 (1.3)	428 (3.8)	23 (2.0) ▲	28 (1.2)	377 (5.6)	-23 (2.0) ▼	7 (0.7)	330 (10.2)	0 (0.9)
Algeria	41 (1.5)	404 (5.3)	◊ ◊	49 (1.3)	374 (5.6)	◊ ◊	11 (0.9)	342 (8.7)	◊ ◊
Colombia	49 (1.4)	389 (5.0)	◊ ◊	43 (1.4)	338 (5.7)	◊ ◊	7 (0.6)	329 (6.7)	◊ ◊
Morocco r	45 (1.5)	370 (6.1)	-9 (2.3) ▼	46 (1.6)	331 (6.1)	6 (2.2) ▲	9 (1.0)	329 (16.1)	3 (1.2) ▲
El Salvador	39 (1.3)	365 (4.5)	◊ ◊	53 (1.2)	315 (4.4)	◊ ◊	8 (0.6)	303 (9.0)	◊ ◊
Tunisia r	46 (1.4)	383 (4.4)	-10 (2.3) ▼	46 (1.4)	305 (4.5)	9 (2.1) ▲	8 (0.6)	278 (10.0)	1 (0.9)
Kuwait	56 (1.4)	353 (3.7)	◊ ◊	39 (1.3)	296 (4.5)	◊ ◊	5 (0.4)	280 (9.0)	◊ ◊
Qatar	61 (0.7)	328 (1.3)	◊ ◊	33 (0.6)	273 (2.2)	◊ ◊	6 (0.3)	275 (5.2)	◊ ◊
Yemen r	36 (1.5)	261 (7.4)	◊ ◊	52 (1.5)	225 (5.8)	◊ ◊	13 (1.0)	210 (9.6)	◊ ◊
International Avg.	57 (0.2)	500 (0.6)		32 (0.2)	449 (0.8)		11 (0.1)	429 (1.2)	
Benchmarking Participants									
Massachusetts, US	74 (1.4)	589 (3.6)	◊ ◊	19 (1.2)	534 (5.2)	◊ ◊	8 (0.8)	519 (5.7)	◊ ◊
Minnesota, US	71 (2.2)	575 (5.3)	◊ ◊	21 (1.4)	512 (6.2)	◊ ◊	8 (1.1)	482 (7.9)	◊ ◊
Quebec, Canada	68 (1.2)	540 (3.0)	-3 (1.6)	24 (1.0)	484 (3.6)	2 (1.4)	8 (0.6)	457 (5.0)	1 (0.8)
Ontario, Canada	63 (1.3)	534 (3.0)	-4 (1.9) ▼	27 (1.1)	484 (3.9)	4 (1.6) ▲	10 (0.8)	457 (4.9)	1 (1.1)
Alberta, Canada	68 (1.0)	523 (2.6)	◊ ◊	24 (0.8)	475 (3.6)	◊ ◊	8 (0.6)	451 (5.8)	◊ ◊
British Columbia, Canada	65 (0.9)	526 (2.9)	◊ ◊	27 (0.7)	475 (3.1)	◊ ◊	8 (0.7)	457 (5.7)	◊ ◊
Dubai, UAE r	68 (1.1)	468 (2.3)	◊ ◊	26 (1.1)	416 (4.3)	◊ ◊	6 (0.7)	401 (7.4)	◊ ◊

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on students' responses to four statements about mathematics: 1) I usually do well in mathematics; 2) Mathematics is harder for me than for many of my classmates (Reversed); 3) I'm just not good at mathematics (Reversed); 4) I learn things quickly in mathematics. Average is computed across the four items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a little or a lot on average across the four statements are assigned to the high level. Students disagreeing a little or a lot on average are assigned to the low level. All other students are assigned to the middle level.

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

higher), and correspondingly fewer boys in the medium and low categories (seven and four percentage points lower, respectively). As was the case for science at grade 4, there were no gender differences overall in attainment on mathematics at grade 4 and so these figures indicate some degree of over-confidence from boys or unjustified lack of confidence from girls.

Remarkably similar patterns were found in the four highest scoring countries, Hong Kong, Singapore, Chinese Taipei and Japan: all had more boys in the highest confidence category and fewer boys in the lowest confidence category. Three of the four also had fewer boys in the medium confidence category.

Exhibit 7.7 Index of students' self-confidence in learning mathematics (SCM) by gender

TIMSS2007 Mathematics 4th Grade

Country	High SCM Percent of Students		Medium SCM Percent of Students		Low SCM Percent of Students	
	Girls	Boys	Girls	Boys	Girls	Boys
Hong Kong SAR	37 (1.3)	54 (1.3) ▲	43 (1.2) ▲	34 (1.2)	20 (1.0) ▲	12 (0.9)
Singapore	39 (1.3)	52 (1.5) ▲	38 (1.0) ▲	31 (1.1)	23 (1.0) ▲	16 (0.9)
Chinese Taipei	29 (1.3)	43 (1.3) ▲	39 (1.1)	36 (1.2)	33 (1.1) ▲	21 (1.1)
Japan	37 (1.4)	53 (1.4) ▲	38 (1.1) ▲	33 (1.2)	25 (1.1) ▲	14 (1.0)
Kazakhstan	69 (1.9) ▲	63 (1.7)	21 (1.8)	27 (1.9) ▲	10 (1.0)	10 (1.4)
Russian Federation	52 (1.8)	57 (1.3) ▲	31 (1.4)	31 (1.3)	16 (1.3) ▲	13 (1.3)
England	59 (1.4)	69 (1.2) ▲	29 (1.3) ▲	22 (1.0)	12 (0.9) ▲	8 (0.9)
Latvia	44 (1.4)	55 (1.5) ▲	38 (1.5) ▲	33 (1.3)	18 (1.3) ▲	12 (0.8)
Netherlands	59 (1.4)	73 (1.2) ▲	26 (1.2) ▲	18 (1.1)	15 (1.3) ▲	9 (0.8)
Lithuania	52 (1.3)	62 (1.2) ▲	37 (1.4) ▲	30 (1.2)	11 (0.8) ▲	8 (0.7)
United States	65 (0.9)	70 (1.1) ▲	23 (0.8)	22 (0.9)	12 (0.6) ▲	8 (0.5)
Germany	63 (1.1)	76 (1.1) ▲	24 (1.0) ▲	17 (1.0)	12 (1.0) ▲	7 (0.6)
Denmark	66 (1.9)	73 (1.3) ▲	25 (1.6) ▲	21 (1.1)	9 (0.8) ▲	6 (0.8)
Australia	60 (1.7)	68 (1.7) ▲	30 (1.2) ▲	23 (1.3)	11 (1.1)	9 (0.9)
Hungary	58 (1.5)	67 (1.2) ▲	30 (1.4) ▲	24 (1.1)	12 (0.7) ▲	10 (0.7)
Italy	62 (1.2)	70 (1.2) ▲	30 (1.1) ▲	24 (1.1)	8 (0.6) ▲	6 (0.5)
Austria	64 (1.2)	76 (1.0) ▲	24 (1.1) ▲	19 (0.9)	11 (0.8) ▲	5 (0.5)
Sweden	76 (1.1)	77 (1.2)	19 (1.1)	19 (1.1)	5 (0.4)	4 (0.5)
Slovenia	65 (1.2)	72 (1.3) ▲	29 (1.0) ▲	22 (1.2)	6 (0.6)	6 (0.5)
Armenia r	50 (1.7)	53 (1.8)	36 (1.5)	35 (1.7)	14 (1.0)	12 (1.0)
Slovak Republic	56 (1.5)	63 (1.4) ▲	30 (1.3)	27 (1.3)	15 (0.9) ▲	10 (0.9)
Scotland	65 (1.5)	68 (1.3)	26 (1.4) ▲	22 (1.1)	9 (0.9)	10 (0.8)
New Zealand	49 (1.1)	54 (1.1) ▲	39 (1.0) ▲	35 (1.1)	12 (0.8)	11 (0.7)
Czech Republic	52 (1.6)	60 (1.4) ▲	34 (1.4) ▲	29 (1.3)	14 (0.8) ▲	10 (0.9)
Norway	68 (1.4)	71 (1.1)	26 (1.3)	23 (1.0)	7 (0.7)	7 (0.6)
Ukraine	54 (1.5)	56 (1.3)	34 (1.5)	34 (1.2)	12 (0.8) ▲	10 (0.9)
Georgia	69 (1.5)	68 (1.7)	24 (1.1)	26 (1.5)	6 (1.0)	7 (0.8)
Iran, Islamic Rep. of r	65 (1.9)	66 (1.8)	29 (1.7)	26 (1.8)	6 (1.0)	8 (0.8)
Algeria	40 (1.8)	41 (1.6)	51 (1.7) ▲	47 (1.5)	9 (0.8)	12 (1.3) ▲
Colombia	46 (1.6)	52 (1.9) ▲	45 (1.5)	42 (1.9)	9 (0.9) ▲	6 (0.7)
Morocco r	46 (2.1)	45 (2.0)	47 (2.1)	45 (2.0)	7 (1.1)	10 (1.2) ▲
El Salvador	36 (1.5)	42 (1.7) ▲	55 (1.4) ▲	50 (1.6)	9 (0.9)	8 (0.8)
Tunisia	48 (1.8) ▲	43 (1.6)	45 (1.7)	48 (1.6)	7 (0.6)	9 (0.9)
Kuwait	60 (1.6) ▲	51 (2.4)	36 (1.5)	43 (2.4) ▲	5 (0.4)	6 (0.6) ▲
Qatar r	63 (0.7) ▲	60 (1.0)	32 (0.7)	34 (1.0)	5 (0.4)	7 (0.4) ▲
Yemen r	36 (2.1)	34 (2.2)	51 (1.9)	53 (2.2)	13 (1.3)	13 (1.1)
International Avg.	54 (0.3)	60 (0.2) ▲	34 (0.2) ▲	31 (0.2)	12 (0.2) ▲	9 (0.1)
Benchmarking Participants						
Massachusetts, US	69 (2.0)	79 (1.4) ▲	21 (1.8) ▲	16 (1.3)	10 (1.1) ▲	5 (1.0)
Minnesota, US	71 (2.6)	72 (2.8)	23 (2.1)	20 (1.6)	7 (1.1)	8 (1.5)
Quebec, Canada	60 (1.8)	75 (1.3) ▲	28 (1.4) ▲	20 (1.2)	11 (1.0) ▲	5 (0.6)
Ontario, Canada	59 (1.8)	66 (1.8) ▲	29 (1.4)	26 (1.7)	12 (1.2) ▲	9 (0.8)
Alberta, Canada	65 (1.3)	71 (1.3) ▲	26 (1.2) ▲	22 (1.0)	9 (0.8) ▲	7 (0.8)
British Columbia, Canada	60 (1.2)	70 (1.3) ▲	30 (1.0) ▲	24 (1.1)	10 (0.9) ▲	6 (0.8)
Dubai, UAE r	65 (1.6)	70 (1.5) ▲	28 (1.4)	25 (1.5)	6 (0.9)	6 (0.7)

▲ Percent significantly higher than other gender

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on students' responses to four statements about mathematics: 1) I usually do well in mathematics; 2) Mathematics is harder for me than for many of my classmates (Reversed); 3) I am just not good at mathematics (Reversed); 4) I learn things quickly in mathematics.
Average is computed across the four items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a little or a lot on average across the four statements are assigned to the high level. Students disagreeing a little or a lot on average are assigned to the low level. All other students are assigned to the middle level.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
An "r" indicates data are available for at least 70 but less than 85% of the students.

Similar patterns are found in the group of countries with achievement matching England's. The one exception was Kazakhstan, where more girls are found in the high confidence category. Internationally, the only other countries where this occurred were Tunisia, Kuwait and Qatar.

Such patterns of higher confidence among boys were widespread across the TIMSS 2007 countries, and this is reflected in the international averages: boys are over-represented in the international averages in the high confidence category and under-represented in the other categories.

7.3 Pupils' attitudes towards grade 8 science

Exhibit 7.8 shows that 55 per cent of England's grade 8 pupils had a highly positive attitude to science, similar to the proportion enjoying science at grade 4. As in grade 4, their attitude to science was measured by their responses to three statements about their enjoyment of science (answers were given on a four point scale from 'agree a lot' to 'disagree a lot'). The international analysis of pupils' attitudes uses responses to these statements to create an index of 'Positive Affect Toward Science' (PATS). Pupils were categorised into three bands: High PATS, medium PATS and low PATS (see Exhibit 7.8 for details of how the index was created).

Exhibit 7.8 shows the percentage of pupils in each band for each participating country. The countries are listed in order of overall achievement in science at grade 8 (as indicated in Chapter 3). Comparisons between countries on science achievement are complicated at grade 8, because some participating countries follow an integrated science curriculum, while others follow separate curricula for the four domains of biology, Earth science, chemistry and physics. All four countries which outscored England (Singapore, Chinese Taipei, Japan and Korea) follow an integrated curriculum, as does Hong Kong, performing at the same level as England. The remaining three countries which achieved overall at a similar level to England (Hungary, the Czech Republic and Slovenia) follow separate curricula. This means that their outcomes are not directly comparable, and so only those following an integrated curriculum are included here.

Internationally, among those countries teaching integrated science, the proportions of pupils in the highly positive category ranged from 38 to 88 per cent of pupils, with three of the highest achieving countries having the lowest proportion of grade 8 pupils in this category (Chinese Taipei, Japan and Korea). As was the case at grade 4, those countries with the very highest proportions of grade 8 pupils having highly positive attitudes towards science (above 80 per cent) were less well developed countries.

Exhibit 7.8 shows that, despite the relatively large percentage of pupils in the highly positive category in England, the proportion has dropped 21 percentage points since TIMSS 1999 and 15 points since 1995, while the percentages in the medium and low categories have increased correspondingly. This means that pupils' levels of enjoyment of science rose a little from 1995 to 1999, but had then dropped again by 2007. This is despite the continued high overall achievement of England's grade 8 pupils in science. At grade 4, pupils were doing well in science but had relatively low levels of enjoyment. At grade 8, it appears that they had begun to enjoy science a little more between 1995 and 1999, but now do so less. It was not possible to make a comparison with 2003 data because the questions asked were different in 2003 (see below for more information).

England is not alone in this trend. Of the five comparable countries achieving more highly than England or at the same level in science at grade 8, three have experienced a drop in the percentages in the highly positive category since 1999 (Singapore, Chinese Taipei and Hong Kong). The remaining two countries in this group, Korea and Japan, saw an increase in the highly positive category, the only two countries teaching integrated science at grade 8 to do so (see Exhibit 7.8). Korea had an increase in both time-comparisons and Japan in the 1995 comparison only. Overall, those countries where attitudes towards science improved in 2007 were in a minority.

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Exhibit 7.8 Index of students' positive affect toward science (PATS) with trends

TIMSS2007 8th Science Grade

General/Integrated Science

Country	High PATS				Medium PATS			
	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995
Singapore	68 (0.9)	586 (4.3)	-10 (1.6) ▼	-14 (1.5) ▼	19 (0.7)	535 (6.1)	7 (1.0) ▲	6 (1.1) ▲
Chinese Taipei	40 (1.3)	597 (3.9)	-22 (1.7) ▼	◊ ◊	24 (0.7)	552 (4.2)	8 (0.9) ▲	◊ ◊
Japan	47 (1.1)	574 (2.2)	1 (1.8)	3 (1.7) ▲	28 (0.9)	545 (2.8)	5 (1.1) ▲	-2 (1.1) ▼
Korea, Rep. of	38 (1.1)	586 (2.4)	8 (1.5) ▲	4 (1.7) ▲	27 (0.7)	544 (2.9)	-3 (0.9) ▼	-15 (1.2) ▼
England	55 (1.3)	561 (4.9)	-21 (1.6) ▼	-15 (1.8) ▼	20 (0.8)	532 (4.9)	9 (1.1) ▲	4 (1.2) ▲
Hong Kong SAR	60 (1.4)	549 (4.8)	-4 (1.9) ▼	4 (2.2)	22 (0.8)	508 (5.4)	4 (1.1) ▲	-5 (1.3) ▼
United States	54 (1.2)	533 (2.9)	-6 (1.5) ▼	-1 (1.9)	22 (0.5)	508 (3.6)	4 (0.8) ▲	-2 (0.9) ▼
Australia	47 (1.4)	535 (4.7)	- -	-2 (1.7)	22 (0.8)	504 (4.2)	- -	-1 (1.1)
Scotland	56 (1.3)	517 (3.4)	◊ ◊	-13 (2.0) ▼	22 (0.8)	482 (4.5)	◊ ◊	7 (1.1) ▲
Italy	47 (1.1)	511 (3.7)	-16 (1.8) ▼	- -	26 (0.9)	488 (3.6)	10 (1.2) ▲	- -
Norway	59 (1.3)	495 (2.1)	◊ ◊	2 (2.1)	20 (0.8)	483 (3.7)	◊ ◊	-1 (1.2)
Jordan	77 (1.7)	493 (3.7)	3 (2.0)	◊ ◊	13 (0.9)	455 (7.4)	-3 (1.1) ▼	◊ ◊
Malaysia	73 (1.2)	483 (6.0)	-17 (1.4) ▼	◊ ◊	18 (0.9)	438 (7.2)	12 (1.0) ▲	◊ ◊
Thailand	68 (1.2)	478 (4.5)	-9 (1.6) ▼	- -	25 (0.9)	454 (4.7)	9 (1.1) ▲	- -
Israel	51 (1.2)	492 (4.6)	-7 (1.8) ▼	- -	22 (0.7)	453 (5.3)	3 (1.0) ▲	- -
Bahrain	68 (1.0)	476 (1.9)	◊ ◊	◊ ◊	18 (0.7)	455 (3.5)	◊ ◊	◊ ◊
Iran, Islamic Rep. of	73 (1.3)	467 (3.8)	-8 (1.5) ▼	-7 (1.8) ▼	17 (1.0)	444 (5.1)	5 (1.1) ▲	2 (1.3)
Turkey	77 (1.1)	461 (3.7)	- -	◊ ◊	15 (0.7)	435 (5.6)	- -	◊ ◊
Tunisia	88 (0.8)	447 (2.1)	1 (1.1)	◊ ◊	7 (0.5)	428 (4.7)	1 (0.7)	◊ ◊
Oman	82 (0.9)	434 (2.8)	◊ ◊	◊ ◊	14 (0.7)	387 (5.3)	◊ ◊	◊ ◊
Kuwait	60 (1.1)	428 (3.2)	◊ ◊	- -	21 (0.7)	413 (4.5)	◊ ◊	- -
Colombia	83 (1.2)	419 (3.6)	◊ ◊	3 (1.7)	12 (0.9)	416 (5.1)	◊ ◊	-4 (1.3) ▼
Egypt	82 (1.3)	421 (3.6)	◊ ◊	◊ ◊	13 (1.2)	373 (6.9)	◊ ◊	◊ ◊
Palestinian Nat'l Auth.	70 (1.2)	421 (3.8)	◊ ◊	◊ ◊	18 (0.8)	377 (5.5)	◊ ◊	◊ ◊
Saudi Arabia	68 (1.3)	413 (2.9)	◊ ◊	◊ ◊	19 (0.8)	389 (4.4)	◊ ◊	◊ ◊
El Salvador	77 (1.2)	390 (3.0)	◊ ◊	◊ ◊	17 (0.9)	380 (4.5)	◊ ◊	◊ ◊
Botswana	84 (0.8)	370 (3.1)	◊ ◊	◊ ◊	11 (0.6)	291 (5.7)	◊ ◊	◊ ◊
Qatar	61 (0.6)	333 (1.8)	◊ ◊	◊ ◊	19 (0.5)	303 (3.9)	◊ ◊	◊ ◊
Ghana	80 (1.0)	320 (4.7)	◊ ◊	◊ ◊	16 (0.8)	254 (7.7)	◊ ◊	◊ ◊
International Avg.	65 (0.2)	476 (0.7)			19 (0.1)	442 (0.9)		
Benchmarking Participants								
Massachusetts, US	54 (2.9)	568 (6.6)	-5 (3.6)	◊ ◊	22 (1.3)	551 (5.3)	4 (1.6) ▲	◊ ◊
Minnesota, US	50 (2.1)	553 (5.4)	◊ ◊	-3 (3.5)	23 (1.2)	534 (5.6)	◊ ◊	0 (2.0)
Ontario, Canada	56 (1.8)	542 (3.2)	-4 (2.4)	1 (2.4)	21 (0.9)	514 (5.7)	5 (1.3) ▲	-3 (1.3) ▼
British Columbia, Canada	55 (1.4)	541 (3.3)	-5 (2.4) ▼	◊ ◊	21 (0.8)	512 (3.8)	1 (1.5)	◊ ◊
Quebec, Canada	53 (2.0)	516 (3.8)	6 (3.9)	5 (3.4)	18 (1.0)	503 (6.3)	-4 (2.0)	-4 (1.7) ▼
Basque Country, Spain	44 (1.7)	516 (3.5)	◊ ◊	◊ ◊	23 (1.2)	496 (3.9)	◊ ◊	◊ ◊
Dubai, UAE r	68 (1.6)	506 (2.8)	◊ ◊	◊ ◊	18 (0.9)	469 (5.0)	◊ ◊	◊ ◊

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on students' responses to three statements about science: 1) I enjoy learning science; 2) Science is boring (Reversed); 3) I like science. Average is computed across the three items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a lot or a little on average across the three statements are assigned to the high level. Students disagreeing a little or a lot on average across the three statements are assigned to the low level. All other students are assigned to the middle level.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.
An "x" indicates data are available for less than 50% of the students. A diamond (◊) indicates the country did not participate in the assessment.

In spite of this, it is clear that enjoyment is related to achievement to some degree: Exhibit 7.8 shows that, as achievement in science decreases, so too does enjoyment of it. This could be because those who enjoy science more do better at it, or the reverse might be true: that those who do better at it enjoy it more.

The grade 8 pupils are asked to respond to an additional question not included in the grade 4 questionnaire. This investigates the extent of the value they place on science and is based on responses to four statements addressing the extent to which they perceive science as:

- Helping them in daily life
- Being necessary for learning other school subjects
- Being necessary for getting into the university of their choice
- Being necessary for getting the job they want.

Exhibit 7.8 Index of students' positive affect toward science (PATS) with trends (continued)

TIMSS2007 8th Science Grade

General/Integrated Science (Continued)

Country	Low PATS								
	2007 Percent of Students		Average Achievement		Difference in Percent from 1999			Difference in Percent from 1995	
Singapore	13	(0.6)	517	(6.8)	3	(1.1)	▲	8	(0.8) ▲
Chinese Taipei	35	(1.2)	527	(3.8)	14	(1.4)	▲	◊	◊
Japan	25	(1.1)	529	(3.5)	-6	(1.7)	▼	-1	(1.5)
Korea, Rep. of	36	(1.0)	526	(2.6)	-5	(1.5)	▼	11	(1.6) ▲
England	25	(1.1)	510	(5.0)	12	(1.3)	▲	11	(1.4) ▲
Hong Kong SAR	19	(1.1)	498	(6.7)	0	(1.5)		0	(1.6)
United States	24	(0.9)	503	(3.5)	2	(1.1)		3	(1.3) ▲
Australia	31	(1.1)	494	(4.3)	-	-		3	(1.4)
Scotland	22	(1.1)	459	(4.3)	◊	◊		6	(1.5) ▲
Italy	26	(1.0)	475	(3.5)	7	(1.5)	▲	-	-
Norway	21	(1.0)	472	(3.7)	◊	◊		0	(1.6)
Jordan	10	(1.1)	470	(8.3)	-1	(1.3)		◊	◊
Malaysia	8	(0.5)	434	(9.2)	5	(0.7)	▲	◊	◊
Thailand	6	(0.5)	466	(7.2)	0	(0.7)		-	-
Israel	28	(1.2)	452	(5.5)	4	(1.6)	▲	-	-
Bahrain	14	(0.8)	451	(4.7)	◊	◊		◊	◊
Iran, Islamic Rep. of	9	(0.7)	448	(6.8)	3	(0.9)	▲	5	(0.9) ▲
Turkey	8	(0.8)	429	(6.9)	-	-		◊	◊
Tunisia	4	(0.4)	434	(7.1)	-2	(0.7)	▼	◊	◊
Oman	3	(0.4)	383	(13.0)	◊	◊		◊	◊
Kuwait	20	(0.9)	408	(5.9)	◊	◊		-	-
Colombia	5	(0.4)	425	(8.6)	◊	◊		1	(0.7)
Egypt	5	(0.4)	363	(9.7)	◊	◊		◊	◊
Palestinian Nat'l Auth.	12	(0.7)	380	(7.6)	◊	◊		◊	◊
Saudi Arabia	13	(0.9)	388	(4.4)	◊	◊		◊	◊
El Salvador	6	(0.5)	395	(6.8)	◊	◊		◊	◊
Botswana	5	(0.5)	274	(8.4)	◊	◊		◊	◊
Qatar	20	(0.5)	307	(3.9)	◊	◊		◊	◊
Ghana	4	(0.3)	226	(10.7)	◊	◊		◊	◊
International Avg.	16	(0.2)	436	(1.3)					
Benchmarking Participants									
Massachusetts, US	24	(2.3)	536	(4.6)	1	(2.9)		◊	◊
Minnesota, US	26	(1.5)	516	(5.5)	◊	◊		3	(2.5)
Ontario, Canada	23	(1.3)	500	(5.3)	0	(1.8)		2	(1.9)
British Columbia, Canada	24	(1.1)	505	(3.3)	3	(1.7)	▲	◊	◊
Quebec, Canada	30	(1.7)	497	(4.8)	-3	(3.5)		-2	(3.3)
Basque Country, Spain	33	(1.7)	476	(4.3)	◊	◊		◊	◊
Dubai, UAE r	14	(1.0)	463	(6.7)	◊	◊		◊	◊

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

From their responses, an index of valuing science is derived, based once again on high, medium and low bands. In England, 52 per cent of grade 8 pupils value science highly (see Exhibit 7.9), a significant increase from 2003, with corresponding decreases in the medium and low categories. This is similar to findings from PISA 2006, where between 55 and 62 per cent of year 11 pupils agreed with three statements about the value of science to themselves and their futures (themes were that: science is very relevant to the pupils; when the pupils leave school, there will be many opportunities for them to use science'; 'they will use science in many ways when they are adults').

Seventeen per cent of England's TIMSS 2007 pupils were in the low category for valuing science, meaning that 83 per cent were in the high and medium categories. This compares with 75 per cent in the corresponding categories on the enjoyment index. Thus, although a quarter of grade 8 pupils indicate that they do not much enjoy science, the figures suggest that at least some of these must regard it as important to themselves and to their future.

Exhibit 7.9 Index of students' valuing science (SVS) with trends

TIMSS2007 Science 8th Grade

General/Integrated Science

Country	High SVS			Medium SVS			Low SVS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Singapore	67 (0.9)	585 (4.2)	-2 (1.3)	25 (0.7)	547 (5.2)	0 (1.0)	8 (0.6)	483 (7.9)	2 (0.7) ▲
Chinese Taipei	35 (1.0)	588 (4.8)	2 (1.4)	42 (0.9)	566 (3.2)	-1 (1.2)	24 (0.9)	514 (4.7)	-1 (1.3)
Japan	26 (0.8)	576 (3.3)	5 (1.1) ▲	43 (0.9)	561 (2.1)	-4 (1.2) ▼	32 (1.0)	528 (3.2)	-1 (1.4)
Korea, Rep. of	41 (1.0)	573 (2.6)	5 (1.4) ▲	41 (0.9)	550 (2.3)	-3 (1.1) ▼	17 (0.7)	514 (4.0)	-2 (0.9) ▼
England	52 (1.3)	552 (5.2)	7 (2.1) ▲	31 (1.0)	542 (5.1)	-4 (1.5) ▼	17 (0.8)	515 (5.2)	-3 (1.4) ▼
Hong Kong SAR	58 (1.2)	543 (4.9)	5 (1.6) ▲	33 (0.9)	525 (5.1)	-5 (1.2) ▼	9 (0.8)	472 (9.1)	0 (1.0)
United States	53 (0.9)	532 (3.4)	-2 (1.2)	30 (0.6)	515 (3.0)	0 (0.9)	17 (0.6)	497 (3.2)	1 (0.8)
Australia	42 (1.2)	531 (5.1)	0 (1.6)	30 (0.8)	511 (4.3)	-1 (1.2)	28 (0.9)	496 (3.7)	1 (1.3)
Scotland	57 (1.1)	511 (3.5)	1 (1.5)	27 (0.7)	489 (3.7)	1 (1.1)	16 (0.7)	461 (4.6)	-2 (1.1)
Italy	34 (0.9)	512 (4.5)	1 (1.2)	46 (0.8)	492 (2.9)	-2 (1.2)	21 (0.8)	477 (3.2)	1 (1.1)
Norway	45 (0.9)	492 (2.4)	6 (1.4) ▲	35 (0.8)	492 (2.7)	-1 (1.2)	21 (0.9)	472 (3.3)	-5 (1.3) ▼
Jordan	88 (0.9)	491 (3.5)	2 (1.1)	10 (0.6)	446 (7.9)	-1 (0.8)	3 (0.4)	439 (19.9)	-1 (0.6)
Malaysia	69 (1.3)	486 (5.7)	-7 (1.8) ▼	25 (1.0)	449 (6.1)	4 (1.3) ▲	6 (0.6)	390 (12.6)	3 (0.7) ▲
Thailand	85 (0.7)	475 (4.3)	◊ ◊	14 (0.6)	447 (5.7)	◊ ◊	2 (0.2)	~ ~	◊ ◊
Israel	49 (1.2)	481 (5.0)	1 (1.7)	27 (0.9)	470 (5.1)	1 (1.2)	24 (1.0)	459 (6.0)	-2 (1.4)
Bahrain	82 (0.8)	472 (1.8)	9 (1.1) ▲	13 (0.6)	460 (4.7)	-6 (0.9) ▼	5 (0.4)	442 (7.2)	-3 (0.6) ▼
Iran, Islamic Rep. of	67 (1.2)	461 (3.7)	5 (1.7) ▲	25 (1.0)	457 (4.8)	-1 (1.3)	9 (0.6)	450 (6.1)	-4 (0.9) ▼
Turkey	69 (1.0)	458 (3.9)	◊ ◊	22 (0.7)	455 (4.7)	◊ ◊	9 (0.5)	430 (6.3)	◊ ◊
Tunisia	85 (0.8)	446 (2.2)	5 (1.1) ▲	11 (0.6)	442 (4.1)	-3 (0.9) ▼	4 (0.3)	438 (5.5)	-2 (0.6) ▼
Oman	91 (0.5)	429 (2.9)	◊ ◊	8 (0.4)	386 (7.0)	◊ ◊	2 (0.2)	~ ~	◊ ◊
Kuwait	82 (0.8)	426 (2.8)	◊ ◊	12 (0.6)	409 (5.5)	◊ ◊	7 (0.5)	385 (9.6)	◊ ◊
Colombia	74 (1.0)	414 (3.6)	◊ ◊	20 (0.8)	433 (4.5)	◊ ◊	6 (0.5)	432 (8.3)	◊ ◊
Egypt	86 (0.7)	417 (3.6)	3 (1.1) ▲	11 (0.5)	375 (6.9)	-3 (0.9) ▼	2 (0.3)	~ ~	0 (0.4)
Palestinian Nat'l Auth.	84 (0.9)	418 (3.8)	2 (1.2)	12 (0.7)	355 (6.7)	-2 (1.0)	3 (0.4)	350 (10.6)	0 (0.5)
Saudi Arabia	80 (1.1)	408 (2.7)	- -	14 (0.8)	399 (4.7)	- -	6 (0.7)	391 (6.8)	- -
El Salvador	78 (0.9)	384 (3.0)	◊ ◊	17 (0.7)	403 (4.4)	◊ ◊	5 (0.5)	411 (7.8)	◊ ◊
Botswana	83 (0.7)	372 (3.3)	-3 (1.0) ▼	14 (0.6)	287 (4.7)	3 (0.9) ▲	3 (0.3)	274 (13.4)	0 (0.3)
Qatar	76 (0.5)	329 (1.9)	◊ ◊	16 (0.4)	305 (4.0)	◊ ◊	9 (0.3)	301 (5.9)	◊ ◊
Ghana	92 (0.8)	311 (5.0)	6 (1.2) ▲	7 (0.7)	245 (16.0)	-5 (1.0) ▼	2 (0.2)	~ ~	-1 (0.3)
International Avg.	66 (0.2)	471 (0.7)		23 (0.1)	449 (1.0)		11 (0.1)	441 (1.6)	
Benchmarking Participants									
Dubai, UAE r	73 (1.1)	495 (3.0)	◊ ◊	18 (0.9)	489 (5.6)	◊ ◊	8 (0.6)	476 (7.0)	◊ ◊
Minnesota, US	57 (1.3)	547 (5.4)	◊ ◊	29 (0.9)	531 (5.0)	◊ ◊	14 (1.0)	521 (6.9)	◊ ◊
Ontario, Canada	53 (1.5)	541 (3.3)	-3 (2.0)	31 (1.3)	515 (5.0)	2 (1.6)	16 (0.8)	499 (6.0)	2 (1.1)
British Columbia, Canada	53 (1.0)	539 (3.2)	◊ ◊	30 (0.8)	518 (3.4)	◊ ◊	17 (0.8)	501 (4.3)	◊ ◊
Massachusetts, US	50 (1.0)	569 (5.3)	◊ ◊	32 (0.9)	548 (5.3)	◊ ◊	19 (0.9)	539 (4.3)	◊ ◊
Basque Country, Spain	41 (1.4)	507 (3.8)	-2 (1.8)	30 (1.1)	500 (3.5)	1 (1.4)	28 (1.4)	483 (4.4)	1 (1.7)
Quebec, Canada	35 (1.4)	522 (4.3)	-4 (2.0)	39 (1.2)	509 (2.9)	1 (1.6)	26 (1.2)	487 (4.2)	2 (1.6)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Index based on students' responses to four statements about science: 1) I think learning science will help me in my daily life; 2) I need science to learn other school subjects; 3) I need to do well in science to get into the university of my choice; 4) I need to do well in science to get the job I want. Average is computed across the four items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a lot or a little on average across the four statements are assigned to the high level. Students disagreeing a little or a lot on average across the four statements are assigned to the low level. All other students are assigned to the middle level.

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

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

An "x" indicates data are available for less than 50% of the students. A diamond (◊) indicates the country did not participate in the assessment.

Among the higher achieving countries, there is variation in responses to this question, ranging from 26 to 67 per cent in the high value category (for Japan and Singapore, respectively). Japan and Chinese Taipei have a third and a quarter of their pupils, respectively, in the low value category. Thus, even among high achieving pupils in high achieving countries, there can be a sizeable proportion who do not value their learning in science. In that context, it is positive that England's pupils value science so highly.

Hong Kong, performing similarly to England, had a similar proportion of pupils in the high value category; like England, this was an increase on 2003 proportions. Once again, the international data showed that those countries with higher proportions of pupils valuing science highly were predominantly less well developed countries.

Exhibit 7.10 Index of students' self-confidence in learning science (SCS) with trends (continued)

TIMSS2007 Science 8th Grade

General/Integrated Science

Country	High SCS			Medium SCS			Low SCS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Singapore	40 (1.0)	601 (4.5)	-5 (1.3) ▼	38 (0.9)	544 (5.4)	2 (1.1)	21 (0.7)	546 (6.0)	3 (0.9) ▲
Chinese Taipei	23 (1.0)	619 (4.0)	-4 (1.4) ▼	36 (0.9)	552 (4.2)	-2 (1.2)	41 (1.2)	536 (3.3)	7 (1.6) ▲
Japan	20 (0.7)	601 (2.8)	0 (1.1)	44 (1.0)	554 (2.4)	-2 (1.2)	36 (1.1)	529 (2.8)	2 (1.5)
Korea, Rep. of	24 (1.0)	603 (2.5)	4 (1.2) ▲	40 (0.9)	556 (2.4)	-2 (1.1)	36 (0.9)	516 (2.5)	-2 (1.3)
England	53 (1.5)	569 (4.7)	1 (2.1)	31 (1.1)	517 (5.5)	-1 (1.7)	15 (0.9)	504 (4.7)	0 (1.3)
Hong Kong SAR	33 (1.3)	561 (4.9)	1 (1.7)	49 (0.9)	516 (5.1)	2 (1.2)	18 (1.0)	515 (5.9)	-2 (1.4)
United States	56 (1.1)	543 (3.1)	0 (1.4)	29 (0.7)	498 (3.2)	-2 (1.0)	15 (0.7)	482 (3.8)	2 (0.9)
Australia	41 (1.3)	549 (4.9)	-7 (2.0) ▼	39 (1.0)	496 (3.7)	4 (1.5) ▲	20 (1.0)	483 (4.3)	3 (1.3) ▲
Scotland	52 (1.4)	530 (3.2)	-7 (2.0) ▼	31 (1.1)	468 (3.6)	4 (1.5) ▲	17 (1.0)	447 (4.5)	3 (1.3) ▲
Italy	53 (1.0)	517 (3.6)	-4 (1.5) ▼	33 (0.9)	476 (3.3)	1 (1.3)	14 (0.8)	460 (4.6)	3 (1.0) ▲
Norway	57 (1.2)	507 (2.0)	-3 (1.7)	32 (0.9)	467 (2.8)	1 (1.3)	11 (0.7)	447 (4.5)	2 (1.0)
Jordan	64 (1.5)	511 (3.6)	7 (1.8) ▲	30 (1.2)	446 (4.1)	-6 (1.5) ▼	5 (0.6)	419 (12.3)	-1 (0.8)
Malaysia	26 (1.3)	514 (6.4)	-12 (1.8) ▼	52 (1.2)	454 (6.3)	4 (1.6) ▲	22 (0.9)	461 (5.8)	8 (1.1) ▲
Thailand	30 (1.2)	495 (4.9)	◊ ◊	59 (1.0)	457 (4.1)	◊ ◊	11 (0.8)	479 (6.8)	◊ ◊
Israel	56 (1.6)	507 (4.2)	-3 (1.9)	33 (1.2)	432 (4.9)	1 (1.5)	11 (0.7)	418 (7.0)	1 (0.9)
Bahrain	58 (0.9)	496 (2.2)	2 (1.3)	35 (0.9)	433 (2.5)	-2 (1.3)	7 (0.4)	421 (6.6)	0 (0.7)
Turkey	51 (1.3)	484 (4.0)	◊ ◊	37 (1.0)	427 (4.2)	◊ ◊	11 (0.6)	417 (5.3)	◊ ◊
Tunisia	70 (0.9)	457 (2.2)	1 (1.4)	26 (0.8)	417 (2.3)	0 (1.2)	4 (0.4)	417 (6.2)	0 (0.5)
Oman	52 (1.1)	457 (3.0)	◊ ◊	44 (1.0)	393 (3.1)	◊ ◊	4 (0.3)	373 (10.9)	◊ ◊
Iran, Islamic Rep. of	58 (1.3)	479 (3.9)	11 (1.7) ▲	35 (1.1)	437 (3.9)	-9 (1.4) ▼	7 (0.5)	432 (8.1)	-1 (0.7)
Kuwait	49 (0.9)	445 (3.4)	◊ ◊	42 (0.8)	401 (3.3)	◊ ◊	9 (0.5)	386 (5.8)	◊ ◊
Colombia	62 (1.4)	434 (3.3)	◊ ◊	34 (1.2)	396 (4.3)	◊ ◊	5 (0.4)	390 (8.5)	◊ ◊
Egypt	60 (1.4)	438 (3.4)	-4 (1.8) ▼	35 (1.4)	379 (4.6)	3 (1.7)	5 (0.4)	357 (9.6)	1 (0.5)
Palestinian Nat'l Auth.	53 (1.3)	446 (3.7)	-4 (1.7) ▼	41 (1.1)	368 (4.2)	4 (1.5) ▲	6 (0.5)	348 (7.5)	-1 (0.7)
Saudi Arabia	59 (1.2)	427 (3.0)	- -	36 (1.1)	378 (3.0)	- -	5 (0.5)	364 (6.5)	- -
El Salvador	44 (1.3)	408 (3.4)	◊ ◊	51 (1.2)	372 (3.3)	◊ ◊	5 (0.6)	388 (6.9)	◊ ◊
Botswana	49 (1.0)	381 (3.3)	3 (1.4) ▲	41 (0.9)	338 (4.2)	-3 (1.1) ▼	9 (0.5)	316 (6.9)	0 (0.7)
Qatar	52 (0.6)	357 (2.1)	◊ ◊	40 (0.7)	288 (3.2)	◊ ◊	8 (0.3)	266 (5.4)	◊ ◊
Ghana	54 (1.5)	334 (5.3)	-3 (2.0)	41 (1.3)	273 (5.7)	4 (1.7) ▲	5 (0.5)	268 (11.1)	-1 (0.8)
International Avg.	48 (0.2)	492 (0.7)		38 (0.2)	439 (0.7)		13 (0.1)	427 (1.3)	
Benchmarking Participants									
Massachusetts, US	58 (2.9)	579 (6.3)	◊ ◊	28 (1.6)	537 (4.8)	◊ ◊	14 (1.7)	506 (6.4)	◊ ◊
Minnesota, US	50 (2.8)	567 (4.9)	◊ ◊	32 (1.6)	520 (5.3)	◊ ◊	18 (2.3)	493 (5.3)	◊ ◊
Ontario, Canada	51 (1.4)	553 (3.3)	-1 (2.0)	33 (1.0)	507 (4.0)	0 (1.5)	16 (1.1)	483 (6.5)	1 (1.5)
British Columbia, Canada	54 (1.2)	548 (3.1)	◊ ◊	32 (0.7)	507 (3.5)	◊ ◊	15 (0.9)	486 (4.0)	◊ ◊
Quebec, Canada	49 (1.5)	525 (3.6)	-1 (2.3)	33 (0.9)	497 (3.9)	2 (1.4)	18 (1.1)	481 (5.6)	-1 (1.6)
Basque Country, Spain	50 (1.9)	526 (3.4)	-1 (2.6)	33 (1.1)	478 (3.7)	-1 (1.7)	18 (1.3)	455 (4.6)	2 (1.7)
Dubai, UAE r	57 (1.6)	521 (3.1)	◊ ◊	36 (1.4)	457 (4.1)	◊ ◊	8 (0.7)	452 (8.7)	◊ ◊

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Index based on students' responses to four statements about science:1) I usually do well in science; 2) Science is more difficult for me than for many of my classmates (Reversed); 3) Science is not one of my strengths (Reversed); 4) I learn things quickly in science. Average is computed across the four items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a little or a lot on average across the four statements are assigned to the high level. Students disagreeing a little or a lot on average are assigned to the low level. All other students are assigned to the middle level.

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

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

An "x" indicates data are available for less than 50% of the students. A diamond (◊) indicates the country did not participate in the assessment.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

As was the case at grade 4, despite the change in levels of enjoyment of science since 1995 and 1999, grade 8 pupils' levels of confidence in science have remained stable in England. Exhibit 7.10 shows that 53 per cent of England's grade 8 pupils have a high level of self-confidence in their ability to learn in science. This is similar to PISA 2006, where 54 per cent of year 11 pupils agreed that they learn science topics quickly, while 44 per cent agreed that science topics are easy for them.

Once again, higher levels of achievement in TIMSS 2007 were associated with being in a higher confidence band although, as was the case with enjoyment, the reasons for this could lie in either direction: that high confidence might arise from, or alternatively might follow from, high attainment.

Internationally, the proportions of pupils in the high confidence category ranged from 20 per cent to 70 per cent. England's percentage was higher than that of any of the three highest scoring countries, whose percentages ranged from the lowest (Japan at 20 per cent)

Exhibit 7.11 Index of students' self-confidence in learning science (SCS) by gender (continued)

TIMSS2007 8th Science Grade

General/Integrated Science

Country	High SCS Percent of Students		Medium SCS Percent of Students		Low SCS Percent of Students	
	Girls	Boys	Girls	Boys	Girls	Boys
Singapore	34 (1.2)	47 (1.2) ▲	39 (1.0)	38 (1.2)	27 (1.0) ▲	16 (0.8)
Chinese Taipei	16 (1.1)	30 (1.3) ▲	32 (1.2)	39 (1.1) ▲	51 (1.4) ▲	31 (1.4)
Japan	15 (0.9)	25 (1.0) ▲	42 (1.3)	47 (1.3) ▲	44 (1.6) ▲	28 (1.3)
Korea, Rep. of	18 (1.0)	30 (1.3) ▲	41 (1.2)	39 (1.2)	41 (1.3) ▲	31 (1.2)
England	46 (1.7)	61 (1.8) ▲	35 (1.3) ▲	28 (1.4)	19 (1.1) ▲	11 (1.0)
Hong Kong SAR	28 (1.4)	38 (1.5) ▲	50 (1.4)	47 (1.2)	22 (1.3) ▲	15 (1.0)
United States	52 (1.2)	60 (1.3) ▲	31 (1.0) ▲	28 (0.9)	17 (0.9) ▲	12 (0.8)
Australia	36 (1.5)	46 (1.6) ▲	40 (1.4)	38 (1.1)	24 (1.2) ▲	15 (1.1)
Scotland	47 (1.7)	57 (1.6) ▲	33 (1.4)	30 (1.3)	20 (1.4) ▲	13 (1.0)
Italy	51 (1.5)	55 (1.5)	34 (1.2)	31 (1.2)	15 (1.1)	14 (1.1)
Norway	52 (1.5)	62 (1.3) ▲	34 (1.3) ▲	29 (1.1)	14 (1.0) ▲	9 (0.7)
Jordan	67 (1.9)	62 (2.2)	29 (1.6)	31 (1.6)	4 (0.5)	7 (1.1) ▲
Malaysia	25 (1.5)	27 (1.6)	51 (1.3)	53 (1.6)	24 (1.2) ▲	19 (1.0)
Thailand	29 (1.4)	31 (1.4)	58 (1.2)	61 (1.3) ▲	14 (1.1) ▲	9 (0.8)
Israel	56 (1.8)	57 (1.8)	33 (1.5)	33 (1.5)	11 (0.9)	10 (0.9)
Bahrain	62 (1.2) ▲	54 (1.3)	30 (1.1)	39 (1.3) ▲	8 (0.4)	7 (0.7)
Iran, Islamic Rep. of	61 (1.9)	56 (2.0)	34 (1.7)	37 (1.7)	6 (0.7)	8 (0.7) ▲
Turkey	55 (1.7) ▲	48 (1.4)	35 (1.4)	40 (1.3) ▲	10 (1.0)	12 (0.8)
Tunisia	70 (1.2)	70 (1.3)	26 (1.1)	26 (1.2)	4 (0.4)	5 (0.6)
Oman	52 (1.8)	52 (1.4)	44 (1.6)	44 (1.3)	4 (0.4)	4 (0.4)
Kuwait	51 (1.2) ▲	46 (1.4)	39 (1.1)	45 (1.2) ▲	10 (0.6)	9 (0.7)
Colombia	61 (1.6)	62 (1.5)	34 (1.5)	33 (1.4)	4 (0.5)	5 (0.6)
Egypt	59 (1.9)	60 (1.7)	36 (1.8)	35 (1.6)	5 (0.6)	5 (0.5)
Palestinian Nat'l Auth.	54 (1.9)	51 (1.7)	39 (1.6)	43 (1.5)	6 (0.7)	6 (0.6)
Saudi Arabia	61 (1.7)	57 (1.9)	34 (1.6)	37 (1.7)	5 (0.8)	6 (0.7)
El Salvador	44 (1.6)	45 (1.7)	51 (1.5)	51 (1.6)	5 (0.8)	4 (0.7)
Botswana	48 (1.3)	51 (1.3)	42 (1.1)	41 (1.2)	10 (0.7)	8 (0.6)
Qatar	56 (0.7) ▲	49 (0.9)	37 (0.8)	43 (0.9) ▲	7 (0.4)	8 (0.5)
Ghana	49 (1.5)	58 (1.8) ▲	45 (1.4) ▲	37 (1.6)	6 (0.7)	5 (0.5)
International Avg.	47 (0.3)	50 (0.3) ▲	38 (0.2)	39 (0.3)	15 (0.2) ▲	11 (0.2)
Benchmarking Participants						
Massachusetts, US	51 (3.4)	65 (2.6) ▲	30 (1.8) ▲	26 (1.9)	19 (2.3) ▲	9 (1.3)
Minnesota, US	46 (3.2)	55 (3.0) ▲	32 (1.6)	32 (2.2)	23 (2.6) ▲	13 (2.2)
Ontario, Canada	49 (1.7)	53 (1.8)	33 (1.0)	34 (1.6)	18 (1.6) ▲	14 (1.1)
British Columbia, Canada	52 (1.5)	56 (1.8)	32 (1.1)	31 (1.1)	16 (1.2)	13 (1.0)
Quebec, Canada	49 (1.7)	50 (1.9)	34 (1.2)	32 (1.2)	18 (1.3)	18 (1.3)
Basque Country, Spain	48 (2.1)	51 (2.2)	32 (1.4)	33 (1.6)	20 (1.5) ▲	16 (1.5)
Dubai, UAE r	58 (2.2)	55 (1.9)	34 (1.8)	37 (1.8)	7 (1.0)	8 (0.7)

▲ Percent significantly higher than other gender

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on students' responses to four statements about science:1) I usually do well in science; 2) Science is more difficult for me than for many of my classmates (Reversed); 3) Science is not one of my strengths (Reversed); 4) I learn things quickly in science. Average is computed across the four items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a little or a lot on average across the four statements are assigned to the high level. Students disagreeing a little or a lot on average are assigned to the low level. All other students are assigned to the middle level.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A dash (-) indicates comparable data are not available.
An "r" indicates data are available for at least 70 but less than 85% of the students. An "x" indicates data are available for less than 50% of the students.

to 40 per cent (Singapore). Similarly, Hong Kong, with an integrated curriculum and performing similarly to England, had only 33 per cent of its pupils in the high category. It is clear that, internationally, level of self-confidence is not automatically a predictor of level of attainment.

In England, there was a gender difference in levels of confidence at grade 8, just as there had been at grade 4 (see Exhibit 7.11). More boys were found in the high category (15 percentage points, more) and more girls in the medium and low categories (seven and eight percentage points more, respectively). The difference in the high category is greater than the equivalent four percentage points' difference at grade 4, suggesting that the

gender difference in confidence in England becomes more pronounced over time, despite the lack of any real overall difference in attainment between the genders.

A similar pattern of gender difference was found internationally: the international average in the high confidence category at grade 8 was greater for boys than girls, while the reverse was true in the low category. In all of the countries outscoring England, and in Hong Kong performing at the same level, boys were more confident than girls.

7.4 Pupils' attitudes towards grade 8 mathematics

In England, the proportion of grade 8 pupils with a positive attitude to mathematics was lower than that for grade 4 mathematics. Exhibit 7.12 shows that 40 per cent had a highly positive attitude to mathematics, a decrease of 25 percentage points since 1999, the most recent year for which a comparable index is available and the largest decrease of any country. There was a corresponding increase in the proportion of England's pupils in the medium and low categories, with the lion's share of the redistribution affecting the low category. England's grade 8 pupils have improved their attainment in mathematics since 2003, but not their levels of enjoyment of the subject.

As was the case with science, the degree of positive attitude was measured by pupils' responses to three statements about their enjoyment of mathematics (answers were given on a four point scale from 'agree a lot' to 'disagree a lot'). Responses were collated to create an index of 'Positive Affect Toward Mathematics' (PATM). Pupils were categorised into three bands: High PATM, medium PATM and low PATM (see Exhibit 7.12 for details of how the index was created). Exhibit 7.12 shows the percentage of pupils in each band for each participating country. The countries are listed in order of overall achievement in mathematics at grade 8 (as indicated in Chapter 3). Countries performing overall at a similar level to England are indicated by a box.

In 2003, the comparable attitude index was not calculated, which is why the comparisons here have been made against earlier data. In 2003, outcomes were reported only on responses to the statement 'I enjoy mathematics'. In England in 2003, 53 per cent of pupils agreed with that statement a lot or a little, more than the proportion in the highly positive category in 2007.

Internationally, the percentage of pupils in the highly positive category in 2007 ranged between 25 and 84 per cent, a particularly wide range. As has been observed earlier, the countries with the greatest percentages of pupils in this high category were predominantly less well developed countries.

Other countries with a significant decrease since 1999 in the percentage of pupils in the highly positive category in grade 8 mathematics included Singapore, Chinese Taipei, Hong Kong, the United States, Lithuania, Hungary, Italy and Romania. This group contains not only countries performing similarly to England, but also some outperforming England and some performing less well than England. These trends make it clear that England is not alone in having high attainment but relatively low levels of enjoyment.

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Among the higher performing countries, only Korea had a significant increase in the proportion of its pupils in the highly positive category. This increase took its percentage to 33, still lower than England's. These outcomes indicate that there is no straightforward link between enjoyment of mathematics and attainment in it at grade 8. Despite this, it is clear that enjoyment is related to achievement to some extent: Exhibit 7.12 shows that, as achievement in mathematics decreases, so does enjoyment of it. This could be because those who enjoy mathematics more do better at it, or the reverse might be true: that those who do better at it enjoy it more.

As was the case for grade 8 science, pupils were asked to respond to an additional mathematics question not included in the grade 4 questionnaire. This investigated the extent of the value they place on mathematics and is based on responses to four statements addressing the extent to which they perceive mathematics as:

- Helping them in daily life
- Being necessary for learning other school subjects
- Being necessary for getting into the university of their choice
- Being necessary for getting the job they want.

From pupils' responses, an index of valuing mathematics was derived, based once again on high, medium and low bands. In England, 74 per cent of grade 8 pupils valued mathematics highly (see Exhibit 7.13), much higher than the 52 per cent who valued science highly at grade 8. This was a significant increase of 10 percentage points from the 2003 equivalent and suggests that pupils perceive mathematics to be more relevant to them than science. There were corresponding decreases in the medium valuing category and, to a lesser extent, in the low category.

Only five per cent of England's pupils were in the low category for valuing mathematics, indicating that 95 per cent are in the high and medium categories. This compares with 65 per cent in the corresponding categories on the enjoyment index. Thus, although almost a third of grade 8 pupils indicated that they do not enjoy mathematics, many of these pupils, like those who enjoy the subject more, are sufficiently realistic to know that the subject is important to their lives and their futures.

Once again, the international data shows that those countries with higher proportions of pupils valuing mathematics highly are predominantly less well developed countries.

Among the higher achieving countries in grade 8 mathematics, the proportion in the high valuing category ranged from 43 to 77 per cent (for Japan and Singapore, respectively). There was less variation within the group of countries performing similarly to England: their equivalent percentages ranged from 70 to 85 per cent. Internationally, for countries which showed a change since 2003 in the percentage valuing mathematics highly, the change was typically an increase. However, for Singapore in 2007, the change was negative: a significant drop of three percentage points.

For science at grade 8, comparisons were made with similar attitudinal findings from PISA. This has not been done for mathematics at grade 8, since mathematics was a minor subject in PISA 2006.

Despite the reduced in levels of enjoyment in mathematics since 1999, grade 8 pupils in England have gained confidence in their abilities in mathematics. Exhibit 7.14 shows that 53 per cent of grade 8 pupils had a high level of self-confidence in learning mathematics in 2007, a statistically significant increase on the equivalent index in 2003. This was accompanied by a decrease in the low category of confidence, while the proportion in the medium category remained stable.

The international range in terms of proportions of pupils in the high confidence category was from 17 per cent (Japan) to 59 per cent (Israel). Thus, England was one of the countries with the highest proportion of highly confident pupils. Once again, higher levels of achievement were associated with higher confidence.

Among the five highest attaining countries, the percentages in the high confidence category ranged from 17 to 41 per cent and were not significantly different from 2003 figures, whereas the equivalent range in the group of countries performing similarly to England was 41 to 53 per cent.

As was true for both subjects at grade 4 and for science at grade 8, Exhibit 7.15 shows that there were more boys than girls in the high confidence band for grade 8 mathematics in England (18 percentage points higher). Correspondingly, there were fewer boys in the medium and low categories (six and 12 percentage points fewer, respectively). As in the other cases, there were no gender differences overall in attainment on mathematics at grade 8 and so, again, these figures indicate some degree of over-confidence from boys or unjustified lack of confidence from girls.

Once again, remarkably similar patterns were found in the five highest scoring countries, Chinese Taipei , Korea, Singapore, Hong Kong and Japan: all had more boys in the highest confidence category and fewer boys in the lowest confidence category.

Similar patterns were found in the group of countries with achievement matching England's. Four of the six countries in this group had more boys in the high category. The two exceptions were Lithuania and the Russian Federation, which had no gender difference in this category.

Widespread differences were represented in the international averages: boys were over-represented in the international averages in the high confidence category and under-represented in the low category. More unusually, however, in grade 8 mathematics, they were also over-represented in the medium confidence category. Boys clearly have a higher opinion of their mathematics abilities than girls have of theirs, even though this is not always borne out by their achievement.

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Exhibit 7.12 Index of students' positive affect toward mathematics (PATM) with trends

TIMSS2007 Mathematics 8th Grade

Country	High PATM				Medium PATM			
	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995
Chinese Taipei	37 (1.2)	657 (3.7)	-8 (1.6) ▼	◊ ◊	18 (0.6)	605 (5.1)	-4 (0.8) ▼	◊ ◊
Korea, Rep. of	33 (0.9)	650 (2.9)	3 (1.1) ▲	-2 (1.4)	23 (0.6)	600 (3.4)	-12 (0.9) ▼	-13 (1.2) ▼
Singapore	60 (1.0)	615 (3.6)	-7 (1.5) ▼	-7 (1.6) ▼	20 (0.6)	575 (5.3)	1 (1.0)	0 (1.0)
Hong Kong SAR	47 (1.2)	603 (5.5)	-9 (1.6) ▼	-2 (1.9)	22 (0.9)	566 (6.4)	-2 (1.1)	-4 (1.2) ▼
Japan	30 (1.1)	609 (3.7)	-1 (1.5)	-7 (1.8) ▼	30 (1.0)	567 (3.0)	-4 (1.2) ▼	-6 (1.2) ▼
Hungary	30 (1.0)	554 (4.4)	-6 (1.6) ▼	-5 (1.6) ▼	22 (1.0)	517 (4.9)	-13 (1.2) ▼	-12 (1.5) ▼
England	40 (1.4)	532 (5.7)	-25 (1.9) ▼	-27 (2.1) ▼	25 (0.9)	515 (6.1)	6 (1.2) ▲	7 (1.3) ▲
Russian Federation	53 (1.1)	533 (4.6)	0 (1.9)	5 (1.7) ▲	27 (0.8)	494 (4.7)	-5 (1.3) ▼	-7 (1.3) ▼
United States	41 (0.8)	524 (2.9)	-11 (1.4) ▼	-9 (1.4) ▼	24 (0.5)	511 (3.3)	2 (0.8) ▲	-2 (0.9) ▼
Lithuania	38 (1.1)	531 (3.4)	-14 (1.9) ▼	5 (1.8) ▲	28 (0.8)	503 (2.7)	-1 (1.3)	-6 (1.5) ▼
Czech Republic	31 (1.0)	530 (3.0)	-1 (1.9)	-1 (1.6)	22 (0.6)	501 (3.6)	-10 (1.3) ▼	-8 (1.3) ▼
Slovenia	25 (1.1)	520 (4.3)	- -	-15 (2.0) ▼	22 (0.7)	507 (3.0)	- -	-12 (1.2) ▼
Armenia	55 (1.4)	511 (3.9)	◊ ◊	◊ ◊	23 (0.7)	494 (6.4)	◊ ◊	◊ ◊
Australia	34 (1.3)	521 (6.2)	- -	-10 (1.8) ▼	27 (0.8)	498 (3.7)	- -	-1 (1.0)
Sweden	39 (1.1)	517 (2.9)	◊ ◊	-9 (2.1) ▼	24 (0.6)	488 (2.9)	◊ ◊	-3 (1.4)
Malta	42 (0.6)	517 (1.8)	◊ ◊	◊ ◊	21 (0.6)	474 (3.2)	◊ ◊	◊ ◊
Scotland	33 (1.0)	502 (4.5)	◊ ◊	- -	29 (0.8)	490 (4.1)	◊ ◊	- -
Serbia	35 (1.4)	518 (4.3)	◊ ◊	◊ ◊	16 (0.7)	499 (5.7)	◊ ◊	◊ ◊
Italy	38 (1.2)	506 (3.3)	-16 (1.8) ▼	- -	23 (0.8)	482 (4.5)	1 (1.2)	- -
Malaysia	73 (1.0)	485 (5.2)	-16 (1.2) ▼	◊ ◊	18 (0.8)	445 (5.6)	9 (0.9) ▲	◊ ◊
Norway	37 (1.1)	488 (2.4)	◊ ◊	-12 (1.6) ▼	24 (0.6)	474 (2.6)	◊ ◊	-2 (1.1) ▼
Cyprus	44 (0.9)	497 (2.4)	-23 (1.4) ▼	-21 (1.4) ▼	21 (0.6)	455 (3.4)	2 (1.0) ▲	2 (0.9)
Bulgaria	46 (1.2)	487 (5.6)	-4 (2.5)	- -	22 (0.9)	463 (5.5)	-3 (1.4) ▼	- -
Israel	49 (1.1)	475 (4.8)	-12 (1.9) ▼	- -	22 (0.8)	470 (5.3)	2 (1.2)	- -
Ukraine	54 (1.5)	485 (3.9)	◊ ◊	◊ ◊	23 (0.8)	456 (4.3)	◊ ◊	◊ ◊
Romania	47 (1.4)	486 (4.9)	-6 (2.1) ▼	-8 (2.0) ▼	21 (0.8)	451 (5.1)	-5 (1.4) ▼	-7 (1.3) ▼
Bosnia and Herzegovina	41 (1.2)	476 (3.2)	◊ ◊	◊ ◊	16 (0.6)	459 (4.2)	◊ ◊	◊ ◊
Lebanon	63 (1.3)	465 (4.3)	◊ ◊	◊ ◊	19 (0.9)	428 (5.9)	◊ ◊	◊ ◊
Thailand	57 (1.5)	457 (5.6)	-2 (1.9)	- -	31 (1.1)	420 (5.1)	-1 (1.4)	- -
Turkey	71 (1.2)	450 (5.1)	- -	◊ ◊	17 (0.8)	399 (6.3)	- -	◊ ◊
Jordan	72 (1.4)	448 (4.0)	3 (1.9)	◊ ◊	15 (0.8)	396 (5.5)	-3 (1.1) ▼	◊ ◊
Tunisia	73 (1.0)	430 (2.5)	0 (1.4)	◊ ◊	14 (0.6)	398 (4.2)	1 (0.8)	◊ ◊
Georgia	58 (1.7)	436 (5.0)	◊ ◊	◊ ◊	22 (1.0)	399 (7.8)	◊ ◊	◊ ◊
Iran, Islamic Rep. of	64 (1.2)	425 (4.4)	-7 (1.5) ▼	-3 (1.8)	21 (1.0)	382 (4.5)	2 (1.2)	0 (1.4)
Bahrain	59 (0.9)	412 (2.0)	◊ ◊	◊ ◊	18 (0.6)	389 (2.8)	◊ ◊	◊ ◊
Indonesia	72 (1.3)	400 (3.9)	-10 (1.7) ▼	◊ ◊	21 (1.0)	390 (4.9)	7 (1.3) ▲	◊ ◊
Syrian Arab Republic	70 (1.1)	410 (3.6)	◊ ◊	◊ ◊	17 (0.8)	376 (5.4)	◊ ◊	◊ ◊
Egypt	78 (1.1)	404 (3.4)	◊ ◊	◊ ◊	14 (0.8)	362 (6.5)	◊ ◊	◊ ◊
Algeria	83 (0.7)	394 (2.2)	◊ ◊	◊ ◊	10 (0.5)	364 (3.9)	◊ ◊	◊ ◊
¶ Morocco	84 (0.7)	387 (3.1)	- -	- -	10 (0.6)	353 (7.1)	- -	- -
Colombia	69 (1.3)	385 (3.5)	◊ ◊	-1 (1.9)	20 (1.0)	377 (4.7)	◊ ◊	-2 (1.5)
Oman	78 (0.9)	386 (3.3)	◊ ◊	◊ ◊	16 (0.8)	335 (4.7)	◊ ◊	◊ ◊
Palestinian Nat'l Auth.	56 (1.3)	392 (4.1)	◊ ◊	◊ ◊	22 (0.8)	340 (5.0)	◊ ◊	◊ ◊
Botswana	78 (1.0)	376 (2.3)	◊ ◊	◊ ◊	13 (0.6)	339 (3.8)	◊ ◊	◊ ◊
Kuwait	57 (1.0)	367 (2.4)	◊ ◊	- -	20 (0.7)	349 (3.7)	◊ ◊	- -
El Salvador	68 (1.3)	351 (2.7)	◊ ◊	◊ ◊	22 (1.0)	327 (3.8)	◊ ◊	◊ ◊
Saudi Arabia	54 (1.4)	340 (3.7)	◊ ◊	◊ ◊	22 (0.8)	321 (4.0)	◊ ◊	◊ ◊
Ghana	70 (1.2)	327 (4.2)	◊ ◊	◊ ◊	22 (0.8)	282 (6.3)	◊ ◊	◊ ◊
Qatar	57 (0.5)	321 (1.6)	◊ ◊	◊ ◊	19 (0.5)	299 (4.0)	◊ ◊	◊ ◊
International Avg.	54 (0.2)	471 (0.6)			21 (0.1)	441 (0.7)		
Benchmarking Participants								
Massachusetts, US	41 (1.6)	565 (5.2)	-6 (2.9) ▼	◊ ◊	26 (1.1)	549 (5.1)	1 (1.7)	◊ ◊
Minnesota, US	43 (2.2)	551 (5.3)	◊ ◊	-10 (3.6) ▼	25 (1.1)	530 (5.6)	◊ ◊	2 (1.9)
Quebec, Canada	47 (1.4)	544 (4.4)	4 (2.4)	-2 (2.8)	19 (0.7)	529 (4.9)	-15 (2.1) ▼	-3 (1.9)
Ontario, Canada	48 (1.7)	537 (3.9)	-12 (2.4) ▼	-10 (2.4) ▼	23 (0.9)	512 (4.0)	3 (1.3) ▲	-2 (1.4)
British Columbia, Canada	35 (1.0)	532 (3.5)	-7 (2.5) ▼	◊ ◊	26 (0.8)	515 (4.3)	-3 (1.5)	◊ ◊
Basque Country, Spain	37 (1.5)	525 (3.4)	◊ ◊	◊ ◊	24 (0.9)	499 (3.7)	◊ ◊	◊ ◊
Dubai, UAE	54 (1.3)	480 (2.9)	◊ ◊	◊ ◊	22 (1.1)	451 (5.0)	◊ ◊	◊ ◊

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Index based on students' responses to three statements about mathematics: 1) I enjoy learning mathematics; 2) Mathematics is boring (Reversed); 3) I like mathematics. Average is computed across the three items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a lot or a little on average across the three statements are assigned to the high level. Students disagreeing a little or a lot on average across the three statements are assigned to the low level. All other students are assigned to the middle level.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

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

A diamond (◊) indicates the country did not participate in the assessment.

Exhibit 7.12 Index of students' positive affect toward mathematics (PATM) with trends (continued)

TIMSS2007 8th Mathematics Grade

Country	Low PATM			
	2007 Percent of Students	Average Achievement	Difference in Percent from 1999	Difference in Percent from 1995
Chinese Taipei	45 (1.4)	547 (4.6)	12 (1.7) ▲	◊ ◊
Korea, Rep. of	44 (0.9)	558 (3.1)	8 (1.3) ▲	15 (1.4) ▲
Singapore	20 (0.8)	545 (5.4)	6 (1.1) ▲	6 (1.2) ▲
Hong Kong SAR	31 (1.2)	532 (7.3)	11 (1.4) ▲	6 (1.7) ▲
Japan	40 (1.2)	543 (2.5)	5 (1.6) ▲	13 (1.8) ▲
Hungary	48 (1.4)	496 (3.6)	19 (2.0) ▲	16 (1.9) ▲
England	35 (1.5)	495 (4.9)	19 (1.8) ▲	20 (1.8) ▲
Russian Federation	20 (0.8)	488 (5.7)	5 (1.3) ▲	2 (1.2)
United States	35 (0.8)	490 (3.3)	9 (1.2) ▲	11 (1.1) ▲
Lithuania	34 (1.1)	481 (3.5)	14 (1.6) ▲	0 (1.8)
Czech Republic	47 (1.1)	489 (2.7)	11 (1.9) ▲	9 (1.9) ▲
Slovenia	53 (1.1)	492 (2.1)	- -	27 (1.9) ▲
Armenia	22 (1.2)	489 (4.5)	◊ ◊	◊ ◊
Australia	39 (1.2)	476 (4.1)	- -	11 (1.5) ▲
Sweden	37 (1.1)	470 (2.7)	◊ ◊	12 (1.7) ▲
Malta	37 (0.7)	465 (2.4)	◊ ◊	◊ ◊
Scotland	38 (1.0)	476 (4.1)	◊ ◊	- -
Serbia	49 (1.6)	467 (3.7)	◊ ◊	◊ ◊
Italy	39 (1.1)	455 (3.2)	15 (1.6) ▲	- -
Malaysia	10 (0.6)	445 (6.0)	7 (0.6) ▲	◊ ◊
Norway	39 (1.1)	451 (2.1)	◊ ◊	14 (1.5) ▲
Cyprus	35 (0.8)	436 (2.4)	21 (1.2) ▲	19 (1.2) ▲
Bulgaria	32 (1.2)	448 (6.4)	8 (2.2) ▲	- -
Israel	28 (1.1)	451 (4.8)	10 (1.4) ▲	- -
Ukraine	23 (1.1)	440 (4.0)	◊ ◊	◊ ◊
Romania	31 (1.2)	443 (4.5)	11 (1.6) ▲	15 (1.5) ▲
Bosnia and Herzegovina	43 (1.3)	444 (3.4)	◊ ◊	◊ ◊
Lebanon	17 (0.9)	428 (4.9)	◊ ◊	◊ ◊
Thailand	12 (0.7)	427 (5.8)	3 (0.9) ▲	- -
Turkey	11 (0.8)	386 (5.8)	- -	◊ ◊
Jordan	13 (1.0)	385 (9.2)	0 (1.3)	◊ ◊
Tunisia	13 (0.7)	395 (4.2)	-1 (1.0)	◊ ◊
Georgia	20 (1.2)	392 (6.5)	◊ ◊	◊ ◊
Iran, Islamic Rep. of	15 (0.9)	382 (6.6)	5 (1.1) ▲	2 (1.3)
Bahrain	23 (0.8)	376 (3.0)	◊ ◊	◊ ◊
Indonesia	7 (0.6)	402 (7.3)	3 (0.7) ▲	◊ ◊
Syrian Arab Republic	13 (0.6)	368 (4.5)	◊ ◊	◊ ◊
Egypt	8 (0.5)	376 (7.6)	◊ ◊	◊ ◊
Algeria	7 (0.5)	357 (3.8)	◊ ◊	◊ ◊
¶ Morocco	6 (0.6)	353 (9.4)	- -	- -
Colombia	11 (0.7)	380 (6.7)	◊ ◊	2 (1.1) ▲
Oman	6 (0.4)	334 (7.5)	◊ ◊	◊ ◊
Palestinian Nat'l Auth.	22 (1.0)	347 (4.1)	◊ ◊	◊ ◊
Botswana	9 (0.7)	332 (5.0)	◊ ◊	◊ ◊
Kuwait	24 (0.9)	338 (4.3)	◊ ◊	- -
El Salvador	10 (0.7)	327 (6.0)	◊ ◊	◊ ◊
Saudi Arabia	24 (1.0)	323 (4.7)	◊ ◊	◊ ◊
Ghana	8 (0.6)	269 (8.4)	◊ ◊	◊ ◊
Qatar	24 (0.5)	296 (2.8)	◊ ◊	◊ ◊
International Avg.	26 (0.1)	428 (0.7)		
Benchmarking Participants				
Massachusetts, US	33 (2.1)	524 (6.4)	5 (2.8)	◊ ◊
Minnesota, US	32 (2.5)	509 (5.5)	◊ ◊	8 (3.4) ▲
Quebec, Canada	34 (1.4)	509 (3.1)	11 (2.5) ▲	6 (2.3) ▲
Ontario, Canada	29 (1.4)	491 (4.9)	9 (1.9) ▲	12 (2.0) ▲
British Columbia, Canada	38 (1.2)	486 (3.0)	10 (2.7) ▲	◊ ◊
Basque Country, Spain	39 (1.5)	476 (3.8)	◊ ◊	◊ ◊
Dubai, UAE	24 (1.1)	442 (4.9)	◊ ◊	◊ ◊

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Exhibit 7.13 Index of students' valuing mathematics (SVM) with trends

TIMSS2007 8th Mathematics Grade

Country	High SVM			Medium SVM			Low SVM		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Chinese Taipei	45 (1.2)	623 (5.3)	3 (1.6) ▲	39 (1.0)	598 (4.2)	-2 (1.3)	16 (0.8)	534 (5.8)	-1 (1.1)
Korea, Rep. of	53 (0.9)	617 (3.0)	10 (1.4) ▲	37 (0.7)	582 (3.4)	-6 (1.2) ▼	10 (0.5)	551 (4.8)	-4 (0.7) ▼
Singapore	77 (0.8)	598 (3.8)	-3 (1.0) ▼	19 (0.7)	590 (5.3)	2 (0.9)	4 (0.3)	528 (8.4)	2 (0.4) ▲
Hong Kong SAR	60 (1.4)	588 (5.8)	3 (1.7) ▲	31 (1.1)	561 (6.5)	-5 (1.4) ▼	8 (0.7)	510 (9.7)	2 (0.8) ▲
Japan	43 (0.9)	584 (3.3)	8 (1.2) ▲	43 (0.7)	568 (2.5)	-6 (1.0) ▼	14 (0.7)	536 (5.4)	-2 (1.0)
Hungary	75 (1.0)	522 (3.7)	-4 (1.2) ▼	20 (0.8)	504 (4.7)	3 (1.1) ▲	5 (0.4)	494 (8.7)	1 (0.5)
England	74 (1.0)	515 (5.2)	10 (1.7) ▲	21 (0.8)	514 (5.5)	-6 (1.5) ▼	5 (0.4)	505 (8.8)	-3 (0.8) ▼
Russian Federation	79 (0.9)	515 (4.1)	0 (1.2)	17 (0.8)	511 (5.3)	0 (1.0)	4 (0.4)	489 (7.7)	0 (0.5)
United States	82 (0.7)	511 (2.8)	1 (0.8)	14 (0.5)	501 (3.9)	0 (0.6)	4 (0.3)	485 (5.3)	0 (0.4)
Lithuania	85 (0.6)	511 (2.3)	-1 (0.9)	11 (0.6)	489 (5.0)	0 (0.8)	4 (0.3)	454 (7.9)	1 (0.4)
Czech Republic	70 (0.8)	505 (2.7)	◊ ◊	25 (0.7)	502 (3.3)	◊ ◊	5 (0.4)	493 (5.0)	◊ ◊
Slovenia	67 (0.9)	504 (2.3)	1 (1.6)	29 (0.8)	501 (3.1)	0 (1.3)	5 (0.4)	472 (4.8)	-1 (0.6)
Armenia	64 (0.9)	504 (4.3)	0 (1.4)	24 (0.8)	499 (5.9)	2 (1.1)	13 (0.7)	498 (5.3)	-1 (1.1)
Australia	75 (1.1)	502 (4.4)	1 (1.4)	19 (0.9)	484 (3.8)	0 (1.2)	6 (0.4)	470 (7.0)	-1 (0.7)
Sweden	68 (0.8)	497 (2.5)	9 (1.5) ▲	28 (0.7)	485 (2.6)	-9 (1.4) ▼	4 (0.3)	463 (5.5)	0 (0.5)
Malta	77 (0.6)	495 (1.5)	◊ ◊	18 (0.5)	473 (3.1)	◊ ◊	5 (0.3)	440 (6.0)	◊ ◊
Scotland	82 (0.7)	491 (3.8)	4 (1.2) ▲	15 (0.6)	477 (4.5)	-3 (0.9) ▼	4 (0.4)	467 (8.2)	-1 (0.6)
Serbia	72 (0.8)	489 (3.7)	3 (1.2) ▲	19 (0.6)	493 (5.3)	-2 (0.9)	9 (0.6)	474 (5.9)	-2 (0.8) ▼
Italy	53 (0.8)	488 (3.7)	5 (1.4) ▲	39 (0.9)	477 (3.1)	-3 (1.3) ▼	8 (0.5)	448 (4.5)	-2 (0.8) ▼
Malaysia	76 (1.0)	480 (4.8)	-9 (1.3) ▼	21 (0.9)	459 (6.1)	6 (1.1) ▲	3 (0.5)	418 (15.9)	2 (0.5) ▲
Norway	79 (0.9)	475 (2.0)	7 (1.4) ▲	17 (0.7)	458 (3.4)	-4 (1.2) ▼	5 (0.3)	441 (6.8)	-3 (0.7) ▼
Cyprus	80 (0.7)	472 (1.8)	3 (0.9) ▲	15 (0.5)	453 (3.3)	-1 (0.7)	5 (0.4)	415 (7.6)	-2 (0.6) ▼
Bulgaria	71 (1.1)	471 (5.3)	-1 (1.6)	20 (0.9)	471 (5.7)	0 (1.2)	9 (0.7)	447 (7.5)	1 (1.1)
Israel	77 (1.1)	473 (4.1)	4 (1.5) ▲	17 (0.9)	458 (5.2)	-3 (1.3) ▼	6 (0.5)	409 (9.6)	0 (0.7)
Ukraine	84 (0.8)	470 (3.5)	◊ ◊	13 (0.6)	454 (5.3)	◊ ◊	3 (0.4)	451 (10.5)	◊ ◊
Romania	72 (1.0)	463 (5.1)	2 (1.5)	20 (0.8)	470 (4.8)	-1 (1.2)	7 (0.6)	455 (6.7)	-1 (0.8)
Bosnia and Herzegovina	79 (0.9)	459 (3.0)	◊ ◊	15 (0.7)	461 (4.0)	◊ ◊	6 (0.5)	454 (5.9)	◊ ◊
Lebanon	77 (1.2)	459 (4.5)	-3 (1.5) ▼	18 (1.1)	423 (5.5)	3 (1.4)	5 (0.6)	425 (7.5)	1 (0.7)
Thailand	92 (0.5)	445 (4.9)	◊ ◊	7 (0.5)	410 (7.5)	◊ ◊	1 (0.1)	~ ~	◊ ◊
Turkey	87 (0.6)	438 (4.8)	◊ ◊	10 (0.5)	407 (6.5)	◊ ◊	3 (0.3)	361 (11.3)	◊ ◊
Jordan	91 (0.7)	436 (3.8)	3 (1.0) ▲	7 (0.4)	391 (7.9)	-3 (0.8) ▼	2 (0.3)	~ ~	0 (0.4)
Tunisia	91 (0.5)	423 (2.5)	4 (0.8) ▲	6 (0.4)	403 (5.2)	-3 (0.6) ▼	3 (0.3)	385 (6.1)	-1 (0.5)
Georgia	81 (1.2)	421 (5.9)	◊ ◊	15 (0.9)	403 (8.8)	◊ ◊	4 (0.5)	381 (12.4)	◊ ◊
Iran, Islamic Rep. of	83 (0.8)	408 (4.1)	6 (1.1) ▲	13 (0.6)	392 (7.5)	-3 (0.9) ▼	4 (0.4)	354 (9.5)	-3 (0.6) ▼
Bahrain	88 (0.6)	401 (1.4)	6 (0.9) ▲	9 (0.5)	390 (5.2)	-5 (0.8) ▼	3 (0.3)	367 (8.5)	-1 (0.5)
Indonesia	95 (0.6)	399 (3.7)	10 (1.0) ▲	5 (0.5)	379 (10.6)	-9 (0.9) ▼	1 (0.2)	~ ~	0 (0.3)
Syrian Arab Republic	88 (0.6)	402 (3.6)	◊ ◊	9 (0.5)	373 (6.4)	◊ ◊	3 (0.3)	372 (8.7)	◊ ◊
Egypt	89 (0.7)	401 (3.3)	3 (1.0) ▲	9 (0.6)	355 (7.2)	-3 (0.8) ▼	2 (0.2)	~ ~	-1 (0.4)
Algeria	92 (0.5)	390 (2.0)	◊ ◊	6 (0.4)	370 (4.9)	◊ ◊	2 (0.2)	~ ~	◊ ◊
¶ Morocco	94 (0.5)	384 (2.9)	- -	5 (0.5)	358 (13.6)	- -	1 (0.2)	~ ~	- -
Colombia	89 (0.7)	383 (3.6)	◊ ◊	9 (0.6)	383 (5.4)	◊ ◊	2 (0.4)	~ ~	◊ ◊
Oman	92 (0.5)	381 (3.2)	◊ ◊	6 (0.5)	310 (8.3)	◊ ◊	2 (0.2)	~ ~	◊ ◊
Palestinian Nat'l Auth.	86 (0.9)	380 (3.6)	1 (1.2)	11 (0.7)	313 (7.1)	-1 (0.9)	3 (0.4)	311 (10.1)	0 (0.5)
Botswana	83 (0.8)	377 (2.1)	-4 (1.0) ▼	15 (0.8)	318 (4.2)	4 (0.9) ▲	3 (0.3)	325 (8.5)	0 (0.4)
Kuwait	84 (0.8)	361 (2.1)	◊ ◊	10 (0.5)	342 (5.3)	◊ ◊	6 (0.5)	311 (9.5)	◊ ◊
El Salvador	91 (0.5)	342 (2.6)	◊ ◊	8 (0.4)	355 (5.2)	◊ ◊	2 (0.3)	~ ~	◊ ◊
Saudi Arabia	82 (0.9)	334 (2.9)	- -	13 (0.8)	322 (5.8)	- -	5 (0.5)	307 (8.6)	- -
Ghana	92 (0.6)	316 (4.1)	5 (1.1) ▲	6 (0.5)	262 (11.9)	-4 (0.9) ▼	2 (0.2)	~ ~	-1 (0.4)
Qatar	80 (0.5)	317 (1.4)	◊ ◊	13 (0.4)	292 (3.9)	◊ ◊	6 (0.3)	268 (5.0)	◊ ◊
International Avg.	78 (0.1)	458 (0.5)		17 (0.1)	438 (0.9)		5 (0.1)	435 (1.3)	
Benchmarking Participants									
Massachusetts, US	81 (1.2)	552 (4.8)	◊ ◊	15 (1.1)	534 (6.2)	◊ ◊	4 (0.5)	515 (9.5)	◊ ◊
Minnesota, US	85 (1.4)	537 (4.8)	◊ ◊	12 (1.0)	516 (4.4)	◊ ◊	3 (0.6)	481 (14.2)	◊ ◊
Quebec, Canada	80 (0.8)	534 (3.6)	-2 (1.1)	17 (0.7)	514 (4.5)	2 (1.0)	3 (0.3)	486 (10.2)	0 (0.4)
Ontario, Canada	84 (1.0)	522 (3.4)	0 (1.4)	13 (0.8)	498 (5.8)	1 (1.1)	3 (0.4)	479 (14.2)	-1 (0.5)
British Columbia, Canada	80 (0.9)	515 (3.2)	◊ ◊	16 (0.8)	497 (4.3)	◊ ◊	4 (0.3)	461 (6.2)	◊ ◊
Basque Country, Spain	69 (1.1)	508 (3.0)	7 (1.7) ▲	22 (1.1)	484 (4.0)	-4 (1.5) ▼	9 (0.7)	465 (5.8)	-3 (1.1) ▼
Dubai, UAE	83 (0.8)	469 (2.9)	◊ ◊	13 (0.7)	454 (5.3)	◊ ◊	3 (0.3)	416 (12.0)	◊ ◊

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

Index based on students' responses to four statements about mathematics: 1) I think learning mathematics will help me in my daily life; 2) I need mathematics to learn other school subjects; 3) I need to do well in mathematics to get into the university of my choice; 4) I need to do well in mathematics to get the job I want. Average is computed across the four items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a lot or a little on average across the four statements are assigned to the high level. Students disagreeing a little or a lot on average across the four statements are assigned to the low level. All other students are assigned to the middle level.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

A diamond (◊) indicates the country did not participate in the assessment.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 7.14 Index of students' self-confidence in learning mathematics (SCM) with trends

TIMSS2007 8th Grade Mathematics

Country	High SCM			Medium SCM			Low SCM		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Chinese Taipei	27 (1.1)	674 (3.7)	1 (1.5)	27 (0.7)	610 (5.0)	-3 (1.0) ▼	46 (1.2)	547 (4.4)	2 (1.6)
Korea, Rep. of	29 (0.8)	668 (2.6)	-2 (1.1)	34 (0.7)	606 (3.1)	-2 (1.0) ▼	38 (0.8)	536 (2.8)	4 (1.2) ▲
Singapore	41 (1.0)	638 (3.3)	2 (1.3)	34 (0.9)	572 (4.6)	0 (1.1)	25 (0.8)	547 (4.7)	-2 (1.0)
Hong Kong SAR	30 (1.1)	622 (5.1)	1 (1.4)	40 (1.0)	562 (6.7)	2 (1.2)	30 (0.7)	539 (5.8)	-2 (1.1) ▼
Japan	17 (0.6)	638 (3.9)	0 (0.9)	35 (0.8)	586 (2.9)	-3 (1.1) ▼	48 (0.9)	535 (2.6)	2 (1.2) ▲
Hungary	42 (1.0)	566 (3.5)	-3 (1.4)	32 (0.9)	499 (4.2)	1 (1.3)	26 (1.0)	464 (3.7)	2 (1.3)
England	53 (1.4)	543 (4.9)	6 (2.1) ▲	32 (1.0)	494 (4.7)	-2 (1.6)	15 (0.8)	457 (5.5)	-4 (1.3) ▼
Russian Federation	41 (1.1)	560 (4.3)	-2 (1.5)	31 (0.8)	496 (4.9)	1 (1.2)	28 (0.8)	466 (4.1)	1 (1.2)
United States	53 (1.0)	537 (2.5)	2 (1.3)	28 (0.7)	487 (3.2)	-1 (0.9)	19 (0.7)	462 (3.0)	-1 (1.0)
Lithuania	41 (1.0)	556 (2.7)	4 (1.4) ▲	34 (0.9)	481 (2.9)	-3 (1.2) ▼	25 (0.9)	461 (3.1)	-1 (1.2)
Czech Republic	43 (0.9)	542 (2.6)	◊ ◊	31 (0.7)	490 (2.8)	◊ ◊	25 (0.8)	456 (3.1)	◊ ◊
Slovenia	40 (1.1)	541 (2.9)	-1 (1.4)	41 (0.9)	485 (2.2)	2 (1.3)	19 (0.8)	458 (3.2)	-1 (1.2)
Armenia r	37 (0.9)	521 (4.0)	-4 (1.5) ▼	38 (1.1)	496 (4.6)	-2 (1.5)	26 (1.0)	485 (4.7)	7 (1.4) ▲
Australia	45 (1.2)	539 (4.8)	-5 (2.1) ▼	35 (0.8)	472 (4.1)	5 (1.3) ▲	19 (0.9)	445 (3.7)	0 (1.5)
Sweden	49 (1.0)	528 (2.6)	1 (1.6)	35 (0.7)	468 (2.4)	-1 (1.2)	16 (0.6)	438 (3.6)	0 (1.1)
Malta	38 (0.7)	536 (2.1)	◊ ◊	35 (0.7)	467 (2.0)	◊ ◊	27 (0.6)	449 (2.2)	◊ ◊
Scotland	53 (1.3)	515 (4.0)	1 (2.0)	33 (1.0)	465 (3.6)	1 (1.4)	14 (0.7)	442 (4.6)	-1 (1.2)
Serbia	48 (1.3)	539 (3.4)	4 (1.7) ▲	25 (0.8)	464 (3.6)	-1 (1.1)	27 (1.1)	426 (3.9)	-3 (1.6)
Italy	48 (1.0)	514 (3.1)	2 (1.3)	28 (0.7)	462 (3.6)	-1 (1.1)	24 (0.9)	434 (3.7)	-2 (1.4)
Malaysia	27 (1.4)	521 (5.3)	-11 (1.8) ▼	50 (1.2)	458 (5.1)	5 (1.5) ▲	23 (0.8)	453 (4.5)	6 (1.0) ▲
Norway	50 (0.8)	505 (2.1)	4 (1.4) ▲	31 (0.7)	450 (2.1)	-1 (1.1)	19 (0.7)	415 (2.2)	-2 (1.1) ▼
Cyprus	50 (1.0)	508 (1.7)	4 (1.3) ▲	30 (0.8)	437 (2.5)	-2 (1.1) ▼	20 (0.7)	411 (3.3)	-2 (1.0) ▼
Bulgaria	37 (1.3)	516 (5.5)	4 (1.8)	38 (1.1)	452 (5.3)	-1 (1.8)	25 (1.1)	430 (7.6)	-3 (1.6)
Israel	59 (1.0)	495 (4.1)	0 (1.5)	29 (0.9)	432 (5.3)	-1 (1.3)	12 (0.7)	417 (7.2)	1 (1.0)
Ukraine	36 (1.2)	523 (3.8)	◊ ◊	36 (0.9)	448 (3.5)	◊ ◊	28 (1.1)	423 (3.2)	◊ ◊
Romania	33 (1.2)	517 (5.3)	3 (1.7)	41 (1.1)	449 (4.6)	-4 (1.6) ▼	27 (1.2)	426 (4.4)	2 (1.5)
Bosnia and Herzegovina	41 (1.2)	502 (2.6)	◊ ◊	27 (0.8)	441 (3.2)	◊ ◊	32 (1.1)	422 (3.5)	◊ ◊
Lebanon	49 (1.2)	483 (4.1)	6 (1.8) ▲	39 (1.3)	425 (4.2)	-5 (1.8) ▼	12 (0.9)	416 (4.9)	-1 (1.1)
Thailand	22 (1.1)	489 (6.9)	◊ ◊	60 (0.9)	428 (4.6)	◊ ◊	18 (0.7)	430 (5.6)	◊ ◊
Turkey	39 (1.1)	494 (6.1)	◊ ◊	36 (0.8)	403 (4.7)	◊ ◊	24 (1.0)	384 (4.3)	◊ ◊
Jordan	58 (1.5)	468 (3.7)	9 (1.9) ▲	34 (1.2)	388 (4.2)	-5 (1.6) ▼	9 (0.6)	361 (6.6)	-4 (0.9) ▼
Tunisia	45 (1.3)	452 (2.8)	1 (1.6)	34 (0.8)	400 (2.6)	-2 (1.1)	21 (1.0)	391 (2.7)	1 (1.3)
Georgia	44 (1.8)	455 (4.9)	◊ ◊	37 (1.5)	401 (7.5)	◊ ◊	19 (1.0)	379 (7.0)	◊ ◊
Iran, Islamic Rep. of	45 (1.2)	443 (5.0)	10 (1.5) ▲	40 (1.1)	380 (3.7)	-8 (1.4) ▼	14 (0.9)	368 (6.1)	-2 (1.1)
Bahrain	53 (0.8)	435 (2.1)	8 (1.2) ▲	33 (0.7)	366 (2.4)	-5 (1.1) ▼	15 (0.6)	350 (3.0)	-4 (0.9) ▼
Indonesia	28 (1.0)	405 (5.4)	2 (1.6)	58 (1.0)	394 (3.8)	-1 (1.3)	14 (0.8)	401 (5.0)	-1 (1.2)
Syrian Arab Republic	47 (1.1)	429 (3.5)	◊ ◊	40 (0.9)	378 (4.2)	◊ ◊	13 (0.7)	361 (4.7)	◊ ◊
Egypt	55 (1.5)	422 (3.7)	-3 (1.8)	38 (1.4)	368 (3.8)	3 (1.7)	7 (0.4)	356 (8.0)	0 (0.6)
Algeria	46 (1.0)	412 (2.2)	◊ ◊	41 (0.9)	372 (2.7)	◊ ◊	12 (0.6)	358 (2.7)	◊ ◊
¶ Morocco	43 (1.6)	417 (3.7)	- -	39 (1.2)	360 (3.6)	- -	18 (0.9)	348 (5.4)	- -
Colombia	46 (1.3)	409 (3.6)	◊ ◊	40 (1.2)	363 (3.8)	◊ ◊	13 (0.7)	351 (4.5)	◊ ◊
Oman	45 (1.1)	415 (3.4)	◊ ◊	47 (1.1)	346 (3.7)	◊ ◊	8 (0.5)	327 (5.6)	◊ ◊
Palestinian Nat'l Auth.	44 (1.1)	414 (3.6)	0 (1.5)	44 (1.0)	341 (4.3)	3 (1.3) ▲	13 (0.7)	333 (5.0)	-3 (1.0) ▼
Botswana	42 (1.0)	385 (3.0)	4 (1.3) ▲	41 (0.9)	355 (2.6)	-4 (1.2) ▼	17 (0.7)	354 (3.6)	0 (1.0)
Kuwait	54 (0.9)	381 (2.5)	◊ ◊	35 (0.9)	331 (2.6)	◊ ◊	11 (0.6)	319 (5.7)	◊ ◊
El Salvador	35 (1.1)	377 (3.2)	◊ ◊	52 (1.1)	327 (2.7)	◊ ◊	13 (0.8)	323 (4.5)	◊ ◊
Saudi Arabia	47 (1.2)	361 (3.2)	- -	42 (1.0)	310 (3.5)	- -	11 (0.7)	294 (4.9)	- -
Ghana	44 (1.3)	341 (4.8)	0 (1.9)	46 (0.9)	292 (4.8)	1 (1.5)	11 (0.8)	285 (7.4)	-2 (1.0)
Qatar	55 (0.6)	339 (2.3)	◊ ◊	34 (0.6)	279 (2.3)	◊ ◊	11 (0.3)	267 (3.4)	◊ ◊
International Avg.	43 (0.2)	492 (0.6)		37 (0.1)	433 (0.6)		20 (0.1)	412 (0.7)	
Benchmarking Participants									
Massachusetts, US	60 (1.6)	577 (4.0)	◊ ◊	24 (1.1)	515 (5.1)	◊ ◊	17 (1.1)	489 (7.6)	◊ ◊
Minnesota, US	59 (1.6)	560 (4.3)	◊ ◊	24 (1.4)	507 (5.0)	◊ ◊	17 (1.0)	476 (5.5)	◊ ◊
Quebec, Canada	51 (1.2)	560 (4.2)	-8 (1.8) ▼	27 (1.0)	511 (3.6)	3 (1.3) ▲	22 (0.9)	479 (3.5)	5 (1.3) ▲
Ontario, Canada	59 (1.5)	548 (2.9)	-3 (2.0)	24 (1.0)	485 (4.7)	2 (1.3)	16 (1.0)	456 (5.0)	1 (1.3)
British Columbia, Canada	52 (1.3)	545 (3.2)	◊ ◊	28 (0.9)	486 (3.9)	◊ ◊	20 (0.9)	454 (2.9)	◊ ◊
Basque Country, Spain	46 (1.5)	534 (3.0)	0 (2.2)	29 (1.1)	484 (3.8)	0 (1.5)	25 (1.2)	456 (4.3)	1 (1.8)
Dubai, UAE	51 (1.1)	500 (3.1)	◊ ◊	35 (0.8)	434 (3.4)	◊ ◊	14 (0.9)	417 (5.9)	◊ ◊

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Index based on students' responses to four statements about mathematics: 1) I usually do well in mathematics; 2) Mathematics is more difficult for me than for many of my classmates (Reversed); 3) Mathematics is not one of my strengths (Reversed); 4) I learn things quickly in mathematics. Average is computed across the four items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a little or a lot on average across the four statements are assigned to the high level. Students disagreeing a little or a lot on average are assigned to the low level. All other students are assigned to the middle level.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

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

An "r" indicates data are available for at least 70 but less than 85% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 7.15 Index of students' self-confidence in learning mathematics (SCM) by gender

TIMSS2007 8th Mathematics Grade

Country	High SCM Percent of Students		Medium SCM Percent of Students		Low SCM Percent of Students	
	Girls	Boys	Girls	Boys	Girls	Boys
Chinese Taipei	20 (1.1)	35 (1.4) ▲	25 (0.9)	28 (1.0) ▲	55 (1.4) ▲	37 (1.3)
Korea, Rep. of	23 (1.0)	33 (1.2) ▲	35 (1.1) ▲	32 (0.9)	41 (1.1) ▲	34 (1.2)
Singapore	39 (1.4)	43 (1.3) ▲	33 (1.1)	35 (1.3)	28 (1.2) ▲	22 (1.0)
Hong Kong SAR	23 (1.1)	38 (1.5) ▲	39 (1.2)	40 (1.6)	38 (1.2) ▲	23 (1.0)
Japan	11 (0.8)	22 (1.0) ▲	34 (1.1)	36 (1.2)	54 (1.1) ▲	41 (1.2)
Hungary	38 (1.4)	45 (1.5) ▲	33 (1.3)	32 (1.3)	29 (1.3) ▲	23 (1.2)
England	44 (1.6)	62 (1.7) ▲	35 (1.3) ▲	29 (1.4)	21 (1.2) ▲	9 (0.8)
Russian Federation	42 (1.7)	39 (1.4)	28 (1.1)	34 (1.3) ▲	30 (1.4)	27 (1.1)
United States	49 (1.2)	57 (1.2) ▲	30 (0.9) ▲	26 (0.8)	21 (0.9) ▲	17 (0.9)
Lithuania	39 (1.4)	42 (1.3)	32 (1.2)	36 (1.2) ▲	29 (1.3) ▲	22 (1.0)
Czech Republic	41 (1.2)	46 (1.2) ▲	30 (0.9)	32 (1.0)	29 (1.2) ▲	22 (1.1)
Slovenia	37 (1.5)	42 (1.3) ▲	43 (1.3)	40 (1.3)	20 (1.1)	18 (1.2)
r Armenia	37 (1.4)	36 (1.3)	36 (1.6)	39 (1.4)	27 (1.6)	25 (1.3)
Australia	39 (1.8)	51 (1.5) ▲	37 (1.3)	34 (1.5)	24 (1.5) ▲	15 (0.8)
Sweden	43 (1.2)	55 (1.3) ▲	36 (1.1)	34 (1.1)	21 (1.0) ▲	11 (0.7)
Malta	36 (1.0)	40 (1.0) ▲	33 (1.1)	37 (1.0) ▲	31 (1.0) ▲	23 (0.8)
Scotland	49 (1.7)	58 (1.6) ▲	35 (1.3) ▲	30 (1.4)	16 (0.9) ▲	12 (0.9)
Serbia	50 (1.5)	47 (1.8)	23 (1.1)	27 (1.2) ▲	27 (1.4)	27 (1.5)
Italy	45 (1.4)	52 (1.3) ▲	29 (1.0)	28 (1.0)	26 (1.3) ▲	21 (1.1)
Malaysia	29 (1.7)	26 (1.5)	47 (1.4)	53 (1.6) ▲	24 (1.1) ▲	21 (0.9)
Norway	47 (1.1)	53 (1.1) ▲	32 (1.3)	30 (1.0)	22 (1.2) ▲	17 (0.8)
Cyprus	52 (1.5) ▲	48 (1.1)	28 (1.2)	33 (1.0) ▲	21 (1.1)	19 (0.9)
Bulgaria	36 (1.6)	38 (1.7)	37 (1.5)	39 (1.6)	27 (1.6)	23 (1.3)
Israel	58 (1.6)	61 (1.2)	29 (1.4)	29 (1.4)	13 (1.0)	10 (1.0)
Ukraine	37 (1.7)	36 (1.3)	35 (1.1)	37 (1.3)	28 (1.5)	27 (1.2)
Romania	33 (1.6)	32 (1.4)	39 (1.5)	42 (1.5)	28 (1.9)	25 (1.3)
Bosnia and Herzegovina	43 (1.6)	39 (1.6)	25 (1.2)	29 (1.1) ▲	32 (1.5)	32 (1.5)
Lebanon	46 (1.6)	52 (1.7) ▲	39 (1.6)	39 (1.8)	15 (1.2) ▲	9 (0.9)
Thailand	21 (1.2)	24 (1.3) ▲	58 (1.2)	61 (1.2) ▲	22 (1.1) ▲	15 (0.8)
Turkey	38 (1.5)	41 (1.3)	35 (1.1)	38 (1.1) ▲	27 (1.5) ▲	22 (1.2)
Jordan	56 (2.3)	59 (1.9)	35 (1.9)	33 (1.5)	9 (0.8)	8 (1.0)
Tunisia	43 (1.5)	48 (1.6) ▲	33 (1.1)	34 (1.3)	24 (1.3) ▲	18 (1.2)
r Georgia	40 (2.2)	48 (2.1) ▲	38 (2.4)	36 (1.8)	21 (1.2) ▲	16 (1.5)
Iran, Islamic Rep. of	46 (1.9)	44 (1.5)	39 (1.9)	42 (1.2)	15 (1.5)	14 (1.1)
Bahrain	58 (1.1) ▲	47 (0.9)	29 (1.1)	37 (0.9) ▲	13 (0.9)	16 (0.8) ▲
Indonesia	28 (1.2)	29 (1.4)	57 (1.3)	58 (1.3)	15 (1.2)	13 (0.9)
Syrian Arab Republic	45 (1.6)	49 (1.5)	40 (1.3)	40 (1.0)	14 (0.9) ▲	11 (1.0)
Egypt	52 (1.8)	57 (1.8) ▲	40 (1.8)	36 (1.8)	7 (0.6)	7 (0.6)
Algeria	43 (1.1)	50 (1.3) ▲	43 (1.2) ▲	39 (1.2)	14 (0.9) ▲	11 (0.7)
¶ Morocco	40 (1.8)	46 (2.0) ▲	40 (1.9)	38 (1.5)	20 (1.3)	15 (1.8)
Colombia	43 (1.7)	50 (1.6) ▲	41 (1.6)	40 (1.2)	16 (1.2) ▲	11 (0.9)
Oman	47 (1.7)	43 (1.4)	45 (1.7)	49 (1.4)	8 (0.8)	8 (0.7)
Palestinian Nat'l Auth.	42 (1.5)	45 (1.8)	44 (1.3)	43 (1.4)	13 (1.0)	12 (1.1)
Botswana	40 (1.1)	44 (1.4) ▲	42 (1.0)	40 (1.3)	18 (0.9) ▲	16 (1.0)
Kuwait	55 (1.2)	54 (1.3)	34 (1.1)	36 (1.2)	11 (0.8)	10 (0.8)
El Salvador	31 (1.6)	38 (1.4) ▲	53 (1.6)	51 (1.5)	15 (1.0) ▲	11 (0.9)
Saudi Arabia	50 (1.6) ▲	44 (1.7)	40 (1.3)	43 (1.5)	10 (0.9)	13 (1.0) ▲
Ghana	37 (1.5)	50 (1.5) ▲	51 (1.2) ▲	41 (1.2)	12 (1.0) ▲	9 (0.8)
Qatar	57 (0.8) ▲	54 (0.9)	32 (0.8)	37 (0.9) ▲	12 (0.5) ▲	10 (0.5)
International Avg.	41 (0.2)	45 (0.2) ▲	37 (0.2)	37 (0.2) ▲	22 (0.2) ▲	18 (0.2)
Benchmarking Participants						
Massachusetts, US	56 (1.6)	63 (1.9) ▲	25 (1.3)	22 (1.2)	20 (1.3) ▲	14 (1.4)
Minnesota, US	55 (2.0)	64 (1.7) ▲	25 (1.4)	24 (1.9)	21 (1.3) ▲	13 (1.2)
Quebec, Canada	45 (1.6)	57 (1.5) ▲	28 (1.3)	26 (1.4)	27 (1.5) ▲	17 (1.0)
Ontario, Canada	54 (2.3)	65 (1.9) ▲	25 (1.5)	23 (1.5)	20 (1.5) ▲	12 (1.1)
British Columbia, Canada	46 (1.6)	58 (1.6) ▲	30 (1.3) ▲	26 (1.2)	24 (1.2) ▲	16 (0.9)
Basque Country, Spain	43 (1.9)	48 (1.8) ▲	29 (1.4)	29 (1.5)	27 (1.7)	23 (1.6)
r Dubai, UAE	47 (1.6)	54 (2.0) ▲	35 (1.3)	34 (1.4)	18 (1.0) ▲	11 (1.6)

▲ Percent significantly higher than other gender

Index based on students' responses to four statements about mathematics: 1) I usually do well in mathematics; 2) Mathematics is more difficult for me than for many of my classmates (Reversed); 3) Mathematics is not one of my strengths (Reversed); 4) I learn things quickly in mathematics.

Average is computed across the four items based on a 4-point scale: 1. Agree a lot; 2. Agree a little; 3. Disagree a little; 4. Disagree a lot. Students agreeing a little or a lot on average across the four statements are assigned to the high level. Students disagreeing a little or a lot on average are assigned to the low level. All other students are assigned to the middle level.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

An "r" indicates data are available for at least 70 but less than 85% of the students.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

7.5 Summary

This chapter has discussed TIMSS 2007 outcomes relating to pupils' attitudes. In both subjects and at both grades, between half and two-thirds of pupils have a high level of enjoyment and confidence in their learning in mathematics and science. The one exception was in mathematics at grade 8, where only 40 per cent stated that they enjoy mathematics, despite higher levels of confidence and relatively high levels of attainment. Exhibit 7.16 summarises these findings.

Exhibit 7.16 Summary of enjoyment and confidence

	High positive category (percentage)		Low positive category (percentage)	
	Enjoyment	**Confidence**	**Enjoyment**	**Confidence**
Grade 4 science	59	55	24	14
Grade 4 mathematics	62	64	21	10
Grade 8 science	55	53	25	15
Grade 8 mathematics	40	53	35	15

In each subject at each grade, boys had higher levels of confidence than girls, despite no overall differences in attainment.

At grade 8, pupils generally valued their learning in mathematics, despite their lack of enjoyment of it; they clearly recognise that it can be useful to them. The same is true of science to a lesser extent.

This chapter has explored attitudes based on the indices used in the international reports. For comparisons over time in responses to the individual questions used to form the international indices, please see Appendix 2.

TIMSS 2007 International Reports available at http://timssandpirls.bc.edu/TIMSS2007

8 The teachers and schools

This chapter examines the factors relating to schools and teachers. The following are some of the important findings from the analysis of school and teacher factors.

- The majority of pupils at grade 4 and grade 8 are taught in schools where teaching staff report that they have a positive perception of the school climate.
- Pupils and teachers in England consider their schools to be safe environments. The percentage of grade 4 and grade 8 pupils taught in schools that teaching staff perceive as safe has increased significantly between 2003 and 2007.
- The majority of schools in England are well-resourced compared with the international average, although the level of resourcing was largely unchanged from 2003 to 2007.
- Pupils of science and mathematics are tested less frequently than pupils in other participating countries.

Where relevant, trends in England's performance on teacher- and school-level variables are compared with those of other countries. The pattern of reporting follows that used in previous sections: factors related to grade 4 science are discussed first, followed by grade 4 mathematics, grade 8 science and grade 8 mathematics.

8.1 The teachers and schools: grade 4 science

School climate

The teachers and headteachers rated their school on several perceptions related to school climate (eight questions were included: teachers' job satisfaction; teachers' understanding of the school's curricular goals; teachers' degree of success in implementing the school's curriculum; teachers' expectations for pupil achievement; parental support for pupil achievement; parental involvement in school activities; students' regard for school property; and students' desire to do well in school). The data from these responses was used to create two indices of school climate, one based on the responses given by headteachers (Principal Perceptions of School Climate) and the other from teacher responses (Teacher Perceptions of School Climate). The responses were categorised as low, medium or high, a high rating indicates that there is a perception that there is a positive climate in the school. (see Exhibits 8.1 and 8.2). As in 2003, the majority of pupils are taught in schools where teachers and headteachers think that there is a positive climate in their school.

In terms of headteachers' responses, 45 per cent of pupils were taught in schools where headteachers' gave high ratings of school climate. This was more than double the international average (22 per cent) and higher than countries such as the Netherlands, Norway, Singapore, Hong Kong and Japan. However, there has been a significant increase in the percentage of pupils taught at schools where the headteacher does not perceive the school climate in a positive light (eight per cent, compared with two per cent in 2003). It is important to recognise that this is below the international average of 10 per cent and is similar to other European countries, such as Germany and Italy.

Exhibit 8.1 Index of principals' perception of school climate with trends, grade 4

TIMSS2007 Science 4th Grade

Country	High PPSC			Medium PPSC			Low PPSC		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Chinese Taipei	64 (3.7)	558 (2.8)	7 (5.3)	35 (3.6)	557 (3.2)	-6 (5.3)	1 (0.7)	~ ~	-1 (1.1)
Australia	50 (4.2)	545 (4.6)	12 (6.2) ▲	47 (3.8)	512 (4.4)	-7 (6.4)	2 (1.2)	~ ~	-5 (3.8)
New Zealand	49 (3.2)	525 (4.0)	0 (4.6)	47 (3.0)	487 (4.5)	0 (4.4)	4 (1.2)	478 (11.6)	0 (1.9)
Scotland	48 (4.8)	505 (3.6)	-2 (6.9)	51 (4.8)	497 (4.3)	6 (6.8)	0 (0.5)	~ ~	-3 (1.8)
United States	48 (3.0)	559 (3.9)	0 (4.6)	46 (3.1)	525 (3.5)	1 (4.6)	6 (1.5)	474 (10.9)	-1 (2.2)
England r	45 (4.5)	549 (4.4)	11 (6.5)	47 (4.6)	538 (4.3)	-17 (6.8) ▼	8 (2.3)	516 (7.3)	6 (2.7) ▲
Austria	36 (3.1)	532 (4.2)	◊ ◊	62 (3.1)	521 (2.8)	◊ ◊	1 (0.6)	~ ~	◊ ◊
Singapore	36 (0.0)	605 (6.6)	4 (4.1)	62 (0.0)	578 (4.8)	-1 (4.1)	2 (0.0)	~ ~	-3 (1.6)
Iran, Islamic Rep. of	31 (3.8)	449 (9.6)	7 (5.5)	64 (3.8)	429 (6.1)	-3 (5.7)	5 (1.7)	433 (12.8)	-3 (3.1)
Kazakhstan	29 (5.4)	532 (10.9)	◊ ◊	65 (5.7)	535 (5.7)	◊ ◊	5 (2.3)	513 (37.7) ◊	◊
Sweden	27 (3.6)	532 (4.4)	◊ ◊	66 (4.0)	526 (3.5)	◊ ◊	6 (2.6)	480 (9.7) ◊	◊
Hong Kong SAR	27 (3.9)	554 (6.4)	-3 (6.0)	69 (4.2)	555 (4.1)	4 (6.4)	5 (2.0)	531 (17.7)	-1 (2.9)
El Salvador	26 (4.1)	418 (11.4)	◊ ◊	60 (4.4)	377 (4.8)	◊ ◊	14 (3.1)	388 (12.2) ◊	◊
Denmark	26 (3.9)	533 (4.5)	◊ ◊	69 (4.1)	514 (3.8)	◊ ◊	5 (2.1)	485 (17.4) ◊	◊
Qatar	24 (0.2)	325 (4.1)	◊ ◊	69 (0.2)	279 (2.4)	◊ ◊	7 (0.1)	335 (5.2) ◊	◊
Norway	21 (3.8)	484 (5.8)	-5 (5.5)	78 (3.9)	473 (4.0)	6 (5.6)	1 (1.0)	~ ~	-1 (1.4)
Kuwait	18 (2.9)	359 (13.6)	◊ ◊	73 (3.5)	352 (5.6)	◊ ◊	9 (2.3)	298 (12.5) ◊	◊
Slovenia	18 (3.7)	517 (6.8)	10 (4.2) ▲	78 (3.8)	519 (2.2)	-7 (4.7)	4 (1.7)	522 (9.4)	-3 (2.7)
Lithuania	15 (3.0)	524 (4.4)	-10 (4.6) ▼	81 (3.3)	514 (2.8)	9 (5.0)	4 (1.4)	493 (3.9)	1 (2.0)
Morocco r	13 (3.8)	337 (32.4)	10 (4.0) ▲	56 (5.0)	301 (9.1)	16 (6.9) ▲	31 (3.9)	268 (12.7)	-25 (6.1) ▼
Germany	13 (2.6)	541 (4.4)	◊ ◊	78 (3.0)	531 (2.6)	◊ ◊	9 (2.0)	489 (10.6) ◊	◊
Hungary	12 (3.0)	573 (8.9)	4 (3.7)	78 (4.0)	537 (3.7)	-7 (5.0)	10 (3.1)	489 (11.2)	3 (3.9)
Colombia	12 (2.6)	452 (10.4)	◊ ◊	63 (5.0)	398 (6.8)	◊ ◊	25 (4.8)	386 (13.3) ◊	◊
Italy	12 (2.7)	534 (8.2)	-3 (3.9)	81 (2.9)	536 (3.3)	5 (4.4)	8 (1.8)	531 (16.5)	-2 (3.0)
Netherlands r	11 (2.6)	534 (10.6)	-8 (4.6)	84 (3.1)	522 (3.3)	5 (5.0)	5 (2.1)	483 (10.6)	3 (2.4)
Yemen	11 (2.7)	227 (14.2)	◊ ◊	71 (3.8)	199 (8.3)	◊ ◊	18 (3.6)	174 (16.3) ◊	◊
Japan	10 (2.6)	551 (5.7)	-8 (4.0) ▼	84 (3.0)	548 (2.1)	6 (4.5)	7 (1.9)	540 (5.5)	2 (2.6)
Russian Federation	9 (2.0)	568 (9.9)	5 (2.3) ▲	83 (3.1)	546 (4.9)	-1 (4.1)	8 (2.5)	524 (20.2)	-4 (3.5)
Tunisia	9 (2.5)	371 (22.4)	0 (3.5)	66 (3.9)	327 (6.3)	17 (5.5) ▲	25 (3.6)	273 (13.5)	-17 (5.3) ▼
Algeria	7 (2.1)	353 (12.6)	◊ ◊	65 (4.4)	355 (8.3)	◊ ◊	28 (4.1)	346 (10.7) ◊	◊
Armenia r	5 (1.8)	502 (43.1)	3 (2.2)	72 (3.7)	484 (6.7)	-8 (5.2)	23 (3.5)	482 (14.9)	5 (4.9)
Slovak Republic	4 (1.5)	574 (9.7)	◊ ◊	69 (3.4)	531 (3.8)	◊ ◊	27 (3.4)	501 (11.9) ◊	◊
Ukraine	3 (1.3)	475 (19.3)	◊ ◊	93 (2.3)	475 (3.0)	◊ ◊	5 (1.9)	445 (25.6) ◊	◊
Latvia	2 (1.4)	~ ~	-4 (3.1)	84 (3.2)	544 (2.5)	-1 (5.3)	14 (3.2)	537 (5.6)	5 (4.4)
Georgia	2 (1.1)	~ ~	◊ ◊	73 (4.0)	424 (5.5)	◊ ◊	26 (4.1)	401 (8.9) ◊	◊
Czech Republic	1 (0.0)	~ ~	◊ ◊	79 (3.8)	517 (3.4)	◊ ◊	21 (3.9)	508 (6.6) ◊	◊
International Avg	22 (0.5)	491 (2.3)		68 (0.6)	474 (0.8)		10 (0.4)	444 (2.6)	
Benchmarking Participants									
Massachusetts, US	70 (7.8)	579 (5.8)	◊ ◊	30 (7.9)	554 (9.5)	◊ ◊	1 (0.9)	~ ~	◊ ◊
Dubai, UAE r	60 (0.4)	466 (4.0)	◊ ◊	37 (0.4)	456 (6.0)	◊ ◊	4 (0.3)	435 (5.6) ◊	◊
Alberta, Canada	58 (4.4)	552 (4.5)	◊ ◊	39 (4.3)	533 (4.3)	◊ ◊	3 (1.6)	492 (18.7) ◊	◊
Minnesota, US	54 (9.4)	561 (10.9)	◊ ◊	46 (9.4)	548 (9.5)	◊ ◊	0 (0.0)	~ ~	◊ ◊
British Columbia, Canada	45 (4.6)	548 (5.2)	◊ ◊	49 (4.3)	530 (3.7)	◊ ◊	6 (1.8)	504 (9.8) ◊	◊
Ontario, Canada	41 (5.0)	548 (4.9)	-2 (6.7)	50 (5.1)	533 (4.9)	-2 (6.9)	9 (2.3)	496 (15.0)	4 (3.3)
Quebec, Canada	17 (3.1)	532 (5.1)	-8 (4.7)	82 (3.3)	514 (3.3)	12 (5.1) ▲	2 (1.0)	~ ~	-4 (2.3)

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on principals' responses to eight questions about their schools: teachers' job satisfaction; teachers' understanding of the school's curricular goals; teachers' degree of success in implementing the school's curriculum; teachers' expectations for student achievement; parental support for student achievement; parental involvement in school activities; students' regard for school property; and students' desire to do well in school. Average is computed based on a 5-point scale: 1 = very high; 2 = high; 3 = medium; 4 = low; and 5 = very low. High level indicates average is less than or equal to 2. Medium level indicates that average is greater than 2 and less or equal to 3. Low level indicates average is greater than 3.

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

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

A similar pattern is reflected in the teacher perceptions of school climate. Thirty-five per cent of England's pupils are taught in schools where the teachers' ratings gave a high perception of school climate, a small but not significant increase since 2003. Since the 2003 survey there have been small but not significant decreases in the percentage of pupils taught in schools where the teachers' ratings gave a medium or low perception of school climate.

In general the headteachers of grade 4 pupils rated school climate more positively than the teachers. The difference between headteacher and teacher perceptions of school climate is not specific to England, with other countries showing a similar relationship between ratings, for example the Netherlands, the United States and Singapore.

Exhibit 8.2 Index of science teachers' perception of school climate with trends, grade 4

TIMSS2007 Science 4th Grade

Country	High TPSC			Medium TPSC			Low TPSC		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Scotland r	47 (3.3)	513 (3.1)	6 (6.1)	50 (3.2)	493 (3.8)	-7 (6.0)	2 (1.3)	~ ~	1 (1.7)
New Zealand	37 (2.4)	528 (3.2)	0 (3.8)	57 (2.6)	494 (3.5)	-1 (4.1)	6 (1.4)	469 (8.5)	1 (1.8)
Australia	37 (3.6)	546 (5.5)	6 (5.1)	54 (3.3)	520 (4.8)	-5 (5.0)	10 (1.8)	497 (12.4)	-1 (3.1)
United States	36 (2.7)	562 (3.5)	-6 (3.9)	51 (2.9)	534 (3.1)	4 (4.0)	13 (1.8)	488 (7.0)	2 (2.4)
England r	35 (3.8)	556 (5.4)	6 (5.9)	59 (3.8)	536 (3.7)	-4 (6.2)	6 (1.7)	502 (8.0)	-2 (2.9)
El Salvador	31 (4.1)	402 (9.3)	◊ ◊	60 (4.5)	386 (5.9)	◊ ◊	10 (2.5)	371 (12.6)	◊ ◊
Austria	29 (2.5)	535 (3.2)	◊ ◊	66 (2.4)	524 (3.0)	◊ ◊	4 (1.3)	477 (12.2)	◊ ◊
Kazakhstan	29 (5.5)	526 (12.0)	◊ ◊	67 (5.7)	535 (5.8)	◊ ◊	4 (1.8)	552 (19.1)	◊ ◊
Chinese Taipei	28 (3.8)	557 (4.6)	-6 (5.8)	65 (4.3)	557 (2.5)	2 (6.2)	7 (2.0)	545 (9.1)	4 (2.4)
Iran, Islamic Rep. of	28 (3.8)	451 (11.0)	3 (5.5)	58 (4.0)	434 (5.9)	-2 (6.1)	15 (2.6)	415 (10.0)	-1 (4.4)
Qatar	21 (0.1)	306 (5.0)	◊ ◊	65 (0.2)	296 (2.4)	◊ ◊	14 (0.1)	250 (4.9)	◊ ◊
Lithuania	20 (3.0)	525 (5.2)	-14 (4.5) ▼	76 (3.2)	512 (2.7)	11 (4.6) ▲	4 (1.2)	493 (10.3)	3 (1.2) ▲
Hong Kong SAR	19 (3.2)	575 (5.4)	8 (4.2)	67 (3.9)	555 (4.3)	-9 (5.7)	14 (3.3)	539 (8.2)	1 (4.6)
Germany	18 (2.4)	543 (4.3)	◊ ◊	69 (3.2)	533 (2.5)	◊ ◊	13 (2.4)	478 (9.8)	◊ ◊
Norway	18 (3.1)	491 (6.2)	0 (4.7)	80 (3.1)	474 (3.7)	3 (4.8)	3 (0.8)	455 (18.7)	-3 (2.0)
Kuwait r	18 (3.5)	363 (12.7)	◊ ◊	56 (4.1)	355 (8.2)	◊ ◊	27 (3.9)	323 (11.7)	◊ ◊
Sweden	17 (2.5)	542 (5.6)	◊ ◊	75 (2.9)	525 (3.4)	◊ ◊	8 (2.0)	495 (11.3)	◊ ◊
Denmark	17 (3.7)	538 (4.0)	◊ ◊	69 (4.7)	520 (2.9)	◊ ◊	14 (3.5)	495 (9.8)	◊ ◊
Ukraine	15 (2.9)	475 (6.7)	◊ ◊	80 (3.2)	474 (3.6)	◊ ◊	5 (1.7)	466 (4.7)	◊ ◊
Slovenia	15 (2.2)	518 (5.0)	-2 (4.2)	81 (2.3)	519 (2.2)	1 (4.6)	5 (1.2)	510 (7.7)	1 (2.2)
Singapore	13 (2.3)	587 (9.0)	-7 (4.2)	74 (2.9)	592 (5.0)	3 (4.8)	13 (1.8)	556 (8.3)	4 (2.8)
Yemen	11 (3.0)	184 (25.7)	◊ ◊	57 (4.3)	212 (9.2)	◊ ◊	32 (3.8)	186 (13.3)	◊ ◊
Colombia	10 (2.6)	439 (22.8)	◊ ◊	62 (4.7)	402 (7.1)	◊ ◊	28 (4.4)	390 (11.9)	◊ ◊
Georgia	9 (2.6)	437 (12.2)	◊ ◊	72 (4.3)	416 (5.2)	◊ ◊	19 (3.8)	412 (10.6)	◊ ◊
Italy	9 (2.0)	545 (6.8)	1 (3.0)	73 (3.0)	539 (3.3)	0 (4.5)	18 (2.7)	515 (8.0)	-1 (3.8)
Russian Federation	9 (2.0)	572 (16.1)	3 (2.7)	83 (2.7)	548 (5.1)	4 (4.3)	8 (1.9)	515 (15.5)	-7 (3.7)
Tunisia r	7 (1.9)	363 (23.0)	1 (2.9)	54 (3.5)	326 (7.9)	-4 (5.2)	38 (3.6)	298 (10.4)	2 (5.2)
Hungary	6 (1.5)	575 (10.4)	-8 (3.2) ▼	74 (3.7)	543 (3.5)	-4 (4.9)	19 (3.6)	496 (9.6)	13 (4.1) ▲
Slovak Republic	5 (1.8)	536 (13.3)	◊ ◊	67 (3.4)	532 (4.6)	◊ ◊	27 (3.3)	508 (12.1)	◊ ◊
Latvia	5 (1.5)	554 (11.3)	0 (2.8)	79 (2.7)	542 (2.4)	-10 (4.3) ▼	16 (2.6)	544 (6.2)	10 (3.5) ▲
Algeria	5 (1.9)	370 (10.1)	◊ ◊	57 (4.9)	356 (10.8)	◊ ◊	38 (4.9)	345 (9.5)	◊ ◊
Netherlands	4 (1.9)	528 (7.9)	-3 (3.2)	83 (3.2)	527 (3.2)	-1 (4.8)	13 (2.6)	497 (9.1)	5 (3.6)
Japan	4 (1.5)	573 (9.9)	-9 (3.1) ▼	76 (3.5)	547 (2.3)	1 (4.9)	20 (3.2)	545 (3.3)	8 (4.2)
Armenia s	4 (1.4)	482 (23.3)	-14 (4.2) ▼	52 (4.0)	482 (8.0)	-8 (6.9)	45 (4.0)	489 (10.0)	22 (6.8) ▲
Czech Republic	3 (1.4)	498 (7.7)	◊ ◊	68 (3.7)	520 (3.7)	◊ ◊	29 (3.7)	505 (4.8)	◊ ◊
Morocco s	2 (1.3)	~ ~	-4 (2.7)	39 (3.8)	319 (12.8)	11 (6.4)	58 (3.8)	276 (8.1)	-7 (6.3)
International Avg.	17 (0.5)	494 (1.9)		66 (0.6)	477 (0.9)		17 (0.5)	454 (1.8)	
Benchmarking Participants									
Dubai, UAE s	53 (4.2)	464 (10.2)	◊ ◊	40 (3.9)	446 (6.3)	◊ ◊	7 (0.8)	384 (7.7)	◊ ◊
Massachusetts, US	50 (7.2)	581 (5.9)	◊ ◊	47 (6.5)	566 (5.7)	◊ ◊	3 (2.7)	498 (47.1)	◊ ◊
Alberta, Canada	48 (4.1)	555 (4.4)	◊ ◊	48 (4.1)	533 (4.6)	◊ ◊	4 (1.5)	500 (34.7)	◊ ◊
Minnesota, US r	45 (8.9)	555 (13.3)	◊ ◊	52 (8.9)	552 (7.2)	◊ ◊	4 (1.9)	504 (14.1)	◊ ◊
Ontario, Canada	27 (4.7)	545 (6.2)	-10 (6.2)	61 (4.8)	537 (5.4)	6 (6.5)	12 (3.3)	500 (12.9)	3 (4.6)
British Columbia, Canada r	26 (3.6)	554 (4.9)	◊ ◊	67 (4.3)	531 (3.5)	◊ ◊	8 (2.8)	511 (14.2)	◊ ◊
Quebec, Canada	16 (3.2)	536 (5.0)	2 (4.2)	68 (4.3)	518 (3.5)	-5 (5.8)	16 (3.2)	503 (7.3)	3 (4.5)

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on teachers' responses to eight questions about their schools: teachers' job satisfaction; teachers' understanding of the school's curricular goals; teachers' degree of success in implementing the school's curriculum; teachers' expectations for student achievement; parental support for student achievement; parental involvement in school activities; students' regard for school property; and students' desire to do well in school. Average is computed based on a 5-point scale: 1 = very high; 2 = high; 3 = medium; 4 = low; and 5 = very low. High level indicates average is less than or equal to 2. Medium level indicates that average is greater than 2 and less or equal to 3. Low level indicates average is greater than 3.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.
A diamond (◊) indicates the country did not participate in the assessment.

School safety

As in previous TIMSS surveys, teachers were asked to rate their schools in terms of safety of the school's neighbourhood, their sense of their own physical safety at school and the school's security policies and practices. The responses to these questions were combined into an index of teachers' perceptions of safety in the school and were categorised as 'high', 'medium' or 'low' (see Exhibit 8.3). A 'high' rating for this index of teacher safety indicates that the teacher perceives the school to be a safe environment to teach in. In 2007 there was significant increase in the number of teachers who felt that their school was a safe environment. This increase means that almost 100 per cent of grade 4 pupils were taught in schools where teachers' perceptions of school safety are either high (86 per cent) or medium (14 per cent). This is a positive outcome as the stringent sampling criteria for TIMSS means that this finding is likely to reflect the feelings of the general teaching population, suggesting that schools in England are perceived to be safe environments by the teachers who work in them.

Exhibit 8.3 Index of science teachers' perception of safety in school with trends, grade 4

TIMSS2007 Science 4th Grade

Country	High TPSS			Medium TPSS			Low TPSS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Singapore	96 (1.1)	586 (4.0)	8 (2.7) ▲	3 (1.1)	632 (20.4)	-9 (2.7) ▼	0 (0.0)	~ ~	0 (0.0)
Austria	96 (1.1)	526 (2.7)	◊ ◊	4 (1.0)	503 (12.6)	◊ ◊	0 (0.2)	~ ~	◊ ◊
Norway	95 (1.7)	476 (3.6)	5 (3.2)	4 (1.4)	483 (11.8)	-5 (3.0)	1 (0.9)	~ ~	1 (1.1)
Czech Republic	94 (1.5)	516 (3.3)	◊ ◊	6 (1.4)	506 (13.1)	◊ ◊	0 (0.0)	~ ~	◊ ◊
Slovak Republic	92 (2.0)	525 (5.3)	◊ ◊	8 (2.0)	537 (6.6)	◊ ◊	0 (0.0)	~ ~	◊ ◊
Georgia	91 (2.2)	420 (5.0)	◊ ◊	5 (1.5)	409 (10.1)	◊ ◊	4 (1.5)	413 (19.5)	◊ ◊
Germany	91 (1.5)	532 (2.5)	◊ ◊	9 (1.6)	480 (14.8)	◊ ◊	0 (0.4)	~ ~	◊ ◊
Lithuania	91 (2.1)	515 (2.5)	10 (3.8) ▲	7 (1.8)	513 (5.7)	-10 (3.3) ▼	2 (1.1)	~ ~	0 (1.6)
Hong Kong SAR	90 (2.6)	559 (3.5)	6 (4.6)	9 (2.4)	536 (13.5)	-5 (4.3)	1 (0.8)	~ ~	-1 (1.5)
Scotland r	89 (2.5)	504 (2.6)	11 (4.0) ▲	11 (2.5)	476 (10.0)	-11 (4.0) ▼	0 (0.0)	~ ~	-1 (0.0)
Kazakhstan	88 (3.3)	535 (4.8)	◊ ◊	12 (3.2)	517 (24.6)	◊ ◊	0 (0.0)	~ ~	◊ ◊
Australia	87 (2.3)	532 (4.1)	9 (4.2) ▲	12 (2.3)	491 (10.1)	-8 (4.1)	1 (0.4)	~ ~	-1 (0.9)
Kuwait r	86 (3.1)	354 (6.2)	◊ ◊	12 (2.8)	306 (13.8)	◊ ◊	1 (1.1)	~ ~	◊ ◊
Hungary	86 (2.6)	541 (3.3)	-2 (4.0)	12 (2.4)	505 (9.6)	2 (3.7)	1 (0.9)	~ ~	0 (1.3)
New Zealand	86 (1.8)	512 (2.8)	-2 (2.7)	14 (1.8)	456 (6.9)	2 (2.6)	0 (0.2)	~ ~	0 (0.4)
Netherlands	86 (2.9)	528 (3.1)	1 (3.6)	10 (2.1)	482 (7.7)	-3 (2.9)	5 (1.8)	518 (14.4)	2 (2.4)
England r	86 (2.4)	547 (3.2)	15 (4.7) ▲	14 (2.4)	508 (6.1)	-14 (4.7) ▼	0 (0.3)	~ ~	-1 (1.2)
Qatar	85 (0.1)	288 (2.8)	◊ ◊	15 (0.1)	313 (4.4)	◊ ◊	0 (0.0)	~ ~	◊ ◊
Ukraine	84 (3.0)	475 (3.6)	◊ ◊	14 (2.8)	465 (6.7)	◊ ◊	2 (1.0)	~ ~	◊ ◊
Denmark	84 (3.1)	523 (3.0)	◊ ◊	15 (3.2)	503 (7.0)	◊ ◊	1 (0.9)	~ ~	◊ ◊
Slovenia	84 (2.0)	518 (2.1)	11 (4.6) ▲	14 (1.9)	519 (4.8)	-9 (4.4) ▼	2 (0.8)	~ ~	-2 (1.9)
Italy	83 (2.4)	538 (3.1)	18 (4.2) ▲	15 (2.0)	527 (10.5)	-9 (3.6) ▼	2 (1.1)	~ ~	-9 (2.5) ▼
Sweden	83 (2.9)	529 (2.8)	◊ ◊	16 (2.8)	507 (7.1)	◊ ◊	1 (0.6)	~ ~	◊ ◊
Russian Federation	82 (3.2)	546 (5.2)	9 (4.5) ▲	18 (3.2)	553 (7.5)	-8 (4.5)	0 (0.5)	~ ~	-1 (0.8)
Iran, Islamic Rep. of	81 (3.1)	439 (4.9)	0 (5.3)	14 (2.6)	427 (10.6)	-3 (4.8)	5 (1.8)	424 (24.9)	3 (2.3)
Chinese Taipei	80 (3.2)	558 (2.5)	4 (4.7)	18 (3.0)	554 (4.9)	-3 (4.5)	2 (1.4)	~ ~	0 (1.9)
United States	78 (2.5)	549 (3.1)	-6 (3.2)	21 (2.4)	498 (6.4)	6 (3.1) ▲	1 (0.5)	~ ~	-1 (0.9)
Latvia	74 (3.3)	542 (2.5)	9 (5.4)	24 (3.3)	545 (3.9)	-7 (5.3)	2 (0.6)	~ ~	-2 (2.0)
Yemen	72 (4.3)	202 (8.3)	◊ ◊	26 (4.2)	201 (16.0)	◊ ◊	1 (1.0)	~ ~	◊ ◊
Algeria	68 (4.8)	356 (6.7)	◊ ◊	24 (4.3)	342 (18.6)	◊ ◊	8 (2.5)	352 (17.5)	◊ ◊
Japan	67 (3.6)	548 (2.4)	10 (5.3)	30 (3.4)	548 (3.2)	-6 (5.3)	3 (1.5)	546 (6.7)	-4 (2.7)
Tunisia r	66 (3.7)	312 (8.4)	-14 (5.3) ▼	17 (3.1)	334 (13.3)	6 (4.1)	17 (3.1)	320 (10.5)	7 (4.1)
El Salvador	63 (3.8)	391 (6.1)	◊ ◊	22 (3.3)	386 (9.6)	◊ ◊	15 (3.3)	379 (9.7)	◊ ◊
Colombia	52 (5.8)	407 (10.3)	◊ ◊	26 (4.1)	391 (8.9)	◊ ◊	22 (4.9)	403 (10.1)	◊ ◊
Morocco s	40 (3.9)	308 (12.4)	-10 (6.1)	30 (3.4)	283 (11.1)	0 (6.1)	29 (3.5)	288 (14.4)	10 (5.3)
Armenia s	38 (4.0)	487 (10.1)	-44 (6.2) ▼	23 (3.4)	459 (10.6)	8 (5.6)	39 (3.5)	499 (9.9)	36 (3.8) ▲
International Avg.	80 (0.5)	478 (0.9)		15 (0.4)	464 (1.9)		5 (0.3)	414 (4.7)	
Benchmarking Participants									
Dubai, UAE s	98 (0.2)	452 (6.0)	◊ ◊	2 (0.2)	~ ~	◊ ◊	0 (0.0)	~ ~	◊ ◊
Massachusetts, US	91 (4.0)	577 (4.5)	◊ ◊	8 (3.9)	527 (10.0)	◊ ◊	1 (0.0)	~ ~	◊ ◊
Alberta, Canada	90 (2.4)	544 (4.3)	◊ ◊	9 (2.4)	530 (6.2)	◊ ◊	1 (0.3)	~ ~	◊ ◊
Quebec, Canada	89 (2.7)	522 (2.9)	9 (4.6) ▲	8 (2.2)	486 (8.2)	-10 (4.1) ▼	3 (1.3)	517 (9.5)	0 (1.8)
British Columbia, Canada r	88 (2.9)	539 (2.7)	◊ ◊	12 (2.9)	513 (11.2)	◊ ◊	0 (0.0)	~ ~	◊ ◊
Minnesota, US	87 (6.0)	561 (5.3)	◊ ◊	13 (6.0)	495 (20.2)	◊ ◊	0 (0.0)	~ ~	◊ ◊
Ontario, Canada	84 (3.5)	540 (3.8)	-6 (4.7)	15 (3.5)	505 (12.1)	5 (4.6)	0 (0.3)	~ ~	0 (0.4)

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on teachers' responses to three statements about their schools: this school is located in a safe neighborhood; I feel safe at this school; and this school's security policies and practices are sufficient. High level indicates that the teacher agrees a lot or agrees to all three statements. Low level indicates that teacher disagrees or disagrees a lot to all three statements. Medium level includes all other combinations of responses.

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

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

Pupils were asked a number of questions which formed a comparable index (students' perceptions of being safe in the schools (see Exhibit 8.4). This index is concerned with the extent to which pupils feel safe in school, as with the teacher safety index pupil responses are categorised as 'low', 'medium' and 'high'. A response that is categorised as 'high' indicates that the pupils feel that their school is a safe environment. In England, 32 per cent of pupils were placed at the high level and 43 per cent at the medium level of the index of pupil safety. As in 2003, there are discrepancies between teachers' and pupils' perceptions of safety at school. However, this difference between teachers' and pupils' perceptions is also seen in many other countries: for example, the Netherlands, Hong Kong and Australia.

Exhibit 8.4 Index of students' perception of being safe in school with trends, grade 4

TIMSS2007 Science 4th Grade

Country	High SPBSS			Medium SPBSS			Low SPBSS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Kazakhstan	80 (2.3)	535 (6.4)	◊ ◊	18 (2.2)	524 (5.7)	◊ ◊	3 (0.4)	518 (13.9)	◊ ◊
Sweden	70 (1.2)	529 (2.8)	◊ ◊	25 (0.9)	519 (3.7)	◊ ◊	5 (0.5)	494 (9.0)	◊ ◊
Denmark	59 (1.5)	520 (3.2)	◊ ◊	34 (1.4)	519 (3.5)	◊ ◊	8 (0.5)	499 (6.1)	◊ ◊
Norway	55 (1.3)	490 (3.8)	2 (1.7)	34 (0.9)	472 (3.9)	0 (1.3)	12 (0.8)	451 (7.1)	-1 (1.1)
Germany	54 (1.1)	540 (2.5)	◊ ◊	34 (0.8)	524 (3.4)	◊ ◊	12 (0.6)	506 (5.0)	◊ ◊
Japan	52 (1.3)	553 (2.6)	7 (1.8) ▲	34 (0.9)	547 (2.3)	-4 (1.2) ▼	14 (0.8)	536 (4.6)	-3 (1.1) ▼
Ukraine	52 (1.4)	483 (3.2)	◊ ◊	37 (1.0)	473 (3.5)	◊ ◊	11 (0.8)	459 (7.0)	◊ ◊
Russian Federation	51 (1.3)	552 (4.5)	11 (1.8) ▲	40 (1.1)	543 (6.1)	-6 (1.5) ▼	9 (0.6)	529 (8.0)	-5 (1.0) ▼
Lithuania	50 (1.3)	523 (2.7)	6 (1.7) ▲	38 (1.1)	510 (3.0)	-5 (1.5) ▼	12 (0.7)	492 (4.3)	-1 (1.0)
Austria	49 (1.0)	533 (2.6)	◊ ◊	35 (0.9)	524 (3.3)	◊ ◊	15 (0.9)	508 (4.4)	◊ ◊
Armenia r	49 (1.6)	495 (4.9)	-9 (2.2) ▼	38 (1.3)	480 (8.3)	1 (1.9)	13 (1.0)	488 (15.2)	7 (1.1) ▲
Netherlands	48 (1.4)	531 (3.3)	5 (2.0) ▲	38 (1.1)	522 (2.8)	-2 (1.5)	14 (0.8)	503 (4.9)	-3 (1.3) ▼
Georgia	48 (1.5)	434 (4.9)	◊ ◊	43 (1.4)	415 (5.1)	◊ ◊	9 (0.7)	395 (10.0)	◊ ◊
Czech Republic	45 (1.5)	525 (3.7)	◊ ◊	43 (1.2)	513 (3.3)	◊ ◊	11 (0.7)	487 (5.1)	◊ ◊
Slovak Republic	44 (1.3)	545 (3.3)	◊ ◊	40 (1.0)	523 (5.3)	◊ ◊	15 (1.2)	490 (7.6)	◊ ◊
Iran, Islamic Rep. of	43 (1.4)	437 (4.9)	10 (2.6) ▲	43 (1.2)	438 (5.1)	-1 (1.9)	14 (0.8)	431 (7.1)	-9 (1.7) ▼
Latvia	41 (1.2)	549 (2.8)	-1 (1.9)	46 (1.1)	544 (3.1)	2 (1.6)	12 (0.8)	518 (3.7)	-1 (1.2)
Scotland	40 (1.2)	506 (3.1)	7 (1.8) ▲	39 (0.9)	506 (3.0)	0 (1.4)	21 (1.0)	482 (5.0)	-6 (1.6) ▼
Slovenia	40 (1.2)	525 (2.3)	0 (1.9)	42 (1.0)	521 (2.8)	2 (1.5)	18 (0.6)	502 (3.7)	-2 (1.4)
Yemen	39 (2.1)	212 (9.1)	◊ ◊	42 (1.5)	214 (7.4)	◊ ◊	19 (1.2)	179 (8.7)	◊ ◊
Italy	39 (1.0)	545 (3.9)	6 (1.5) ▲	41 (0.9)	532 (3.5)	0 (1.3)	20 (0.9)	521 (4.3)	-5 (1.3) ▼
Hong Kong SAR	37 (1.3)	561 (3.7)	-3 (1.9)	42 (0.9)	555 (3.8)	2 (1.3)	22 (1.1)	541 (4.8)	1 (1.6)
Algeria	36 (2.2)	378 (7.1)	◊ ◊	47 (1.6)	351 (6.5)	◊ ◊	17 (1.1)	326 (9.7)	◊ ◊
Hungary	35 (1.5)	553 (3.8)	-2 (1.9)	42 (1.2)	537 (4.6)	-1 (1.6)	23 (1.2)	516 (5.6)	3 (1.4)
Kuwait	34 (1.4)	395 (5.3)	◊ ◊	39 (1.0)	355 (5.2)	◊ ◊	27 (1.1)	310 (7.1)	◊ ◊
El Salvador	32 (1.4)	399 (5.0)	◊ ◊	46 (0.9)	394 (4.0)	◊ ◊	22 (1.2)	379 (5.6)	◊ ◊
England	32 (1.1)	556 (3.6)	0 (1.6)	43 (0.9)	544 (3.5)	1 (1.3)	25 (0.9)	522 (4.1)	-1 (1.5)
Colombia	31 (1.3)	424 (5.7)	◊ ◊	48 (1.0)	401 (5.5)	◊ ◊	21 (1.1)	385 (9.2)	◊ ◊
Australia	30 (1.2)	541 (3.7)	1 (1.6)	44 (1.3)	530 (4.0)	5 (1.6) ▲	26 (1.4)	512 (4.7)	-6 (1.9) ▼
Singapore	30 (0.9)	609 (4.5)	4 (1.3) ▲	45 (0.7)	585 (4.1)	-2 (1.0)	25 (0.7)	566 (5.5)	-3 (1.2) ▼
Qatar	28 (0.5)	338 (3.2)	◊ ◊	40 (0.6)	302 (3.6)	◊ ◊	31 (0.6)	271 (3.1)	◊ ◊
Chinese Taipei	28 (1.1)	572 (2.6)	0 (1.5)	38 (0.9)	557 (2.5)	0 (1.2)	35 (1.1)	545 (2.7)	0 (1.5)
Morocco r	26 (1.3)	325 (8.4)	1 (2.5)	54 (1.5)	298 (7.2)	2 (2.3)	20 (1.4)	285 (12.6)	-4 (2.0)
New Zealand	25 (0.9)	529 (3.4)	-1 (1.2)	42 (0.9)	509 (2.9)	0 (1.3)	33 (1.1)	483 (3.7)	1 (1.3)
Tunisia	23 (1.4)	362 (8.4)	0 (2.3)	49 (1.1)	327 (6.8)	-1 (1.6)	28 (1.1)	300 (7.5)	1 (1.8)
United States	- -	- -	- -	- -	- -	- -	- -	- -	- -
International Avg.	42 (0.2)	489 (0.8)		40 (0.2)	475 (0.8)		18 (0.2)	455 (1.2)	
Benchmarking Participants									
British Columbia, Canada	37 (0.9)	550 (3.2)	◊ ◊	41 (0.9)	538 (3.2)	◊ ◊	22 (0.7)	516 (3.8)	◊ ◊
Quebec, Canada	35 (1.2)	527 (3.4)	1 (1.6)	43 (1.1)	517 (3.5)	1 (1.4)	22 (1.0)	502 (4.0)	-3 (1.5)
Alberta, Canada	35 (1.1)	557 (4.5)	◊ ◊	41 (1.0)	541 (4.0)	◊ ◊	24 (1.1)	525 (4.2)	◊ ◊
Ontario, Canada	32 (1.1)	549 (4.1)	2 (1.6)	42 (1.0)	537 (4.5)	2 (1.4)	25 (1.1)	520 (4.4)	-4 (1.6) ▼
Dubai, UAE	25 (1.3)	498 (4.6)	◊ ◊	48 (1.1)	468 (4.0)	◊ ◊	27 (1.4)	438 (5.7)	◊ ◊
Massachusetts, US	- -	- -	◊ ◊	- -	- -	◊ ◊	- -	- -	◊ ◊
Minnesota, US	- -	- -	◊ ◊	- -	- -	◊ ◊	- -	- -	◊ ◊

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on students' responses to five statements about things that happened in their schools in the last month (1 = yes and 2 = no): something of mine was stolen; I was hit or hurt by other student(s) (e.g., shoving, hitting, kicking); I was made to do things that I didn't want to do by other students; I was made fun of or called names; and I was left out of activities by other students. High level indicates that the student answered NO to all five statements. Low level indicates that the student answered YES to three or more statements. Medium level includes all other possible combinations of responses.

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

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

An "r" indicates data are available for at least 70 but less than 85% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

Resources in school

Headteachers were asked about school resources and how the school's ability to provide education was affected by a lack of general resources as well as specific science and mathematics resources. The headteachers' responses to these questions were categorised as 'high', 'medium' and 'low', a response in the 'high' category indicates that the headteacher perceives that the school is well resourced. For grade 4 science the outcomes are shown in Exhibit 8.5. The parallel findings for mathematics are discussed in section 8.2.

At grade 4, almost all pupils were taught at schools resourced at the high or medium level, according to the ratings given by their headteachers. Exhibit 8.6 shows that there was a

Exhibit 8.5 Index of availability of school resources for science instruction, grade 4

TIMSS2007 Science 4th Grade

Country	High ASRSI		Medium ASRSI		Low ASRSI	
	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement
Singapore	83 (0.0)	586 (4.6)	16 (0.0)	597 (9.2)	1 (0.0)	~ ~
Austria	71 (3.3)	526 (3.3)	28 (3.3)	522 (5.9)	0 (0.0)	~ ~
Czech Republic	64 (4.2)	514 (3.9)	36 (4.2)	516 (4.7)	0 (0.0)	~ ~
Japan	53 (4.0)	547 (2.8)	45 (4.2)	548 (2.4)	3 (1.4)	566 (12.8)
England	50 (4.4)	547 (4.6)	49 (4.3)	536 (4.3)	1 (1.1)	~ ~
Germany	48 (3.7)	535 (3.1)	50 (3.7)	523 (3.7)	2 (1.1)	~ ~
Denmark	47 (5.4)	523 (4.2)	52 (5.5)	512 (4.5)	1 (0.0)	~ ~
Hungary	46 (4.4)	531 (6.1)	49 (4.5)	540 (4.9)	5 (1.8)	547 (10.8)
Slovenia	46 (4.0)	516 (3.5)	53 (4.1)	520 (2.5)	1 (0.9)	~ ~
Scotland	44 (4.5)	502 (4.5)	53 (4.5)	499 (3.7)	3 (1.5)	510 (13.2)
Hong Kong SAR	43 (4.6)	556 (4.8)	56 (4.5)	553 (4.9)	1 (0.8)	~ ~
United States	42 (3.6)	550 (4.2)	55 (3.5)	533 (3.9)	3 (1.0)	502 (20.4)
New Zealand	40 (3.1)	501 (5.1)	58 (3.2)	509 (3.2)	2 (1.1)	~ ~
Australia	39 (4.1)	534 (4.7)	61 (4.2)	522 (5.4)	0 (0.4)	~ ~
Chinese Taipei	36 (4.4)	562 (3.9)	59 (4.2)	555 (2.5)	4 (1.8)	543 (9.7)
Russian Federation	36 (4.1)	553 (8.1)	61 (4.1)	545 (4.7)	3 (1.2)	493 (26.8)
Kazakhstan	33 (5.0)	534 (8.0)	59 (4.8)	532 (8.5)	8 (2.2)	532 (10.2)
Sweden	30 (3.8)	535 (3.3)	65 (4.0)	521 (4.0)	4 (1.8)	511 (14.9)
Qatar	29 (0.2)	267 (3.5)	68 (0.2)	302 (2.6)	2 (0.1)	~ ~
Kuwait	27 (3.9)	355 (10.0)	70 (4.2)	345 (6.6)	3 (1.6)	379 (32.4)
Lithuania	25 (3.6)	510 (5.0)	73 (3.7)	516 (2.8)	2 (1.0)	~ ~
Norway	23 (3.6)	481 (5.1)	74 (3.8)	475 (4.2)	3 (1.4)	452 (15.5)
Netherlands r	22 (3.8)	524 (5.7)	75 (4.0)	522 (3.7)	3 (1.5)	500 (15.2)
Slovak Republic	21 (3.1)	530 (9.9)	72 (3.4)	525 (5.5)	6 (2.0)	510 (11.8)
Italy	18 (2.9)	541 (6.6)	75 (3.4)	535 (4.0)	6 (2.0)	521 (8.4)
Latvia	14 (3.1)	526 (7.1)	84 (3.3)	545 (2.4)	2 (1.2)	~ ~
El Salvador	13 (1.9)	451 (13.2)	62 (4.2)	384 (4.6)	26 (4.0)	373 (9.5)
Armenia	12 (2.1)	453 (8.4)	76 (3.2)	491 (7.3)	12 (2.6)	473 (14.3)
Morocco	9 (3.3)	371 (32.1)	48 (4.4)	296 (8.7)	43 (3.5)	273 (10.3)
Ukraine	9 (2.4)	478 (6.6)	82 (3.1)	474 (3.4)	8 (2.2)	465 (18.0)
Colombia	9 (3.2)	475 (20.2)	48 (4.8)	416 (7.2)	43 (4.5)	370 (9.7)
Iran, Islamic Rep. of	8 (2.1)	443 (23.7)	75 (3.5)	441 (4.6)	17 (3.1)	407 (10.4)
Yemen	8 (2.0)	207 (15.2)	37 (3.8)	205 (10.1)	55 (4.0)	190 (10.6)
Georgia	7 (2.7)	411 (13.5)	77 (4.1)	418 (4.8)	15 (3.3)	424 (15.2)
Tunisia	6 (2.1)	340 (28.5)	64 (4.2)	324 (7.8)	30 (4.0)	301 (12.0)
Algeria	5 (1.7)	363 (24.0)	74 (4.9)	358 (5.8)	21 (4.7)	329 (24.2)
International Avg.	31 (0.6)	483 (2.1)	59 (0.7)	477 (1.3)	10 (0.4)	442 (3.4)
Benchmarking Participants						
Dubai, UAE r	82 (0.2)	467 (3.5)	17 (0.2)	424 (5.5)	1 (0.1)	~ ~
Alberta, Canada	50 (4.7)	541 (4.7)	48 (4.6)	544 (5.4)	2 (1.0)	~ ~
Quebec, Canada	49 (4.6)	517 (4.1)	51 (4.6)	517 (3.9)	0 (0.1)	~ ~
Minnesota, US	38 (6.9)	550 (16.4)	61 (7.2)	554 (6.6)	1 (1.6)	~ ~
British Columbia, Canada	37 (4.8)	541 (4.8)	62 (4.8)	535 (4.0)	1 (0.7)	~ ~
Massachusetts, US	37 (5.5)	575 (10.9)	60 (6.0)	572 (5.6)	3 (2.3)	534 (40.3)
Ontario, Canada	28 (4.2)	544 (6.3)	70 (4.4)	535 (4.9)	2 (1.4)	~ ~

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on principals' average response to five questions about shortages that affect general capacity to provide instruction: instructional materials (e.g., textbook); budget for supplies (e.g., paper, pencils); school buildings and grounds; heating/cooling and lighting systems; and instructional space (e.g., classrooms); and the average response to six questions about shortages that affect science instruction: science laboratory equipment and materials; computers for science instruction; computer software for science instruction; calculators for science instruction; library materials relevant to science instruction; and audio-visual resources for science instruction. Averages are computed based on a 4-point scale: 1 = none, 2 = a little, 3 = some, and 4 = a lot. High level indicates that both averages are less than 2. Low level indicates that both averages are greater than or equal to 3. Medium level includes all other possible combinations of responses.

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

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students.

five per cent increase in the percentage of pupils taught at schools resourced at a high level, although this was not significant.

This trend is reflected in other countries, with only a minority showing significant gains in resourcing. This is a positive finding as it shows that there is a continuing trend of schools and of headteachers in England being satisfied that they are resourced at a relatively high level.

Classroom practice

As in previous surveys, in order to give a full picture of school and classroom contexts, data was collected about classroom activities. In 2003 teachers in England reported a far

Exhibit 8.6 High index of availability of school resources for science instruction with trends, grade 4

TIMSS2007 Science 4th Grade

Country	High ASRSI					
	2007 Percent of Students		Difference in Percent from 2003		Difference in Percent from 1995	
Singapore	83	(0.0)	-1	(2.8)	36	(4.1) ▲
Austria	71	(3.3)	◊	◊	7	(5.5)
Czech Republic	64	(4.2)	◊	◊	27	(6.1) ▲
Japan	53	(4.0)	5	(5.5)	28	(5.4) ▲
England	r 50	(4.4)	5	(6.6)	24	(6.3) ▲
Hungary	46	(4.4)	13	(5.9) ▲	24	(5.7) ▲
Slovenia	r 46	(4.0)	-3	(5.7)	39	(4.8) ▲
Scotland	44	(4.5)	-7	(6.5)	–	–
Hong Kong SAR	43	(4.6)	8	(6.4)	22	(6.3) ▲
United States	r 42	(3.6)	6	(5.0)	18	(4.8) ▲
New Zealand	40	(3.1)	-1	(4.5)	19	(4.9) ▲
Australia	39	(4.1)	1	(5.7)	15	(6.2) ▲
Chinese Taipei	36	(4.4)	16	(5.4) ▲	◊	◊
Russian Federation	36	(4.1)	32	(4.3) ▲	◊	◊
Lithuania	25	(3.6)	14	(4.2) ▲	◊	◊
Norway	r 23	(3.6)	-4	(5.6)	6	(4.8)
Netherlands	r 22	(3.8)	-7	(5.8)	-7	(5.9)
Italy	18	(2.9)	-7	(4.4)	–	–
Latvia	r 14	(3.1)	-6	(5.6)	13	(3.1) ▲
Armenia	r 12	(2.1)	6	(3.5)	◊	◊
Morocco	r 9	(3.3)	3	(4.3)	◊	◊
Iran, Islamic Rep. of	8	(2.1)	-4	(4.0)	4	(2.8)
Tunisia	5	(2.0)	-2	(3.0)	◊	◊
International Avg.	36	(0.8)				
Benchmarking Participants						
Alberta, Canada	50	(4.7)	◊	◊	42	(6.2) ▲
Quebec, Canada	49	(4.6)	13	(6.4) ▲	4	(12.0)
Minnesota, US	r 38	(6.9)	◊	◊	30	(8.2) ▲
Ontario, Canada	28	(4.2)	3	(6.2)	14	(5.4) ▲

▲ 2007 percent significantly higher
▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Trend notes: Data are not shown for Kuwait, because comparable data from previous cycles are not available. Data for Tunisia do not include private schools.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A dash (-) indicates comparable data are not available.
An "r" indicates data are available for at least 70 but less than 85% of the students.
A diamond (◊) indicates the country did not participate in the assessment.

more 'hands-on approach' than was seen internationally. This is shown to be a continuing pattern in the 2007 data (see Exhibit 8.7). Teachers' reports show that 58 per cent of grade 4 pupils carry out investigations 'in about half of lessons or more', compared with an international average of 32 per cent. Only four countries had a higher percentage of pupils conducting investigations this frequently.

Another aspect of the 2003 data that is reflected in the teachers' reports from the 2007 survey is the percentage of pupils who spend 'half of lessons or more' designing investigations. This is 53 per cent, more than double the international average and only three countries had a higher percentage. These findings suggest that there is a positive trend for an active approach to the teaching of science in primary classrooms, something that is not reflected in most other countries.

In addition to teachers' reports of classroom activities, pupils themselves were asked about the activities they took part in during their science lessons. Similarities can be seen between the teacher and pupil reports. Grade 4 pupils also report a more 'hands-on' approach to science compared with their international counterparts. Exhibit 8.8 shows that 76 per cent reported doing a science experiment at least once a month, 27 percentage

Exhibit 8.7 Teachers' reports on students doing science investigations, grade 4

TIMSS2007 Science 4th Grade

Country	Percentage of Students Whose Teachers Reported Students Doing the Activity About Half of the Lessons or More													
	Observe Natural Phenomena such as the Weather or a Plant Growing and Describe What They See		Give Explanations About Something They Are Studying		Watch Me Do a Science Experiment		Design or Plan Experiments or Investigations		Do Experiments or Investigations		Work Together in Small Groups on Experiments or Investigations		Relate What Students Are Learning in Science to Their Daily Lives	
Algeria	20	(4.7)	88	(2.8)	43	(4.9)	17	(3.3)	24	(3.7)	28	(3.7)	75	(5.0)
Armenia	70	(3.4)	59	(4.0)	56	(3.9)	56	(4.5)	62	(3.7)	65	(4.0)	62	(3.7)
Australia	16	(2.4)	48	(3.1)	11	(2.7)	18	(2.9)	29	(3.3)	38	(3.5)	57	(3.5)
Austria	9	(1.9)	58	(3.1)	3	(1.0)	2	(0.9)	6	(1.6)	12	(2.3)	71	(2.9)
Chinese Taipei	21	(3.1)	59	(4.0)	37	(4.2)	44	(4.2)	64	(4.2)	69	(4.1)	65	(3.9)
Colombia	46	(5.0)	89	(3.3)	31	(4.6)	31	(4.7)	34	(4.8)	38	(3.8)	92	(2.4)
Czech Republic	21	(3.6)	82	(2.9)	9	(2.0)	3	(1.4)	7	(2.1)	7	(2.3)	89	(2.8)
Denmark	r 18	(3.1)	r 41	(4.0)	r 8	(2.4)	r 15	(3.3)	r 50	(4.6)	r 55	(4.7)	r 45	(4.6)
El Salvador	30	(3.9)	74	(3.9)	7	(2.4)	11	(2.7)	15	(3.2)	21	(3.6)	82	(3.2)
England	25	(3.6)	72	(3.5)	10	(2.5)	53	(4.0)	58	(3.9)	61	(4.0)	70	(3.5)
Georgia	32	(3.7)	86	(4.3)	17	(3.4)	11	(2.5)	8	(2.1)	19	(3.3)	74	(4.6)
Germany	12	(2.2)	64	(3.1)	3	(1.1)	7	(1.7)	14	(2.4)	19	(2.6)	70	(2.7)
Hong Kong SAR	7	(2.2)	65	(4.5)	6	(2.1)	4	(1.6)	6	(2.2)	11	(2.9)	65	(4.2)
Hungary	18	(3.0)	70	(4.0)	8	(2.0)	6	(1.9)	6	(1.7)	10	(2.3)	82	(3.5)
Iran, Islamic Rep. of	49	(4.2)	73	(3.3)	66	(3.6)	58	(4.3)	68	(3.8)	62	(3.9)	80	(2.6)
Italy	29	(3.1)	91	(1.9)	23	(2.5)	25	(2.7)	31	(3.1)	22	(2.7)	72	(3.0)
Japan	64	(3.3)	61	(4.2)	36	(4.0)	56	(3.8)	86	(2.6)	82	(3.0)	54	(4.2)
Kazakhstan	52	(5.3)	99	(0.7)	18	(3.9)	15	(3.6)	15	(4.1)	19	(4.2)	98	(0.9)
Kuwait	r 18	(3.0)	r 77	(3.9)	r 75	(3.9)	r 31	(4.0)	r 45	(4.5)	r 62	(4.2)	r 91	(2.3)
Latvia	43	(3.8)	75	(3.5)	34	(4.2)	47	(4.2)	56	(4.2)	42	(4.3)	96	(1.6)
Lithuania	25	(3.2)	44	(3.6)	9	(2.3)	6	(1.6)	4	(1.4)	16	(2.6)	83	(2.7)
Morocco	21	(3.6)	83	(2.9)	54	(3.8)	32	(4.4)	34	(4.0)	41	(4.3)	79	(3.8)
Netherlands	8	(2.5)	39	(4.0)	4	(1.9)	3	(1.5)	11	(3.2)	16	(3.5)	54	(4.7)
New Zealand	14	(1.9)	57	(3.0)	5	(1.4)	22	(2.6)	31	(2.8)	46	(3.1)	52	(3.0)
Norway	11	(2.6)	30	(3.7)	2	(0.9)	3	(1.1)	5	(1.6)	7	(1.8)	42	(3.9)
Qatar	r 27	(0.1)	r 79	(0.2)	r 64	(0.2)	r 41	(0.1)	46	(0.2)	r 68	(0.2)	r 91	(0.1)
Russian Federation	45	(4.0)	96	(0.7)	20	(2.7)	10	(1.7)	13	(2.1)	26	(3.2)	90	(2.2)
Scotland	r 18	(3.0)	r 62	(4.3)	r 16	(3.1)	r 24	(3.6)	r 46	(4.2)	r 54	(4.8)	r 66	(3.8)
Singapore	15	(2.0)	76	(2.2)	36	(2.4)	13	(1.6)	49	(3.0)	48	(2.5)	69	(2.4)
Slovak Republic	47	(3.9)	69	(3.5)	28	(3.0)	21	(3.2)	28	(3.5)	19	(2.7)	89	(2.4)
Slovenia	34	(2.9)	82	(2.5)	21	(2.4)	17	(2.3)	39	(3.2)	31	(2.8)	90	(1.9)
Sweden	12	(2.8)	36	(3.4)	5	(1.7)	12	(2.5)	24	(3.2)	29	(3.5)	50	(3.5)
Tunisia	36	(4.1)	72	(3.9)	58	(3.8)	48	(4.5)	58	(4.2)	59	(4.2)	74	(3.4)
Ukraine	82	(3.3)	96	(1.6)	26	(3.4)	14	(2.8)	14	(2.8)	26	(3.5)	90	(2.5)
United States	28	(2.6)	78	(2.3)	16	(2.2)	20	(2.5)	44	(2.9)	52	(2.8)	76	(2.2)
Yemen	13	(3.2)	64	(4.1)	37	(4.5)	24	(4.3)	16	(3.3)	23	(4.1)	77	(3.7)
International Avg.	29	(0.6)	69	(0.6)	25	(0.5)	23	(0.5)	32	(0.5)	36	(0.6)	74	(0.5)
Benchmarking Participants														
Alberta, Canada	27	(3.4)	68	(3.5)	18	(2.6)	29	(4.2)	53	(3.9)	58	(3.8)	75	(3.6)
British Columbia, Canada	r 28	(4.2)	r 63	(4.2)	r 17	(4.0)	r 13	(2.7)	r 28	(4.1)	r 33	(3.2)	r 61	(4.4)
Dubai, UAE	s 51	(4.8)	s 88	(2.2)	s 60	(4.5)	s 66	(4.2)	s 67	(4.5)	s 60	(4.9)	s 96	(1.1)
Massachusetts, US	30	(6.1)	71	(6.8)	r 17	(3.9)	36	(6.4)	56	(7.4)	63	(7.0)	74	(5.3)
Minnesota, US	36	(7.0)	74	(5.2)	14	(4.3)	23	(7.1)	65	(6.7)	74	(5.9)	73	(7.7)
Ontario, Canada	21	(4.3)	69	(4.6)	19	(3.9)	20	(4.1)	48	(5.4)	56	(4.5)	72	(3.6)
Quebec, Canada	16	(3.4)	59	(3.8)	16	(3.3)	28	(4.0)	45	(4.1)	47	(4.3)	57	(4.0)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

points higher than the international average. This was higher than the percentage of pupils doing experiments and investigations in Chinese Taipei, Hong Kong, Japan and the Netherlands. However, it is important to recognise that these reports are not directly comparable: although the questions about classroom activities were covered in both the grade 4 teacher and pupil questionnaires, in the pupil questionnaire the questions were adapted in order to make them more pupil-friendly. For example, pupils were asked: 'In school, how often do you do these things? I look at something like the weather or a plant growing and write down what I see', whereas in the teacher questionnaire the question was

Exhibit 8.8 Students' reports on doing science investigations, grade 4

TIMSS2007 4th Science Grade

Country	Percentage of Students Who Reported Doing the Activity Once or Twice a Month or More					
	Look at Something Like the Weather or a Plant Growing and Write Down What I See	Write or Give an Explanations For Something I Am Studying in Science	Watch the Teacher Do a Science Experiment	Design or Plan a Science Experiment or Investigation	Do a Science Experiment or Investigation	Work with Other Students in a Small Group on a Science Experiment or Investigation
Algeria	73 (1.6)	80 (1.0)	81 (1.1)	76 (1.3)	75 (1.4)	71 (1.3)
Armenia	52 (1.4) r	69 (1.6) r	63 (1.3) r	37 (1.5) r	33 (1.5) r	36 (1.6)
Australia	34 (1.4)	57 (1.5)	45 (2.4)	36 (1.3)	41 (2.0)	52 (2.1)
Austria	34 (0.8)	58 (1.2)	62 (1.1)	32 (0.9)	33 (1.0)	37 (1.0)
Chinese Taipei	63 (1.0)	77 (0.9)	88 (0.7)	43 (1.2)	65 (1.1)	83 (1.0)
Colombia	75 (1.1)	81 (0.8)	71 (1.3)	74 (1.2)	76 (1.2)	71 (1.3)
Czech Republic	47 (1.3)	68 (1.0)	61 (1.8)	26 (1.3)	29 (1.2)	39 (1.6)
Denmark	30 (1.4)	55 (1.6)	48 (2.6)	29 (1.8)	27 (1.3)	60 (2.0)
El Salvador	69 (1.4)	76 (1.2)	61 (1.9)	50 (1.5)	51 (1.6)	65 (1.4)
England	45 (1.3)	77 (1.0)	73 (1.4)	71 (1.7)	76 (1.4)	80 (1.1)
Georgia	59 (1.5)	77 (1.2)	57 (1.3)	38 (1.5)	34 (1.3)	39 (1.7)
Germany	40 (1.0)	69 (0.8)	56 (1.1)	27 (0.9)	25 (0.9)	38 (1.2)
Hong Kong SAR	39 (1.0)	47 (1.0)	36 (1.5)	21 (0.8)	22 (0.8)	33 (1.4)
Hungary	55 (1.1)	67 (1.2)	73 (1.4)	31 (1.0)	24 (1.1)	29 (1.4)
Iran, Islamic Rep. of	63 (1.9)	82 (1.3)	89 (1.1)	67 (2.0)	73 (1.8)	73 (1.6)
Italy	52 (1.2)	72 (0.8)	69 (1.5)	45 (1.2)	47 (1.3)	41 (1.3)
Japan	79 (1.3)	68 (1.2)	68 (1.7)	58 (1.3)	63 (1.1)	88 (0.6)
Kazakhstan	68 (2.8)	85 (1.5)	68 (3.3)	53 (2.4)	52 (2.3)	55 (2.1)
Kuwait	71 (1.7)	83 (0.9)	84 (0.9)	77 (1.1)	77 (1.3)	81 (1.0)
Latvia	65 (1.1)	65 (1.3)	74 (1.4)	62 (1.5)	71 (1.5)	60 (1.4)
Lithuania	57 (1.2)	78 (1.1)	74 (1.1)	39 (1.1)	36 (1.3)	44 (1.2)
Morocco	63 (2.2)	80 (1.2)	78 (1.6)	66 (1.9)	65 (1.9)	67 (2.0)
Netherlands	12 (0.7)	25 (1.2)	43 (1.6)	11 (0.7)	13 (0.9)	27 (1.8)
New Zealand	39 (1.1)	54 (1.1)	47 (1.3)	39 (1.1)	40 (1.2)	53 (1.3)
Norway	33 (1.1)	55 (1.1)	61 (1.4)	38 (1.0)	45 (1.1)	49 (1.3)
Qatar	69 (0.5)	76 (0.5)	84 (0.4)	74 (0.6)	75 (0.5)	77 (0.6)
Russian Federation	58 (1.3)	86 (1.1)	57 (1.9)	40 (2.0)	36 (2.0)	33 (1.6)
Scotland	33 (1.4)	58 (1.6)	57 (2.2)	38 (1.7)	46 (1.9)	64 (1.7)
Singapore	34 (0.9)	63 (0.7)	81 (0.9)	31 (0.7)	46 (0.9)	63 (1.0)
Slovak Republic	44 (1.5)	72 (1.2)	82 (1.3)	38 (1.3)	45 (1.3)	54 (1.3)
Slovenia	61 (1.2)	86 (0.7)	86 (0.8)	70 (1.1)	71 (1.0)	78 (0.9)
Sweden	29 (1.2)	52 (1.4)	49 (2.1)	30 (1.3)	32 (1.8)	47 (2.0)
Tunisia	69 (1.9)	84 (1.1)	86 (1.1)	82 (1.6)	82 (1.3)	74 (1.6)
Ukraine	73 (1.2)	87 (0.7)	69 (1.4)	51 (1.5)	50 (1.5)	48 (1.7)
United States	39 (1.0)	67 (0.7)	63 (1.3)	43 (1.0)	56 (1.2)	62 (1.2)
Yemen	51 (3.1) r	67 (2.3)	61 (3.0) r	44 (2.7) r	37 (2.6) r	45 (2.7)
International Avg.	52 (0.2)	69 (0.2)	67 (0.3)	47 (0.2)	49 (0.2)	56 (0.3)
Benchmarking Participants						
Alberta, Canada	42 (1.7)	78 (0.9)	78 (1.2)	48 (1.5)	61 (1.5)	77 (1.1)
British Columbia, Canada	44 (1.5)	71 (1.2)	66 (1.5)	34 (1.4)	45 (1.5)	56 (1.5)
Dubai, UAE	50 (1.6) r	76 (1.2) r	77 (1.3) r	60 (1.4) r	64 (1.9) r	64 (2.1)
Massachusetts, US	38 (1.9)	74 (1.6)	58 (2.1)	41 (2.0)	53 (2.7)	62 (3.3)
Minnesota, US	39 (2.4)	66 (1.3)	70 (2.5)	41 (2.6)	60 (3.0)	69 (2.6)
Ontario, Canada	35 (1.5)	75 (1.3)	62 (1.9)	40 (1.7)	50 (1.5)	65 (1.8)
Quebec, Canada	49 (1.5)	63 (1.2)	54 (2.2)	54 (1.5)	56 (1.6)	57 (1.8)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by students.
() Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear
An "r" indicates data are available for at least 70 but less than 85% of the students.

phrased in this way: 'Observe natural phenomena such as the weather or a plant growing and describe what they see.' In addition to this, the frequency scale used in the pupil and teacher questionnaire was also not comparable. However, similarities can be seen between the teacher and pupil reports. The teacher and pupil reports on mathematics classroom activities are reported in section 8.2.

As in 2003, data was collected from National Research Coordinators and teachers about the use of textbooks (see Exhibit 8.9) and computers to teach science (see Exhibit 8.10). The majority of pupils are taught using textbooks only as a supplementary resource, with only 5 per cent using a textbook as a primary resource, a tenth of the international average. There has been no significant change in teacher reports' in England on the use of textbooks to teach science at grade 4 since 2003.

Exhibit 8.9 Textbook use in teaching science with trends, grade 4

TIMSS2007 Science 4th Grade

Country	Percentage of Students Taught by Teachers Reporting Textbook Use											
	Use Textbook to Teach Science								Do Not Use Textbook to Teach Science			
	As Primary Basis for Lessons				As Supplementary Resource							
	Percent in 2007		Difference in Percent from 2003		Percent in 2007		Difference in Percent from 2003		Percent in 2007		Difference in Percent from 2003	
Algeria	61	(4.8)	◊	◊	35	(5.0)	◊	◊	4	(1.8)	◊	◊
Armenia	68	(3.4)	-	-	30	(3.4)	-	-	2	(0.8)	-	-
Australia	4	(1.1)	-5	(3.5)	14	(3.1)	1	(4.2)	82	(3.3)	3	(5.3)
Austria	14	(2.4)	◊	◊	67	(3.2)	◊	◊	19	(2.5)	◊	◊
Chinese Taipei	90	(2.6)	5	(3.8)	8	(2.3)	-4	(3.6)	2	(1.1)	-1	(2.0)
Colombia	36	(5.7)	◊	◊	57	(5.8)	◊	◊	7	(2.2)	◊	◊
Czech Republic	55	(4.4)	◊	◊	44	(4.4)	◊	◊	1	(0.6)	◊	◊
Denmark r	35	(4.4)	◊	◊	43	(4.8)	◊	◊	21	(4.0)	◊	◊
El Salvador	15	(3.2)	◊	◊	77	(3.3)	◊	◊	8	(2.6)	◊	◊
England r	5	(1.3)	-1	(2.6)	63	(4.2)	5	(6.4)	32	(4.0)	-4	(6.3)
Georgia	84	(3.0)	◊	◊	12	(2.7)	◊	◊	4	(2.0)	◊	◊
Germany	9	(1.7)	◊	◊	58	(3.6)	◊	◊	33	(3.3)	◊	◊
Hong Kong SAR r	93	(1.9)	7	(4.2)	6	(1.8)	-7	(4.2)	1	(0.8)	-1	(1.4)
Hungary	80	(2.9)	-1	(4.4)	20	(2.9)	1	(4.4)	0	(0.4)	0	(0.4)
Iran, Islamic Rep. of r	100	(0.0)	33	(4.7) ▲	0	(0.0)	-28	(4.7) ▼	0	(0.0)	-5	(1.3) ▼
Italy	39	(3.1)	7	(4.5)	48	(2.9)	-13	(4.5) ▼	13	(2.1)	6	(2.6) ▲
Japan	71	(3.2)	-5	(4.6)	28	(3.3)	5	(4.6)	1	(0.0)	0	(0.7)
Kazakhstan	93	(2.4)	◊	◊	7	(2.4)	◊	◊	0	(0.0)	◊	◊
Kuwait r	44	(4.6)	◊	◊	29	(3.9)	◊	◊	27	(4.4)	◊	◊
Latvia	79	(3.7)	-	-	21	(3.7)	-	-	0	(0.0)	-	-
Lithuania	63	(3.6)	-37	(3.6) ▼	36	(3.6)	36	(3.6) ▲	0	(0.0)	0	(0.0)
Morocco	69	(4.2)	-	-	30	(4.3)	-	-	1	(0.8)	-	-
Netherlands r	72	(4.0)	-3	(5.9)	13	(3.1)	1	(4.5)	15	(3.2)	2	(4.4)
New Zealand r	3	(0.9)	-1	(1.8)	18	(2.1)	4	(3.0)	80	(2.1)	-3	(3.4)
Norway r	49	(3.8)	-4	(6.0)	42	(3.9)	2	(5.9)	8	(2.2)	2	(3.1)
Qatar r	57	(0.2)	◊	◊	25	(0.1)	◊	◊	19	(0.2)	◊	◊
Russian Federation	81	(2.7)	-1	(4.2)	18	(2.7)	2	(3.9)	1	(0.2)	-1	(1.3)
Scotland s	5	(2.0)	-34	(5.0) ▼	27	(3.8)	-8	(6.0)	68	(4.1)	42	(5.9) ▲
Singapore	75	(2.7)	0	(4.9)	24	(2.8)	-1	(4.9)	1	(0.4)	1	(0.4)
Slovak Republic	62	(3.8)	◊	◊	37	(3.8)	◊	◊	0	(0.3)	◊	◊
Slovenia	59	(3.1)	33	(4.7) ▲	41	(3.1)	-15	(5.2) ▼	0	(0.1)	-18	(3.4) ▼
Sweden	22	(2.7)	◊	◊	59	(3.5)	◊	◊	19	(2.7)	◊	◊
Tunisia r	29	(3.8)	-4	(5.7)	69	(3.9)	39	(5.7) ▲	3	(1.4)	-35	(4.5) ▼
Ukraine	67	(3.9)	◊	◊	33	(3.9)	◊	◊	0	(0.0)	◊	◊
United States r	43	(3.2)	-3	(4.5)	39	(3.1)	9	(4.3) ▲	17	(2.6)	-6	(3.6)
Yemen	49	(4.1)	◊	◊	38	(4.0)	◊	◊	13	(2.8)	◊	◊
International Avg.	52	(0.5)			34	(0.6)			14	(0.4)		
Benchmarking Participants												
Alberta, Canada	5	(1.3)	◊	◊	12	(2.5)	◊	◊	83	(2.8)	◊	◊
British Columbia, Canada r	37	(4.2)	◊	◊	44	(4.2)	◊	◊	19	(3.3)	◊	◊
Dubai, UAE s	60	(4.7)	◊	◊	35	(4.6)	◊	◊	5	(0.5)	◊	◊
Massachusetts, US	28	(6.2)	◊	◊	32	(7.1)	◊	◊	40	(7.7)	◊	◊
Minnesota, US	23	(6.2)	◊	◊	24	(6.6)	◊	◊	53	(6.4)	◊	◊
Ontario, Canada	21	(3.7)	-12	(5.9) ▼	59	(4.7)	14	(6.5) ▲	20	(3.4)	-2	(5.1)
Quebec, Canada r	38	(4.9)	-2	(6.5)	28	(4.4)	10	(5.6)	34	(4.2)	-8	(6.3)

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

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 comparable data are not available.
An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.
A diamond (◊) indicates the country did not participate in the assessment.

Computer use in schools in grade 4 science lessons has declined. There has been a significant decrease in the percentage of pupils whose teachers reported that computers are available for use in science lessons. In the current TIMSS survey this was 77 per cent, a decrease of 11 per cent since 2003. However, this is still greater than the international average, and in line with other countries including Australia, Hong Kong, the Netherlands and Singapore. It is not clear why this reduction in the use of computers in school may have come about, particularly as it seems counter intuitive in this current technological age. It is possible that certain computer equipment, particularly interactive whiteboards,

Exhibit 8.10 Computer use in science class with trends, grade 4

TIMSS2007 Science 4th Grade

Country	National Curriculum Contains Policies / Statements About the Use of Computers	Trends in Percentage of Students Whose Teachers Reported That Computers Are Available			Percentage of Students Whose Teachers Reported on Computer Use About Half of the Lessons or More			
		2007 Percent of Students	Difference in Percent from 2003		Doing Scientific Procedures or Experiments	Studying Natural Phenomena Through Simulations	Practicing Skills and Procedures	Looking Up Ideas and Information
Algeria	●	5 (2.1)	◊	◊	0 (0.0)	0 (0.0)	3 (1.6)	4 (1.8)
Armenia	●	72 (3.5)	-	-	- -	- -	- -	- -
Australia	●	78 (2.8)	-6	(4.1)	2 (1.2)	3 (1.5)	6 (1.9)	29 (3.9)
Austria	○	74 (3.0)	◊	◊	0 (0.0)	1 (0.8)	3 (0.9)	11 (1.9)
Chinese Taipei	●	53 (4.1)	17	(5.7) ▲	5 (2.1)	5 (2.1)	2 (1.4)	4 (1.8)
Colombia	○	16 (3.0)	◊	◊	1 (0.8)	2 (1.1)	3 (1.3)	6 (1.8)
Czech Republic	○	54 (3.7)	◊	◊	1 (0.7)	1 (0.7)	3 (1.6)	4 (1.9)
Denmark	○	r 91 (2.2)	◊	◊	r 2 (1.4)	r 3 (1.1)	r 11 (3.3)	r 25 (3.9)
El Salvador	○	18 (3.5)	◊	◊	2 (1.1)	3 (1.5)	4 (1.6)	7 (2.3)
England	●	r 77 (3.7)	-11	(4.7) ▼	7 (2.5)	9 (2.5)	8 (2.6)	17 (3.1)
Georgia	○	15 (3.4)	◊	◊	0 (0.4)	1 (0.7)	2 (1.4)	0 (0.0)
Germany	●	64 (3.6)	◊	◊	1 (0.4)	1 (0.8)	2 (1.0)	13 (2.2)
Hong Kong SAR	●	71 (4.1)	7	(6.3)	3 (1.7)	7 (2.4)	10 (2.9)	32 (4.3)
Hungary	○	24 (3.7)	0	(5.4)	0 (0.0)	0 (0.3)	2 (1.2)	2 (1.2)
Iran, Islamic Rep. of	○	2 (0.7)	-2	(1.9)	1 (0.3)	0 (0.0)	0 (0.1)	0 (0.2)
Italy	●	25 (2.6)	6	(3.7)	3 (1.2)	3 (1.3)	3 (1.1)	6 (1.5)
Japan	●	84 (2.9)	-5	(4.0)	0 (0.3)	8 (2.0)	0 (0.0)	4 (1.5)
Kazakhstan	○	38 (5.0)	◊	◊	0 (0.3)	3 (1.5)	8 (3.2)	9 (3.1)
Kuwait	○	r 39 (4.3)	◊	◊	r 12 (3.2)	r 9 (2.7)	r 20 (3.2)	r 20 (3.6)
Latvia	○	37 (3.6)	-	-	1 (0.5)	1 (0.4)	2 (0.7)	12 (2.8)
Lithuania	●	37 (3.8)	29	(4.4) ▲	0 (0.0)	0 (0.0)	2 (1.3)	13 (2.4)
Morocco	○	17 (3.3)	-	-	1 (0.6)	3 (1.3)	2 (1.1)	6 (2.6)
Netherlands	○	62 (4.7)	24	(6.8) ▲	1 (1.0)	0 (0.2)	0 (0.2)	13 (3.0)
New Zealand	○	r 89 (1.7)	4	(3.1)	3 (0.8)	6 (1.4)	5 (1.3)	38 (2.6)
Norway	●	61 (3.8)	7	(5.7)	1 (0.7)	2 (1.1)	1 (0.0)	3 (1.3)
Qatar	○	r 51 (0.2)	◊	◊	r 10 (0.1)	r 14 (0.1)	r 24 (0.2)	r 26 (0.2)
Russian Federation	○	16 (2.1)	12	(2.5) ▲	1 (0.7)	2 (0.9)	1 (0.8)	4 (1.2)
Scotland	●	s 89 (2.8)	9	(5.2)	r 4 (1.5)	r 4 (1.6)	r 9 (2.7)	r 34 (3.7)
Singapore	●	80 (2.6)	3	(4.3)	12 (2.2)	8 (1.6)	17 (2.5)	19 (2.5)
Slovak Republic	○	51 (4.0)	◊	◊	1 (0.8)	1 (0.7)	6 (1.7)	14 (2.7)
Slovenia	○	53 (3.0)	30	(4.9) ▲	1 (0.9)	1 (0.8)	4 (1.1)	10 (2.0)
Sweden	○	77 (2.6)	◊	◊	2 (1.0)	0 (0.0)	2 (1.1)	8 (1.8)
Tunisia	○	31 (3.7)	16	(5.0) ▲	10 (2.3)	9 (2.2)	11 (2.3)	11 (2.4)
Ukraine	○	8 (2.3)	◊	◊	0 (0.0)	0 (0.0)	1 (0.9)	1 (0.8)
United States	○	77 (2.6)	9	(3.6) ▲	5 (1.4)	4 (1.2)	8 (1.4)	19 (2.2)
Yemen	○	24 (4.5)	◊	◊	2 (1.5)	2 (1.2)	9 (3.4)	13 (3.8)
International Avg.		49 (0.6)			3 (0.2)	3 (0.2)	6 (0.3)	12 (0.4)
Benchmarking Participants								
Alberta, Canada	●	78 (3.1)	◊	◊	6 (1.9)	4 (1.5)	8 (1.7)	16 (2.8)
British Columbia, Canada	●	r 58 (4.4)	◊	◊	r 4 (2.4)	r 5 (2.7)	r 6 (2.5)	r 16 (2.8)
Dubai, UAE	○	s 70 (2.6)	◊	◊	s 23 (4.6)	s 20 (4.7)	s 27 (4.4)	s 51 (3.9)
Massachusetts, US	○	73 (4.5)	◊	◊	4 (2.3)	3 (0.2)	6 (2.8)	27 (4.7)
Minnesota, US	○	56 (6.7)	◊	◊	2 (1.6)	3 (2.1)	4 (2.3)	4 (2.5)
Ontario, Canada	●	62 (4.2)	0	(6.2)	6 (2.8)	8 (3.8)	7 (2.8)	19 (4.5)
Quebec, Canada	○	72 (4.5)	18	(6.4) ▲	4 (1.6)	5 (1.9)	6 (1.8)	30 (4.4)

● Yes ○ No ▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by National Research Coordinators and by teachers.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A dash (-) indicates comparable data are not available.
An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.
A diamond (◊) indicates the country did not participate in the assessment.

have become so well integrated into lessons that teachers do not consider that, when they are interacting with this technology, they are using a computer.

8.2 The teachers and schools: grade 4 mathematics

The grade 4 pupils in the TIMSS 2007 survey completed test booklets containing both mathematics and science questions, therefore pupil background data is the same across the

Exhibit 8.11 Index of mathematics teachers' perception of school climate with trends, grade 4

TIMSS2007 Mathematics 4th Grade

Country	High TPSC			Medium TPSC			Low TPSC		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Scotland r	48 (3.4)	505 (3.3)	7 (6.1)	49 (3.3)	487 (3.6)	-9 (6.0)	3 (1.5)	453 (27.6)	1 (1.8)
United States	38 (2.7)	552 (3.9)	-3 (3.7)	49 (2.6)	525 (2.7)	2 (3.6)	14 (1.9)	486 (6.0)	2 (2.5)
England r	37 (3.9)	559 (5.4)	8 (5.9)	57 (3.9)	534 (3.5)	-5 (6.3)	6 (1.7)	501 (8.1)	-3 (2.9)
New Zealand	36 (2.3)	514 (3.6)	-1 (3.7)	57 (2.6)	484 (3.1)	-1 (4.0)	6 (1.4)	460 (8.2)	2 (1.7)
Australia	35 (3.5)	537 (5.7)	5 (5.0)	56 (3.3)	508 (4.9)	-3 (4.9)	9 (1.8)	491 (16.3)	-2 (3.0)
Austria	34 (2.6)	510 (2.8)	◊ ◊	62 (2.5)	505 (2.5)	◊ ◊	4 (1.3)	472 (8.2)	◊ ◊
El Salvador	29 (3.9)	345 (9.7)	◊ ◊	60 (4.3)	325 (6.0)	◊ ◊	11 (2.5)	315 (11.8)	◊ ◊
Kazakhstan	29 (5.5)	551 (15.4)	◊ ◊	67 (5.7)	548 (7.2)	◊ ◊	4 (1.8)	567 (22.4)	◊ ◊
Iran, Islamic Rep. of	28 (3.8)	415 (9.9)	3 (5.5)	58 (4.0)	401 (5.5)	-2 (6.1)	15 (2.6)	385 (7.1)	-1 (4.4)
Chinese Taipei	25 (3.7)	586 (4.0)	-10 (5.5)	71 (4.0)	572 (2.1)	10 (5.7)	4 (1.5)	560 (8.2)	0 (2.1)
Qatar	24 (0.2)	304 (2.0)	◊ ◊	60 (0.2)	296 (1.5)	◊ ◊	16 (0.1)	287 (2.6)	◊ ◊
Hong Kong SAR	22 (3.8)	620 (6.6)	14 (4.5) ▲	65 (4.1)	608 (4.4)	-13 (5.6) ▼	14 (2.8)	581 (8.7)	-1 (4.3)
Lithuania	20 (3.0)	544 (6.9)	-14 (4.5) ▼	76 (3.2)	528 (3.0)	11 (4.6) ▲	4 (1.2)	499 (15.2)	3 (1.2) ▲
Denmark	19 (3.8)	537 (5.7)	◊ ◊	68 (4.2)	526 (2.8)	◊ ◊	13 (3.1)	497 (8.3)	◊ ◊
Norway	18 (3.1)	490 (5.5)	0 (4.7)	80 (3.1)	470 (2.7)	3 (4.8)	3 (0.8)	448 (17.4)	-3 (2.0)
Germany	17 (2.7)	540 (5.3)	◊ ◊	70 (3.3)	528 (2.3)	◊ ◊	13 (2.3)	490 (8.3)	◊ ◊
Ukraine	15 (2.9)	471 (7.9)	◊ ◊	80 (3.2)	469 (3.5)	◊ ◊	5 (1.7)	457 (7.9)	◊ ◊
Sweden	15 (2.3)	515 (4.7)	◊ ◊	76 (3.0)	503 (3.1)	◊ ◊	9 (2.2)	476 (6.8)	◊ ◊
Slovenia	15 (2.2)	503 (4.8)	-2 (4.2)	81 (2.3)	502 (1.9)	1 (4.6)	5 (1.2)	497 (7.6)	1 (2.2)
Singapore	13 (2.1)	608 (10.4)	-8 (4.4)	77 (2.6)	601 (4.6)	5 (4.7)	10 (1.5)	579 (7.2)	3 (2.5)
Kuwait r	11 (3.2)	333 (14.4)	◊ ◊	74 (4.2)	313 (4.9)	◊ ◊	15 (3.1)	307 (12.7)	◊ ◊
Yemen	11 (2.6)	221 (18.9)	◊ ◊	59 (4.6)	226 (8.5)	◊ ◊	30 (4.2)	215 (7.5)	◊ ◊
Georgia	11 (3.1)	456 (9.0)	◊ ◊	68 (4.4)	441 (5.0)	◊ ◊	21 (3.9)	423 (8.7)	◊ ◊
Colombia	10 (2.6)	384 (22.2)	◊ ◊	66 (4.6)	362 (6.7)	◊ ◊	25 (4.1)	333 (9.5)	◊ ◊
Italy	9 (2.0)	513 (6.7)	1 (3.0)	73 (3.0)	511 (3.2)	0 (4.5)	18 (2.7)	484 (8.5)	-1 (3.8)
Russian Federation	9 (2.0)	575 (15.3)	3 (2.7)	83 (2.7)	546 (5.4)	4 (4.3)	8 (1.9)	509 (17.5)	-7 (3.7)
Hungary	6 (1.5)	554 (10.8)	-8 (3.2) ▼	74 (3.7)	518 (3.8)	-4 (4.9)	19 (3.6)	466 (11.0)	13 (4.1) ▲
Tunisia r	6 (1.6)	355 (23.0)	-1 (2.7)	58 (3.7)	333 (5.9)	0 (5.3)	36 (3.8)	314 (8.1)	0 (5.3)
Slovak Republic	5 (1.6)	513 (8.1)	◊ ◊	71 (3.6)	497 (5.5)	◊ ◊	24 (3.1)	488 (9.4)	◊ ◊
Algeria	5 (1.9)	391 (12.1)	◊ ◊	57 (4.9)	377 (8.9)	◊ ◊	38 (4.9)	374 (8.6)	◊ ◊
Netherlands	4 (1.9)	537 (8.9)	-3 (3.2)	83 (3.2)	539 (2.5)	-1 (4.8)	13 (2.6)	505 (9.0)	5 (3.6)
Japan	4 (1.5)	591 (15.6)	-8 (3.1) ▼	74 (3.4)	569 (2.3)	-2 (4.8)	22 (3.2)	560 (3.8)	10 (4.1) ▲
Latvia	4 (1.3)	552 (11.6)	-3 (3.0)	83 (2.6)	537 (2.4)	-1 (4.5)	13 (2.5)	538 (7.2)	4 (3.8)
Morocco s	4 (1.7)	391 (41.2)	0 (2.2)	41 (4.1)	362 (10.0)	7 (5.7)	55 (3.7)	321 (5.3)	-7 (5.5)
Armenia r	4 (1.4)	498 (13.0)	-10 (3.2) ▼	52 (4.0)	499 (5.6)	-19 (5.3) ▼	45 (4.0)	501 (7.6)	29 (4.9) ▲
Czech Republic	1 (0.8)	~ ~	◊ ◊	69 (4.0)	491 (3.1)	◊ ◊	30 (3.9)	477 (4.4)	◊ ◊
International Avg	17 (0.5)	488 (2.1)		67 (0.6)	473 (0.8)		16 (0.5)	453 (1.8)	
Benchmarking Participants									
Massachusetts, US	49 (7.2)	583 (5.6)	◊ ◊	46 (6.6)	567 (5.4)	◊ ◊	5 (3.0)	522 (19.3)	◊ ◊
Alberta, Canada	46 (4.0)	517 (3.9)	◊ ◊	50 (4.1)	496 (3.8)	◊ ◊	3 (1.4)	465 (37.0)	◊ ◊
Dubai, UAE r	44 (4.6)	451 (6.5)	◊ ◊	50 (4.6)	439 (4.6)	◊ ◊	6 (1.1)	368 (21.6)	◊ ◊
Minnesota, US	38 (8.2)	578 (6.7)	◊ ◊	56 (8.0)	545 (7.6)	◊ ◊	5 (2.8)	502 (20.6)	◊ ◊
British Columbia, Canada r	26 (3.4)	525 (5.0)	◊ ◊	67 (4.1)	498 (3.3)	◊ ◊	7 (2.7)	482 (4.5)	◊ ◊
Ontario, Canada	26 (4.3)	525 (5.4)	-11 (6.0)	63 (4.7)	512 (4.4)	8 (6.5)	11 (3.2)	480 (11.4)	3 (4.5)
Quebec, Canada	14 (2.9)	535 (5.3)	0 (3.9)	71 (3.9)	521 (3.7)	-2 (5.3)	15 (2.9)	504 (7.8)	2 (4.2)

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on teachers' responses to eight questions about their schools: teachers' job satisfaction; teachers' understanding of the school's curricular goals; teachers' degree of success in implementing the school's curriculum; teachers' expectations for student achievement; parental support for student achievement; parental involvement in school activities; students' regard for school property; and students' desire to do well in school. Average is computed based on a 5-point scale: 1 = very high; 2 = high; 3 = medium; 4 = low; and 5 = very low. High level indicates average is less than or equal to 2. Medium level indicates that average is greater than 2 and less or equal to 3. Low level indicates average is greater than 3.

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

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

two subjects. This is also the case for some of the data collected from teachers and headteachers. However, in some cases pupils in grade 4 are taught by different teachers for science and mathematics and therefore some of the teacher data for mathematics is different from that presented in section 8.1, and is discussed in this section.

School climate

As for grade 4 science (see section 8.1), an index of mathematics teachers' perception of school climate was compiled (Exhibit 8.11). Thirty-seven per cent of England's pupils are taught in schools where the teachers' responses were categorised as 'high', indicating that they perceived the climate in their school was good. This is a very similar to the

Exhibit 8.12 Index of mathematics teachers' perception of safety in school with trends, grade 4

TIMSS2007 Mathematics 4th Grade

Country	High TPSS			Medium TPSS			Low TPSS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Czech Republic	97 (1.3)	487 (2.8)	◊ ◊	3 (1.2)	468 (12.5)	◊ ◊	0 (0.0)	~ ~	◊ ◊
Singapore	96 (1.0)	600 (3.7)	9 (3.0) ▲	3 (1.0)	619 (22.7)	-9 (2.9) ▼	0 (0.0)	~ ~	0 (0.2)
Austria	95 (1.1)	506 (2.1)	◊ ◊	4 (1.1)	495 (9.9)	◊ ◊	0 (0.2)	~ ~	◊ ◊
Norway	95 (1.7)	473 (2.7)	5 (3.2)	4 (1.4)	481 (13.1)	-5 (3.0)	1 (0.9)	~ ~	1 (1.1)
Slovak Republic	92 (2.0)	496 (4.9)	◊ ◊	8 (2.0)	497 (8.7)	◊ ◊	0 (0.0)	~ ~	◊ ◊
Kuwait r	91 (2.6)	315 (4.4)	◊ ◊	9 (2.6)	304 (11.9)	◊ ◊	0 (0.0)	~ ~	◊ ◊
Germany	91 (1.7)	528 (2.3)	◊ ◊	8 (1.7)	483 (12.1)	◊ ◊	1 (0.6)	~ ~	◊ ◊
Lithuania	91 (2.1)	530 (2.6)	10 (3.8) ▲	7 (1.8)	530 (6.3)	-10 (3.3) ▼	2 (1.1)	~ ~	0 (1.6)
Georgia	89 (2.3)	441 (4.7)	◊ ◊	8 (1.8)	438 (11.2)	◊ ◊	4 (1.5)	428 (18.8)	◊ ◊
Hong Kong SAR	88 (3.2)	608 (4.0)	9 (5.1)	12 (3.2)	605 (9.1)	-5 (5.0)	0 (0.0)	~ ~	-4 (1.7) ▼
Kazakhstan	88 (3.3)	553 (6.3)	◊ ◊	12 (3.2)	525 (30.3)	◊ ◊	0 (0.0)	~ ~	◊ ◊
Scotland r	87 (2.6)	498 (2.7)	10 (4.1) ▲	13 (2.6)	470 (8.3)	-9 (4.1) ▼	0 (0.0)	~ ~	-1 (0.0)
Qatar	87 (0.1)	297 (1.1)	◊ ◊	11 (0.1)	296 (4.3)	◊ ◊	2 (0.0)	~ ~	◊ ◊
Hungary	86 (2.6)	516 (3.8)	-2 (4.0)	12 (2.4)	472 (10.1)	2 (3.7)	1 (0.9)	~ ~	0 (1.3)
New Zealand	86 (1.8)	499 (2.6)	-1 (2.7)	14 (1.8)	451 (7.0)	1 (2.7)	0 (0.1)	~ ~	0 (0.4)
Netherlands	86 (2.9)	540 (2.4)	1 (3.6)	10 (2.1)	493 (8.2)	-3 (2.9)	5 (1.8)	528 (18.8)	2 (2.4)
Australia	86 (2.4)	521 (4.3)	7 (4.3)	14 (2.3)	483 (10.2)	-6 (4.2)	1 (0.4)	~ ~	-1 (0.9)
England r	86 (2.4)	547 (3.2)	15 (4.7) ▲	14 (2.4)	509 (5.6)	-14 (4.7) ▼	0 (0.3)	~ ~	-1 (1.2)
Ukraine	84 (3.0)	470 (3.6)	◊ ◊	14 (2.8)	460 (7.1)	◊ ◊	2 (1.0)	~ ~	◊ ◊
Slovenia	84 (2.0)	502 (2.0)	11 (4.6) ▲	14 (1.9)	502 (4.0)	-9 (4.4) ▼	2 (0.8)	~ ~	-2 (1.9)
Italy	83 (2.4)	510 (3.0)	18 (4.2) ▲	15 (2.0)	500 (10.7)	-9 (3.6) ▼	2 (1.1)	~ ~	-9 (2.5) ▼
Denmark	83 (3.4)	528 (2.2)	◊ ◊	16 (3.2)	501 (6.3)	◊ ◊	1 (1.1)	~ ~	◊ ◊
Sweden	82 (3.0)	507 (2.6)	◊ ◊	16 (3.1)	486 (5.7)	◊ ◊	1 (0.9)	~ ~	◊ ◊
Russian Federation	82 (3.2)	544 (5.6)	9 (4.5) ▲	18 (3.2)	551 (8.0)	-8 (4.5)	0 (0.5)	~ ~	-1 (0.8)
Iran, Islamic Rep. of	81 (3.1)	405 (4.4)	0 (5.3)	14 (2.6)	394 (10.0)	-3 (4.8)	5 (1.8)	391 (17.7)	3 (2.3)
United States	80 (2.2)	538 (2.7)	-2 (3.1)	19 (2.2)	493 (5.8)	4 (2.9)	1 (0.3)	~ ~	-1 (0.8)
Yemen	77 (4.1)	221 (7.2)	◊ ◊	17 (3.6)	218 (9.4)	◊ ◊	5 (2.1)	252 (31.3)	◊ ◊
Latvia	70 (3.9)	536 (2.8)	8 (5.9)	28 (3.8)	539 (4.5)	-8 (5.7)	2 (1.0)	~ ~	-1 (1.9)
Algeria	68 (4.8)	380 (5.5)	◊ ◊	24 (4.3)	368 (16.7)	◊ ◊	8 (2.5)	371 (16.5)	◊ ◊
Japan	66 (3.5)	569 (2.5)	11 (5.3) ▲	30 (3.3)	565 (4.1)	-7 (5.3)	4 (1.6)	566 (5.2)	-4 (2.8)
Chinese Taipei	65 (4.1)	580 (2.2)	-4 (5.5)	27 (4.0)	570 (3.8)	-1 (5.4)	7 (2.3)	565 (6.1)	5 (2.6)
Tunisia r	64 (4.0)	326 (6.7)	-15 (5.5) ▼	16 (3.0)	349 (9.7)	5 (4.0)	20 (3.1)	312 (9.0)	10 (4.2) ▲
El Salvador	63 (3.8)	333 (6.3)	◊ ◊	20 (3.3)	322 (9.1)	◊ ◊	17 (3.5)	325 (9.8)	◊ ◊
Colombia	56 (5.7)	367 (8.6)	◊ ◊	24 (3.9)	342 (8.4)	◊ ◊	20 (4.8)	348 (10.5)	◊ ◊
Morocco s	44 (3.3)	361 (8.5)	-4 (5.7)	33 (3.6)	325 (8.4)	2 (5.8)	23 (3.1)	323 (13.6)	2 (5.3)
Armenia r	38 (4.0)	502 (7.6)	-41 (5.1) ▼	23 (3.4)	485 (7.3)	5 (4.9)	39 (3.5)	507 (6.6)	36 (3.7) ▲
International Avg.	80 (0.5)	476 (0.7)		15 (0.5)	461 (1.8)		5 (0.3)	410 (4.5)	
Benchmarking Participants									
Dubai, UAE s	100 (0.0)	445 (3.7)	◊ ◊	0 (0.0)	~ ~	◊ ◊	0 (0.0)	~ ~	◊ ◊
Alberta, Canada	92 (2.0)	506 (3.1)	◊ ◊	7 (2.0)	489 (5.7)	◊ ◊	1 (0.3)	~ ~	◊ ◊
Massachusetts, US	90 (4.2)	578 (3.8)	◊ ◊	9 (3.9)	533 (5.1)	◊ ◊	1 (0.0)	~ ~	◊ ◊
Quebec, Canada	89 (2.8)	524 (3.2)	8 (4.6)	9 (2.3)	485 (6.8)	-8 (4.1)	2 (1.3)	~ ~	0 (1.8)
British Columbia, Can	88 (2.9)	508 (2.7)	◊ ◊	12 (2.9)	487 (8.6)	◊ ◊	0 (0.0)	~ ~	◊ ◊
Minnesota, US	87 (4.6)	559 (6.3)	◊ ◊	13 (4.6)	531 (14.8)	◊ ◊	0 (0.0)	~ ~	◊ ◊
Ontario, Canada	86 (3.4)	516 (3.0)	-4 (4.6)	14 (3.4)	485 (10.7)	4 (4.5)	0 (0.3)	~ ~	0 (0.4)

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on teachers' responses to three statements about their schools: this school is located in a safe neighborhood; I feel safe at this school; and this school's security policies and practices are sufficient. High level indicates that the teacher agrees a lot or agrees to all three statements. Low level indicates that teacher disagrees or disagrees a lot to all three statements. Medium level includes all other combinations of responses.

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

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

perceptions of the grade 4 science teachers. There have been no significant changes in grade 4 mathematics teachers' perceptions of school climate since 2003.

Safety in school

Nearly all pupils are taught in schools that the mathematics teacher considers to be safe (see Exhibit 8.12). That is, teachers' perceptions of safety are either high (86 per cent) or medium (14 per cent). This reflects closely the data from the grade 4 science teachers. This is a positive outcome as the stringent sampling criteria for TIMSS means that this finding is likely to reflect the feelings of the general teaching population, suggesting that schools in England are perceived to be safe environments by the teachers who work in them.

Exhibit 8.13 Index of availability of school resources for mathematics instruction, grade 4

TIMSS2007 Mathematics 4th Grade

Country	High ASRMI		Medium ASRMI		Low ASRMI	
	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement
Singapore	84 (0.0)	599 (4.2)	15 (0.0)	605 (8.3)	1 (0.0)	~ ~
Austria	73 (3.1)	505 (2.5)	27 (3.1)	505 (4.9)	0 (0.0)	~ ~
Czech Republic	65 (3.7)	489 (3.7)	35 (3.7)	481 (3.8)	0 (0.0)	~ ~
Scotland	61 (3.8)	499 (3.5)	38 (3.8)	488 (3.9)	1 (0.0)	~ ~
Slovenia	61 (4.2)	502 (2.6)	38 (4.1)	501 (2.4)	1 (0.7)	~ ~
Japan	58 (4.1)	568 (3.0)	40 (4.2)	567 (2.9)	3 (1.4)	587 (16.4)
Australia	57 (4.9)	523 (3.1)	42 (4.9)	505 (8.0)	1 (0.5)	~ ~
Hong Kong SAR	57 (4.1)	608 (4.9)	43 (4.0)	603 (5.3)	1 (0.8)	~ ~
Germany	56 (3.8)	531 (2.8)	42 (3.7)	521 (3.9)	2 (1.1)	~ ~
New Zealand	55 (3.3)	493 (3.3)	44 (3.3)	494 (4.0)	1 (0.8)	~ ~
England	53 (4.6)	547 (4.6)	46 (4.5)	535 (4.1)	0 (0.0)	~ ~
Hungary	51 (4.5)	512 (6.7)	47 (4.5)	507 (5.6)	3 (1.2)	513 (15.8)
Denmark	50 (5.3)	530 (3.4)	49 (5.4)	518 (4.0)	1 (0.0)	~ ~
United States	49 (3.5)	536 (4.2)	48 (3.5)	525 (3.7)	3 (1.0)	481 (15.2)
Russian Federation	45 (4.4)	550 (8.0)	53 (4.2)	540 (6.0)	2 (1.0)	~ ~
Netherlands r	42 (4.9)	538 (3.4)	54 (4.8)	528 (3.5)	4 (2.1)	551 (23.4)
Kazakhstan	39 (5.1)	555 (8.5)	57 (5.0)	545 (11.0)	4 (1.6)	557 (12.5)
Sweden	37 (4.1)	510 (3.0)	59 (4.3)	499 (3.7)	3 (1.5)	484 (9.0)
Chinese Taipei	33 (4.1)	579 (3.9)	63 (4.0)	575 (2.4)	4 (1.8)	559 (10.3)
Italy	27 (3.3)	509 (7.1)	68 (3.4)	506 (3.9)	4 (1.7)	499 (7.1)
Slovak Republic	27 (3.6)	498 (7.5)	65 (3.9)	494 (5.5)	9 (2.4)	496 (13.5)
Norway	27 (3.8)	483 (4.7)	72 (3.9)	469 (3.6)	1 (0.8)	~ ~
Qatar	26 (0.1)	312 (1.9)	70 (0.2)	292 (1.3)	4 (0.1)	310 (6.5)
Kuwait	24 (3.7)	316 (8.9)	73 (3.9)	317 (5.2)	3 (1.6)	331 (25.8)
Lithuania	24 (3.6)	520 (6.8)	74 (3.7)	532 (3.0)	2 (1.1)	~ ~
Latvia	23 (3.9)	535 (5.6)	75 (4.1)	539 (2.7)	2 (1.4)	~ ~
Armenia	17 (3.1)	484 (5.8)	72 (3.9)	504 (5.9)	11 (2.7)	492 (10.2)
Ukraine	15 (2.6)	490 (6.5)	76 (3.3)	466 (3.5)	9 (2.5)	457 (16.6)
Georgia	13 (3.2)	420 (9.9)	75 (4.0)	440 (4.6)	12 (3.0)	444 (17.8)
El Salvador	12 (1.7)	381 (14.4)	65 (4.0)	326 (5.0)	23 (3.7)	314 (10.2)
Iran, Islamic Rep. of	10 (2.2)	414 (17.3)	74 (3.6)	406 (4.5)	16 (3.1)	380 (10.1)
Colombia	9 (3.1)	441 (16.8)	51 (4.9)	362 (6.5)	40 (4.0)	330 (8.6)
Yemen	8 (2.4)	223 (10.7)	35 (3.9)	230 (8.3)	57 (3.9)	220 (8.9)
Morocco	7 (2.8)	385 (35.2)	50 (4.0)	340 (6.9)	43 (3.6)	326 (8.8)
Tunisia	7 (2.1)	345 (15.9)	65 (4.1)	334 (6.0)	28 (3.9)	309 (9.6)
Algeria	5 (1.7)	367 (16.7)	72 (4.9)	382 (4.9)	22 (4.8)	360 (20.6)
International Avg.	36 (0.6)	480 (1.7)	55 (0.7)	472 (0.9)	9 (0.4)	429 (3.1)
Benchmarking Participants						
Dubai, UAE r	79 (0.3)	445 (2.7)	21 (0.3)	437 (3.4)	1 (0.1)	~ ~
Quebec, Canada	51 (4.3)	521 (4.8)	49 (4.3)	516 (4.3)	0 (0.2)	~ ~
Alberta, Canada	49 (4.6)	507 (3.7)	49 (4.5)	504 (4.7)	3 (1.3)	499 (18.0)
British Columbia, Canada	46 (4.8)	505 (4.6)	54 (4.8)	506 (3.8)	0 (0.0)	~ ~
Massachusetts, US	43 (6.3)	575 (8.7)	53 (6.4)	574 (5.1)	3 (2.3)	546 (21.1)
Minnesota, US	40 (9.5)	558 (14.1)	58 (9.1)	553 (6.6)	1 (1.6)	~ ~
Ontario, Canada	37 (4.0)	522 (3.7)	61 (4.3)	506 (4.6)	2 (1.4)	~ ~

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on principals' average response to five questions about shortages that affect general capacity to provide instruction: instructional materials (e.g., textbook); budget for supplies (e.g., paper, pencils); school buildings and grounds; heating/cooling and lighting systems; and instructional space (e.g., classrooms); and the average response to five questions about shortages that affect mathematics instruction: computers for mathematics instruction; computer software for mathematics instruction; calculators for mathematics instruction; library materials relevant to mathematics instruction; and audio-visual resources for mathematics instruction. Averages are computed based on a 4-point scale: 1 = none; 2 = a little; 3 = some; and 4 = a lot. High level indicates that both averages are less than 2. Low level indicates that both averages are greater than or equal to 3. Medium level includes all other possible combinations of responses.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70 but less than 85% of the students.

Resources in school

According to the grade 4 mathematics teachers, almost all pupils were taught at schools resourced at the high or medium level (see Exhibit 8.13). As in 2003, the same pattern was reported for mathematics provision as science provision. The similarity in the maths and science index is as expected, as the index includes ratings on general as well as specific resources.

Classroom practice

As for grade 4 science, the 2007 survey collected information about the activities in mathematics lessons. This information came from both teachers (see Exhibit 8.14) and pupils (see Exhibit 8.15). The data from teachers indicates that, as in 2003, the percentage

Exhibit 8.14 Teachers' reports on mathematics content-related emphasis in students' classroom activities, grade 4

TIMSS2007 Mathematics 4th Grade

Country	Percentage of Students Whose Teachers Reported Students Doing the Activity About Half of the Lessons or More											
	Practice Adding, Subtracting, Multiplying, and Dividing Without Using Calculator		Work on Fractions and Decimals		Write Equations for Word Problems		Learn About Shapes such as Circles, Triangles, Rectangles, and Cubes		Measure Things in the Classroom and Around the School		Make Tables, Charts, or Graphs	
Algeria	66	(4.3)	35	(4.8)	28	(5.1)	26	(4.9)	17	(4.6)	26	(5.0)
Armenia	56	(3.2)	60	(3.6)	57	(3.5)	50	(3.6)	53	(3.8)	56	(3.6)
Australia	83	(3.1)	19	(2.6)	34	(3.8)	15	(3.2)	8	(2.5)	10	(3.0)
Austria	92	(1.6)	3	(0.8)	25	(2.8)	6	(1.4)	4	(1.3)	1	(0.7)
Chinese Taipei	72	(3.5)	25	(3.6)	68	(3.3)	16	(3.1)	12	(2.9)	12	(2.9)
Colombia	83	(3.6)	36	(3.7)	26	(3.8)	27	(3.7)	26	(4.4)	30	(3.6)
Czech Republic	96	(1.7)	1	(0.4)	40	(4.3)	20	(3.0)	2	(0.7)	2	(1.1)
Denmark	69	(4.2)	17	(3.1)	3	(1.5)	14	(3.2)	3	(1.7)	6	(1.8)
El Salvador	61	(3.9)	22	(3.2)	13	(3.0)	31	(4.2)	20	(3.4)	18	(3.2)
England	81	(2.8)	23	(3.4)	36	(4.3)	2	(0.8)	1	(0.8)	4	(1.5)
Georgia	95	(1.6)	17	(3.3)	38	(4.4)	32	(4.4)	4	(1.6)	13	(3.0)
Germany	95	(1.1)	2	(0.8)	41	(3.2)	7	(1.7)	1	(0.0)	2	(1.1)
Hong Kong SAR	50	(3.6)	24	(3.7)	18	(3.0)	9	(2.3)	8	(2.2)	7	(2.1)
Hungary	96	(1.0)	3	(1.2)	58	(4.0)	2	(1.0)	4	(1.7)	1	(0.6)
Iran, Islamic Rep. of	69	(3.8)	23	(3.3)	22	(3.2)	33	(4.0)	25	(3.0)	24	(3.4)
Italy	78	(2.2)	44	(3.0)	12	(1.9)	24	(2.6)	8	(1.6)	16	(2.3)
Japan	90	(2.3)	50	(3.5)	82	(3.1)	32	(3.4)	13	(2.6)	34	(3.6)
Kazakhstan	97	(1.3)	29	(4.1)	57	(4.4)	45	(5.4)	5	(1.7)	24	(4.8)
Kuwait	r 80	(3.6)	r 26	(3.7)	r 32	(3.8)	r 29	(4.0)	r 17	(3.3)	r 10	(2.6)
Latvia	95	(1.4)	16	(3.2)	35	(3.7)	29	(3.5)	9	(2.4)	20	(3.3)
Lithuania	99	(0.9)	20	(2.9)	19	(2.7)	11	(2.3)	3	(1.1)	17	(2.8)
Morocco	72	(3.7)	16	(3.5)	21	(3.1)	27	(3.5)	18	(3.0)	24	(3.8)
Netherlands	93	(2.3)	21	(3.5)	4	(1.8)	1	(0.4)	1	(0.9)	5	(1.6)
New Zealand	84	(1.8)	21	(2.2)	37	(2.8)	4	(1.3)	3	(0.7)	5	(1.0)
Norway	66	(3.1)	5	(1.6)	3	(1.2)	4	(1.5)	1	(0.8)	1	(0.7)
Qatar	87	(0.1)	25	(0.2)	32	(0.2)	20	(0.2)	18	(0.1)	10	(0.1)
Russian Federation	97	(0.8)	14	(2.1)	17	(2.2)	47	(3.1)	3	(1.2)	45	(3.2)
Scotland	80	(3.2)	8	(2.4)	9	(2.2)	3	(1.6)	1	(0.8)	2	(1.0)
Singapore	73	(2.4)	48	(2.6)	52	(2.9)	13	(1.8)	9	(1.8)	9	(1.6)
Slovak Republic	97	(1.0)	1	(0.6)	62	(3.7)	40	(3.7)	3	(1.0)	4	(1.6)
Slovenia	86	(2.3)	2	(0.9)	16	(2.2)	5	(1.4)	5	(1.0)	6	(1.4)
Sweden	75	(3.4)	3	(1.0)	5	(1.5)	4	(1.3)	5	(1.5)	2	(0.9)
Tunisia	69	(3.5)	r 24	(3.5)	43	(3.7)	27	(3.5)	28	(3.4)	32	(3.7)
Ukraine	95	(1.4)	14	(2.6)	72	(3.7)	43	(3.7)	9	(2.4)	13	(2.8)
United States	83	(1.7)	25	(2.4)	51	(2.4)	11	(1.8)	7	(1.5)	14	(1.9)
Yemen	67	(4.4)	40	(4.5)	16	(3.2)	27	(4.4)	15	(3.2)	16	(3.6)
International Avg.	81	(0.5)	21	(0.5)	33	(0.5)	20	(0.5)	10	(0.4)	15	(0.4)
Benchmarking Participants												
Alberta, Canada	78	(3.5)	7	(2.2)	36	(3.9)	7	(2.2)	5	(1.8)	12	(2.7)
British Columbia, Canada	r 74	(3.3)	r 7	(2.9)	r 49	(4.1)	r 3	(1.3)	r 2	(1.0)	r 9	(2.2)
Dubai, UAE	s 88	(2.3)	s 30	(6.1)	s 27	(5.6)	s 11	(2.9)	s 7	(2.4)	s 20	(3.9)
Massachusetts, US	72	(6.0)	23	(6.5)	42	(6.4)	10	(4.7)	5	(3.5)	13	(4.7)
Minnesota, US	92	(3.4)	22	(6.0)	39	(6.3)	10	(5.0)	1	(0.8)	11	(5.6)
Ontario, Canada	61	(4.0)	7	(2.0)	35	(4.1)	7	(2.2)	6	(2.0)	21	(3.8)
Quebec, Canada	77	(3.6)	23	(3.6)	56	(4.3)	10	(2.3)	3	(1.4)	8	(1.9)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.
() Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the

of pupils doing computation and fractions about half the time or more is very similar to the international average. That is, 81 per cent for doing computations (international average 81 per cent) and 23 per cent for doing fraction work (international average 21 per cent). However, there are some content areas in which England strays from the international mean. Teachers report that pupils are less likely to engage in measuring, data handling and shape activities, when compared with the international average. This is a pattern that has continued since 2003 and does not necessarily highlight a problem in terms of curriculum coverage but may simply reflect a broader curriculum. This trend is observed in several other countries including the Netherlands, Scotland, Sweden and Hong Kong, which all have smaller proportions of pupils doing these activities. As found in TIMSS 2003, teachers report that the greatest percentages of lesson time are spent working on problems with or without the teacher's guidance (see Exhibit 8.16).

Exhibit 8.15 Students' reports on mathematics content-related emphasis in classroom activities, grade 4

TIMSS2007 Mathematics 4th Grade

Country	Percentage of Students Who Reported Doing the Activity About Half of the Lessons or More									
	Practice Adding, Subtracting, Multiplying, and Dividing Without Using Calculator		Work on Fractions and Decimals		Learn About Shapes such as Circles, Triangles, Rectangles, and Cubes		Measure Things in the Classroom and Around the School		Make Tables, Charts, or Graphs	
Algeria	61	(1.9)	61	(2.2)	60	(2.3)	33	(1.7)	51	(1.8)
Armenia	62	(1.5) r	64	(1.5) r	59	(1.5) r	24	(1.4) r	41	(1.7)
Australia	76	(1.2)	54	(1.6)	51	(1.4)	23	(0.9)	34	(1.3)
Austria	73	(0.9)	44	(1.4)	64	(0.9)	24	(0.8)	29	(0.9)
Chinese Taipei	54	(0.9)	50	(1.1)	54	(1.0)	26	(0.8)	40	(0.9)
Colombia	60	(1.6)	77	(1.3)	82	(1.1)	57	(1.5)	72	(1.2)
Czech Republic	69	(1.1)	15	(1.4)	54	(1.6)	13	(0.9)	13	(0.8)
Denmark	57	(2.0)	36	(1.8)	48	(1.7)	7	(0.7)	28	(2.1)
El Salvador	65	(1.5)	75	(1.4)	86	(0.9)	50	(1.5)	73	(1.3)
England	65	(1.1)	45	(1.2)	34	(1.4)	9	(0.6)	38	(1.0)
Georgia	79	(0.9)	66	(1.8)	79	(1.4)	34	(1.6)	47	(1.9)
Germany	74	(0.8) r	27	(1.1)	61	(1.0)	26	(0.9) r	36	(1.2)
Hong Kong SAR	57	(1.2)	52	(1.0)	46	(1.2)	16	(0.7)	29	(1.1)
Hungary	75	(1.1)	32	(1.5)	53	(1.6)	13	(0.9)	16	(0.9)
Iran, Islamic Rep. of	52	(2.2)	43	(2.2)	62	(2.3)	43	(2.0)	50	(2.4)
Italy	57	(1.2)	64	(1.3)	69	(1.2)	19	(1.0)	46	(1.3)
Japan	85	(0.7)	77	(1.3)	65	(1.4)	33	(1.1)	61	(1.1)
Kazakhstan	62	(3.0)	47	(2.9)	55	(3.9)	21	(2.6)	35	(2.8)
Kuwait	66	(1.5)	55	(2.0)	68	(1.7)	43	(1.7)	53	(1.8)
Latvia	73	(1.0)	43	(1.3)	62	(1.4)	18	(0.9)	28	(1.2)
Lithuania	83	(0.9)	62	(1.2)	61	(1.2)	13	(0.8)	45	(1.3)
Morocco	66	(1.9)	63	(2.5)	66	(2.5)	48	(2.2)	57	(2.1)
Netherlands	77	(1.0)	35	(1.6)	18	(1.0)	10	(0.6)	30	(1.3)
New Zealand	75	(0.9)	58	(0.9)	53	(1.4)	24	(1.0)	43	(1.0)
Norway	57	(1.0)	40	(1.5)	46	(1.3)	17	(0.9)	24	(1.0)
Qatar	70	(0.6)	58	(0.6)	75	(0.5)	50	(0.6)	64	(0.6)
Russian Federation	79	(1.1)	35	(2.3)	61	(2.2)	20	(1.1)	40	(2.1)
Scotland	72	(1.1)	37	(1.4)	41	(1.2)	18	(1.0)	37	(1.4)
Singapore	77	(0.8)	73	(0.7)	69	(0.7)	17	(0.7)	36	(0.8)
Slovak Republic	78	(1.1)	31	(1.4)	76	(1.4)	17	(1.0)	23	(1.3)
Slovenia	73	(1.0)	30	(1.7)	53	(1.1)	27	(1.1)	43	(1.3)
Sweden	75	(0.9)	27	(1.6)	46	(1.6)	19	(1.0)	36	(1.4)
Tunisia	67	(2.3)	21	(1.9)	57	(2.7)	41	(2.3)	54	(2.5)
Ukraine	71	(1.2)	65	(1.6)	73	(1.1)	40	(1.2)	36	(1.3)
United States	72	(0.7)	64	(0.8)	55	(1.0)	25	(0.8)	48	(0.9)
Yemen	59	(2.9)	51	(2.7) r	46	(2.4) r	36	(2.7) r	34	(2.4)
International Avg.	69	(0.2)	49	(0.3)	59	(0.3)	27	(0.2)	41	(0.3)
Benchmarking Participants										
Alberta, Canada	77	(1.0)	50	(2.3)	51	(1.9)	28	(1.5)	51	(1.6)
British Columbia, Canada	77	(0.8)	47	(2.0)	48	(1.5)	23	(1.4)	47	(1.5)
Dubai, UAE	71	(1.1) r	62	(1.5) r	64	(1.4) r	26	(1.6) r	47	(1.6)
Massachusetts, US	75	(1.3)	64	(1.9)	54	(2.5)	20	(1.3)	51	(1.8)
Minnesota, US	75	(1.7)	63	(2.1)	57	(2.0)	24	(1.4)	43	(2.0)
Ontario, Canada	69	(1.1)	38	(2.0)	53	(2.1)	28	(1.8)	53	(1.7)
Quebec, Canada	79	(1.3)	61	(1.8)	54	(1.7)	24	(1.3)	38	(1.4)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by students.
() Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
An "r" indicates data are available for at least 70 but less than 85% of the students.

The teachers' perceptions were in some cases very different from the perceptions of pupils. Pupils were less likely than teachers to report that they carried out computation activities. However, they were more likely to report that they did other types of activity. This difference was particularly marked for data handling and shape activities. According to pupil reports, 38 per cent of pupils undertook data handling activities ('Make tables, charts or graphs') in half of lessons or more, a much higher percentage than the four per cent teachers reported. Comparable figures for shape activities were 34 per cent and two per cent respectively. It is possible that these activities are more memorable for pupils and so they are over-reported.

Since 2003, there has been a reduction in the use of textbooks in grade 4 mathematics lessons (see Exhibit 8.17). There has been a significant decrease in the percentage of pupils taught at schools where teachers use textbooks as the primary basis for teaching,

Exhibit 8.16 Percentage of time in mathematics lessons students spend on various activities in a typical week, grade 4

TIMSS2007 Mathematics 4th Grade

Country	Reviewing Homework	Listening to Lecture-style Presentations	Working Problems with Teacher's Guidance	Working Problems on Their Own Without Teacher's Guidance
Algeria	r 11 (0.6)	r 15 (1.6)	r 20 (1.5)	r 20 (1.1)
Armenia	r 11 (0.4)	r 22 (0.7)	r 18 (0.7)	r 15 (0.6)
Australia	5 (0.3)	12 (0.6)	29 (0.8)	24 (1.1)
Austria	7 (0.2)	15 (0.5)	20 (0.6)	25 (0.7)
Chinese Taipei	10 (0.4)	35 (1.1)	15 (0.5)	11 (0.6)
Colombia	r 12 (0.9)	r 19 (1.5)	r 15 (0.6)	r 16 (1.0)
Czech Republic	6 (0.3)	17 (0.6)	22 (0.7)	23 (0.8)
Denmark	10 (0.5)	9 (0.7)	23 (1.3)	30 (1.4)
El Salvador	13 (0.6)	11 (0.6)	21 (0.7)	13 (0.7)
England	5 (0.3)	16 (0.9)	24 (1.0)	32 (1.1)
Georgia	11 (0.5)	19 (0.8)	15 (0.6)	16 (0.6)
Germany	10 (0.3)	12 (0.3)	19 (0.5)	26 (0.7)
Hong Kong SAR	8 (0.4)	38 (1.3)	16 (0.7)	13 (0.8)
Hungary	r 9 (0.4)	r 10 (0.7)	r 24 (0.8)	r 28 (1.0)
Iran, Islamic Rep. of	12 (0.4)	12 (0.5)	16 (0.6)	14 (0.5)
Italy	9 (0.3)	23 (0.7)	15 (0.5)	15 (0.5)
Japan	4 (0.3)	19 (0.9)	29 (1.0)	18 (1.1)
Kazakhstan	10 (0.4)	17 (0.7)	17 (0.5)	21 (0.8)
Kuwait	x x	x x	x x	x x
Latvia	6 (0.3)	7 (0.5)	24 (0.8)	30 (1.0)
Lithuania	8 (0.4)	7 (0.4)	24 (0.7)	30 (0.8)
Morocco	r 11 (0.8)	r 14 (1.1)	r 21 (1.0)	r 16 (1.0)
Netherlands	r 3 (0.4)	r 13 (0.9)	r 19 (0.9)	r 39 (1.4)
New Zealand	3 (0.2)	7 (0.4)	31 (0.8)	28 (0.7)
Norway	8 (0.4)	17 (0.6)	21 (0.9)	32 (1.3)
Qatar	s 11 (0.0)	s 18 (0.1)	s 18 (0.0)	s 12 (0.0)
Russian Federation	9 (0.3)	13 (0.9)	22 (0.5)	23 (0.8)
Scotland	r 6 (0.3)	r 22 (0.8)	r 19 (0.8)	r 30 (1.1)
Singapore	14 (0.5)	19 (0.6)	18 (0.5)	17 (0.5)
Slovak Republic	6 (0.2)	16 (0.6)	22 (0.8)	22 (0.6)
Slovenia	9 (0.3)	15 (0.4)	21 (0.5)	29 (0.8)
Sweden	5 (0.4)	11 (0.5)	25 (1.8)	38 (1.9)
Tunisia	r 10 (0.6)	r 9 (0.8)	r 24 (1.0)	r 19 (0.9)
Ukraine	10 (0.4)	10 (0.6)	19 (0.6)	19 (0.7)
United States	9 (0.3)	17 (0.6)	25 (0.7)	20 (0.5)
Yemen	r 13 (0.6)	r 17 (1.1)	r 15 (0.9)	r 11 (0.4)
International Avg.	9 (0.1)	16 (0.1)	21 (0.1)	22 (0.2)
Benchmarking Participants				
Alberta, Canada	9 (0.6)	14 (0.8)	23 (0.9)	24 (1.2)
British Columbia, Canada	r 9 (0.5)	r 15 (0.6)	r 22 (0.8)	r 25 (1.2)
Dubai, UAE	x x	x x	x x	x x
Massachusetts, US	8 (0.4)	15 (1.0)	30 (2.1)	20 (0.9)
Minnesota, US	8 (0.5)	18 (1.4)	25 (1.2)	23 (1.3)
Ontario, Canada	11 (0.8)	17 (1.1)	23 (1.1)	22 (0.9)
Quebec, Canada	7 (0.5)	29 (1.2)	17 (0.8)	14 (0.7)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.

with only 15 per cent of pupils taught mathematics using textbooks as the primary basis for the lesson. Just over a fifth of England's grade 4 pupils were not using textbooks at all, a significant increase. Teachers were also asked to comment on the use of calculators and computers in maths lessons. Calculators continue to be common in England's grade 4 mathematics classrooms (see Exhibit 8.18). Teachers reported that they are mainly used for checking answers (13 per cent), followed by solving complex problems (12 per cent). This is the opposite of findings from the 2003 survey, where the most common use was solving complex problems (22 per cent), followed by checking answers (18 per cent) and exploring number concepts (14 per cent). England is still among a minority of countries for whom the percentage of pupils not permitted to use calculators is low. The popularity of calculator use reflects the current requirements of the National Curriculum.

As with grade 4 science, there has been a reduction in the percentage of pupils using computers in their mathematics lessons since 2003, although this decrease was not

Exhibit 8.16 Percentage of time in mathematics lessons students spend on various activities in a typical week, grade 4 (continued)

TIMSS2007 Mathematics 4th Grade

Country	Listening to Teacher Re-teach and Clarify Content/Procedures	Taking Tests or Quizzes	Participating in Classroom Management Tasks Not Related to the Lesson's Content / Purpose	Other Student Activities
Algeria	r 13 (1.0)	r 11 (0.7)	r 4 (0.4)	r 5 (0.5)
Armenia	r 13 (0.5)	r 12 (0.6)	r 5 (0.3)	r 5 (0.3)
Australia	13 (0.5)	7 (0.4)	5 (0.3)	5 (0.6)
Austria	19 (0.5)	8 (0.2)	4 (0.2)	3 (0.2)
Chinese Taipei	11 (0.4)	9 (0.5)	4 (0.3)	3 (0.4)
Colombia	r 14 (0.9)	r 12 (0.8)	r 7 (0.5)	r 5 (0.4)
Czech Republic	10 (0.5)	11 (0.6)	4 (0.2)	6 (0.5)
Denmark	11 (0.6)	5 (0.4)	7 (0.5)	5 (0.6)
El Salvador	17 (0.6)	13 (0.5)	7 (0.4)	7 (0.5)
England	12 (0.5)	4 (0.3)	3 (0.3)	r 4 (0.4)
Georgia	12 (0.5)	15 (0.6)	5 (0.4)	8 (0.4)
Germany	17 (0.7)	8 (0.2)	5 (0.3)	3 (0.4)
Hong Kong SAR	9 (0.5)	6 (0.4)	4 (0.3)	5 (0.5)
Hungary	r 9 (0.5)	r 11 (1.2)	r 3 (0.2)	r 6 (0.7)
Iran, Islamic Rep. of	15 (0.5)	13 (0.5)	8 (0.4)	9 (0.4)
Italy	14 (0.4)	13 (0.4)	6 (0.3)	4 (0.2)
Japan	15 (0.7)	9 (0.4)	2 (0.2)	3 (0.6)
Kazakhstan	10 (0.5)	16 (0.7)	3 (0.4)	5 (0.6)
Kuwait	x x	x x	x x	x x
Latvia	12 (0.4)	12 (0.5)	3 (0.2)	6 (0.4)
Lithuania	10 (0.4)	14 (0.7)	3 (0.3)	4 (0.5)
Morocco	r 16 (0.8)	r 12 (0.5)	r 5 (0.4)	r 5 (0.4)
Netherlands	r 12 (0.7)	r 7 (0.4)	r 4 (0.3)	r 4 (0.4)
New Zealand	13 (0.4)	6 (0.3)	5 (0.3)	7 (0.6)
Norway	11 (0.5)	6 (0.3)	3 (0.3)	3 (0.4)
Qatar	s 14 (0.0)	s 12 (0.0)	s 7 (0.0)	s 8 (0.0)
Russian Federation	9 (0.4)	18 (0.6)	1 (0.2)	5 (0.4)
Scotland	r 10 (0.3)	r 5 (0.3)	r 4 (0.3)	r 6 (0.4)
Singapore	11 (0.3)	8 (0.2)	6 (0.3)	6 (0.4)
Slovak Republic	18 (0.6)	8 (0.4)	3 (0.2)	4 (0.4)
Slovenia	11 (0.4)	7 (0.3)	3 (0.2)	r 4 (0.4)
Sweden	10 (0.4)	5 (0.2)	3 (0.3)	3 (0.5)
Tunisia	r 17 (0.8)	r 13 (0.8)	r 4 (0.3)	r 5 (0.5)
Ukraine	17 (0.7)	16 (0.6)	3 (0.2)	6 (0.5)
United States	11 (0.3)	9 (0.3)	4 (0.3)	4 (0.3)
Yemen	r 14 (0.7)	r 14 (1.0)	r 7 (0.4)	r 8 (0.4)
International Avg.	13 (0.1)	10 (0.1)	4 (0.1)	5 (0.1)
Benchmarking Participants				
Alberta, Canada	10 (0.4)	7 (0.3)	5 (0.3)	6 (0.8)
British Columbia, Can	r 11 (0.4)	r 7 (0.3)	r 5 (0.4)	r 5 (0.8)
Dubai, UAE	x x	x x	x x	x x
Massachusetts, US	12 (0.7)	7 (0.5)	4 (0.5)	5 (0.7)
Minnesota, US	11 (0.5)	7 (0.4)	5 (0.4)	4 (0.5)
Ontario, Canada	10 (0.5)	7 (0.4)	6 (0.9)	5 (0.6)
Quebec, Canada	11 (0.5)	8 (0.4)	7 (0.5)	6 (0.6)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

significant. However, the percentage of pupils who have computers available for use in mathematics lessons is 30 percentage points higher than the international average, similar to the percentage in Singapore and Japan, and higher than that in Chinese Taipei and Hong Kong (see Exhibit 8.19).

Exhibit 8.17 Textbook use in teaching mathematics with trends, grade 4

TIMSS2007 Mathematics 4th Grade

Country	Percentage of Students Taught by Teachers Reporting Textbook Use											
	Use Textbook to Teach Mathematics								Do Not Use Textbook to Teach Mathematics			
	As Primary Basis for Lessons				As Supplementary Resource							
	Percent in 2007		Difference in Percent from 2003		Percent in 2007		Difference in Percent from 2003		Percent in 2007		Difference in Percent from 2003	
Algeria	61	(5.1)	◊	◊	36	(5.1)	◊	◊	3	(1.6)	◊	◊
Armenia r	83	(2.7)	15	(5.4) ▲	17	(2.7)	-2	(4.6)	0	(0.0)	-13	(3.3) ▼
Australia	17	(2.7)	1	(4.1)	59	(3.7)	3	(5.5)	24	(3.5)	-4	(5.3)
Austria	78	(2.4)	◊	◊	21	(2.5)	◊	◊	1	(0.4)	◊	◊
Chinese Taipei	94	(2.0)	2	(3.1)	4	(1.4)	-3	(2.5)	2	(1.4)	1	(1.8)
Colombia	37	(4.1)	◊	◊	60	(4.3)	◊	◊	3	(1.9)	◊	◊
Czech Republic	65	(3.9)	◊	◊	33	(3.9)	◊	◊	2	(0.8)	◊	◊
Denmark	89	(2.5)	◊	◊	9	(2.2)	◊	◊	2	(1.1)	◊	◊
El Salvador	14	(2.7)	◊	◊	74	(3.6)	◊	◊	12	(3.0)	◊	◊
England r	15	(3.1)	-12	(5.0) ▼	64	(4.4)	2	(6.3)	21	(3.6)	10	(4.6) ▲
Georgia	77	(3.9)	◊	◊	18	(3.5)	◊	◊	6	(2.7)	◊	◊
Germany	79	(2.4)	◊	◊	21	(2.5)	◊	◊	0	(0.3)	◊	◊
Hong Kong SAR	84	(2.8)	2	(4.5)	15	(2.8)	-4	(4.5)	2	(0.6)	2	(0.6) ▲
Hungary	77	(2.9)	0	(4.8)	22	(2.9)	-1	(4.8)	1	(0.7)	1	(0.7)
Iran, Islamic Rep. of r	100	(0.0)	32	(4.5) ▲	0	(0.0)	-27	(4.5) ▼	0	(0.0)	-5	(1.7) ▼
Italy	20	(2.5)	9	(3.2) ▲	67	(3.0)	-11	(3.9) ▼	13	(2.1)	2	(2.9)
Japan	83	(3.0)	-2	(4.2)	16	(3.0)	2	(4.2)	1	(0.5)	0	(0.5)
Kazakhstan	97	(1.8)	◊	◊	3	(1.8)	◊	◊	0	(0.0)	◊	◊
Kuwait r	28	(4.1)	◊	◊	34	(4.6)	◊	◊	38	(4.8)	◊	◊
Latvia	86	(2.4)	-7	(3.6)	14	(2.4)	8	(3.6) ▲	0	(0.0)	-1	(0.6)
Lithuania	82	(2.4)	-18	(2.4) ▼	18	(2.4)	18	(2.4) ▲	0	(0.0)	0	(0.0)
Morocco	76	(3.7)	-	-	23	(3.7)	-	-	1	(0.9)	-	-
Netherlands	98	(1.1)	1	(1.8)	2	(1.1)	1	(1.2)	0	(0.0)	-2	(1.4)
New Zealand	5	(1.0)	-11	(3.0) ▼	91	(1.4)	18	(3.3) ▲	4	(1.0)	-7	(2.5) ▼
Norway	88	(2.2)	2	(3.8)	10	(1.9)	-3	(3.6)	2	(1.2)	1	(1.4)
Qatar	67	(0.2)	◊	◊	17	(0.1)	◊	◊	16	(0.1)	◊	◊
Russian Federation	88	(2.2)	-4	(3.0)	12	(2.2)	4	(3.0)	0	(0.0)	0	(0.0)
Scotland s	72	(3.8)	-9	(5.7)	28	(3.8)	9	(5.7)	0	(0.0)	0	(0.0)
Singapore	75	(2.9)	9	(4.9)	24	(2.7)	-10	(4.8) ▼	1	(0.7)	1	(0.7)
Slovak Republic	53	(3.8)	◊	◊	47	(3.8)	◊	◊	0	(0.0)	◊	◊
Slovenia	48	(3.3)	4	(5.6)	44	(3.3)	-2	(5.8)	8	(1.5)	-2	(2.9)
Sweden	93	(1.5)	◊	◊	6	(1.5)	◊	◊	1	(0.4)	◊	◊
Tunisia r	27	(3.7)	-5	(5.5)	71	(3.7)	6	(5.6)	2	(1.0)	-1	(1.7)
Ukraine	77	(3.5)	◊	◊	21	(3.4)	◊	◊	1	(0.8)	◊	◊
United States	59	(2.6)	-1	(4.1)	33	(2.3)	3	(3.6)	8	(1.6)	-3	(2.6)
Yemen	57	(4.3)	◊	◊	36	(4.5)	◊	◊	7	(2.2)	◊	◊
International Avg.	65	(0.5)			30	(0.5)			5	(0.3)		
Benchmarking Participants												
Alberta, Canada	34	(3.9)	◊	◊	39	(3.7)	◊	◊	27	(3.3)	◊	◊
British Columbia, Canada	58	(4.0)	◊	◊	39	(3.9)	◊	◊	2	(1.2)	◊	◊
Dubai, UAE s	44	(5.7)	◊	◊	44	(4.4)	◊	◊	12	(3.7)	◊	◊
Massachusetts, US	48	(5.8)	◊	◊	34	(5.4)	◊	◊	18	(6.1)	◊	◊
Minnesota, US	75	(5.5)	◊	◊	17	(4.5)	◊	◊	8	(4.3)	◊	◊
Ontario, Canada	68	(4.3)	29	(6.4) ▲	31	(4.3)	-23	(6.3) ▼	1	(0.2)	-6	(2.4) ▼
Quebec, Canada	76	(3.5)	21	(5.7) ▲	22	(3.2)	-19	(5.4) ▼	2	(1.4)	-3	(2.1)

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

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 comparable data are not available.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

Exhibit 8.18 Calculator use in mathematics class with trends, grade 4

TIMSS2007 Mathematics 4th Grade

Country	National Curriculum Contains Policies / Statements About the Use of Calculators	Trends in Percentage of Students Whose Teachers Reported That Calculators Are Not Permitted		Percentage of Students Whose Teachers Reported on Calculator Use About Half of the Lessons or More			
		2007 Percent of Students	Difference in Percent from 2003	Checking Answers	Doing Routine Computations	Solving Complex Problems	Exploring Number Concepts
Algeria	●	8 (2.1)	◊ ◊	12 (2.9)	10 (3.0)	18 (3.6)	15 (2.9)
Armenia	●	s 18 (4.3)	-56 (5.7) ▼	- -	- -	- -	- -
Australia	●	5 (1.5)	-1 (2.8)	14 (2.4)	3 (1.1)	13 (2.4)	10 (2.5)
Austria	○	94 (1.2)	◊ ◊	0 (0.3)	0 (0.0)	0 (0.0)	0 (0.0)
Chinese Taipei	○	53 (4.6)	-1 (6.3)	2 (0.0)	2 (0.1)	2 (1.0)	2 (1.6)
Colombia	○	57 (4.6)	◊ ◊	5 (1.8)	3 (1.1)	2 (1.1)	5 (1.6)
Czech Republic	○	33 (3.8)	◊ ◊	5 (1.9)	2 (1.2)	2 (1.1)	3 (1.3)
Denmark	●	11 (2.6)	◊ ◊	8 (2.6)	6 (2.0)	23 (3.9)	11 (2.7)
El Salvador	○	74 (3.9)	◊ ◊	5 (1.8)	6 (2.1)	9 (2.5)	6 (1.9)
England	●	r 2 (1.0)	1 (1.2)	13 (2.9)	2 (0.8)	12 (2.5)	7 (2.1)
Georgia	○	62 (5.2)	◊ ◊	2 (0.8)	1 (0.5) r	0 (0.3)	1 (1.0)
Germany	○	72 (3.2)	◊ ◊	1 (0.6)	0 (0.0)	0 (0.0)	0 (0.0)
Hong Kong SAR	●	52 (4.3)	-36 (5.2) ▼	2 (1.1)	2 (1.3)	3 (1.4)	3 (0.8)
Hungary	●	94 (2.0)	6 (3.5)	1 (0.5)	0 (0.0)	0 (0.0)	0 (0.0)
Iran, Islamic Rep. of	○	87 (2.8)	5 (4.8)	1 (0.7)	2 (1.0)	2 (1.4)	2 (0.9)
Italy	●	89 (0.8)	1 (2.4)	1 (0.7)	1 (0.8)	0 (0.0)	0 (0.0)
Japan	●	35 (3.4)	3 (5.0)	0 (0.0)	0 (0.0)	4 (1.6)	2 (1.0)
Kazakhstan	●	26 (5.0)	◊ ◊	2 (1.0)	2 (1.0)	6 (2.0)	3 (1.3)
Kuwait	○	r 97 (1.5)	◊ ◊	r 6 (2.3)	r 7 (2.4)	r 4 (1.8)	r 6 (2.3)
Latvia	○	91 (2.2)	-7 (2.8) ▼	0 (0.0)	1 (0.8)	0 (0.3)	1 (0.6)
Lithuania	○	55 (3.6)	-14 (5.1) ▼	3 (1.4)	1 (0.0)	2 (1.4)	1 (0.0)
Morocco	○	r 77 (3.6)	- -	4 (1.7) r	4 (1.5) r	3 (1.3) r	3 (1.5)
Netherlands	○	49 (4.3)	-12 (6.5)	0 (0.4)	0 (0.4)	1 (0.8)	0 (0.0)
New Zealand	●	8 (1.6)	5 (2.1) ▲	11 (1.8)	3 (1.1)	9 (1.7)	6 (1.4)
Norway	●	14 (2.9)	4 (4.0)	1 (0.5)	0 (0.0)	3 (1.1)	1 (0.5)
Qatar	○	r 78 (0.2)	◊ ◊	4 (0.1)	5 (0.1)	6 (0.1)	3 (0.1)
Russian Federation	○	78 (3.3)	-11 (4.0) ▼	3 (1.2)	1 (0.6)	2 (1.0)	2 (0.8)
Scotland	●	s 9 (2.3)	0 (3.4)	3 (1.5)	1 (0.7)	5 (1.7)	4 (1.1)
Singapore	○	98 (0.9)	0 (1.7)	1 (0.7)	1 (0.7)	1 (0.6)	1 (0.7)
Slovak Republic	●	27 (3.5)	◊ ◊	3 (1.3)	1 (0.9)	2 (1.0)	1 (0.6)
Slovenia	●	94 (1.5)	-1 (2.5)	0 (0.1)	0 (0.2)	0 (0.0)	0 (0.0)
Sweden	●	14 (2.6)	◊ ◊	4 (1.3)	2 (0.7)	7 (1.8)	3 (1.1)
Tunisia	○	r 92 (2.2)	-4 (2.7)	7 (1.6)	8 (1.7)	7 (1.9)	7 (1.9)
Ukraine	○	96 (1.7)	◊ ◊	0 (0.4)	0 (0.0)	1 (0.7)	1 (0.8)
United States	●	r 31 (3.2)	-1 (4.2)	7 (1.3)	3 (0.9)	12 (1.7)	6 (1.2)
Yemen	○	r 68 (4.2)	◊ ◊	7 (2.6)	11 (3.2)	11 (3.1)	15 (3.8)
International Avg.		54 (0.5)		4 (0.3)	3 (0.2)	5 (0.3)	4 (0.2)
Benchmarking Participants							
Alberta, Canada	●	14 (2.4)	◊ ◊	5 (1.6)	4 (1.7)	14 (2.7)	8 (2.1)
British Columbia, Canada	●	r 14 (2.3)	◊ ◊	r 5 (1.4)	r 3 (1.1)	r 14 (2.9)	r 7 (1.9)
Dubai, UAE	●	s 68 (3.3)	◊ ◊	s 5 (2.2)	s 4 (1.4)	s 4 (1.3)	s 5 (0.5)
Massachusetts, US	●	8 (2.7)	◊ ◊	3 (2.2)	0 (0.1)	2 (1.5)	2 (1.5)
Minnesota, US	-	5 (2.7)	◊ ◊	12 (5.2) r	2 (0.1) r	12 (5.3) r	10 (5.0)
Ontario, Canada	●	7 (2.3)	-13 (4.5) ▼ r	5 (1.9)	5 (2.1)	19 (3.9)	14 (3.8)
Quebec, Canada	●	45 (4.5)	8 (6.3)	4 (2.0)	0 (0.2)	5 (1.6)	1 (0.4)

● Yes ○ No

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by National Research Coordinators and by teachers.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A dash (-) indicates comparable data are not available.
An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.
A diamond (◊) indicates the country did not participate in the assessment.

8.3 The teachers and schools: grade 8 science

School climate

The teachers and headteachers at grade 8 rated their school's climate using the same series of statements reported for grade 4. Using this data, three indices of school climate were derived: indices of headteachers' perceptions, of grade 8 science teachers' perceptions and

Exhibit 8.19 Computer use in mathematics class with trends, grade 4

TIMSS2007 Mathematics 4th Grade

Country	National Curriculum Contains Policies / Statements About the Use of Computers	Trends in Percentage of Students Whose Teachers Reported That Computers Are Available		Percentage of Students Whose Teachers Reported on Computer Use About Half of the Lessons or More		
		2007 Percent of Students	Difference in Percent from 2003	Discovering Principles and Concepts	Practicing Skills and Procedures	Looking Up Ideas and Information
Algeria	●	20 (3.6)	◊ ◊	3 (1.7)	4 (1.8)	4 (1.9)
Armenia	●	r 66 (3.7)	53 (4.6) ▲	- -	- -	- -
Australia	●	78 (3.2)	2 (4.8)	3 (1.4)	8 (2.3)	4 (1.7)
Austria	○	69 (2.8)	◊ ◊	0 (0.4)	3 (1.1)	2 (0.8)
Chinese Taipei	○	41 (4.1)	25 (5.2) ▲	2 (0.1)	2 (1.7)	2 (1.1)
Colombia	○	18 (3.7)	◊ ◊	1 (0.9)	2 (1.0)	3 (1.4)
Czech Republic	○	59 (3.6)	◊ ◊	1 (0.9)	7 (2.5)	2 (0.9)
Denmark	●	95 (1.4)	◊ ◊	2 (1.3)	8 (2.3)	2 (1.3)
El Salvador	○	16 (3.0)	◊ ◊	1 (1.0)	3 (1.3)	3 (1.5)
England	●	r 76 (3.4)	-6 (4.8)	7 (2.0)	10 (2.4)	3 (1.7)
Georgia	○	20 (4.0)	◊ ◊	2 (1.6)	3 (1.6)	3 (1.7)
Germany	○	54 (3.5)	◊ ◊	0 (0.0)	3 (1.0)	0 (0.0)
Hong Kong SAR	●	58 (3.9)	4 (5.9)	7 (2.4)	3 (1.6)	5 (1.9)
Hungary	●	23 (3.5)	9 (4.8)	1 (0.4)	1 (0.4)	1 (0.4)
Iran, Islamic Rep. of	○	3 (1.2)	1 (1.6)	1 (0.5)	0 (0.0)	0 (0.3)
Italy	●	31 (2.7)	6 (4.1)	0 (0.0)	0 (0.0)	2 (0.8)
Japan	●	79 (3.3)	-5 (4.6)	0 (0.0)	1 (0.9)	0 (0.0)
Kazakhstan	○	34 (4.5)	◊ ◊	1 (0.9)	6 (2.9)	6 (2.9)
Kuwait	●	r 23 (4.1)	◊ ◊	r 4 (1.9)	r 6 (2.3)	r 5 (2.0)
Latvia	○	22 (2.8)	9 (4.7)	0 (0.0)	0 (0.0)	0 (0.0)
Lithuania	○	39 (3.7)	26 (4.4) ▲	0 (0.0)	1 (0.7)	2 (0.7)
Morocco	○	14 (3.1)	- -	2 (1.2)	2 (1.3)	3 (1.5)
Netherlands	○	84 (2.9)	8 (4.5)	6 (1.9)	30 (4.1)	6 (2.2)
New Zealand	●	77 (2.7)	7 (4.1)	4 (1.1)	10 (1.6)	3 (0.9)
Norway	●	69 (3.3)	10 (5.6)	1 (0.9)	3 (1.3)	1 (0.8)
Qatar	○	42 (0.2)	◊ ◊	7 (0.1)	10 (0.1)	6 (0.1)
Russian Federation	○	14 (2.7)	10 (3.0) ▲	0 (0.0)	2 (1.1)	2 (1.1)
Scotland	●	r 93 (2.4)	12 (4.5) ▲	6 (1.9)	20 (3.7)	4 (1.6)
Singapore	●	81 (2.4)	1 (4.1)	7 (1.3)	13 (1.8)	4 (1.1)
Slovak Republic	○	47 (3.9)	◊ ◊	0 (0.3)	4 (1.4)	2 (0.8)
Slovenia	●	39 (3.1)	15 (4.8) ▲	0 (0.0)	2 (0.9)	1 (0.4)
Sweden	●	67 (3.4)	◊ ◊	2 (1.1)	4 (1.4)	1 (0.5)
Tunisia	○	r 25 (3.5)	13 (4.5) ▲	8 (2.1)	6 (1.8)	7 (1.9)
Ukraine	○	6 (2.0)	◊ ◊	0 (0.4)	0 (0.4)	0 (0.4)
United States	○	65 (2.6)	5 (3.5)	4 (0.9)	11 (1.5)	4 (1.0)
Yemen	○	24 (4.2)	◊ ◊	10 (3.2)	12 (3.5)	9 (3.2)
International Avg.		46 (0.5)		3 (0.2)	6 (0.3)	3 (0.2)
Benchmarking Participants						
Alberta, Canada	●	72 (4.1)	◊ ◊	2 (0.9)	4 (1.3)	3 (1.4)
British Columbia, Canada	●	r 47 (4.2)	◊ ◊	r 0 (0.3)	r 1 (0.9)	r 0 (0.5)
Dubai, UAE	○	s 49 (6.0)	◊ ◊	s 6 (2.0)	s 12 (3.0)	s 17 (4.6)
Massachusetts, US	●	59 (5.7)	◊ ◊	7 (2.8)	9 (2.7)	3 (2.0)
Minnesota, US	-	61 (7.0)	◊ ◊	2 (0.1)	9 (4.9)	1 (0.8)
Ontario, Canada	●	64 (3.9)	7 (6.0)	7 (3.3)	3 (2.1)	3 (1.4)
Quebec, Canada	○	45 (4.2)	-1 (6.3)	0 (0.1)	1 (0.8)	2 (1.1)

● Yes ○ No

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by National Research Coordinators and by teachers.

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

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

of grade 8 mathematics teachers' perceptions. The perceptions of grade 8 mathematics teachers are discussed in section 8.4.

The majority of grade 8 pupils are taught in schools where headteachers have a positive view of their school's climate, with only four per cent of pupils taught in schools that headteachers rate as 'low' in terms of school climate (see Exhibit 8.20). There has been no significant change in headteachers' perceptions of school climate since 2003.

Compared with 2003 data, significantly more grade 8 pupils are taught in schools that their science teachers perceive as having a good school climate. Eighteen per cent are taught in schools where teachers' perceptions of school climate are rated as 'high', an increase of six per cent since 2003 (see Exhibit 8.21). Percentages in the other two categories remained stable, with no significant differences. Once again, headteachers were more positive than the teachers in their perceptions of school climate.

Safety in school

The trend data indicates that teachers' perceptions of school safety have improved significantly since 2003. In the current TIMSS survey, nearly all grade 8 science teacher responses placed England's schools in the 'high' and 'medium' categories. Seventy-seven per cent of pupils were taught in schools where their science teachers' perceptions of safety were high (see Exhibit 8.22). This mirrors the findings at grade 4 and should be considered as a positive outcome, suggesting that teachers in both grade 4 and grade 8 perceive that their schools are safe places to work, and more so than in 2003.

Grade 8 pupils were also asked to comment on their perceptions of safety at school, via the same questions used at grade 4 (see Exhibit 8.23). Most of the grade 8 pupils perceived their school to be a safe environment. There has been a significant increase in the percentage of pupils who are placed high on the index of pupil perceptions of safety (an increase of seven per cent since 2003). This trend was also seen in several other countries, including Australia, Singapore, Japan, Hong Kong and Italy. However, this improvement was not observed in all countries, for example, Korea and Sweden show a significant decrease in the percentage of pupils with high ratings for safety. As in 2003, the perceptions of safety reported by grade 8 pupils are closer to those given by grade 8 science teachers, compared with the difference between teacher and pupil perceptions of safety at grade 4. In addition to this, the grade 8 pupils report greater feelings of safety compared with pupils in grade 4. However, this does not imply that grade 4 pupils experience more danger at school. Instead, this finding might reflect a lack of social maturity in the grade 4 pupils.

Exhibit 8.20 Index of principals' perception of school climate with trends, grade 8

TIMSS2007 8th Science Grade

Country	High PPSC						Medium PPSC						Low PPSC					
	2007 Percent of Students		Average Achievement		Difference in Percent from 2003		2007 Percent of Students		Average Achievement		Difference in Percent from 2003		2007 Percent of Students		Average Achievement		Difference in Percent from 2003	
Chinese Taipei	54	(4.2)	571	(4.8)	17	(5.7) ▲	42	(4.2)	552	(5.3)	-18	(5.7) ▼	4	(1.6)	518	(11.5)	1	(1.9)
Scotland s	35	(4.1)	512	(6.7)	-7	(5.9)	59	(4.6)	485	(5.1)	7	(6.6)	6	(2.4)	497	(30.3)	0	(3.5)
Australia	33	(3.5)	557	(8.1)	2	(5.6)	58	(4.5)	501	(3.8)	-3	(6.5)	9	(2.4)	465	(10.3)	2	(3.6)
Indonesia	32	(4.0)	445	(8.6)	13	(5.1) ▲	58	(4.4)	428	(5.6)	-13	(5.8) ▼	11	(3.1)	424	(10.7)	0	(4.2)
United States	32	(3.2)	547	(4.4)	-11	(4.6) ▼	57	(3.7)	513	(3.8)	8	(4.9)	12	(2.2)	485	(10.6)	4	(2.9)
England s	31	(3.9)	563	(8.3)	-1	(7.0)	65	(3.9)	536	(5.9)	2	(7.3)	4	(1.7)	474	(19.0)	-1	(3.6)
Israel	26	(3.4)	493	(10.2)	-2	(5.3)	66	(4.1)	465	(5.7)	-3	(5.8)	7	(2.3)	441	(16.3)	5	(2.6) ▲
Egypt	25	(3.4)	427	(7.6)	-1	(4.8)	65	(3.8)	403	(4.9)	3	(5.7)	10	(2.9)	386	(12.5)	-2	(4.2)
Korea, Rep. of	25	(3.6)	553	(3.5)	9	(4.9)	66	(3.6)	553	(2.6)	-2	(5.3)	9	(2.2)	551	(8.3)	-7	(3.7)
Jordan	25	(3.4)	510	(6.7)	7	(4.7)	67	(4.1)	477	(4.7)	-5	(5.9)	8	(2.3)	432	(14.9)	-3	(3.5)
Singapore	24	(0.0)	626	(7.1)	-6	(0.0) ▼	70	(0.0)	552	(5.9)	4	(0.0) ▲	6	(0.0)	502	(17.1)	2	(0.0) ▲
Malaysia	23	(3.8)	508	(12.4)	7	(5.0)	70	(3.7)	459	(6.3)	0	(5.6)	6	(1.8)	469	(16.8)	-7	(3.6)
Qatar	23	(0.1)	298	(3.4)	◊	◊	70	(0.1)	322	(1.6)	◊	◊	7	(0.1)	341	(4.5)	◊	◊
El Salvador	23	(3.4)	405	(6.6)	◊	◊	62	(4.3)	387	(4.3)	◊	◊	15	(3.3)	365	(7.8)	◊	◊
Thailand	22	(3.6)	489	(11.2)	◊	◊	73	(4.0)	467	(5.1)	◊	◊	5	(1.9)	441	(19.7)	◊	◊
Malta	21	(0.2)	499	(2.2)	◊	◊	61	(0.2)	477	(1.8)	◊	◊	18	(0.2)	338	(3.4)	◊	◊
Hong Kong SAR	21	(3.6)	564	(7.5)	9	(4.5) ▲	67	(4.4)	523	(6.3)	-3	(6.0)	12	(3.2)	499	(16.8)	-6	(4.7)
Oman	20	(3.6)	434	(7.6)	◊	◊	69	(4.0)	422	(4.2)	◊	◊	11	(2.6)	403	(13.0)	◊	◊
Ghana	20	(3.2)	351	(10.4)	7	(4.7)	59	(4.2)	295	(8.3)	-9	(6.1)	21	(3.9)	281	(9.9)	3	(5.1)
Bahrain	18	(0.2)	492	(5.0)	7	(0.2) ▲	76	(0.2)	466	(1.7)	3	(0.3) ▲	6	(0.1)	422	(4.8)	-9	(0.2) ▼
Syrian Arab Republic	17	(3.1)	450	(8.0)	◊	◊	69	(3.3)	452	(3.6)	◊	◊	14	(2.8)	453	(8.4)	◊	◊
Lebanon	17	(3.3)	455	(10.5)	-1	(4.8)	66	(4.3)	417	(6.5)	2	(6.3)	18	(3.2)	356	(15.8)	-1	(4.3)
Iran, Islamic Rep. of	16	(2.6)	512	(10.0)	6	(3.4)	64	(3.8)	456	(3.7)	-4	(5.3)	20	(3.1)	425	(5.8)	-2	(4.3)
Saudi Arabia	16	(3.3)	411	(8.2)	-	-	63	(4.6)	405	(3.6)	-	-	21	(3.9)	389	(8.2)	-	-
Kuwait	15	(2.7)	429	(8.8)	◊	◊	70	(3.8)	418	(3.6)	◊	◊	15	(3.1)	406	(10.7)	◊	◊
Colombia	14	(2.6)	443	(8.6)	◊	◊	52	(4.5)	420	(4.4)	◊	◊	34	(4.8)	403	(9.6)	◊	◊
Sweden	13	(2.5)	532	(7.3)	-8	(4.0)	78	(3.6)	507	(3.1)	6	(5.2)	8	(2.6)	513	(10.3)	2	(3.4)
Palestinian Nat'l Auth.	11	(2.6)	422	(7.2)	-3	(4.0)	78	(3.3)	403	(3.9)	1	(4.8)	11	(2.4)	392	(14.8)	2	(3.5)
Cyprus	11	(0.1)	437	(7.3)	-10	(0.2) ▼	74	(0.2)	454	(2.2)	-2	(0.3) ▼	16	(0.2)	447	(4.5)	12	(0.2) ▲
Japan	10	(2.3)	598	(10.3)	-18	(4.2) ▼	77	(3.2)	552	(2.2)	8	(4.7)	13	(2.7)	530	(7.6)	10	(3.0) ▲
Hungary	9	(2.8)	584	(10.4)	3	(3.5)	79	(4.0)	537	(3.7)	-4	(5.2)	11	(3.1)	521	(7.5)	1	(4.0)
Turkey	8	(2.2)	499	(19.0)	◊	◊	55	(4.4)	465	(5.1)	◊	◊	36	(4.3)	427	(6.4)	◊	◊
Romania	8	(2.1)	496	(13.0)	1	(3.1)	61	(4.2)	464	(4.8)	-8	(5.9)	31	(4.1)	452	(8.6)	8	(5.5)
Bosnia and Herzegovina	7	(2.0)	475	(7.4)	◊	◊	80	(3.0)	465	(3.4)	◊	◊	13	(2.5)	463	(6.3)	◊	◊
Algeria	7	(2.2)	412	(7.5)	◊	◊	60	(4.0)	408	(2.1)	◊	◊	33	(3.9)	408	(3.0)	◊	◊
Italy	7	(2.2)	503	(11.1)	-5	(3.5)	77	(3.7)	497	(3.4)	1	(5.1)	16	(3.1)	480	(6.9)	4	(3.9)
Slovenia	7	(2.0)	558	(8.0)	-2	(3.0)	85	(3.0)	537	(2.4)	2	(4.1)	8	(2.2)	527	(9.5)	0	(3.2)
Serbia	7	(2.3)	464	(16.4)	4	(2.7)	81	(3.4)	472	(3.4)	9	(5.3)	13	(2.9)	462	(8.9)	-13	(4.8) ▼
Botswana	6	(2.1)	378	(17.9)	5	(2.3) ▲	58	(4.6)	357	(4.4)	27	(6.2) ▲	35	(4.8)	342	(5.3)	-32	(6.4) ▼
Bulgaria	5	(2.1)	500	(36.7)	-	-	65	(4.2)	475	(7.6)	-	-	31	(4.2)	458	(11.1)	-	-
Norway	5	(2.0)	504	(8.3)	-8	(3.3) ▼	89	(2.9)	486	(2.5)	8	(4.5)	6	(2.2)	477	(4.0)	1	(3.1)
Armenia r	4	(1.7)	461	(15.6)	1	(2.2)	73	(3.8)	491	(7.6)	-6	(5.6)	23	(3.5)	482	(8.1)	5	(5.3)
Ukraine	4	(1.6)	550	(10.9)	◊	◊	87	(2.9)	486	(3.7)	◊	◊	10	(2.4)	449	(11.3)	◊	◊
Tunisia	3	(1.4)	477	(7.7)	1	(1.7)	44	(3.6)	451	(3.3)	14	(5.2) ▲	54	(3.5)	439	(2.7)	-15	(5.1) ▼
Czech Republic	2	(1.8)	~	~	◊	◊	58	(4.0)	548	(2.9)	◊	◊	40	(4.2)	526	(3.2)	◊	◊
Lithuania	2	(1.4)	~	~	-6	(2.7) ▼	94	(2.1)	519	(2.7)	6	(3.7)	4	(1.6)	495	(7.4)	0	(2.5)
Russian Federation	2	(0.9)	~	~	1	(1.1)	79	(3.0)	532	(4.1)	9	(4.2) ▲	19	(3.1)	514	(6.1)	-10	(4.2) ▼
Georgia	0	(0.0)	~	~	◊	◊	72	(4.3)	422	(5.9)	◊	◊	28	(4.3)	414	(5.8)	◊	◊
¶ Morocco	16	(5.3)	410	(12.5)	-	-	68	(5.4)	400	(4.0)	-	-	15	(4.1)	403	(12.6)	-	-
International Avg.	16	(0.4)	484	(1.6)			68	(0.5)	465	(0.6)			16	(0.4)	445	(1.6)		
Benchmarking Participants																		
Dubai, UAE r	56	(0.7)	506	(4.8)	◊	◊	42	(0.7)	466	(4.5)	◊	◊	2	(0.3)	~	~	◊	◊
Massachusetts, US	44	(7.4)	571	(6.6)	◊	◊	45	(8.1)	561	(10.0)	◊	◊	10	(3.0)	491	(13.9)	◊	◊
Minnesota, US	44	(7.2)	534	(8.1)	◊	◊	53	(6.9)	548	(4.8)	◊	◊	3	(2.7)	429	(6.0)	◊	◊
British Columbia, Canada	35	(4.9)	539	(5.2)	◊	◊	62	(5.0)	521	(4.0)	◊	◊	3	(1.5)	527	(37.1)	◊	◊
Ontario, Canada	34	(4.7)	545	(5.1)	-8	(6.4)	57	(5.1)	522	(4.0)	5	(6.9)	9	(2.5)	509	(10.4)	4	(3.3)
Basque Country, Spain	23	(4.8)	520	(5.3)	11	(5.9)	65	(4.9)	495	(3.4)	-13	(6.2) ▼	12	(2.1)	468	(8.1)	3	(3.3)
Quebec, Canada	18	(3.5)	545	(9.2)	4	(4.1)	71	(4.3)	502	(4.2)	-7	(5.3)	12	(3.1)	478	(6.0)	4	(3.8)

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on principals' responses to eight questions about their schools: teachers' job satisfaction; teachers' understanding of the school's curricular goals; teachers' degree of success in implementing the school's curriculum; teachers' expectations for student achievement; parental support for student achievement; parental involvement in school activities; students' regard for school property; and students' desire to do well in school. Average is computed based on a 5-point scale: 1 = very high; 2 = high; 3 = medium; 4 = low; and 5 = very low. High level indicates average is less than or equal to 2. Medium level indicates that average is greater than 2 and less or equal to 3. Low level indicates average is greater than 3.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

Exhibit 8.21 Index of science teachers' perception of school climate with trends, grade 8

TIMSS2007 8th Science Grade

Country	High TPSC			Medium TPSC			Low TPSC		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Indonesia	25 (3.7)	445 (9.8)	11 (4.1) ▲	57 (4.0)	435 (5.5)	-12 (5.0) ▼	18 (3.3)	424 (10.8)	1 (4.2)
Egypt	25 (3.0)	434 (6.4)	5 (4.2)	59 (3.9)	405 (4.8)	-1 (5.6)	16 (2.7)	377 (9.9)	-4 (4.2)
Lebanon	25 (3.2)	442 (13.2)	5 (4.3)	51 (4.1)	423 (6.3)	-4 (5.4)	25 (3.6)	369 (9.9)	0 (4.8)
Israel r	23 (3.7)	499 (7.6)	-2 (4.8)	64 (4.4)	469 (6.1)	2 (5.7)	13 (2.7)	416 (13.6)	0 (3.7)
Malaysia	22 (3.5)	500 (11.3)	6 (4.6)	60 (4.1)	469 (7.6)	-11 (5.7) ▼	19 (3.3)	442 (10.2)	5 (4.7)
Chinese Taipei	22 (3.5)	574 (6.9)	2 (4.9)	65 (4.0)	561 (4.1)	0 (5.8)	13 (2.9)	541 (10.8)	-2 (4.3)
Scotland s	21 (1.7)	520 (6.0)	8 (2.5) ▲	63 (2.2)	491 (4.4)	3 (3.7)	16 (2.2)	484 (10.0)	-12 (3.7) ▼
Qatar	18 (0.1)	350 (2.8)	◊ ◊	55 (0.2)	320 (1.8)	◊ ◊	26 (0.1)	292 (3.2)	◊ ◊
Malta	18 (0.2)	511 (2.2)	◊ ◊	46 (0.3)	482 (1.9)	◊ ◊	36 (0.3)	382 (2.2)	◊ ◊
England s	18 (2.2)	584 (8.4)	6 (3.1) ▲	60 (3.1)	542 (5.7)	-10 (5.5)	22 (2.9)	510 (8.3)	3 (5.2)
United States	18 (2.3)	545 (6.6)	-6 (3.4)	54 (3.2)	521 (3.9)	3 (4.4)	28 (2.6)	495 (5.5)	3 (3.7)
Oman	16 (3.3)	446 (8.3)	◊ ◊	68 (4.1)	426 (4.0)	◊ ◊	17 (2.9)	387 (8.9)	◊ ◊
Ghana	14 (2.6)	353 (15.5)	0 (4.1)	56 (3.8)	300 (7.8)	-5 (6.0)	30 (3.6)	285 (8.3)	5 (5.3)
Australia r	14 (1.8)	547 (8.3)	0 (2.8)	56 (3.5)	526 (5.8)	-1 (5.3)	30 (3.4)	487 (5.8)	1 (5.2)
Saudi Arabia	14 (3.4)	417 (5.8)	- -	57 (4.0)	408 (3.2)	- -	30 (3.4)	384 (5.8)	- -
Syrian Arab Republic	14 (2.5)	465 (5.8)	◊ ◊	66 (3.5)	451 (3.4)	◊ ◊	20 (3.1)	442 (8.3)	◊ ◊
Jordan	14 (3.0)	518 (11.9)	7 (3.6)	49 (4.4)	487 (5.4)	-5 (6.2)	38 (3.9)	462 (7.4)	-1 (5.5)
Singapore	13 (1.5)	626 (11.8)	4 (2.2) ▲	64 (2.6)	568 (5.2)	-7 (3.6)	23 (1.9)	531 (10.4)	3 (2.8)
Cyprus r	13 (0.6)	452 (3.2)	0 (1.1)	61 (1.1)	450 (2.4)	4 (1.6) ▲	26 (0.9)	453 (3.4)	-4 (1.4) ▼
Iran, Islamic Rep. of	12 (2.4)	496 (12.1)	3 (3.3)	49 (3.8)	464 (5.1)	6 (5.5)	38 (3.9)	441 (4.7)	-10 (5.5)
Bahrain	12 (1.2)	475 (4.2)	1 (2.4)	63 (2.3)	474 (2.5)	13 (4.2) ▲	25 (2.0)	447 (5.1)	-14 (4.1) ▼
El Salvador	12 (3.1)	404 (9.5)	◊ ◊	58 (4.3)	388 (4.2)	◊ ◊	30 (3.6)	379 (6.3)	◊ ◊
Thailand	10 (2.1)	505 (18.3)	◊ ◊	65 (3.6)	470 (5.9)	◊ ◊	25 (3.6)	457 (7.8)	◊ ◊
Hong Kong SAR	10 (2.7)	565 (10.9)	3 (3.6)	65 (4.0)	528 (6.8)	-1 (6.2)	26 (4.0)	520 (8.4)	-2 (6.0)
Bosnia and Herzegovina	10 (1.6)	471 (10.6)	◊ ◊	60 (2.3)	467 (2.8)	◊ ◊	30 (2.1)	461 (3.7)	◊ ◊
Palestinian Nat'l Auth.	9 (2.2)	432 (14.5)	-1 (3.6)	62 (3.7)	408 (4.3)	-6 (5.4)	29 (3.5)	382 (7.5)	7 (5.0)
Colombia	9 (2.4)	443 (16.1)	◊ ◊	46 (5.4)	421 (6.1)	◊ ◊	45 (5.0)	408 (4.8)	◊ ◊
Korea, Rep. of r	9 (2.3)	553 (6.3)	3 (2.8)	65 (3.7)	556 (2.6)	-5 (4.9)	26 (3.2)	545 (3.3)	2 (4.4)
Kuwait r	8 (2.2)	443 (14.6)	◊ ◊	67 (3.6)	412 (4.4)	◊ ◊	25 (3.4)	415 (8.4)	◊ ◊
Romania	8 (1.3)	495 (9.5)	-3 (2.1)	58 (2.6)	464 (5.0)	-2 (3.8)	34 (2.8)	450 (5.8)	5 (4.0)
Serbia	8 (1.5)	480 (7.8)	1 (1.9)	67 (2.5)	472 (3.4)	4 (3.3)	25 (2.6)	464 (5.2)	-5 (3.4)
Turkey	7 (2.0)	525 (12.9)	◊ ◊	32 (4.4)	473 (8.3)	◊ ◊	60 (4.5)	435 (4.3)	◊ ◊
Japan	7 (2.0)	592 (14.5)	-2 (3.0)	51 (4.3)	558 (2.7)	-10 (5.9)	42 (4.3)	543 (3.9)	12 (5.7) ▲
Sweden	7 (1.2)	534 (7.2)	0 (2.1)	70 (2.5)	510 (3.0)	5 (4.1)	23 (2.4)	503 (5.3)	-6 (3.8)
Hungary	7 (1.5)	567 (12.1)	2 (1.7)	73 (2.4)	541 (3.4)	-6 (3.2)	21 (2.3)	521 (4.7)	4 (3.0)
Botswana	6 (2.1)	414 (14.3)	5 (2.3) ▲	31 (4.5)	368 (6.4)	0 (6.2)	63 (4.8)	342 (3.9)	-6 (6.4)
Lithuania	6 (1.0)	535 (6.7)	0 (1.5)	78 (1.8)	519 (2.7)	-6 (2.4) ▼	16 (1.8)	509 (3.3)	6 (2.3) ▲
Slovenia	6 (1.3)	558 (7.8)	2 (1.9)	71 (2.6)	536 (2.6)	-6 (3.8)	23 (2.6)	538 (3.4)	4 (3.6)
Ukraine	6 (1.6)	499 (13.1)	◊ ◊	84 (2.3)	487 (3.5)	◊ ◊	10 (1.8)	472 (6.3)	◊ ◊
Algeria	5 (1.5)	407 (5.6)	◊ ◊	43 (3.4)	410 (2.8)	◊ ◊	52 (3.3)	407 (2.3)	◊ ◊
Bulgaria	5 (1.7)	514 (31.3)	- -	44 (3.4)	478 (7.3)	- -	51 (3.6)	456 (7.9)	- -
Norway	4 (1.7)	502 (8.2)	-3 (2.7)	81 (3.0)	488 (2.4)	-4 (4.3)	14 (2.7)	473 (5.1)	7 (3.5)
Tunisia	4 (1.7)	434 (6.5)	-2 (2.7)	47 (4.2)	446 (3.1)	-7 (6.0)	49 (4.0)	445 (3.0)	9 (5.5)
Armenia r	3 (0.8)	514 (17.3)	-8 (1.7) ▼	59 (2.1)	487 (6.5)	-5 (2.9)	38 (2.2)	487 (5.7)	13 (3.2) ▲
Italy	3 (1.1)	488 (26.7)	-1 (2.1)	55 (3.6)	504 (3.7)	6 (5.6)	42 (3.7)	486 (4.4)	-5 (5.4)
Georgia	3 (0.9)	445 (6.4)	◊ ◊	54 (2.8)	425 (5.9)	◊ ◊	43 (2.9)	415 (5.6)	◊ ◊
Russian Federation	2 (0.7)	~ ~	1 (0.9)	67 (2.1)	534 (4.7)	15 (3.3) ▲	31 (2.0)	516 (3.3)	-16 (3.3) ▼
Czech Republic	1 (0.6)	~ ~	◊ ◊	42 (2.7)	547 (3.4)	◊ ◊	57 (2.8)	532 (2.5)	◊ ◊
¶ Morocco	7 (2.8)	445 (14.7)	- -	30 (5.5)	421 (7.1)	- -	63 (4.7)	393 (3.4)	- -
International Avg	11 (0.3)	489 (1.7)		58 (0.5)	469 (0.7)		31 (0.4)	449 (1.0)	
Benchmarking Participants									
Dubai, UAE s	36 (3.1)	518 (6.1)	◊ ◊	59 (3.2)	475 (5.6)	◊ ◊	5 (0.7)	432 (9.9)	◊ ◊
Ontario, Canada	28 (5.1)	536 (4.6)	9 (6.3)	60 (5.2)	531 (4.2)	-2 (7.0)	12 (2.8)	484 (13.4)	-7 (5.0)
Massachusetts, US	27 (7.0)	574 (11.3)	◊ ◊	51 (7.6)	554 (10.2)	◊ ◊	22 (5.2)	528 (13.1)	◊ ◊
British Columbia, Canada	20 (3.0)	541 (4.2)	◊ ◊	67 (3.7)	525 (3.7)	◊ ◊	12 (2.7)	504 (13.3)	◊ ◊
Basque Country, Spain	17 (3.4)	518 (7.4)	10 (4.3) ▲	57 (5.4)	498 (4.4)	-11 (7.2)	27 (4.5)	490 (5.9)	0 (6.2)
Minnesota, US	17 (5.5)	549 (13.0)	◊ ◊	60 (7.3)	545 (4.0)	◊ ◊	23 (5.7)	508 (13.0)	◊ ◊
Quebec, Canada	9 (2.5)	571 (19.5)	1 (3.7)	52 (5.6)	516 (5.0)	-15 (7.1) ▼	39 (5.1)	493 (4.6)	14 (6.1) ▲

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on teachers' responses to eight questions about their schools: teachers' job satisfaction; teachers' understanding of the school's curricular goals; teachers' degree of success in implementing the school's curriculum; teachers' expectations for student achievement; parental support for student achievement; parental involvement in school activities; students' regard for school property; and students' desire to do well in school. Average is computed based on a 5-point scale: 1 = very high; 2 = high; 3 = medium; 4 = low; and 5 = very low. High level indicates average is less than or equal to 2. Medium level indicates that average is greater than 2 and less or equal to 3. Low level indicates average is greater than 3.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

Exhibit 8.22 Index of science teachers' perception of safety in school with trends, grade 8

TIMSS2007 Science 8th Grade

Country	High TPSS					Medium TPSS					Low TPSS				
	2007 Percent of Students		Average Achievement		Difference in Percent from 2003	2007 Percent of Students		Average Achievement		Difference in Percent from 2003	2007 Percent of Students		Average Achievement		Difference in Percent from 2003
Norway	94	(1.6)	487	(2.2)	13 (3.3) ▲	5	(1.5)	480	(9.0)	-13 (3.2) ▼	1	(0.0)	~	~	1 (0.0)
Singapore	94	(1.2)	568	(4.8)	2 (1.9)	6	(1.1)	557	(16.0)	-2 (1.8)	1	(0.5)	~	~	0 (0.8)
Hong Kong SAR	92	(2.7)	529	(5.1)	4 (4.0)	7	(2.6)	540	(23.6)	-5 (3.9)	1	(0.9)	~	~	1 (0.9)
Hungary	91	(1.6)	539	(3.0)	7 (2.7) ▲	8	(1.3)	543	(10.0)	-6 (2.4) ▼	2	(0.6)	~	~	-1 (0.9)
Czech Republic	90	(1.8)	539	(2.1)	◊ ◊	9	(1.7)	534	(5.8)	◊ ◊	1	(0.4)	~	~	◊ ◊
Oman	89	(2.7)	427	(3.0)	◊ ◊	10	(2.6)	392	(13.5)	◊ ◊	1	(0.7)	~	~	◊ ◊
Syrian Arab Republic	89	(2.4)	455	(2.9)	◊ ◊	10	(2.2)	422	(11.9)	◊ ◊	1	(0.7)	~	~	◊ ◊
Indonesia	88	(2.6)	439	(4.2)	3 (3.6)	11	(2.7)	406	(11.1)	-1 (3.5)	1	(0.0)	~	~	-2 (1.2)
Qatar	87	(0.1)	316	(1.9)	◊ ◊	12	(0.1)	335	(3.9)	◊ ◊	1	(0.0)	~	~	◊ ◊
Georgia	87	(2.3)	421	(5.3)	◊ ◊	8	(1.6)	418	(6.0)	◊ ◊	5	(1.2)	417	(10.9)	◊ ◊
Kuwait r	86	(3.1)	417	(3.9)	◊ ◊	12	(2.9)	411	(13.0)	◊ ◊	2	(1.4)	~	~	◊ ◊
Ukraine	86	(2.1)	486	(3.6)	◊ ◊	13	(2.0)	483	(8.5)	◊ ◊	1	(0.6)	~	~	◊ ◊
Australia r	86	(2.4)	521	(4.6)	15 (4.3) ▲	13	(2.1)	498	(6.9)	-14 (4.1) ▼	2	(0.9)	~	~	-2 (1.5)
Egypt	85	(3.1)	408	(3.9)	-1 (4.1)	14	(3.0)	417	(8.4)	1 (4.0)	2	(1.2)	~	~	0 (1.6)
Thailand	84	(3.1)	473	(5.0)	◊ ◊	14	(3.0)	456	(8.9)	◊ ◊	2	(0.9)	~	~	◊ ◊
Israel r	83	(2.9)	478	(5.7)	1 (4.0)	13	(2.4)	427	(14.9)	-2 (3.5)	3	(1.6)	434	(22.3)	1 (2.0)
Malaysia	83	(3.2)	473	(6.4)	10 (5.2) ▲	14	(3.1)	455	(15.3)	-7 (4.7)	2	(1.3)	~	~	-3 (2.7)
Cyprus r	82	(0.7)	451	(2.2)	8 (1.5) ▲	15	(0.6)	451	(3.5)	-7 (1.4) ▼	3	(0.4)	432	(11.7)	-1 (0.5)
Lithuania	82	(2.1)	518	(2.7)	3 (3.3)	14	(1.8)	524	(4.9)	-5 (3.1)	3	(0.8)	507	(8.0)	1 (1.1)
Sweden	82	(2.7)	514	(2.7)	4 (3.8)	18	(2.7)	492	(5.9)	-3 (3.8)	0	(0.0)	~	~	-1 (0.7)
Bosnia and Herzegovina	82	(1.6)	466	(3.0)	◊ ◊	15	(1.3)	465	(4.7)	◊ ◊	4	(1.0)	464	(8.5)	◊ ◊
Iran, Islamic Rep. of	80	(3.2)	466	(4.3)	6 (4.7)	15	(2.7)	432	(7.6)	-9 (4.3) ▼	6	(1.8)	432	(9.8)	2 (2.3)
Slovenia	79	(2.2)	537	(2.6)	7 (3.4) ▲	18	(2.1)	540	(2.7)	-3 (3.1)	3	(1.1)	535	(9.5)	-3 (1.8)
Serbia	79	(2.2)	470	(3.4)	3 (3.4)	18	(2.0)	477	(4.9)	1 (3.0)	4	(1.1)	453	(14.7)	-4 (1.7) ▼
Romania	78	(2.2)	465	(4.3)	0 (3.2)	19	(2.1)	446	(5.3)	-1 (3.2)	3	(0.7)	470	(8.2)	0 (1.1)
Russian Federation	78	(2.3)	530	(4.1)	18 (3.2) ▲	21	(2.1)	528	(5.4)	-13 (3.2) ▼	1	(0.5)	~	~	-5 (1.4) ▼
Bahrain	78	(1.9)	469	(2.5)	4 (2.8)	21	(1.9)	462	(6.0)	0 (2.7)	1	(0.0)	~	~	-4 (1.6) ▼
Italy	78	(2.9)	498	(3.2)	10 (4.4) ▲	18	(2.6)	488	(7.2)	-5 (3.9)	4	(1.3)	480	(11.4)	-5 (2.5)
Turkey	77	(3.7)	460	(4.3)	◊ ◊	17	(3.3)	433	(8.5)	◊ ◊	5	(1.9)	431	(20.2)	◊ ◊
Bulgaria	77	(2.9)	469	(7.3)	- -	18	(2.5)	464	(9.8)	- -	4	(1.3)	482	(21.3)	- -
England s	77	(3.0)	550	(5.1)	15 (5.8) ▲	21	(2.8)	523	(8.7)	-13 (5.7) ▼	2	(0.8)	~	~	-2 (1.9)
Saudi Arabia	77	(3.7)	409	(2.9)	- -	19	(3.4)	380	(7.8)	- -	4	(1.5)	381	(10.3)	- -
Lebanon	76	(3.5)	422	(6.2)	-5 (4.3)	19	(3.1)	387	(16.7)	2 (4.1)	5	(1.6)	371	(20.5)	3 (1.8)
Jordan	75	(3.8)	486	(5.2)	3 (5.2)	19	(3.2)	467	(8.7)	-7 (4.8)	7	(2.2)	476	(12.8)	4 (2.6)
United States r	73	(2.3)	531	(3.5)	-7 (3.3) ▼	23	(2.2)	493	(6.7)	5 (3.2)	4	(1.3)	452	(14.1)	2 (1.5)
Tunisia	72	(3.5)	445	(2.7)	-3 (4.8)	23	(3.1)	445	(3.6)	2 (4.5)	5	(1.8)	429	(7.3)	0 (2.4)
Korea, Rep. of r	72	(3.6)	555	(2.2)	22 (5.0) ▲	23	(3.5)	544	(4.1)	-20 (4.9) ▼	5	(1.7)	562	(6.4)	-3 (2.7)
Palestinian Nat'l Auth.	72	(3.7)	411	(4.6)	17 (5.6) ▲	16	(3.2)	399	(9.1)	-10 (5.0)	12	(2.6)	364	(11.1)	-8 (4.4)
Scotland s	69	(3.0)	497	(4.4)	8 (4.3)	29	(2.8)	494	(6.9)	-7 (4.1)	3	(0.9)	485	(22.8)	-2 (1.7)
Malta	67	(0.4)	459	(1.7)	◊ ◊	25	(0.3)	452	(2.2)	◊ ◊	8	(0.1)	387	(3.8)	◊ ◊
Algeria	65	(3.4)	410	(2.2)	◊ ◊	25	(3.1)	404	(3.0)	◊ ◊	9	(2.1)	412	(4.5)	◊ ◊
Japan	63	(4.5)	559	(3.0)	8 (5.9)	29	(4.0)	549	(5.6)	-6 (5.3)	8	(2.3)	540	(6.6)	-2 (3.3)
Chinese Taipei	62	(4.6)	557	(4.9)	-1 (6.3)	31	(4.3)	569	(5.8)	-1 (5.9)	7	(1.9)	540	(11.4)	2 (2.5)
El Salvador	59	(3.9)	386	(4.5)	◊ ◊	28	(3.9)	392	(5.8)	◊ ◊	14	(2.8)	378	(9.2)	◊ ◊
Colombia	56	(4.1)	426	(4.8)	◊ ◊	30	(4.4)	408	(6.3)	◊ ◊	14	(3.1)	395	(7.7)	◊ ◊
Ghana	39	(4.0)	328	(10.7)	-4 (6.1)	42	(4.2)	293	(9.0)	-1 (6.4)	18	(3.0)	273	(10.0)	5 (4.5)
Botswana	39	(4.3)	365	(5.6)	2 (6.3)	41	(4.8)	344	(5.3)	-2 (6.5)	20	(3.5)	354	(7.7)	0 (5.2)
Armenia r	36	(2.5)	490	(5.2)	-30 (3.9) ▼	21	(1.8)	481	(5.7)	-9 (3.1) ▼	43	(2.5)	489	(9.9)	38 (2.8) ▲
¶ Morocco	48	(3.8)	413	(5.5)	- -	32	(4.9)	400	(6.0)	- -	20	(5.6)	396	(8.2)	- -
International Avg.	76	(0.4)	469	(0.6)		18	(0.4)	457	(1.3)		6	(0.2)	441	(2.3)	
Benchmarking Participants															
Dubai, UAE s	99	(0.7)	487	(3.2)	◊ ◊	1	(0.0)	~	~	◊ ◊	0	(0.0)	~	~	◊ ◊
British Columbia, Canada r	87	(2.5)	528	(3.0)	◊ ◊	13	(2.5)	519	(9.4)	◊ ◊	0	(0.2)	~	~	◊ ◊
Ontario, Canada	84	(3.6)	532	(3.0)	-7 (4.3)	16	(3.5)	499	(12.6)	8 (4.2)	1	(0.4)	~	~	-1 (1.5)
Quebec, Canada	83	(3.6)	516	(4.5)	2 (4.9)	15	(3.4)	491	(8.5)	-3 (4.7)	2	(1.1)	~	~	1 (1.1)
Basque Country, Spain	82	(4.3)	500	(3.6)	13 (6.7)	17	(4.1)	486	(8.9)	-13 (6.7)	2	(1.3)	~	~	0 (1.7)
Minnesota, US	72	(6.3)	543	(4.0)	◊ ◊	28	(6.3)	519	(14.3)	◊ ◊	0	(0.0)	~	~	◊ ◊
Massachusetts, US	71	(5.0)	570	(4.7)	◊ ◊	29	(5.0)	512	(13.7)	◊ ◊	0	(0.0)	~	~	◊ ◊

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

Index based on teachers' responses to three statements about their schools: this school is located in a safe neighborhood; I feel safe at this school; and this school's security policies and practices are sufficient. High level indicates that the teacher agrees a lot or agrees to all three statements. Low level indicates that teacher disagrees or disagrees a lot to all three statements. Medium level includes all other combinations of responses.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 8.23 Index of students' perception of being safe in school with trends, grade 8

TIMSS2007 Science 8th Grade

Country	High SPBSS			Medium SPBSS			Low SPBSS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Sweden	75 (0.8)	514 (2.7)	-3 (1.3) ▼	20 (0.7)	515 (3.0)	1 (1.1)	5 (0.4)	474 (8.2)	2 (0.5) ▲
Georgia	73 (1.5)	435 (5.7)	◊ ◊	22 (1.5)	419 (5.1)	◊ ◊	5 (0.5)	373 (9.3)	◊ ◊
Russian Federation	71 (1.1)	534 (3.6)	12 (1.4) ▲	25 (0.9)	525 (5.5)	-10 (1.3) ▼	4 (0.3)	504 (9.5)	-2 (0.5) ▼
Ukraine	70 (0.9)	493 (3.2)	◊ ◊	25 (0.8)	478 (4.4)	◊ ◊	4 (0.4)	463 (11.4)	◊ ◊
Serbia	69 (1.1)	478 (3.0)	1 (1.6)	25 (0.9)	464 (4.6)	-2 (1.4)	6 (0.5)	443 (9.8)	1 (0.7)
Bosnia and Herzegovina	67 (1.0)	473 (2.6)	◊ ◊	26 (0.9)	462 (4.1)	◊ ◊	7 (0.6)	429 (7.7)	◊ ◊
Norway	65 (1.1)	490 (2.3)	2 (1.5)	29 (1.0)	485 (2.9)	-1 (1.3)	5 (0.3)	475 (6.8)	-1 (0.6)
Armenia	65 (1.1)	489 (5.0)	-7 (1.5) ▼	27 (0.9)	493 (8.9)	5 (1.2) ▲	8 (0.6)	478 (15.6)	2 (0.8)
Japan	65 (1.0)	556 (2.3)	4 (1.4) ▲	28 (0.8)	552 (2.8)	-3 (1.1) ▼	7 (0.5)	548 (5.3)	-1 (0.7)
Italy	63 (1.1)	499 (3.1)	7 (1.5) ▲	32 (1.1)	490 (3.0)	-3 (1.4)	5 (0.4)	480 (7.3)	-4 (0.7) ▼
Hungary	61 (1.0)	543 (3.3)	0 (1.5)	30 (0.8)	536 (3.2)	-2 (1.3)	9 (0.7)	530 (5.7)	2 (0.8) ▲
Israel	61 (1.3)	480 (4.4)	7 (1.8) ▲	29 (1.1)	474 (5.4)	-7 (1.6) ▼	10 (0.8)	428 (8.2)	-1 (1.0)
Scotland	60 (1.1)	495 (3.6)	0 (1.7)	32 (1.0)	502 (4.3)	0 (1.4)	8 (0.6)	491 (7.9)	0 (0.9)
Lithuania	59 (1.0)	522 (2.9)	0 (1.5)	35 (1.0)	518 (3.3)	1 (1.3)	6 (0.5)	496 (6.5)	-1 (0.7)
Czech Republic	59 (1.2)	543 (2.3)	◊ ◊	35 (0.9)	536 (2.3)	◊ ◊	6 (0.5)	515 (5.8)	◊ ◊
England	58 (1.1)	543 (4.5)	7 (1.8) ▲	33 (0.9)	544 (5.4)	-5 (1.4) ▼	9 (0.6)	539 (8.7)	-3 (1.1) ▼
Kuwait	58 (1.1)	432 (2.8)	◊ ◊	31 (1.0)	414 (4.3)	◊ ◊	11 (0.6)	377 (5.2)	◊ ◊
El Salvador	54 (1.1)	389 (3.0)	◊ ◊	38 (1.0)	388 (3.4)	◊ ◊	8 (0.6)	386 (6.5)	◊ ◊
Slovenia	54 (1.2)	538 (2.3)	1 (1.8)	36 (1.0)	543 (2.9)	-1 (1.6)	10 (0.7)	524 (6.1)	0 (0.9)
Jordan	53 (1.4)	500 (4.5)	35 (2.7) ▲	38 (1.2)	474 (4.5)	16 (2.0) ▲	9 (0.6)	442 (6.5)	-51 (3.3) ▼
Singapore	52 (0.9)	578 (4.2)	8 (1.2) ▲	37 (0.7)	562 (5.1)	-6 (1.0) ▼	11 (0.7)	537 (8.7)	-2 (0.8) ▼
Malta	52 (0.8)	469 (2.2)	◊ ◊	37 (0.7)	456 (3.0)	◊ ◊	12 (0.5)	419 (6.2)	◊ ◊
Korea, Rep. of	51 (1.3)	550 (2.5)	-11 (1.7) ▼	41 (1.1)	558 (2.5)	9 (1.4) ▲	8 (0.5)	553 (4.9)	2 (0.7) ▲
Hong Kong SAR	51 (1.0)	535 (4.6)	5 (1.7) ▲	39 (0.8)	530 (5.5)	-4 (1.2) ▼	10 (0.7)	512 (8.3)	-2 (1.0) ▼
Malaysia	51 (1.5)	486 (5.8)	0 (1.9)	40 (1.1)	460 (6.5)	-1 (1.5)	9 (0.7)	438 (11.3)	1 (0.9)
Turkey	50 (1.4)	468 (4.4)	◊ ◊	40 (1.2)	446 (4.5)	◊ ◊	10 (0.6)	421 (6.0)	◊ ◊
Bulgaria	50 (1.4)	479 (6.0)	- -	38 (1.1)	475 (8.4)	- -	12 (1.1)	447 (7.5)	- -
Cyprus	50 (0.9)	459 (2.4)	9 (1.3) ▲	37 (0.8)	455 (2.6)	-5 (1.2) ▼	13 (0.5)	420 (5.4)	-4 (0.9) ▼
Syrian Arab Republic	49 (1.1)	464 (3.0)	◊ ◊	36 (0.9)	451 (3.9)	◊ ◊	15 (0.8)	429 (5.0)	◊ ◊
Chinese Taipei	49 (1.2)	566 (4.4)	2 (1.4)	35 (0.8)	557 (3.7)	-1 (1.1)	16 (0.7)	556 (5.1)	-1 (1.0)
Iran, Islamic Rep. of	49 (1.5)	469 (3.8)	-1 (2.1)	41 (1.2)	452 (4.1)	2 (1.6)	10 (0.7)	441 (6.4)	-1 (1.0)
Oman	48 (1.2)	439 (3.6)	◊ ◊	39 (0.9)	421 (3.5)	◊ ◊	13 (0.7)	386 (6.6)	◊ ◊
Romania	48 (1.1)	477 (4.3)	0 (1.8)	38 (1.0)	459 (4.1)	0 (1.4)	14 (0.7)	434 (6.0)	0 (1.2)
Qatar	47 (0.5)	338 (2.3)	◊ ◊	38 (0.6)	320 (2.6)	◊ ◊	15 (0.4)	274 (4.7)	◊ ◊
Australia	46 (1.2)	517 (4.4)	4 (1.7) ▲	38 (1.0)	515 (4.1)	-1 (1.4)	15 (0.7)	514 (4.9)	-3 (1.1) ▼
Saudi Arabia	46 (1.2)	409 (2.9)	- -	41 (1.0)	406 (2.8)	- -	13 (0.7)	385 (5.9)	- -
Algeria	46 (1.3)	413 (2.1)	◊ ◊	43 (1.1)	408 (2.0)	◊ ◊	11 (0.6)	403 (4.3)	◊ ◊
Palestinian Nat'l Auth.	45 (1.4)	427 (4.2)	4 (1.9) ▲	42 (1.1)	401 (3.8)	0 (1.5)	13 (0.8)	355 (9.1)	-4 (1.2) ▼
Tunisia	43 (1.2)	446 (2.7)	-3 (1.5) ▼	43 (0.9)	445 (2.3)	3 (1.3) ▲	14 (0.9)	443 (3.5)	1 (1.1)
Egypt	42 (1.3)	437 (3.6)	0 (1.9)	39 (0.8)	403 (4.8)	-1 (1.3)	19 (1.2)	371 (5.9)	1 (1.5)
Colombia	40 (1.6)	421 (4.1)	◊ ◊	48 (1.2)	416 (3.8)	◊ ◊	12 (0.8)	416 (4.4)	◊ ◊
Lebanon	39 (1.9)	448 (6.4)	2 (2.6)	38 (1.8)	414 (8.3)	1 (2.0)	23 (1.5)	372 (5.9)	-3 (2.3)
Bahrain	37 (0.8)	486 (2.7)	-5 (1.3) ▼	45 (0.8)	468 (2.5)	3 (1.2) ▲	18 (0.7)	439 (3.5)	1 (1.1)
Indonesia	36 (1.3)	430 (4.4)	-3 (1.8)	45 (1.1)	433 (3.4)	0 (1.5)	19 (1.1)	415 (5.1)	3 (1.4) ▲
Thailand	30 (1.2)	480 (4.6)	◊ ◊	47 (1.0)	471 (4.2)	◊ ◊	23 (1.0)	458 (6.6)	◊ ◊
Ghana	14 (0.9)	341 (7.3)	1 (1.4)	50 (1.0)	315 (5.5)	1 (1.4)	36 (1.1)	279 (6.2)	-1 (1.7)
Botswana	10 (0.6)	391 (4.9)	-2 (0.8) ▼	59 (0.9)	368 (3.1)	3 (1.2) ▲	31 (1.0)	323 (4.4)	-1 (1.4)
United States	- -	- -	- -	- -	- -	- -	- -	- -	- -
¶ Morocco	37 (1.4)	406 (5.2)	- -	47 (1.1)	403 (3.2)	- -	16 (1.0)	389 (6.0)	- -
International Avg	51 (0.2)	475 (0.6)		37 (0.1)	464 (0.6)		12 (0.1)	442 (1.0)	
Benchmarking Participants									
Basque Country, Spain	63 (1.5)	505 (3.0)	1 (2.5)	31 (1.4)	491 (4.3)	-1 (2.1)	6 (0.7)	467 (8.8)	0 (1.0)
Quebec, Canada	60 (1.1)	510 (3.2)	5 (1.6) ▲	34 (1.0)	508 (3.8)	-2 (1.4)	7 (0.6)	495 (6.2)	-3 (0.9) ▼
British Columbia, Canada	49 (1.1)	528 (3.2)	◊ ◊	38 (0.9)	528 (3.1)	◊ ◊	13 (0.8)	515 (4.8)	◊ ◊
Ontario, Canada	47 (1.5)	529 (5.0)	2 (2.1)	39 (1.1)	526 (3.6)	-1 (1.5)	14 (1.0)	521 (4.0)	-1 (1.5)
Dubai, UAE	47 (1.9)	504 (3.9)	◊ ◊	41 (1.5)	485 (3.6)	◊ ◊	12 (0.8)	471 (6.2)	◊ ◊
Massachusetts, US	- -	- -	◊ ◊	- -	- -	◊ ◊	- -	- -	◊ ◊
Minnesota, US	- -	- -	◊ ◊	- -	- -	◊ ◊	- -	- -	◊ ◊

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on students' responses to five statements about things that happened in their schools in the last month (1 = yes and 2 = no): something of mine was stolen; I was hit or hurt by other student(s) (e.g., shoving, hitting, kicking); I was made to do things that I didn't want to do by other students; I was made fun of or called names; and I was left out of activities by other students. High level indicates that the student answered NO to all five statements. Low level indicates that the student answered YES to three or more statements. Medium level includes all other possible combinations of responses.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

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

A diamond (◊) indicates the country did not participate in the assessment.

Resources in school

As at grade 4, headteachers rated 19 resource areas according to whether the school's capacity to provide education was affected by a shortage or inadequacy of each. Headteachers' ratings indicated that 95 per cent of grade 8 pupils are taught in schools which are resourced at a high or medium level (see Exhibit 8.24). This is not significantly different from the findings of the 2003, 1999 and 1995 surveys, suggesting that there have been no significant gains in resourcing since 1995. This should not be considered a negative outcome, as England is still above the international average for high and medium level resourcing and the trend data shows that schools in England continue to be well resourced.

Teachers were asked to rate a list of criteria to indicate to what extent each limited how they taught the TIMSS science class. Five of these criteria were combined into an index of limiting factors (students with different academic abilities; students who come from a wide range of backgrounds; students with special needs; uninterested students and disruptive students, see Exhibit 8.25). In this index, a high score indicates fewer limitations to teaching. The majority of pupils are taught in schools where there are few factors limiting how they teach science to the TIMSS class. The percentage of pupils taught in schools with few limiting factors is much higher than the international average, and the second highest of all countries.

Classroom practice

In addition to the information about school and classroom contexts, data was collected from teachers and pupils about classroom activities (see Exhibits 8.26 and 8.27). As at grade 4, grade 8 teachers in England seem to adopt a more 'hands-on' approach to teaching science. The percentage of pupils in England doing science investigations in about half of their lessons or more was greater than the international average (70 per cent compared with the international average of 47 per cent). This is similar to the findings from 2003. However, there are some differences in the teaching approaches adopted at grade 4 and grade 8. For example pupils designed their own investigations less frequently at grade 8 than at grade 4. This might suggest that as pupils move through their science education there is move towards a more theoretical approach.

Grade 8 pupils, were asked how often they carried out the activities rated by their teachers. As with the grade 4 pupils, there were differences in the perceptions of frequency reported by teachers and pupils. Pupils were less likely to report relating science to their daily lives in more than half of lessons (80 per cent in teacher reports compared with 41 per cent from pupils). Conversely, pupils were more likely than their teachers to report watching demonstrations of experiments (47 per cent in teacher reports compared with 61 per cent in pupil reports). The largest discrepancy was found in relation to pupils' reports of the time they spend designing investigations: teacher reports gave a figure of 24 per cent, compared with 51 per cent from pupils. In general, these reflect the findings of the 2003 survey. These discrepancies are interesting and may be explained by the same hypothesis put forward at grade 4, that hands-on activities are over-represented in pupils' reports, possibly because they are the more memorable activities that pupils take part in.

Exhibit 8.24 Index of availability of school resources for science instruction, grade 8

TIMSS2007 Science 8th Grade

Country	High ASRSI		Medium ASRSI		Low ASRSI	
	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement
Singapore	90 (0.0)	567 (4.9)	10 (0.0)	570 (13.9)	0 (0.0)	~ ~
Hong Kong SAR	71 (3.7)	528 (6.0)	29 (3.7)	526 (9.4)	0 (0.0)	~ ~
Czech Republic	65 (4.0)	538 (2.6)	35 (4.0)	540 (3.7)	0 (0.0)	~ ~
Slovenia	58 (4.2)	538 (2.8)	39 (4.3)	537 (4.2)	2 (1.3)	~ ~
Australia	57 (3.4)	531 (6.1)	41 (3.4)	493 (5.5)	2 (0.8)	~ ~
Scotland	52 (4.5)	496 (5.4)	46 (4.5)	493 (6.1)	3 (1.6)	521 (28.9)
Malta	49 (0.3)	474 (2.0)	50 (0.3)	439 (1.9)	2 (0.1)	~ ~
Sweden	49 (4.1)	508 (3.8)	50 (4.0)	514 (3.6)	1 (1.1)	~ ~
Hungary	48 (4.6)	538 (5.4)	48 (4.6)	542 (4.8)	4 (1.7)	527 (8.6)
United States	45 (3.6)	530 (4.1)	50 (3.5)	513 (4.6)	4 (1.5)	505 (14.9)
Japan	45 (4.1)	559 (4.1)	53 (4.3)	551 (3.1)	2 (1.2)	~ ~
Malaysia	44 (4.2)	479 (8.3)	44 (4.5)	457 (8.4)	12 (2.5)	491 (14.8)
Chinese Taipei	39 (4.0)	561 (6.1)	55 (4.2)	560 (5.1)	5 (2.4)	569 (12.7)
Israel	39 (4.2)	486 (8.4)	57 (4.4)	460 (6.0)	4 (1.2)	456 (10.7)
Lebanon	34 (4.2)	448 (12.2)	59 (4.2)	395 (7.9)	7 (3.2)	365 (36.7)
England	32 (3.6)	542 (8.9)	63 (3.9)	542 (5.7)	5 (1.7)	542 (18.3)
Qatar	31 (0.2)	308 (2.8)	66 (0.1)	322 (1.8)	3 (0.0)	366 (7.5)
Cyprus	28 (0.2)	450 (3.5)	59 (0.2)	453 (2.4)	14 (0.2)	447 (4.9)
Egypt	25 (3.4)	418 (8.6)	70 (3.7)	405 (4.7)	5 (1.8)	398 (22.9)
Korea, Rep. of	25 (3.8)	552 (4.2)	73 (3.8)	553 (2.3)	2 (0.7)	~ ~
Russian Federation	25 (3.0)	546 (7.0)	69 (3.1)	525 (4.5)	6 (1.8)	512 (12.7)
Jordan	24 (3.0)	496 (6.9)	69 (3.6)	476 (5.4)	7 (2.0)	490 (19.3)
Lithuania	23 (3.8)	513 (5.7)	74 (3.7)	520 (3.2)	2 (1.3)	~ ~
Bahrain	23 (0.2)	495 (3.0)	73 (0.2)	460 (2.0)	4 (0.1)	446 (7.1)
Norway	22 (3.8)	497 (4.2)	72 (4.0)	483 (2.6)	6 (1.8)	497 (11.8)
Palestinian Nat'l Auth.	19 (3.0)	416 (7.6)	68 (3.7)	404 (4.4)	12 (2.5)	385 (15.2)
Romania	19 (3.6)	470 (12.6)	74 (4.0)	463 (4.7)	7 (2.3)	442 (20.1)
Italy	19 (3.2)	500 (4.9)	79 (3.3)	493 (3.6)	3 (1.3)	518 (9.1)
Bulgaria	18 (3.5)	482 (13.6)	74 (4.0)	465 (7.2)	8 (2.9)	502 (18.5)
Algeria	17 (2.8)	405 (4.3)	76 (3.4)	408 (2.3)	7 (2.2)	413 (7.9)
Oman	15 (3.2)	432 (6.7)	62 (4.3)	421 (4.9)	23 (3.7)	418 (9.4)
Thailand	15 (2.5)	510 (10.0)	64 (4.0)	463 (5.7)	21 (3.3)	466 (11.1)
Colombia	15 (3.0)	433 (13.7)	52 (4.8)	424 (4.1)	33 (4.3)	396 (6.4)
Serbia	14 (2.9)	499 (8.4)	69 (3.7)	468 (3.8)	17 (2.8)	453 (9.5)
El Salvador	13 (2.8)	429 (9.4)	66 (4.0)	383 (4.1)	21 (3.5)	373 (5.5)
Armenia	13 (2.3)	464 (8.0)	76 (3.0)	493 (7.2)	11 (2.4)	480 (7.1)
Syrian Arab Republic	12 (2.8)	456 (8.5)	83 (3.2)	451 (3.6)	5 (1.8)	445 (16.1)
Ghana	10 (2.6)	253 (18.6)	78 (3.7)	307 (5.9)	12 (2.7)	314 (16.0)
Iran, Islamic Rep. of	10 (2.0)	516 (12.5)	71 (3.2)	454 (3.5)	19 (2.9)	448 (10.2)
Kuwait	9 (2.8)	428 (11.2)	84 (3.5)	415 (3.5)	7 (2.4)	424 (10.8)
Saudi Arabia	8 (2.1)	398 (13.5)	77 (3.8)	405 (3.1)	15 (3.6)	392 (9.6)
Turkey	7 (2.3)	513 (14.0)	63 (4.5)	452 (5.0)	30 (4.0)	444 (7.7)
Tunisia	6 (2.0)	451 (6.3)	74 (3.6)	444 (2.5)	19 (3.2)	444 (5.2)
Georgia	6 (1.8)	440 (13.9)	81 (4.6)	419 (5.4)	14 (4.1)	425 (13.5)
Indonesia	5 (1.7)	472 (14.9)	59 (4.4)	429 (4.7)	36 (4.1)	418 (7.0)
Ukraine	5 (1.9)	479 (21.0)	82 (3.5)	485 (3.9)	13 (3.1)	487 (7.7)
Botswana	4 (1.6)	406 (23.6)	64 (3.7)	352 (4.3)	32 (3.8)	349 (5.4)
Bosnia and Herzegovina	4 (1.6)	505 (17.1)	74 (3.4)	466 (3.4)	23 (3.2)	458 (6.9)
¶ Morocco	4 (1.3)	493 (8.5)	47 (6.1)	398 (4.9)	49 (6.0)	396 (4.9)
International Avg.	27 (0.4)	479 (1.5)	62 (0.5)	463 (0.9)	11 (0.4)	447 (2.3)
Benchmarking Participants						
Dubai, UAE r	80 (0.4)	500 (4.1)	16 (0.3)	438 (5.8)	3 (0.1)	449 (4.6)
Basque Country, Spain	71 (4.5)	498 (4.1)	27 (4.6)	499 (3.6)	2 (1.2)	~ ~
Quebec, Canada	54 (5.0)	519 (5.8)	46 (5.0)	493 (4.4)	0 (0.0)	~ ~
British Columbia, Canada	53 (5.2)	525 (4.1)	45 (5.1)	529 (4.6)	3 (1.4)	543 (31.2)
Massachusetts, US	42 (7.2)	567 (9.7)	52 (8.0)	547 (9.8)	5 (3.7)	543 (8.2)
Ontario, Canada	37 (5.2)	530 (4.3)	58 (4.9)	525 (4.8)	5 (2.4)	554 (17.9)
Minnesota, US	35 (7.6)	542 (9.5)	61 (7.0)	538 (5.3)	4 (3.4)	504 (10.0)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on principals' average response to five questions about shortages that affect general capacity to provide instruction: instructional materials (e.g., textbook); budget for supplies (e.g., paper, pencils); school buildings and grounds; heating/cooling and lighting systems; and instructional space (e.g., classrooms); and the average response to six questions about shortages that affect science instruction: science laboratory equipment and materials; computers for science instruction; computer software for science instruction; calculators for science instruction; library materials relevant to science instruction; and audio-visual resources for science instruction. Averages are computed based on a 4-point scale: 1 = none; 2 = a little; 3 = some; and 4 = a lot. High level indicates that both averages are less than 2. Low level indicates that both averages are greater than or equal to 3. Medium level includes all other possible combinations of responses.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students.

Teachers were also asked to estimate the percentage of time pupils spent on each of a list of activities in a typical week of science lessons (see Exhibit 8.28). The data from 2007 mirrors that from the 2003 survey. That is, the largest percentage of time in 2003 was spent working with the teacher's guidance (28 per cent on average), followed by working independently (20 per cent) and listening to lecture style presentations (16 per cent). The percentage of time spent taking tests has decreased slightly to five per cent in 2007 (this was six per cent in 2003), and is half the international average.

In addition to the question about the percentage of lesson time taken up with tests, teachers were also asked to report on the frequency with which they administer science tests and also the content of the tests. There has been no significant change in teachers' reports of the frequency of test administration (see Exhibit 8.29). That is, approximately half of pupils were reported as taking tests once a month, and a further third took tests a few times a year or less. As in 2003, a minority of pupils (15 per cent) took a test every two weeks or more. This is still less than half the international average. This finding appears to challenge the frequently presented notion that pupils in England are over-tested in comparison with pupils in other nations.

In terms of the content and format of the tests, the majority of pupils (70 per cent) in England take only or mostly constructed response tests, as was the case in 2003. This is not in line with test formats used in other participating countries, with an international average of 23 per cent of pupils taking only or mostly constructed response test items (see Exhibit 8.30). The most common test format internationally is to have about half constructed-response and half multiple-choice, an international average of 62 per cent compared to 29 per cent for England. These findings are in line with those from the 2003 survey.

Teachers were asked to report on the use of textbooks in grade 8 science classes. There has been a decrease of five per cent in the percentage of grade 8 pupils in England using them as a primary basis for lessons, although this was not a significant change (see Exhibit 8.31).The pattern in textbook use continues from 2003, with greater use of textbooks in grade 8 science lessons compared with grade 4.

Computer use in grade 8 science has remained stable, with 34 per cent of pupils reported as not having computers available in their science lessons. As in grade 4, computers are mainly used to look up ideas and information (see Exhibit 8.32), although only eight per cent report doing this in half of the lessons or more.

Exhibit 8.25 Index of teachers' reports on teaching science classes with few or no limitations on instruction due to student factors, grade 8

TIMSS2007 Science 8th Grade

Country	High SCFL (Few or No Limitations)			Medium SCFL (Some Limitations)			Low SCFL (A Lot of Limitations)		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Armenia r	62 (2.0)	490 (7.6)	31 (3.8) ▲	31 (2.0)	488 (5.0)	-11 (3.3) ▼	8 (1.0)	474 (5.8)	-20 (2.5) ▼
England s	60 (3.1)	563 (5.6)	-3 (5.3)	28 (2.9)	515 (6.1)	3 (3.9)	12 (1.9)	499 (10.0)	0 (3.9)
Japan	59 (4.0)	563 (2.4)	-4 (5.0)	36 (3.8)	542 (3.8)	0 (4.9)	6 (1.9)	535 (13.8)	4 (2.2) ▲
Hungary	57 (2.5)	549 (3.8)	-1 (3.6)	34 (2.3)	528 (4.3)	-2 (3.2)	9 (1.3)	513 (6.4)	2 (1.7)
Saudi Arabia	54 (4.0)	405 (3.7)	- -	30 (3.7)	402 (7.1)	- -	16 (3.4)	390 (9.5)	- -
Ukraine	52 (3.1)	492 (4.7)	◊ ◊	35 (3.0)	483 (4.6)	◊ ◊	14 (1.9)	470 (5.3)	◊ ◊
Slovenia	50 (2.8)	537 (2.6)	0 (4.2)	40 (2.4)	538 (3.0)	2 (3.8)	10 (1.5)	538 (3.9)	-2 (2.3)
Oman	47 (4.4)	433 (4.7)	◊ ◊	37 (4.4)	411 (7.2)	◊ ◊	15 (3.0)	416 (9.4)	◊ ◊
Egypt	47 (4.2)	419 (4.7)	15 (5.8) ▲	42 (4.3)	403 (5.7)	-1 (6.0)	10 (2.8)	376 (14.0)	-14 (4.5) ▼
Russian Federation	46 (2.4)	541 (5.1)	9 (3.0) ▲	37 (1.8)	523 (4.5)	-4 (2.9)	17 (1.7)	512 (4.8)	-6 (3.2)
Georgia	46 (3.4)	426 (6.0)	◊ ◊	42 (3.7)	418 (5.0)	◊ ◊	11 (2.2)	417 (11.8)	◊ ◊
Indonesia	46 (4.6)	440 (6.0)	9 (5.7)	34 (4.0)	431 (6.7)	-14 (5.3) ▼	20 (2.8)	431 (9.1)	5 (3.7)
Lebanon	45 (3.4)	423 (9.0)	9 (5.1)	38 (3.1)	410 (10.7)	-3 (4.7)	17 (2.5)	395 (10.2)	-6 (3.5)
Scotland s	45 (3.0)	511 (4.4)	3 (4.0)	36 (2.4)	483 (4.9)	-4 (3.7)	20 (2.2)	484 (6.8)	0 (3.4)
Czech Republic	44 (2.4)	548 (2.7)	◊ ◊	42 (2.1)	534 (2.7)	◊ ◊	14 (1.4)	523 (2.7)	◊ ◊
Norway	44 (3.5)	492 (3.4)	-5 (5.7)	45 (3.7)	482 (2.8)	4 (5.8)	11 (2.0)	482 (4.6)	1 (3.4)
Sweden	42 (2.9)	518 (3.8)	-16 (4.2) ▼	43 (2.9)	505 (3.7)	9 (4.1) ▲	15 (2.2)	496 (4.8)	7 (3.0) ▲
Colombia	41 (4.5)	429 (5.5)	◊ ◊	43 (5.6)	412 (6.6)	◊ ◊	16 (3.8)	398 (9.7)	◊ ◊
United States r	41 (2.8)	535 (4.6)	-2 (4.0)	34 (2.5)	516 (4.4)	-4 (3.9)	25 (2.7)	497 (6.2)	6 (3.5)
Qatar	41 (0.1)	321 (2.0)	◊ ◊	41 (0.2)	320 (2.2)	◊ ◊	18 (0.1)	291 (3.3)	◊ ◊
Australia r	40 (3.3)	532 (6.7)	-8 (5.0)	39 (4.1)	512 (7.2)	2 (5.3)	21 (3.4)	499 (6.6)	6 (4.1)
Lithuania	40 (2.4)	529 (3.3)	-32 (3.1) ▼	43 (2.2)	517 (2.9)	16 (2.9) ▲	18 (1.5)	502 (4.5)	16 (1.6) ▲
Malta	40 (0.3)	492 (1.6)	◊ ◊	42 (0.3)	435 (1.9)	◊ ◊	18 (0.2)	407 (3.0)	◊ ◊
Tunisia	39 (3.9)	444 (3.5)	16 (5.3) ▲	39 (4.0)	446 (3.3)	-10 (5.5)	22 (3.4)	444 (4.1)	-6 (4.9)
Korea, Rep. of r	38 (3.9)	557 (2.9)	2 (5.2)	51 (3.9)	550 (2.6)	-3 (4.9)	10 (2.4)	553 (5.5)	0 (3.3)
Syrian Arab Republic	37 (3.9)	454 (5.3)	◊ ◊	40 (3.9)	448 (4.4)	◊ ◊	23 (3.0)	451 (6.8)	◊ ◊
Malaysia	36 (3.8)	501 (10.4)	-31 (5.6) ▼	44 (3.8)	466 (8.5)	15 (5.5) ▲	19 (3.4)	430 (9.6)	16 (3.7) ▲
Singapore	35 (1.9)	616 (4.6)	-1 (3.2)	39 (2.2)	558 (7.8)	-2 (3.2)	26 (2.1)	513 (9.0)	3 (3.1)
Bulgaria	35 (3.2)	492 (10.4)	- -	44 (2.3)	461 (6.7)	- -	21 (2.3)	446 (9.9)	- -
Serbia	34 (2.6)	474 (4.2)	-10 (3.4) ▼	42 (2.1)	471 (3.8)	6 (3.0)	23 (2.2)	466 (4.5)	5 (3.0)
Bosnia and Herzegovina	32 (2.2)	471 (4.2)	◊ ◊	43 (2.2)	463 (3.4)	◊ ◊	25 (2.3)	464 (4.1)	◊ ◊
Romania	32 (2.9)	467 (6.5)	-6 (3.9)	39 (2.9)	464 (4.2)	1 (3.8)	29 (2.3)	454 (5.9)	5 (3.3)
Jordan	31 (3.5)	492 (8.2)	13 (4.8) ▲	40 (4.0)	475 (6.7)	-14 (5.8) ▼	28 (3.7)	480 (7.8)	1 (5.3)
Bahrain	30 (2.8)	473 (4.0)	9 (3.9) ▲	48 (2.9)	461 (3.4)	2 (5.0)	22 (2.7)	471 (6.4)	-12 (4.7) ▼
Ghana	30 (3.6)	314 (11.2)	0 (5.6)	47 (3.6)	308 (8.6)	2 (5.7)	23 (3.3)	276 (11.7)	-2 (5.2)
Hong Kong SAR	29 (4.5)	557 (8.5)	3 (5.7)	41 (4.8)	537 (7.4)	-2 (6.5)	30 (4.0)	489 (10.6)	-1 (5.9)
Palestinian Nat'l Auth.	28 (4.0)	408 (8.7)	3 (5.3)	45 (4.4)	408 (5.8)	4 (6.3)	27 (3.3)	392 (8.1)	-7 (5.6)
El Salvador	28 (3.9)	392 (6.9)	◊ ◊	43 (4.8)	385 (5.8)	◊ ◊	29 (4.1)	386 (6.3)	◊ ◊
Kuwait r	25 (3.8)	412 (7.9)	◊ ◊	49 (4.8)	417 (5.5)	◊ ◊	26 (4.4)	416 (8.4)	◊ ◊
Algeria	25 (3.2)	406 (2.6)	◊ ◊	46 (3.8)	407 (2.6)	◊ ◊	29 (3.1)	412 (3.1)	◊ ◊
Israel	22 (3.0)	490 (9.8)	-7 (4.5)	35 (3.9)	474 (6.6)	-4 (5.1)	43 (4.1)	453 (9.0)	11 (5.0) ▲
Turkey	22 (3.6)	497 (8.9)	◊ ◊	39 (4.2)	449 (6.3)	◊ ◊	39 (3.9)	436 (6.7)	◊ ◊
Cyprus r	18 (0.8)	453 (2.8)	4 (1.2) ▲	47 (1.4)	450 (2.6)	6 (1.9) ▲	35 (1.4)	449 (2.7)	-10 (1.8) ▼
Chinese Taipei	18 (3.1)	575 (7.8)	-9 (5.2)	43 (3.8)	561 (5.6)	8 (5.4)	39 (4.0)	553 (5.6)	1 (6.0)
Thailand	18 (3.4)	495 (18.6)	◊ ◊	54 (4.5)	477 (6.0)	◊ ◊	29 (3.9)	444 (5.9)	◊ ◊
Botswana	17 (3.5)	382 (9.5)	-3 (5.1)	44 (4.5)	352 (4.8)	-1 (6.6)	39 (4.7)	345 (5.4)	3 (6.3)
Iran, Islamic Rep. of	15 (2.7)	458 (7.3)	5 (3.7)	45 (3.6)	466 (5.8)	11 (5.3) ▲	39 (3.7)	451 (5.1)	-15 (5.2) ▼
Italy	14 (1.9)	504 (5.2)	-16 (4.3) ▼	41 (3.2)	499 (4.0)	-3 (5.0)	45 (3.3)	491 (4.4)	18 (4.5) ▲
¶ Morocco	22 (2.9)	427 (5.9)	- -	44 (4.9)	402 (5.0)	- -	34 (4.7)	394 (4.3)	- -
International Avg.	37 (0.5)	477 (1.0)		41 (0.5)	462 (0.8)		22 (0.4)	451 (1.1)	
Benchmarking Participants									
Dubai, UAE s	67 (3.8)	501 (4.8)	◊ ◊	26 (2.8)	471 (8.5)	◊ ◊	7 (2.5)	479 (7.9)	◊ ◊
Ontario, Canada	54 (4.8)	536 (4.1)	7 (6.8)	29 (4.3)	520 (5.1)	-3 (6.2)	16 (3.1)	515 (9.7)	-5 (4.8)
Massachusetts, US	50 (6.1)	563 (8.3)	◊ ◊	31 (4.3)	551 (8.0)	◊ ◊	19 (4.5)	534 (17.7)	◊ ◊
British Columbia, Canada r	42 (4.6)	534 (4.8)	◊ ◊	35 (4.3)	525 (4.8)	◊ ◊	23 (3.0)	521 (6.3)	◊ ◊
Basque Country, Spain	38 (4.7)	509 (4.3)	-1 (6.6)	47 (4.4)	494 (3.8)	6 (6.7)	15 (3.1)	481 (8.4)	-5 (5.2)
Quebec, Canada r	32 (4.3)	541 (7.5)	-33 (6.1) ▼	43 (4.9)	497 (5.0)	13 (6.6)	25 (3.9)	498 (8.8)	20 (4.3) ▲
Minnesota, US	21 (5.5)	536 (12.4)	◊ ◊	51 (8.5)	545 (6.3)	◊ ◊	28 (6.1)	523 (7.5)	◊ ◊

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on teachers' responses to five statements about student factors limiting science instruction: 1) Students with different academic abilities; 2) Students who come from a wide range of backgrounds; 3) Students with special needs; 4) Uninterested students; and 5) Disruptive students. Average is computed across the five statements based on a 4-point scale: 1. Not at all/Not applicable; 2. A little; 3. Some; and 4. A lot. High level indicates average is less than or equal to 2. Medium level indicates average is greater than 2 and less than 3. Low level indicates average is greater than or equal to 3.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

Exhibit 8.26 Teachers' reports on students doing science investigations, grade 8

TIMSS2007 Science 8th Grade

General/Integrated Science

Country	Percentage of Students Whose Teachers Reported Students Doing the Activity About Half of the Lessons or More											
	Observe Natural Phenomena and Describe What They See		Give Explanations About Something They Are Studying		Watch Me Demonstrate an Experiment or Investigation		Design or Plan Experiments or Investigations		Conduct Experiments or Investigations		Work Together in Small Groups on Experiments or Investigations		Relate What Students Are Learning in Science to Their Daily Lives	
Australia	24	(3.6)	68	(2.7)	15	(2.7)	16	(2.4)	67	(3.3)	60	(3.5)	73	(3.1)
Bahrain	36	(2.4)	67	(3.1)	62	(2.5)	17	(2.4)	33	(3.0)	42	(3.1)	80	(2.9)
Botswana	23	(3.7)	75	(3.9)	39	(4.0)	22	(4.2)	36	(4.9)	48	(4.7)	88	(2.9)
Chinese Taipei	26	(3.9)	57	(3.9)	16	(3.0)	10	(2.4)	12	(2.7)	9	(2.5)	62	(4.1)
Colombia	54	(5.0)	87	(2.3)	22	(3.8)	32	(3.8)	34	(4.3)	45	(4.8)	92	(2.5)
Egypt	43	(4.2)	72	(3.3)	73	(4.0)	24	(3.4)	31	(3.7)	47	(4.0)	86	(2.4)
El Salvador	41	(4.3)	79	(3.4)	16	(3.0)	21	(3.5)	20	(3.7)	37	(3.9)	81	(3.6)
England	32	(3.1)	84	(2.1)	47	(3.5)	24	(3.2)	70	(2.9)	73	(2.8)	80	(2.5)
Ghana	48	(4.0)	89	(2.6)	57	(4.2)	44	(3.9)	40	(3.6)	33	(4.0)	89	(2.5)
Hong Kong SAR	21	(3.7)	66	(4.3)	19	(3.8)	13	(3.0)	70	(4.5)	67	(3.8)	63	(4.7)
Iran, Islamic Rep. of	41	(3.9)	73	(3.6)	64	(3.4)	52	(3.6)	62	(3.9)	45	(3.5)	79	(3.3)
Israel	26	(3.4)	83	(3.1)	50	(4.0)	30	(3.7)	31	(4.0)	25	(3.9)	82	(3.4)
Italy	48	(3.0)	89	(2.0)	8	(1.6)	8	(1.6)	9	(1.7)	9	(1.6)	69	(2.8)
Japan	42	(4.2)	30	(3.7)	28	(3.9)	18	(3.2)	68	(4.2)	69	(4.0)	47	(4.4)
Jordan	45	(4.2)	68	(3.8)	77	(3.5)	37	(3.7)	59	(4.2)	56	(3.8)	84	(3.4)
Korea, Rep. of	37	(3.7)	81	(3.1)	34	(3.6)	22	(3.3)	39	(4.2)	33	(3.5)	84	(3.3)
Kuwait	r 36	(4.2)	r 72	(4.7)	r 77	(4.3)	r 34	(4.4)	r 47	(4.3)	r 67	(4.6)	r 84	(3.2)
Malaysia	38	(3.7)	84	(3.0)	25	(3.1)	32	(4.0)	53	(4.1)	61	(4.1)	83	(3.0)
Norway	8	(2.1)	29	(3.2)	10	(1.9)	14	(2.3)	28	(3.4)	30	(3.6)	54	(3.5)
Oman	28	(3.7)	58	(4.1)	54	(4.5)	40	(4.3)	47	(3.7)	66	(4.0)	82	(3.6)
Palestinian Nat'l Auth.	51	(4.3)	65	(4.1)	76	(3.3)	43	(4.0)	47	(3.9)	42	(3.8)	87	(2.7)
Qatar	18	(0.1)	60	(0.2)	56	(0.2)	32	(0.1)	48	(0.2)	63	(0.2)	76	(0.1)
Saudi Arabia	46	(4.8)	63	(4.8)	58	(4.4)	19	(3.6)	34	(4.4)	40	(4.5)	86	(3.2)
Scotland	r 28	(2.8)	r 79	(2.6)	r 28	(2.7)	r 24	(2.6)	r 83	(2.1)	r 87	(1.8)	r 78	(2.3)
Singapore	21	(2.4)	73	(2.1)	20	(2.3)	6	(1.4)	40	(2.5)	34	(2.3)	76	(2.3)
a Sweden	19	(2.7)	65	(2.8)	28	(3.3)	21	(3.1)	66	(3.1)	67	(3.0)	81	(3.0)
Thailand	34	(4.0)	80	(3.6)	35	(3.8)	51	(3.9)	67	(3.9)	81	(2.8)	84	(3.1)
Tunisia	59	(4.0)	79	(3.8)	70	(4.0)	50	(4.0)	62	(3.7)	79	(3.2)	79	(3.7)
Turkey	51	(4.5)	79	(3.5)	54	(4.6)	36	(4.1)	50	(4.1)	30	(3.7)	89	(3.0)
United States	30	(2.9)	80	(2.1)	23	(2.2)	24	(2.9)	48	(3.2)	61	(3.3)	80	(2.3)
International Avg.	35	(0.7)	71	(0.6)	41	(0.6)	27	(0.6)	47	(0.7)	50	(0.6)	79	(0.6)
Benchmarking Participants														
Basque Country, Spain	38	(4.9)	88	(3.3)	5	(1.9)	5	(2.0)	4	(1.6)	12	(2.5)	86	(3.4)
British Columbia, Canada	r 24	(3.7)	r 75	(3.9)	r 30	(3.9)	r 7	(2.0)	r 41	(4.7)	r 41	(4.5)	r 72	(4.3)
Dubai, UAE	s 63	(2.9)	s 88	(3.8)	s 48	(5.7)	s 37	(3.7)	s 52	(4.3)	s 55	(3.6)	s 88	(3.1)
Massachusetts, US	38	(6.2)	76	(6.8)	19	(5.1)	19	(4.7)	47	(6.8)	59	(6.6)	75	(5.2)
Minnesota, US	37	(6.2)	78	(5.8)	13	(4.8)	8	(3.7)	51	(8.5)	67	(8.1)	69	(6.5)
Ontario, Canada	19	(3.8)	71	(4.5)	18	(3.4)	21	(3.9)	38	(4.2)	49	(4.6)	74	(4.3)
Quebec, Canada	28	(3.9)	60	(4.5)	22	(4.2)	35	(4.4)	56	(5.6)	45	(5.4)	66	(4.6)

Background data provided by teachers.

a Sweden: Summarizes reports from physics, biology, and chemistry teachers as well as integrated/general science teachers.

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

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 8.27 Students' reports on doing science investigations, grade 8

TIMSS2007 Science 8th Grade

General/Integrated Science

Country	Percentage of Students Who Reported Doing the Activity About Half of the Lessons or More						
	Make Observations and Describe What Was Seen	Give Explanations About What Is Being Studied	Watch the Teacher Demonstrate an Experiment or Investigation	Design or Plan an Experiment or Investigation	Conduct an Experiment or Investigation	Work in Small Groups on an Experiment or Investigation	Relate What Is Being Learned in Science to Our Daily Lives
Australia	69 (1.2)	59 (1.0)	60 (1.4)	52 (1.2)	59 (1.3)	68 (1.4)	39 (1.1)
Bahrain	68 (1.0)	65 (1.0)	77 (0.8)	56 (1.1)	50 (0.8)	51 (1.0)	64 (1.0)
Botswana	54 (1.0)	72 (1.0)	60 (1.0)	39 (0.8)	43 (0.9)	47 (1.1)	72 (0.9)
Chinese Taipei	35 (1.3)	42 (1.3)	41 (1.2)	27 (1.1)	29 (1.3)	28 (1.3)	38 (1.2)
Colombia	72 (1.5)	75 (1.5)	50 (1.9)	43 (1.6)	49 (1.6)	58 (1.4)	65 (1.7)
Egypt	80 (1.0)	78 (0.8)	78 (0.8)	67 (1.1)	63 (1.3)	60 (1.1)	75 (1.0)
El Salvador	68 (1.1)	63 (1.1)	67 (1.0)	55 (1.2)	47 (1.2)	57 (1.2)	59 (1.0)
England	67 (1.2)	61 (1.1)	61 (1.2)	51 (1.3)	60 (1.4)	70 (1.2)	41 (1.0)
Ghana	70 (1.5)	84 (0.8)	73 (1.4)	54 (1.5)	54 (1.2)	51 (1.4)	81 (0.8)
Hong Kong SAR	62 (1.4)	57 (1.1)	61 (1.2)	42 (1.2)	68 (1.3)	71 (1.4)	63 (1.2)
Iran, Islamic Rep. of	74 (1.2)	76 (1.0)	85 (0.9)	52 (1.2)	66 (1.2)	58 (1.4)	62 (1.3)
Israel	53 (1.5)	70 (1.2)	69 (1.6)	48 (1.7)	52 (1.9)	42 (1.8)	51 (1.3)
Italy	41 (1.1)	78 (1.0)	22 (1.1)	12 (0.9)	11 (0.9)	10 (0.9)	32 (0.8)
Japan	66 (1.6)	38 (1.2)	62 (1.4)	45 (1.5)	72 (1.7)	76 (1.7)	29 (0.9)
Jordan	83 (1.1)	82 (1.1)	77 (1.0)	64 (1.2)	62 (1.3)	62 (1.3)	76 (1.1)
Korea, Rep. of	29 (0.9)	26 (0.7)	46 (1.2)	21 (0.8)	28 (1.1)	29 (1.0)	35 (1.0)
Kuwait	78 (0.8)	70 (0.9)	89 (0.7)	72 (1.1)	67 (1.1)	71 (1.0)	66 (0.8)
Malaysia	69 (1.2)	48 (1.2)	78 (1.0)	46 (1.4)	63 (1.7)	66 (1.6)	59 (1.2)
Norway	39 (1.3)	44 (1.1)	37 (1.5)	31 (1.4)	42 (2.0)	43 (1.8)	32 (0.9)
Oman	75 (1.1)	73 (1.1)	83 (0.8)	63 (1.1)	58 (1.2)	67 (1.3)	76 (0.8)
Palestinian Nat'l Auth.	69 (1.6)	74 (1.0)	75 (1.5)	56 (1.7)	51 (1.7)	53 (1.7)	69 (1.1)
Qatar	79 (0.4)	67 (0.6)	83 (0.5)	66 (0.6)	65 (0.6)	67 (0.5)	66 (0.6)
Saudi Arabia	64 (1.1)	65 (1.1)	74 (1.2)	49 (1.2)	48 (1.1)	45 (1.5)	66 (1.0)
Scotland	68 (1.2)	66 (0.8)	72 (1.0)	61 (1.2)	75 (1.2)	80 (0.8)	49 (0.9)
Singapore	61 (0.9)	66 (0.9)	55 (1.0)	37 (0.8)	50 (1.0)	54 (1.0)	59 (0.9)
Thailand	75 (1.0)	63 (1.0)	78 (1.0)	61 (1.1)	64 (1.3)	74 (1.1)	64 (0.9)
Tunisia	84 (1.0)	87 (0.8)	93 (0.9)	69 (1.1)	66 (1.2)	56 (1.2)	63 (1.0)
Turkey	66 (1.4)	78 (1.1)	73 (1.3)	54 (1.4)	54 (1.4)	46 (1.5)	59 (1.3)
United States	68 (1.1)	68 (0.8)	60 (1.3)	51 (1.1)	57 (1.6)	67 (1.5)	51 (0.9)
International Avg.	65 (0.2)	65 (0.2)	67 (0.2)	50 (0.2)	54 (0.2)	56 (0.2)	57 (0.2)
Benchmarking Participants							
Basque Country, Spain	46 (1.6)	78 (1.2)	38 (1.8)	23 (1.5)	25 (1.6)	35 (2.2)	50 (1.8)
British Columbia, Canada	74 (1.1)	69 (1.1)	65 (1.3)	48 (1.4)	56 (1.5)	67 (1.4)	50 (1.0)
Dubai, UAE	r 70 (1.2)	r 74 (1.0)	r 70 (1.4)	r 49 (1.0)	r 48 (2.0)	r 53 (1.6)	r 65 (1.1)
Massachusetts, US	75 (1.7)	72 (1.4)	66 (2.0)	55 (1.9)	63 (2.2)	74 (2.2)	51 (2.4)
Minnesota, US	72 (2.3)	67 (1.8)	66 (2.5)	52 (2.8)	60 (2.9)	70 (2.6)	51 (2.1)
Ontario, Canada	71 (1.5)	67 (1.4)	56 (2.0)	45 (1.8)	49 (2.1)	56 (2.2)	49 (1.3)
Quebec, Canada	57 (1.4)	59 (1.2)	53 (1.8)	56 (1.5)	59 (1.7)	61 (1.7)	43 (1.4)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by students.

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

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.

Exhibit 8.28 Percentage of time in science lessons students spend on various activities in a typical week, grade 8

TIMSS2007 Science 8th Grade

Country	Listening to Teacher Re-teach and Clarify Content/Procedures		Taking Tests or Quizzes		Participating in Classroom Management Tasks Not Related to the Lesson's Content / Purpose		Other Student Activities	
Algeria	s 20	(1.3)	s 10	(0.7)	s 5	(0.3)	s 7	(0.6)
Armenia	13	(0.4)	11	(0.3)	6	(0.2)	5	(0.3)
Australia	11	(0.5)	7	(0.3)	10	(0.7)	12	(1.1)
Bahrain	r 13	(0.4)	r 12	(0.5)	r 8	(0.2)	r 7	(0.3)
Bosnia and Herzegovina	s 11	(0.4)	s 8	(0.3)	s 4	(0.2)	s 5	(0.4)
Botswana	r 13	(0.8)	r 11	(0.7)	r 6	(0.4)	r 7	(0.7)
Bulgaria	r 8	(0.3)	r 17	(0.6)	r 4	(0.4)	r 4	(0.4)
Chinese Taipei	9	(0.8)	8	(0.6)	4	(0.3)	3	(0.4)
Colombia	11	(0.6)	11	(0.6)	7	(0.5)	6	(0.5)
Cyprus	s 14	(0.2)	s 10	(0.1)	s 7	(0.2)	s 6	(0.2)
Czech Republic	10	(0.3)	10	(0.2)	5	(0.3)	6	(0.3)
Egypt	s 14	(0.8)	s 10	(0.5)	s 6	(0.4)	s 7	(0.5)
El Salvador	16	(0.7)	11	(0.5)	8	(0.4)	7	(0.5)
England	r 10	(0.4)	r 5	(0.2)	r 7	(0.4)	r 8	(0.6)
Georgia	r 9	(0.4)	r 18	(0.6)	r 6	(0.4)	r 10	(1.2)
Ghana	r 12	(0.7)	r 15	(0.6)	r 8	(0.5)	r 7	(0.4)
Hong Kong SAR	8	(0.4)	8	(0.9)	5	(0.4)	8	(1.0)
Hungary	r 13	(0.4)	r 14	(0.3)	r 4	(0.2)	r 7	(0.4)
Indonesia	s 12	(0.5)	s 13	(0.7)	s 7	(0.3)	s 7	(0.3)
Iran, Islamic Rep. of	15	(0.6)	14	(0.6)	8	(0.5)	9	(0.4)
Israel	x	x	x	x	x	x	x	x
Italy	16	(0.6)	10	(0.4)	5	(0.3)	5	(0.4)
Japan	r 14	(0.7)	r 5	(0.5)	r 2	(0.3)	r 8	(1.3)
Jordan	14	(0.5)	12	(0.5)	6	(0.3)	6	(0.4)
Korea, Rep. of	r 13	(0.8)	r 6	(0.4)	r 6	(0.5)	r 5	(0.5)
Kuwait	x	x	x	x	x	x	x	x
Lebanon	s 14	(0.9)	s 14	(0.6)	s 6	(0.4)	s 6	(0.4)
Lithuania	14	(0.4)	14	(0.5)	3	(0.2)	r 3	(0.3)
Malaysia	r 13	(0.8)	r 10	(0.5)	r 9	(0.7)	r 6	(0.5)
Malta	13	(0.1)	5	(0.0)	9	(0.1)	7	(0.0)
Norway	12	(0.4)	6	(0.3)	4	(0.3)	9	(0.8)
Oman	r 14	(0.8)	r 11	(0.7)	r 5	(0.3)	r 9	(0.9)
Palestinian Nat'l Auth.	s 14	(0.8)	s 10	(0.4)	s 6	(0.4)	s 7	(0.4)
Qatar	s 12	(0.0)	s 10	(0.0)	s 7	(0.0)	s 11	(0.0)
Romania	11	(0.5)	14	(0.5)	5	(0.2)	5	(0.2)
Russian Federation	9	(0.2)	15	(0.4)	1	(0.1)	4	(0.2)
Saudi Arabia	x	x	x	x	x	x	x	x
Scotland	r 9	(0.3)	r 4	(0.2)	r 7	(0.3)	r 5	(0.3)
Serbia	r 11	(0.3)	r 8	(0.3)	r 3	(0.2)	r 5	(0.4)
Singapore	9	(0.3)	8	(0.3)	7	(0.4)	5	(0.4)
Slovenia	13	(0.4)	5	(0.3)	4	(0.2)	7	(0.5)
Sweden	r 11	(0.3)	r 7	(0.2)	r 4	(0.2)	r 5	(0.6)
Syrian Arab Republic	s 14	(0.8)	s 11	(0.5)	s 6	(0.3)	s 6	(0.3)
Thailand	18	(0.8)	11	(0.5)	8	(0.4)	7	(0.4)
Tunisia	r 18	(1.0)	r 11	(0.9)	r 5	(0.4)	r 5	(0.5)
Turkey	15	(0.8)	9	(0.6)	9	(0.6)	8	(0.4)
Ukraine	20	(0.8)	14	(0.4)	3	(0.1)	6	(0.4)
United States	11	(0.4)	9	(0.3)	7	(0.3)	12	(0.9)
Morocco	s 19	(1.0)	s 13	(0.9)	s 5	(0.4)	s 6	(1.1)
¶ International Avg.	13	(0.1)	10	(0.1)	6	(0.1)	7	(0.1)
Benchmarking Participants								
Basque Country, Spain	9	(0.7)	8	(0.5)	6	(0.4)	6	(1.2)
British Columbia, Canada	r 10	(0.6)	r 9	(0.4)	r 5	(0.5)	r 10	(1.1)
Dubai, UAE	s 10	(0.5)	s 10	(0.4)	s 6	(0.5)	s 9	(0.3)
Massachusetts, US	12	(0.6)	9	(0.5)	6	(0.7)	11	(1.7)
Minnesota, US	11	(0.8)	8	(0.6)	7	(0.5)	12	(1.9)
Ontario, Canada	10	(0.5)	8	(0.4)	7	(0.7)	9	(1.2)
Quebec, Canada	9	(0.6)	8	(0.5)	10	(0.8)	10	(1.0)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.
¶ Did not satisfy guidelines for sample participation rates (see Appendix A).
Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent
A dash (-) indicates comparable data are not available.
A diamond (◊) indicates the country did not participate in the assessment.
An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

Exhibit 8.29 Frequency of teachers giving science tests with trends, grade 8

TIMSS2007 8th Science Grade

Country	Percentage of Students Whose Teachers Give a Science Test or Examination							
	Every 2 Weeks or More		About Once a Month		A Few Times a Year or Less			
	Percent in 2007	Difference in Percent from 2003	Percent in 2007	Difference in Percent from 2003	Percent in 2007	Difference in Percent from 2003		
Algeria r	15 (2.3)	◊ ◊	53 (3.7)	◊ ◊	32 (3.2)	◊ ◊		
Armenia r	27 (2.0)	15 (2.5) ▲	43 (2.5)	-4 (3.5)	29 (2.3)	-11 (3.4) ▼		
Australia r	10 (1.9)	3 (2.7)	63 (3.3)	-1 (4.9)	27 (3.2)	-1 (4.5)		
Bahrain	72 (2.3)	-11 (3.2) ▼	23 (2.4)	6 (3.3)	5 (1.8)	5 (1.8) ▲		
Bosnia and Herzegovina	4 (0.9)	◊ ◊	21 (1.6)	◊ ◊	75 (1.7)	◊ ◊		
Botswana	14 (2.8)	2 (4.0)	86 (2.8)	-1 (4.1)	0 (0.0)	-1 (0.0)		
Bulgaria	11 (2.1)	- -	41 (3.0)	- -	48 (3.3)	- -		
Chinese Taipei	98 (1.0)	1 (1.8)	2 (1.0)	-2 (1.7)	0 (0.3)	0 (0.3)		
Colombia	86 (3.0)	◊ ◊	13 (2.9)	◊ ◊	1 (0.0)	◊ ◊		
Cyprus r	4 (0.4)	1 (0.7)	51 (1.0)	3 (1.9)	46 (1.0)	-3 (1.9)		
Czech Republic	82 (1.7)	◊ ◊	16 (1.7)	◊ ◊	2 (0.6)	◊ ◊		
Egypt	57 (4.0)	-32 (4.7) ▼	40 (3.9)	29 (4.6) ▲	4 (1.8)	4 (1.8) ▲		
El Salvador	57 (4.2)	◊ ◊	39 (4.0)	◊ ◊	4 (1.8)	◊ ◊		
England s	15 (2.4)	0 (4.4)	51 (3.0)	-7 (5.6)	34 (2.8)	6 (5.2)		
Georgia	37 (3.1)	◊ ◊	50 (3.4)	◊ ◊	13 (1.5)	◊ ◊		
Ghana	74 (3.5)	0 (5.1)	23 (3.2)	-1 (5.0)	2 (1.7)	1 (2.1)		
Hong Kong SAR	18 (3.7)	-2 (4.9)	44 (4.8)	16 (6.2) ▲	38 (4.2)	-14 (5.7) ▼		
Hungary	37 (2.5)	-2 (3.7)	56 (2.7)	6 (3.8)	7 (1.5)	-4 (2.2)		
Indonesia	45 (4.1)	10 (5.2)	48 (4.0)	-4 (5.4)	7 (2.2)	-6 (3.3)		
Iran, Islamic Rep. of	40 (3.6)	-9 (5.5)	47 (4.3)	2 (5.9)	13 (3.0)	6 (3.7)		
Israel	15 (2.7)	6 (3.4)	47 (3.6)	20 (4.8) ▲	38 (3.4)	-25 (4.6) ▼		
Italy	14 (2.1)	-4 (3.6)	58 (3.5)	6 (5.1)	28 (3.0)	-2 (4.3)		
Japan	13 (2.4)	2 (3.6)	34 (3.7)	0 (5.3)	52 (3.9)	-2 (5.7)		
Jordan	66 (4.1)	33 (6.0) ▲	31 (3.9)	-20 (6.0) ▼	3 (1.5)	-13 (4.1) ▼		
Korea, Rep. of s	39 (3.6)	-10 (5.6)	44 (4.2)	11 (5.8)	17 (2.6)	0 (4.1)		
Kuwait r	60 (4.8)	◊ ◊	30 (4.6)	◊ ◊	10 (2.8)	◊ ◊		
Lebanon	72 (3.5)	- -	26 (3.5)	- -	1 (0.6)	- -		
Lithuania	14 (1.6)	-9 (2.5) ▼	74 (2.0)	8 (3.0) ▲	12 (1.5)	1 (2.2)		
Malaysia	18 (3.1)	11 (3.7) ▲	39 (4.3)	-5 (5.9)	43 (4.4)	-5 (5.9)		
Malta	3 (0.1)	◊ ◊	28 (0.3)	◊ ◊	69 (0.3)	◊ ◊		
Norway	1 (0.5)	-2 (1.5)	56 (3.9)	14 (6.2) ▲	44 (3.8)	-12 (6.2) ▼		
Oman	34 (4.1)	◊ ◊	61 (4.4)	◊ ◊	6 (2.0)	◊ ◊		
Palestinian Nat'l Auth. r	51 (3.7)	22 (5.7) ▲	46 (3.7)	13 (5.2) ▲	3 (1.3)	-35 (4.7) ▼		
Qatar	71 (0.1)	◊ ◊	24 (0.1)	◊ ◊	4 (0.1)	◊ ◊		
Romania	45 (3.2)	0 (4.0)	46 (2.9)	-3 (3.8)	9 (1.3)	3 (1.7)		
Russian Federation	70 (1.7)	9 (3.0) ▲	25 (1.5)	-6 (2.7) ▼	6 (0.8)	-4 (1.5) ▼		
Saudi Arabia	54 (4.6)	- -	40 (4.5)	- -	6 (1.7)	- -		
Scotland s	4 (1.2)	0 (1.6)	50 (3.6)	-9 (5.3)	47 (3.4)	8 (5.2)		
Serbia	3 (0.6)	0 (1.0)	19 (2.0)	0 (2.5)	79 (2.2)	0 (2.8)		
Singapore	25 (1.7)	0 (2.7)	52 (2.1)	-9 (3.5) ▼	23 (1.9)	9 (2.8) ▲		
Slovenia	1 (0.5)	1 (0.5)	3 (1.1)	-4 (1.8) ▼	96 (1.2)	3 (1.9)		
Sweden	1 (0.5)	-1 (1.2)	33 (3.3)	-3 (4.6)	66 (3.2)	4 (4.6)		
Syrian Arab Republic	47 (3.4)	◊ ◊	34 (3.5)	◊ ◊	19 (3.0)	◊ ◊		
Thailand	60 (4.1)	◊ ◊	33 (4.2)	◊ ◊	6 (2.1)	◊ ◊		
Tunisia	7 (2.0)	-3 (2.9)	48 (4.6)	-25 (5.7) ▼	45 (4.4)	27 (5.4) ▲		
Turkey	17 (3.2)	◊ ◊	79 (3.6)	◊ ◊	4 (1.6)	◊ ◊		
Ukraine	9 (1.4)	◊ ◊	79 (2.1)	◊ ◊	11 (1.6)	◊ ◊		
United States r	61 (3.0)	-6 (4.6)	32 (2.7)	5 (4.3)	7 (1.3)	1 (2.0)		
¶ Morocco	8 (3.3)	- -	81 (4.0)	- -	12 (3.3)	- -		
International Avg.	34 (0.4)		42 (0.5)		24 (0.3)			
Benchmarking Participants								
Basque Country, Spain	19 (3.7)	-14 (6.1) ▼	69 (4.8)	11 (6.8)	12 (3.1)	3 (4.2)		
British Columbia, Canada r	45 (4.5)	◊ ◊	51 (4.5)	◊ ◊	5 (1.8)	◊ ◊		
Dubai, UAE s	53 (4.2)	◊ ◊	45 (4.1)	◊ ◊	2 (0.7)	◊ ◊		
Massachusetts, US	57 (7.1)	◊ ◊	31 (5.7)	◊ ◊	12 (4.5)	◊ ◊		
Minnesota, US	58 (4.8)	◊ ◊	34 (6.2)	◊ ◊	8 (4.3)	◊ ◊		
Ontario, Canada	31 (4.7)	-1 (6.5)	58 (5.2)	5 (7.3)	12 (3.1)	-4 (4.6)		
Quebec, Canada r	33 (4.7)	-24 (7.1) ▼	52 (4.7)	14 (7.0) ▲	15 (3.1)	10 (3.6) ▲		

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.
A diamond (◊) indicates the country did not participate in the assessment.

Exhibit 8.30 Item formats used by teachers in science tests or examinations with trends, grade 8

TIMSS2007 Science 8th Grade

Country	Only or Mostly Constructed-response: 2007 Percent of Students	Only or Mostly Constructed-response: Average Achievement	Only or Mostly Constructed-response: Difference in Percent from 2003	About Half Constructed-response and Half Multiple-choice: 2007 Percent of Students	About Half Constructed-response and Half Multiple-choice: Average Achievement	About Half Constructed-response and Half Multiple-choice: Difference in Percent from 2003	Only or Mostly Multiple-choice: 2007 Percent of Students	Only or Mostly Multiple-choice: Average Achievement	Only or Mostly Multiple-choice: Difference in Percent from 2003
Algeria r	20 (2.8)	406 (3.5)	◊ ◊	53 (3.4)	409 (2.4)	◊ ◊	27 (3.2)	410 (3.2)	◊ ◊
Armenia r	11 (1.7)	484 (10.8)	-34 (2.9) ↓	42 (2.6)	485 (4.8)	-6 (3.6)	47 (2.6)	491 (8.4)	40 (2.9) ↑
Australia r	23 (3.2)	515 (7.5)	1 (4.4)	71 (3.3)	517 (5.2)	-3 (4.7)	6 (1.4)	515 (13.0)	2 (2.3)
Bahrain	5 (1.0)	440 (14.2)	0 (2.0)	82 (2.0)	471 (2.4)	-2 (3.0)	13 (1.8)	459 (7.3)	2 (2.5)
Bosnia and Herzegovina	13 (1.6)	466 (5.0)	◊ ◊	45 (2.7)	466 (3.2)	◊ ◊	42 (2.5)	465 (3.6)	◊ ◊
Botswana	22 (3.6)	355 (7.2)	8 (5.0)	64 (4.1)	355 (4.6)	-9 (6.0)	14 (3.1)	344 (11.5)	2 (4.4)
Bulgaria	11 (1.7)	474 (12.7)	- -	69 (3.1)	467 (7.5)	- -	20 (2.6)	470 (8.2)	- -
Chinese Taipei	8 (2.5)	567 (10.5)	0 (3.5)	49 (4.2)	565 (4.7)	-18 (5.8) ↓	42 (4.2)	557 (6.1)	19 (5.5) ↑
Colombia	11 (2.6)	431 (13.0)	◊ ◊	78 (3.6)	414 (4.4)	◊ ◊	12 (2.8)	415 (10.5)	◊ ◊
Cyprus r	16 (0.6)	449 (3.1)	4 (0.8) ↑	64 (0.8)	451 (2.2)	4 (1.6) ↑	20 (0.9)	454 (3.4)	-8 (1.6) ↓
Czech Republic	47 (2.6)	536 (2.8)	◊ ◊	45 (2.4)	541 (3.0)	◊ ◊	8 (1.1)	534 (4.2)	◊ ◊
Egypt	6 (1.9)	431 (8.8)	4 (2.2)	81 (3.2)	408 (4.2)	11 (5.3) ↑	13 (2.8)	410 (13.4)	-15 (5.0) ↓
El Salvador	9 (2.5)	395 (9.4)	◊ ◊	88 (2.9)	386 (3.4)	◊ ◊	3 (1.6)	396 (65.3)	◊ ◊
England s	70 (2.8)	548 (5.4)	-2 (4.9)	29 (2.8)	525 (8.1)	2 (4.8)	2 (0.9)	~ ~	0 (1.5)
Georgia	6 (1.1)	431 (11.4)	◊ ◊	58 (3.0)	419 (5.7)	◊ ◊	36 (2.6)	422 (5.3)	◊ ◊
Ghana	32 (3.8)	305 (10.4)	6 (5.4)	64 (3.9)	299 (6.8)	-6 (5.8)	3 (1.8)	355 (65.0)	-1 (2.6)
Hong Kong SAR	40 (4.9)	538 (7.3)	1 (6.8)	59 (4.9)	524 (7.4)	-1 (6.8)	1 (0.7)	~ ~	0 (0.7)
Hungary	42 (2.4)	543 (3.3)	-5 (3.4)	54 (2.3)	537 (3.9)	4 (3.5)	4 (0.9)	528 (12.3)	1 (1.3)
Indonesia	39 (4.3)	432 (5.9)	3 (5.9)	53 (4.4)	438 (5.4)	-2 (5.9)	8 (2.3)	436 (13.3)	-1 (3.2)
Iran, Islamic Rep. of	20 (3.2)	469 (8.2)	-5 (4.5)	74 (3.7)	457 (4.1)	2 (5.1)	7 (2.1)	437 (7.1)	2 (2.7)
Israel	6 (1.8)	459 (18.7)	-1 (2.6)	86 (3.0)	470 (5.3)	16 (4.5) ↑	8 (2.4)	475 (16.9)	-16 (4.3) ↓
Italy	22 (2.6)	495 (4.9)	-11 (4.8) ↓	71 (2.9)	495 (3.6)	10 (5.1) ↑	7 (1.7)	513 (8.8)	0 (2.5)
Japan	42 (4.6)	560 (3.7)	16 (5.8) ↑	47 (4.3)	550 (4.2)	-20 (6.0) ↓	11 (2.7)	550 (7.3)	4 (3.6)
Jordan	7 (1.8)	449 (18.9)	-23 (4.2) ↓	84 (3.1)	483 (4.8)	16 (4.8) ↑	9 (2.6)	499 (8.5)	7 (2.9) ↑
Korea, Rep. of r	10 (2.0)	566 (4.4)	0 (3.1)	28 (3.4)	551 (3.9)	8 (4.7)	62 (3.7)	552 (2.3)	-9 (5.1)
Kuwait r	9 (2.8)	419 (12.9)	◊ ◊	73 (4.7)	414 (4.8)	◊ ◊	19 (3.9)	423 (11.4)	◊ ◊
Lebanon	31 (3.5)	414 (11.1)	12 (5.0) ↑	50 (3.6)	415 (8.3)	-16 (5.5) ↓	19 (3.2)	412 (10.2)	4 (4.3)
Lithuania	30 (2.1)	523 (4.1)	1 (3.0)	66 (2.2)	517 (2.5)	1 (3.1)	4 (0.8)	510 (7.1)	-2 (1.3)
Malaysia	9 (2.5)	472 (12.9)	8 (2.7) ↑	90 (2.5)	471 (6.4)	29 (5.1) ↑	1 (0.7)	~ ~	-36 (4.5) ↓
Malta	47 (0.3)	471 (1.4)	◊ ◊	40 (0.3)	430 (2.4)	◊ ◊	13 (0.3)	452 (2.9)	◊ ◊
Norway	77 (3.2)	488 (2.4)	-10 (4.4) ↓	22 (3.3)	485 (5.4)	9 (4.4) ↑	2 (1.0)	~ ~	0 (1.3)
Oman	7 (2.4)	428 (23.3)	◊ ◊	92 (2.5)	423 (3.1)	◊ ◊	1 (0.5)	~ ~	◊ ◊
Palestinian Nat'l Auth.	9 (2.6)	408 (15.6)	5 (3.1)	78 (3.8)	404 (4.6)	-1 (5.4)	13 (3.0)	401 (12.9)	-4 (4.6)
Qatar	5 (0.1)	333 (4.9)	◊ ◊	82 (0.2)	319 (1.8)	◊ ◊	13 (0.1)	307 (3.9)	◊ ◊
Romania	9 (1.5)	466 (7.7)	-2 (2.1)	76 (1.9)	459 (4.3)	0 (2.9)	15 (1.7)	475 (7.7)	2 (2.3)
Russian Federation	16 (1.6)	528 (5.9)	-19 (3.2) ↓	73 (1.8)	530 (3.9)	15 (3.9) ↑	11 (1.2)	526 (7.6)	4 (1.7) ↑
Saudi Arabia	2 (1.4)	~ ~	- -	61 (3.8)	400 (4.0)	- -	37 (3.8)	407 (4.6)	- -
Scotland s	56 (3.5)	498 (5.0)	8 (5.7)	41 (3.4)	494 (5.9)	-4 (5.5)	3 (1.2)	499 (15.3)	-3 (2.7)
Serbia	32 (2.6)	471 (4.3)	-9 (3.6) ↓	63 (2.6)	471 (3.7)	18 (3.6) ↑	5 (0.8)	459 (9.4)	-9 (2.0) ↓
Singapore	29 (2.3)	578 (6.8)	-1 (3.3)	68 (2.5)	566 (5.8)	0 (3.4)	3 (1.0)	509 (33.6)	1 (1.1)
Slovenia	27 (2.1)	539 (3.0)	-1 (3.3)	71 (2.2)	537 (2.5)	1 (3.3)	2 (0.6)	~ ~	1 (0.8)
Sweden	94 (1.3)	511 (2.9)	1 (2.3)	6 (1.2)	493 (6.3)	-1 (2.2)	0 (0.4)	~ ~	-1 (0.7)
Syrian Arab Republic	6 (1.7)	439 (14.5)	◊ ◊	74 (3.1)	450 (3.6)	◊ ◊	19 (2.7)	461 (6.5)	◊ ◊
Thailand	28 (3.9)	468 (8.9)	◊ ◊	55 (4.6)	474 (6.9)	◊ ◊	17 (3.2)	464 (14.9)	◊ ◊
Tunisia r	11 (2.9)	445 (7.4)	-12 (5.0) ↓	67 (4.2)	442 (3.0)	-7 (6.0)	22 (3.5)	452 (4.8)	18 (3.9) ↑
Turkey	16 (3.6)	446 (9.9)	◊ ◊	66 (4.2)	458 (5.1)	◊ ◊	18 (3.5)	448 (10.7)	◊ ◊
Ukraine	27 (2.0)	492 (4.4)	◊ ◊	70 (2.3)	484 (4.0)	◊ ◊	4 (0.8)	479 (8.3)	◊ ◊
United States r	8 (1.5)	509 (11.6)	-3 (2.6)	70 (2.3)	521 (3.8)	-3 (3.8)	22 (2.1)	517 (7.0)	6 (3.0)
¶ Morocco r	14 (4.0)	420 (9.7)	- -	64 (4.6)	401 (4.2)	- -	22 (2.9)	409 (5.9)	- -
International Avg.	23 (0.4)	469 (1.4)		62 (0.5)	464 (0.7)		14 (0.3)	459 (2.7)	
Benchmarking Participants									
Basque Country, Spain	40 (4.2)	498 (4.6)	8 (6.6)	37 (4.7)	503 (4.6)	-14 (7.1)	23 (4.4)	492 (6.0)	6 (5.9)
British Columbia, Canada r	11 (3.1)	527 (8.0)	◊ ◊	74 (4.0)	527 (3.7)	◊ ◊	16 (3.2)	528 (7.3)	◊ ◊
Dubai, UAE s	27 (3.4)	506 (8.6)	◊ ◊	69 (3.2)	487 (4.2)	◊ ◊	4 (1.4)	451 (20.6)	◊ ◊
Massachusetts, US	6 (3.5)	545 (36.9)	◊ ◊	85 (5.1)	552 (6.0)	◊ ◊	10 (4.1)	572 (15.0)	◊ ◊
Minnesota, US	12 (4.5)	539 (17.1)	◊ ◊	64 (4.9)	535 (6.5)	◊ ◊	24 (4.6)	549 (8.6)	◊ ◊
Ontario, Canada r	23 (3.8)	526 (5.9)	1 (5.6)	74 (4.2)	531 (3.5)	-2 (5.9)	3 (1.7)	498 (36.4)	1 (2.3)
Quebec, Canada	53 (5.4)	514 (4.7)	- -	45 (5.1)	510 (8.0)	- -	3 (1.3)	490 (9.9)	- -

↑ 2007 percent significantly higher ↓ 2007 percent significantly lower

Background data provided by teachers.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 8.31 Textbook use in teaching science with trends, grade 8

TIMSS2007 Science 8th Grade

Country		Percentage of Students Taught by Teachers Reporting Textbook Use									
		Use Textbook to Teach Science						Do Not Use Textbook to Teach Science			
		As Primary Basis for Lessons				As Supplementary Resource					
		Percent in 2007		Difference in Percent from 2003		Percent in 2007		Difference in Percent from 2003		Percent in 2007		Difference in Percent from 2003	
Algeria	r	55	(3.6)	◊	◊	41	(3.5)	◊	◊	4	(1.3)	◊	◊
Armenia	r	77	(2.0)	5	(3.3)	14	(1.5)	-9	(2.9) ▼	9	(1.3)	4	(1.7) ▲
Australia	r	28	(3.4)	-3	(5.5)	56	(3.6)	6	(5.2)	16	(3.0)	-3	(4.3)
Bahrain		50	(3.3)	-18	(4.2) ▼	34	(2.6)	1	(3.7)	17	(2.9)	17	(2.9) ▲
Bosnia and Herzegovina	r	58	(2.5)	◊	◊	31	(2.4)	◊	◊	11	(1.6)	◊	◊
Botswana		28	(3.7)	3	(5.4)	69	(3.8)	-2	(5.7)	3	(1.2)	-2	(2.3)
Bulgaria		81	(2.4)	-	-	16	(2.2)	-	-	2	(1.2)	-	-
Chinese Taipei		75	(3.5)	-7	(4.9)	19	(3.1)	5	(4.4)	6	(2.6)	2	(3.1)
Colombia		14	(2.7)	◊	◊	66	(4.1)	◊	◊	20	(3.3)	◊	◊
Cyprus	r	53	(1.2)	-9	(1.8) ▼	45	(1.2)	9	(1.6) ▲	2	(0.3)	0	(0.8)
Czech Republic		43	(2.4)	◊	◊	56	(2.5)	◊	◊	1	(0.4)	◊	◊
Egypt		48	(4.5)	-18	(6.0) ▼	47	(4.7)	14	(6.2) ▲	4	(1.6)	4	(1.7) ▲
El Salvador		13	(2.8)	◊	◊	76	(3.9)	◊	◊	11	(2.7)	◊	◊
England	s	13	(2.3)	-5	(4.5)	72	(2.8)	0	(5.1)	15	(2.4)	6	(3.6)
Georgia		79	(2.8)	◊	◊	20	(2.7)	◊	◊	1	(0.6)	◊	◊
Ghana		34	(3.7)	0	(5.8)	65	(3.8)	7	(6.1)	1	(0.7)	-7	(2.6) ▼
Hong Kong SAR		87	(3.1)	-4	(4.1)	10	(2.6)	2	(3.7)	3	(1.6)	2	(1.8)
Hungary		70	(2.8)	4	(3.5)	30	(2.8)	-5	(3.6)	1	(0.4)	1	(0.4)
Indonesia	s	63	(4.4)	42	(5.9) ▲	34	(4.1)	10	(6.0)	3	(1.8)	-51	(5.0) ▼
Iran, Islamic Rep. of		85	(2.7)	4	(4.0)	8	(1.8)	-4	(3.0)	7	(2.3)	0	(3.0)
Israel	r	46	(4.6)	2	(6.0)	52	(4.5)	2	(5.9)	1	(0.5)	-4	(1.8) ▼
Italy		62	(3.0)	-1	(4.6)	34	(2.7)	-2	(4.5)	4	(1.3)	2	(1.5)
Japan		57	(3.5)	-5	(5.3)	38	(3.7)	1	(5.3)	5	(1.6)	3	(1.9)
Jordan		61	(4.1)	-7	(5.7)	32	(4.0)	0	(5.6)	7	(2.2)	7	(2.2) ▲
Korea, Rep. of	s	73	(3.4)	-6	(4.5)	24	(3.3)	6	(4.4)	3	(1.3)	0	(1.9)
Kuwait	r	53	(5.4)	◊	◊	26	(4.2)	◊	◊	21	(3.9)	◊	◊
Lebanon		49	(3.8)	-1	(5.5)	37	(3.3)	-9	(5.0)	14	(2.7)	9	(3.1) ▲
Lithuania		68	(2.2)	-32	(2.2) ▼	32	(2.2)	32	(2.2) ▲	0	(0.2)	0	(0.2)
Malaysia		65	(4.3)	21	(5.8) ▲	30	(4.1)	-13	(5.6) ▼	4	(1.6)	-8	(3.2) ▼
Malta		28	(0.2)	◊	◊	54	(0.2)	◊	◊	18	(0.2)	◊	◊
Norway		84	(2.9)	-3	(3.7)	14	(2.7)	1	(3.6)	2	(1.0)	2	(1.0)
Oman		49	(4.4)	◊	◊	46	(4.3)	◊	◊	5	(2.0)	◊	◊
Palestinian Nat'l Auth.		63	(4.6)	-8	(5.9)	30	(4.2)	1	(5.6)	7	(2.2)	6	(2.2) ▲
Qatar	r	58	(0.2)	◊	◊	25	(0.2)	◊	◊	16	(0.1)	◊	◊
Romania		71	(2.6)	1	(3.5)	27	(2.5)	-2	(3.4)	2	(0.7)	1	(0.8)
Russian Federation		72	(2.2)	5	(3.9)	28	(2.2)	-4	(3.9)	0	(0.0)	0	(0.2)
Saudi Arabia		x	x	-	-	x	x	-	-	x	x	-	-
Scotland	s	22	(3.2)	-8	(5.4)	68	(3.2)	8	(5.2)	10	(1.8)	1	(2.7)
Serbia		67	(2.4)	2	(3.3)	32	(2.3)	-2	(3.3)	1	(0.5)	0	(0.7)
Singapore		44	(2.5)	-29	(3.5) ▼	41	(2.3)	14	(3.4) ▲	15	(1.5)	15	(1.5) ▲
Slovenia		53	(2.6)	-6	(4.2)	47	(2.6)	6	(4.2)	0	(0.0)	-1	(0.4)
Sweden		51	(3.2)	11	(4.5) ▲	46	(3.3)	-11	(4.6) ▼	3	(0.8)	0	(1.4)
Syrian Arab Republic		55	(4.0)	◊	◊	31	(3.4)	◊	◊	14	(2.5)	◊	◊
Thailand		54	(4.3)	◊	◊	32	(3.8)	◊	◊	14	(3.0)	◊	◊
Tunisia		28	(3.6)	15	(4.5) ▲	71	(3.6)	-13	(4.8) ▼	1	(0.0)	-2	(1.4)
Turkey		52	(4.8)	◊	◊	45	(4.7)	◊	◊	3	(1.4)	◊	◊
Ukraine		48	(3.0)	◊	◊	50	(3.1)	◊	◊	2	(0.5)	◊	◊
United States	r	38	(2.7)	-2	(4.4)	58	(2.8)	3	(4.7)	5	(1.2)	-2	(2.1)
¶ Morocco		27	(3.3)	-	-	72	(3.2)	-	-	0	(0.4)	-	-
International Avg.		53	(0.5)			40	(0.5)			7	(0.3)		
Benchmarking Participants													
Basque Country, Spain		86	(2.8)	12	(5.6) ▲	7	(2.1)	-14	(5.0) ▼	7	(2.5)	2	(3.1)
British Columbia, Canada	r	57	(4.0)	◊	◊	41	(4.0)	◊	◊	1	(0.9)	◊	◊
Dubai, UAE	s	64	(2.6)	◊	◊	30	(3.0)	◊	◊	6	(3.1)	◊	◊
Massachusetts, US		29	(5.0)	◊	◊	65	(6.0)	◊	◊	6	(3.6)	◊	◊
Minnesota, US		27	(6.0)	◊	◊	68	(6.9)	◊	◊	5	(3.8)	◊	◊
Ontario, Canada		43	(5.2)	0	(6.8)	54	(5.2)	1	(7.0)	4	(1.5)	0	(2.5)
Quebec, Canada	r	38	(4.5)	0	(6.9)	48	(4.7)	-3	(6.9)	14	(3.5)	3	(4.7)

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

Exhibit 8.32 Computer use in science class with trends, grade 8

TIMSS2007 Science 8th Grade

Country	National Curriculum Contains Policies / Statements About the Use of Computers	Trends in Percentage of Students Whose Teachers Reported That Computers Are Available		Percentage of Students Whose Teachers Reported on Computer Use About Half of the Lessons or More				
		2007 Percent of Students	Difference in Percent from 2003	Doing Scientific Procedures or Experiments	Studying Natural Phenomena Through Simulations	Practicing Skills and Procedures	Looking Up Ideas and Information	Processing and Analyzing Data
Algeria	○	r 37 (3.4)	◊	r 6 (1.7)	r 6 (1.5)	r 8 (1.7)	r 13 (2.2)	r 12 (2.0)
Armenia	○	s 53 (3.1)	30 (4.1) ▲	25 (2.2)	26 (2.3)	28 (2.8)	26 (2.2)	28 (2.8)
Australia	●	r 61 (3.6)	-13 (5.2) ▼	4 (1.5)	2 (1.0)	5 (1.3)	10 (2.1)	5 (1.7)
Bahrain	○	35 (2.8)	-20 (4.6) ▼	3 (0.4)	7 (1.1)	11 (1.7)	11 (2.0)	8 (1.1)
Bosnia and Herzegovina	○	21 (2.3)	◊	2 (0.5)	2 (0.6)	3 (0.6)	5 (0.8)	3 (0.6)
Botswana	●	14 (2.8)	9 (3.5) ▲	0 (0.0)	1 (0.0)	1 (0.0)	0 (0.0)	1 (0.0)
Bulgaria	○	56 (3.0)	-	0 (0.3)	1 (0.3)	5 (1.5)	10 (1.8)	4 (1.2)
Chinese Taipei	●	34 (4.0)	-10 (5.6)	1 (0.0)	2 (1.1)	1 (0.0)	3 (1.3)	3 (1.3)
Colombia	○	22 (3.9)	◊	3 (1.3)	2 (1.3)	5 (1.8)	11 (2.8)	6 (2.2)
Cyprus	○	r 19 (1.0)	0 (1.3)	r 1 (0.2)	r 1 (0.2)	r 1 (0.3)	r 3 (0.4)	r 2 (0.3)
Czech Republic	○	77 (2.6)	◊	r 2 (0.6)	r 3 (0.7)	r 7 (1.3)	r 10 (1.4)	r 3 (0.8)
Egypt	○	- -	- -	- -	- -	- -	- -	- -
El Salvador	○	31 (3.5)	◊	1 (0.0)	2 (1.3)	5 (1.8)	13 (2.6)	6 (1.5)
England	●	s 66 (3.1)	-4 (5.0)	1 (0.3)	4 (1.2)	3 (1.1)	8 (1.7)	3 (1.0)
Georgia	○	21 (2.8)	◊	1 (0.3)	1 (0.4)	2 (0.6)	4 (1.0)	3 (0.7)
Ghana	○	5 (2.1)	-4 (3.6)	0 (0.0)	2 (1.4)	1 (0.0)	2 (1.1)	2 (1.1)
Hong Kong SAR	●	55 (5.3)	-1 (7.0)	13 (3.3)	7 (2.6)	6 (2.2)	12 (3.2)	8 (2.6)
Hungary	●	43 (3.2)	2 (4.3)	2 (0.9)	1 (0.6)	3 (0.7)	4 (1.0)	3 (0.8)
Indonesia	○	22 (4.0)	8 (4.7)	0 (0.0)	1 (0.5)	4 (1.7)	2 (1.3)	2 (1.1)
Iran, Islamic Rep. of	○	6 (1.7)	5 (1.9) ▲	1 (0.8)	1 (0.9)	2 (1.0)	3 (1.2)	2 (0.9)
Israel	●	57 (4.2)	6 (5.9)	6 (1.9)	r 3 (1.5)	r 8 (2.2)	8 (2.4)	r 5 (1.9)
Italy	●	37 (3.0)	2 (4.8)	3 (1.0)	2 (0.9)	3 (1.2)	4 (1.4)	3 (1.2)
Japan	●	78 (3.2)	-2 (4.7)	0 (0.0)	3 (1.4)	0 (0.0)	4 (1.7)	1 (0.8)
Jordan	●	18 (3.2)	0 (4.8)	3 (1.4)	4 (1.5)	3 (1.2)	9 (2.5)	6 (1.8)
Korea, Rep. of	●	r 77 (3.3)	-9 (4.2) ▼	25 (3.4)	22 (3.3)	13 (2.7)	22 (3.6)	16 (3.0)
Kuwait	●	r 36 (4.7)	◊	r 10 (3.0)	r 16 (3.5)	r 17 (3.6)	r 18 (3.7)	r 15 (3.2)
Lebanon	○	32 (3.7)	15 (4.4) ▲	6 (2.8)	3 (1.2)	5 (1.4)	12 (3.2)	8 (2.8)
Lithuania	●	73 (2.2)	1 (3.5)	1 (0.5)	3 (0.8)	9 (1.2)	21 (2.0)	9 (1.2)
Malaysia	●	54 (4.4)	39 (5.4) ▲	9 (2.4)	17 (3.5)	10 (2.3)	21 (3.3)	9 (2.5)
Malta	●	30 (0.2)	◊	1 (0.0)	1 (0.0)	2 (0.1)	4 (0.1)	1 (0.1)
Norway	●	77 (3.5)	16 (5.2) ▲	5 (1.6)	0 (0.3)	4 (1.8)	11 (2.3)	4 (1.2)
Oman	○	29 (3.8)	◊	3 (1.5)	3 (1.3)	4 (1.6)	7 (2.0)	3 (1.5)
Palestinian Nat'l Auth.	●	25 (3.5)	-6 (5.2)	1 (0.7)	2 (1.1)	3 (1.3)	6 (1.9)	3 (1.5)
Qatar	○	27 (0.1)	◊	r 5 (0.1)	r 5 (0.1)	r 8 (0.1)	r 10 (0.1)	r 10 (0.1)
Romania	○	64 (3.4)	43 (4.3) ▲	6 (1.2)	5 (1.1)	9 (1.4)	12 (1.7)	8 (1.4)
Russian Federation	○	48 (3.1)	36 (3.6) ▲	1 (0.3)	2 (0.7)	4 (1.0)	9 (1.5)	3 (0.9)
Saudi Arabia	○	23 (3.8)	-	3 (1.4)	3 (1.0)	8 (2.2)	9 (2.6)	5 (1.6)
Scotland	●	s 74 (2.4)	6 (4.3)	r 1 (0.6)	r 2 (0.8)	r 2 (0.6)	r 5 (1.1)	r 1 (0.3)
Serbia	○	26 (2.5)	14 (3.0) ▲	0 (0.2)	1 (0.4)	1 (0.5)	3 (0.7)	2 (0.5)
Singapore	●	66 (2.3)	-13 (3.2) ▼	3 (0.8)	3 (0.8)	5 (1.3)	9 (1.3)	3 (0.9)
Slovenia	○	64 (2.7)	14 (3.9) ▲	2 (0.8)	2 (0.6)	3 (0.8)	8 (1.5)	5 (1.1)
Sweden	○	60 (3.1)	-4 (4.5)	1 (0.5)	0 (0.0)	1 (0.4)	8 (1.6)	2 (0.7)
Syrian Arab Republic	○	23 (2.9)	◊	4 (1.2)	4 (1.2)	4 (1.6)	7 (1.5)	7 (1.7)
Thailand	○	38 (4.4)	◊	7 (1.9)	9 (2.4)	9 (2.5)	14 (3.1)	9 (2.5)
Tunisia	○	14 (2.7)	-22 (5.1) ▼	1 (0.9)	4 (1.5)	3 (1.4)	3 (1.4)	3 (1.4)
Turkey	●	41 (4.1)	◊	6 (2.3)	14 (3.1)	14 (3.0)	19 (3.3)	15 (3.2)
Ukraine	○	17 (2.4)	◊	0 (0.1)	1 (0.4)	2 (0.7)	3 (0.6)	2 (0.5)
United States	○	r 74 (2.6)	2 (3.9)	4 (1.2)	5 (1.3)	10 (2.0)	18 (2.5)	9 (1.4)
¶ Morocco	●	15 (3.8)	-	r 1 (0.7)	r 2 (0.9)	r 1 (0.6)	r 4 (1.8)	r 4 (1.5)
International Avg.		41 (0.5)		4 (0.2)	4 (0.2)	5 (0.2)	9 (0.3)	6 (0.2)
Benchmarking Participants								
Basque Country, Spain	○	66 (3.7)	5 (6.0)	2 (1.2)	2 (1.2)	5 (2.3)	11 (3.2)	8 (2.8)
British Columbia, Canada	●	r 59 (3.8)	◊	r 2 (1.4)	r 2 (1.4)	r 2 (1.3)	r 9 (2.7)	r 3 (1.8)
Dubai, UAE	○	s 37 (2.8)	◊	s 6 (0.8)	s 7 (1.6)	s 14 (2.2)	s 22 (2.3)	s 15 (1.4)
Massachusetts, US	○	59 (7.0)	◊	4 (2.6)	4 (2.5)	7 (3.5)	16 (5.7)	2 (1.2)
Minnesota, US	○	62 (7.0)	◊	1 (1.0)	3 (3.0)	2 (2.1)	9 (4.9)	3 (3.1)
Ontario, Canada	●	71 (3.9)	22 (6.0) ▲	6 (2.2)	4 (1.8)	5 (2.0)	10 (2.8)	6 (2.0)
Quebec, Canada	○	r 60 (5.0)	19 (7.2) ▲	1 (0.8)	2 (1.5)	3 (1.6)	12 (3.7)	7 (3.1)

● Yes ○ No ▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

Background data provided by National Research Coordinators and by teachers.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

8.4 The teachers and schools: grade 8 mathematics

School climate

The pupil background data reported for grade 8 science (section 8.3) applies equally to this section. This is also the case for the data from headteachers, but not the teacher data as most grade 8 pupils are taught the two subjects by different people. Therefore, information relating specifically to trends in mathematics, or data relating to both mathematics and science (not already covered in section 8.3) is reported here.

As outlined in section 8.3, there has been very little change in headteachers' ratings of perceptions of school climate since 2003, with changes of between one or two per cent (see Exhibit 8.33 for a definition of school climate). The trend data for grade 8 mathematics teachers shows that there have also been no significant changes among mathematics teachers' ratings of their school's climate. The majority of grade 8 pupils are taught in schools where the teachers' ratings gave high perception of school climate, an increase of five per cent since 2003 (see Exhibit 8.33).

The relationship between headteacher and teacher ratings seen in grade 4 (section 8.2) is also observed at grade 8 mathematics. That is, headteachers were more positive than the teachers in their perceptions of school climate.

Safety in school

Grade 8 mathematics teachers' perceptions of school safety have improved since 2003. The majority of pupils (79 per cent) are taught in schools where the teachers' perceptions of safety were at the high level (see Exhibit 8.34). It is positive that grade 8 mathematics teachers, like grade 8 science teachers, overwhelmingly feel safe at their school.

Resources in school

England's index for availability of resources for mathematics instruction gives similar outcomes as those for grade 8 science. That is, 95 per cent of pupils are taught in schools that their headteachers believe to be resourced at a 'high' or 'medium' level (see Exhibit 8.35). There have been no significant changes since 2003 in the percentage of pupils taught at schools rated as 'high' for resourcing.

The grade 8 mathematics teachers were asked to rate a list of criteria to indicate to what extent each limited how they taught the TIMSS mathematics class (see section 8.3 for a description of the criteria). Teachers' responses indicated that 95 per cent of pupils were taught in classes where there are no or few limitations to teaching (see Exhibit 8.36). As with the reports from science teachers, the percentage of pupils taught in schools with few limiting factors is much higher than the international average, and second only to Scotland. There have been no significant changes in teacher reports on this index since 2003.

Exhibit 8.33 Index of mathematics teachers' perception of school climate with trends, grade 8

TIMSS2007 Mathematics 8th Grade

Country	High TPSC			Medium TPSC			Low TPSC		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Indonesia	26 (4.4)	424 (12.8)	8 (5.6)	58 (4.7)	400 (6.8)	-5 (6.4)	16 (3.9)	402 (11.5)	-2 (5.4)
Lebanon	24 (3.3)	475 (7.6)	4 (5.2)	64 (4.0)	445 (6.0)	8 (6.3)	12 (2.1)	422 (8.6)	-11 (4.0) ▼
Chinese Taipei	24 (3.8)	624 (8.2)	3 (5.1)	65 (4.1)	596 (4.8)	-3 (5.7)	11 (2.6)	554 (11.5)	1 (3.7)
United States	21 (2.4)	534 (5.1)	-1 (3.7)	57 (2.7)	513 (3.9)	0 (4.2)	23 (2.0)	472 (5.9)	0 (3.3)
Egypt	20 (3.3)	409 (8.0)	1 (4.7)	59 (4.4)	391 (4.5)	1 (6.1)	21 (3.5)	370 (10.0)	-2 (4.9)
Israel r	20 (3.2)	504 (8.0)	-7 (5.2)	60 (4.0)	467 (6.8)	0 (5.9)	20 (2.7)	421 (8.1)	7 (3.4) ▲
Australia	20 (3.2)	544 (10.2)	4 (4.1)	53 (3.9)	497 (5.8)	-4 (5.9)	27 (2.5)	465 (5.3)	0 (4.7)
Scotland	18 (2.9)	498 (11.5)	3 (4.5)	67 (3.4)	489 (4.6)	7 (5.7)	15 (2.4)	467 (13.3)	-10 (4.5) ▼
England r	18 (2.2)	567 (10.5)	5 (3.9)	65 (3.1)	509 (5.5)	-8 (5.9)	17 (2.5)	472 (12.7)	3 (4.9)
Syrian Arab Republic	17 (2.8)	405 (8.4)	◊ ◊	64 (3.7)	392 (5.3)	◊ ◊	20 (3.2)	396 (8.7)	◊ ◊
El Salvador	16 (2.9)	338 (9.2)	◊ ◊	56 (4.3)	341 (4.2)	◊ ◊	28 (4.1)	336 (6.8)	◊ ◊
Bahrain	15 (1.5)	405 (3.2)	8 (2.3) ▲	59 (2.4)	403 (2.4)	10 (4.3) ▲	26 (1.8)	374 (3.7)	-18 (3.8) ▼
Ghana	15 (2.2)	353 (9.9)	-2 (4.5)	59 (4.2)	307 (6.8)	6 (6.3)	26 (3.8)	290 (7.4)	-4 (5.9)
Oman	15 (2.7)	394 (9.6)	◊ ◊	64 (3.8)	378 (4.2)	◊ ◊	21 (3.3)	341 (8.3)	◊ ◊
Singapore	14 (1.6)	655 (11.2)	0 (2.0)	57 (2.4)	596 (5.2)	-4 (3.2)	29 (1.9)	553 (6.7)	4 (2.7)
Saudi Arabia	14 (2.9)	330 (11.1)	- -	55 (4.4)	331 (4.1)	- -	31 (3.7)	323 (5.2)	- -
Malta	14 (0.2)	524 (3.1)	◊ ◊	54 (0.3)	506 (1.7)	◊ ◊	32 (0.3)	441 (1.9)	◊ ◊
Malaysia	13 (2.6)	506 (13.0)	-2 (3.9)	70 (3.6)	472 (5.7)	3 (5.1)	17 (2.9)	455 (13.3)	-1 (4.3)
Qatar	12 (0.1)	316 (2.8)	◊ ◊	67 (0.2)	311 (1.7)	◊ ◊	21 (0.1)	289 (2.1)	◊ ◊
Colombia	12 (2.4)	421 (10.5)	◊ ◊	47 (5.4)	382 (6.3)	◊ ◊	42 (5.1)	367 (5.1)	◊ ◊
Palestinian Nat'l Auth.	12 (2.8)	381 (14.3)	4 (3.7)	58 (3.9)	368 (4.9)	-8 (5.4)	30 (3.0)	360 (7.2)	4 (4.4)
Bosnia and Herzegovina	11 (2.5)	451 (12.3)	◊ ◊	57 (4.3)	461 (3.9)	◊ ◊	32 (3.9)	448 (4.5)	◊ ◊
Iran, Islamic Rep. of	10 (2.1)	461 (12.8)	-2 (3.4)	47 (3.9)	416 (6.3)	12 (5.3) ▲	43 (3.6)	376 (4.2)	-10 (5.3)
Bulgaria	10 (1.8)	512 (23.5)	9 (2.0) ▲	47 (3.7)	475 (7.9)	-10 (5.6)	43 (3.5)	441 (6.9)	2 (5.4)
Romania	10 (2.2)	492 (13.4)	0 (3.4)	57 (3.7)	467 (5.6)	-2 (5.5)	34 (3.6)	444 (7.9)	2 (5.3)
Cyprus	9 (1.9)	458 (6.2)	-5 (2.7)	67 (2.7)	467 (2.2)	-1 (3.6)	23 (2.1)	462 (4.1)	6 (2.8) ▲
Jordan	9 (2.6)	478 (12.0)	2 (3.7)	58 (4.4)	439 (5.7)	3 (6.1)	32 (3.9)	391 (6.9)	-6 (5.7)
Hong Kong SAR	9 (2.7)	646 (13.7)	2 (3.7)	67 (4.3)	579 (6.0)	9 (5.6)	24 (3.8)	531 (13.8)	-11 (5.1) ▼
Korea, Rep. of s	9 (2.0)	625 (10.0)	2 (2.8)	61 (3.4)	600 (3.6)	0 (5.1)	30 (3.1)	583 (4.8)	-2 (4.7)
Ukraine	8 (2.3)	523 (15.7)	◊ ◊	80 (3.3)	459 (4.0)	◊ ◊	12 (2.5)	438 (10.4)	◊ ◊
Thailand	8 (2.3)	454 (25.2)	◊ ◊	69 (3.7)	445 (6.5)	◊ ◊	23 (3.4)	425 (8.5)	◊ ◊
Kuwait r	8 (2.4)	355 (14.0)	◊ ◊	71 (3.6)	355 (3.1)	◊ ◊	21 (3.1)	357 (7.4)	◊ ◊
Japan	7 (2.1)	586 (12.4)	2 (2.7)	61 (3.7)	578 (3.4)	-9 (5.3)	32 (3.7)	552 (4.3)	7 (5.2)
Sweden	7 (1.4)	514 (6.7)	-3 (2.9)	72 (3.2)	492 (2.4)	5 (4.8)	21 (2.9)	483 (5.0)	-2 (4.3)
Serbia	7 (1.8)	492 (10.1)	-1 (2.7)	67 (3.6)	493 (3.6)	-1 (5.4)	26 (3.5)	467 (7.1)	2 (5.1)
Slovenia	6 (1.2)	522 (10.2)	2 (2.1)	70 (3.0)	502 (2.6)	-9 (4.7)	24 (2.9)	493 (4.9)	7 (4.4)
Norway	5 (1.7)	473 (6.9)	-3 (2.7)	85 (2.6)	471 (2.3)	3 (4.0)	10 (2.3)	455 (3.9)	0 (3.3)
Hungary	4 (1.4)	541 (21.2)	1 (2.0)	75 (3.3)	519 (4.3)	-7 (4.4)	20 (3.0)	502 (7.1)	6 (3.9)
Turkey	4 (1.6)	503 (21.0)	◊ ◊	42 (4.2)	453 (9.0)	◊ ◊	54 (4.1)	410 (5.4)	◊ ◊
Tunisia	4 (1.6)	446 (18.4)	-2 (2.4)	37 (4.0)	428 (4.6)	-13 (5.8) ▼	59 (4.1)	415 (2.8)	15 (5.9) ▲
Botswana	4 (1.5)	417 (15.0)	0 (2.2)	42 (4.7)	374 (4.6)	13 (6.4) ▲	55 (4.7)	351 (3.0)	-13 (6.5) ▼
Lithuania	3 (1.3)	522 (16.4)	-2 (2.1)	81 (2.7)	507 (2.6)	-5 (4.0)	16 (2.5)	498 (6.4)	7 (3.4) ▲
Italy	3 (1.1)	477 (29.4)	-1 (2.1)	55 (3.6)	488 (3.9)	6 (5.6)	42 (3.7)	470 (4.4)	-5 (5.4)
Armenia	3 (1.0)	501 (8.4)	-7 (2.4) ▼	64 (3.7)	498 (4.2)	4 (5.4)	33 (3.7)	500 (6.7)	2 (5.2)
Algeria	2 (1.2)	~ ~	◊ ◊	46 (4.7)	390 (3.0)	◊ ◊	52 (4.6)	384 (2.6)	◊ ◊
Russian Federation	2 (0.9)	~ ~	1 (1.1)	67 (3.2)	516 (5.1)	8 (5.3)	31 (3.3)	501 (6.2)	-9 (5.2)
Georgia	1 (0.9)	~ ~	◊ ◊	54 (5.2)	420 (7.6)	◊ ◊	45 (5.3)	398 (9.2)	◊ ◊
Czech Republic	0 (0.5)	~ ~	◊ ◊	46 (3.3)	517 (4.1)	◊ ◊	53 (3.2)	492 (3.3)	◊ ◊
¶ Morocco	8 (2.7)	439 (23.8)	- -	30 (5.5)	391 (8.7)	- -	62 (5.6)	374 (4.7)	- -
International Avg.	11 (0.3)	478 (2.0)		60 (0.5)	455 (0.7)		29 (0.5)	433 (1.1)	
Benchmarking Participants									
Dubai, UAE s	44 (4.1)	485 (6.9)	◊ ◊	47 (5.0)	440 (7.7)	◊ ◊	9 (2.8)	418 (20.0)	◊ ◊
Ontario, Canada	32 (4.9)	536 (4.9)	7 (6.8)	51 (5.3)	516 (4.0)	-10 (7.2)	17 (3.8)	487 (10.9)	2 (5.2)
Massachusetts, US	32 (5.6)	576 (7.3)	◊ ◊	50 (6.9)	539 (9.2)	◊ ◊	18 (4.5)	511 (16.0)	◊ ◊
British Columbia, Canada	24 (3.8)	535 (6.6)	◊ ◊	65 (4.0)	503 (3.7)	◊ ◊	11 (2.4)	497 (13.7)	◊ ◊
Basque Country, Spain	13 (3.7)	518 (8.6)	6 (4.6)	66 (5.1)	506 (3.3)	3 (7.1)	21 (3.5)	466 (6.9)	-10 (6.0)
Quebec, Canada	12 (3.5)	596 (14.3)	-2 (4.5)	49 (4.2)	532 (4.2)	-15 (6.1) ▼	39 (3.8)	505 (5.9)	17 (5.5) ▲
Minnesota, US	10 (3.8)	553 (16.8)	◊ ◊	67 (6.7)	538 (5.0)	◊ ◊	22 (6.4)	502 (15.2)	◊ ◊

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

Index based on teachers' responses to eight questions about their schools: teachers' job satisfaction; teachers' understanding of the school's curricular goals; teachers' degree of success in implementing the school's curriculum; teachers' expectations for student achievement; parental support for student achievement; parental involvement in school activities; students' regard for school property; and students' desire to do well in school. Average is computed based on a 5-point scale: 1 = very high; 2 = high; 3 = medium; 4 = low; and 5 = very low. High level indicates average is less than or equal to 2. Medium level indicates that average is greater than 2 and less or equal to 3. Low level indicates average is greater than 3.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 8.34 Index of mathematics teachers' perception of safety in school with trends, grade 8

TIMSS2007 Mathematics 8th Grade

Country	High TPSS			Medium TPSS			Low TPSS		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Norway	94 (1.4)	469 (1.9)	6 (2.9) ▲	6 (1.4)	460 (7.2)	-6 (2.9) ▼	0 (0.0)	~ ~	0 (0.0)
Singapore	93 (1.2)	597 (4.0)	1 (1.9)	6 (1.1)	539 (16.3)	-1 (1.8)	1 (0.6)	~ ~	0 (0.8)
Hungary	91 (2.1)	517 (3.8)	4 (3.3)	7 (1.7)	527 (12.2)	-3 (2.7)	2 (1.1)	~ ~	-1 (1.7)
Indonesia	91 (2.7)	407 (4.9)	7 (3.7)	8 (2.6)	402 (16.3)	-4 (3.3)	1 (0.7)	~ ~	-3 (1.8)
Qatar	90 (0.1)	308 (1.3)	◊ ◊	8 (0.1)	294 (4.5)	◊ ◊	1 (0.0)	~ ~	◊ ◊
Australia	89 (2.0)	504 (3.8)	8 (3.9)	10 (1.8)	448 (11.9)	-5 (3.5)	1 (0.8)	~ ~	-3 (1.7)
Hong Kong SAR	89 (2.8)	581 (6.0)	10 (4.5) ▲	10 (2.6)	509 (24.4)	-11 (4.4) ▼	1 (1.0)	~ ~	1 (1.0)
Kuwait r	89 (2.8)	358 (2.7)	◊ ◊	8 (2.6)	343 (10.2)	◊ ◊	4 (1.5)	357 (14.1)	◊ ◊
Lithuania	89 (2.4)	507 (2.6)	4 (3.4)	8 (2.0)	488 (8.3)	-5 (3.1)	3 (1.4)	496 (11.6)	1 (1.7)
Czech Republic	89 (2.7)	505 (2.8)	◊ ◊	11 (2.7)	492 (3.4)	◊ ◊	0 (0.0)	~ ~	◊ ◊
Thailand	88 (2.4)	442 (5.7)	◊ ◊	10 (2.4)	452 (15.3)	◊ ◊	3 (0.8)	402 (11.7)	◊ ◊
Oman	87 (3.1)	375 (3.5)	◊ ◊	12 (3.2)	353 (12.5)	◊ ◊	1 (0.6)	~ ~	◊ ◊
Egypt	87 (2.7)	393 (3.6)	0 (3.9)	11 (2.6)	381 (13.9)	4 (3.4)	2 (0.8)	~ ~	-3 (2.1)
Georgia	87 (3.9)	411 (5.7)	◊ ◊	12 (3.8)	406 (24.9)	◊ ◊	1 (0.0)	~ ~	◊ ◊
Syrian Arab Republic	87 (3.0)	396 (4.1)	◊ ◊	11 (2.8)	393 (14.6)	◊ ◊	2 (1.1)	~ ~	◊ ◊
Bahrain	87 (1.7)	397 (1.8)	-1 (2.1)	12 (1.7)	392 (5.3)	1 (2.4)	2 (0.0)	~ ~	0 (1.1)
Ukraine	86 (2.9)	463 (4.3)	◊ ◊	13 (2.8)	458 (10.1)	◊ ◊	0 (0.4)	~ ~	◊ ◊
Bosnia and Herzegovina	85 (3.2)	456 (3.0)	◊ ◊	11 (2.6)	460 (8.4)	◊ ◊	3 (1.6)	465 (12.9)	◊ ◊
Israel r	85 (2.5)	473 (5.6)	5 (3.8)	13 (2.3)	422 (10.4)	-6 (3.6)	3 (1.2)	444 (27.6)	1 (1.4)
Sweden	83 (2.4)	494 (2.5)	1 (3.9)	16 (2.4)	478 (5.8)	-1 (3.9)	0 (0.0)	~ ~	0 (0.4)
Bulgaria	81 (3.2)	464 (5.8)	12 (4.9) ▲	17 (3.0)	462 (10.9)	-10 (4.6) ▼	2 (1.1)	~ ~	-2 (1.9)
Lebanon	80 (3.5)	458 (5.2)	1 (5.4)	18 (3.7)	415 (7.6)	-1 (5.5)	2 (1.1)	~ ~	0 (1.5)
England r	79 (3.3)	518 (5.2)	10 (7.8)	18 (2.9)	493 (14.0)	-6 (6.6)	2 (1.4)	~ ~	-4 (3.8)
Russian Federation	79 (2.7)	513 (4.9)	18 (4.4) ▲	19 (2.6)	513 (9.1)	-16 (4.5) ▼	2 (1.0)	~ ~	-2 (1.7)
Malaysia	79 (3.4)	478 (5.9)	-5 (4.7)	18 (3.2)	456 (11.0)	3 (4.5)	4 (1.6)	465 (28.2)	3 (1.8)
Tunisia	79 (3.7)	421 (2.9)	1 (5.2)	16 (3.1)	418 (5.7)	-4 (4.7)	6 (1.9)	426 (8.9)	3 (2.4)
Italy	78 (2.9)	482 (3.4)	10 (4.4) ▲	18 (2.6)	472 (7.3)	-5 (3.9)	4 (1.3)	463 (10.7)	-5 (2.5)
United States	78 (2.2)	515 (3.3)	-6 (3.1)	19 (2.2)	488 (7.2)	3 (3.1)	3 (0.9)	482 (17.7)	3 (1.0) ▲
Serbia	77 (3.4)	487 (3.6)	-4 (5.0)	20 (3.2)	476 (8.2)	8 (4.3)	3 (1.2)	500 (32.0)	-4 (2.5)
Slovenia	77 (2.4)	503 (2.7)	7 (4.8)	20 (2.1)	493 (5.1)	-6 (4.5)	3 (0.9)	507 (14.2)	-1 (1.7)
Cyprus	77 (2.3)	465 (2.0)	-2 (2.8)	20 (2.3)	465 (5.2)	1 (2.7)	3 (0.9)	475 (7.9)	0 (1.1)
Saudi Arabia	77 (3.2)	332 (3.3)	- -	18 (2.9)	315 (6.5)	- -	5 (1.7)	326 (8.0)	- -
Jordan	77 (3.3)	429 (5.1)	-1 (4.7)	17 (3.1)	424 (8.9)	1 (4.5)	6 (2.0)	417 (20.8)	0 (3.0)
Iran, Islamic Rep. of	77 (2.9)	409 (4.6)	5 (4.8)	18 (2.9)	390 (9.5)	-7 (4.5)	6 (1.7)	367 (16.7)	2 (2.3)
Romania	75 (3.7)	468 (4.6)	-4 (5.3)	21 (3.4)	442 (10.0)	5 (4.8)	4 (1.4)	458 (14.6)	-1 (2.3)
Turkey	72 (4.0)	438 (6.3)	◊ ◊	20 (3.4)	415 (8.9)	◊ ◊	7 (2.4)	414 (12.7)	◊ ◊
Scotland	72 (3.5)	488 (4.5)	13 (5.4) ▲	27 (3.5)	485 (8.6)	-7 (5.4)	1 (0.5)	~ ~	-6 (2.5) ▼
Korea, Rep. of s	70 (3.3)	599 (3.5)	19 (4.9) ▲	25 (3.0)	596 (5.5)	-11 (4.6) ▼	6 (1.7)	581 (11.5)	-8 (3.3) ▼
Chinese Taipei	69 (4.3)	600 (5.6)	-1 (5.5)	27 (4.1)	594 (8.9)	0 (5.2)	4 (1.5)	599 (19.4)	0 (2.2)
Palestinian Nat'l Auth.	68 (3.8)	372 (4.3)	17 (6.0) ▲	24 (3.5)	355 (8.7)	-12 (5.5) ▼	8 (2.2)	352 (19.1)	-5 (3.8)
Japan	68 (3.9)	575 (3.0)	14 (5.6) ▲	25 (3.6)	568 (4.9)	-9 (5.3)	7 (2.3)	538 (13.8)	-5 (3.7)
Malta	65 (0.2)	498 (1.3)	◊ ◊	23 (0.2)	462 (2.4)	◊ ◊	12 (0.1)	489 (3.3)	◊ ◊
Algeria	62 (4.4)	384 (3.1)	◊ ◊	28 (4.0)	390 (3.3)	◊ ◊	9 (2.4)	396 (5.8)	◊ ◊
El Salvador	58 (4.1)	342 (4.2)	◊ ◊	26 (4.1)	338 (7.2)	◊ ◊	16 (3.2)	335 (5.7)	◊ ◊
Colombia	52 (4.9)	383 (5.4)	◊ ◊	35 (5.7)	382 (7.5)	◊ ◊	13 (3.4)	362 (9.3)	◊ ◊
Ghana	41 (3.8)	328 (7.7)	1 (6.0)	43 (4.1)	299 (7.0)	-3 (6.2)	16 (3.0)	280 (9.6)	2 (4.3)
Botswana	37 (4.2)	369 (4.5)	15 (5.6) ▲	39 (4.6)	365 (4.9)	-7 (6.6)	24 (3.6)	354 (4.7)	-8 (5.9)
Armenia	35 (3.6)	497 (4.8)	-42 (4.8) ▼	29 (4.0)	499 (5.4)	8 (5.0)	36 (3.6)	500 (7.0)	34 (3.7) ▲
Morocco	50 (5.4)	399 (5.1)	- -	33 (4.7)	368 (3.5)	- -	18 (4.1)	375 (10.3)	- -
International Avg	77 (0.5)	454 (0.6)		18 (0.4)	440 (1.5)		5 (0.2)	435 (2.8)	
Benchmarking Participants									
Dubai, UAE s	95 (2.6)	460 (3.1)	◊ ◊	5 (2.6)	418 (16.8)	◊ ◊	0 (0.0)	~ ~	◊ ◊
Basque Country, Spain	89 (2.3)	502 (3.1)	16 (5.3) ▲	11 (2.3)	483 (8.9)	-15 (5.3) ▼	0 (0.0)	~ ~	-1 (1.0)
Ontario, Canada	86 (3.2)	521 (3.4)	2 (4.2)	13 (3.1)	494 (13.4)	1 (4.5)	1 (0.4)	~ ~	-2 (1.6)
British Columbia, Canada	86 (3.1)	511 (3.7)	◊ ◊	14 (3.1)	512 (10.6)	◊ ◊	0 (0.0)	~ ~	◊ ◊
Minnesota, US r	84 (6.2)	533 (5.9)	◊ ◊	15 (6.0)	530 (28.2)	◊ ◊	1 (0.1)	~ ~	◊ ◊
Quebec, Canada	83 (3.1)	535 (4.1)	-10 (3.7) ▼	16 (3.0)	502 (9.9)	10 (3.7) ▲	2 (0.9)	~ ~	0 (1.5)
Massachusetts, US	77 (4.6)	551 (6.7)	◊ ◊	21 (4.3)	538 (15.7)	◊ ◊	2 (1.9)	~ ~	◊ ◊

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

ndex based on teachers' responses to three statements about their schools: this school is located in a safe neighborhood; I feel safe at this school; and this school's security policies and ractices are sufficient. High level indicates that the teacher agrees a lot or agrees to all three statements. Low level indicates that teacher disagrees or disagrees a lot to all three tatements. Medium level includes all other combinations of responses.

Did not satisfy guidelines for sample participation rates (see Appendix A).

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

dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

n "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

diamond (◊) indicates the country did not participate in the assessment.

Exhibit 8.35 Index of availability of school resources for mathematics instruction, grade 8

TIMSS2007 Mathematics 8th Grade

Country	High ASRMI		Medium ASRMI		Low ASRMI	
	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement	2007 Percent of Students	Average Achievement
Singapore	91 (0.0)	593 (4.1)	9 (0.0)	588 (12.1)	0 (0.0)	~ ~
Hong Kong SAR	70 (3.8)	571 (7.3)	30 (3.8)	571 (10.9)	0 (0.0)	~ ~
Slovenia	63 (4.4)	502 (2.5)	37 (4.4)	501 (3.9)	0 (0.0)	~ ~
Czech Republic	62 (3.9)	503 (3.6)	38 (3.9)	505 (3.6)	0 (0.0)	~ ~
Australia	55 (3.8)	514 (6.2)	43 (3.9)	476 (6.0)	2 (1.0)	~ ~
Malta	54 (0.2)	494 (1.5)	42 (0.2)	479 (1.7)	4 (0.1)	486 (4.6)
United States	51 (3.6)	512 (4.4)	45 (3.7)	505 (4.6)	4 (1.4)	490 (17.1)
Japan	51 (4.2)	574 (4.4)	49 (4.2)	565 (3.6)	0 (0.0)	~ ~
Hungary	49 (4.7)	523 (6.0)	48 (4.8)	512 (5.6)	3 (1.4)	498 (7.8)
Sweden	49 (4.3)	489 (3.3)	50 (4.2)	494 (2.9)	1 (1.1)	~ ~
Scotland	48 (4.5)	485 (5.5)	51 (4.6)	491 (6.7)	1 (1.0)	~ ~
Malaysia	42 (4.3)	481 (7.5)	45 (4.5)	463 (7.1)	13 (2.5)	486 (14.4)
Lebanon	37 (4.5)	469 (7.7)	60 (4.3)	435 (4.9)	3 (2.8)	406 (77.7)
Israel	36 (4.4)	481 (8.1)	59 (4.6)	456 (5.9)	5 (1.4)	468 (15.0)
Chinese Taipei	36 (3.8)	598 (7.7)	58 (3.9)	598 (6.1)	6 (2.5)	602 (15.2)
England	34 (3.7)	511 (8.4)	61 (3.9)	518 (6.8)	5 (1.7)	487 (8.4)
Korea, Rep. of	30 (3.9)	593 (4.8)	69 (3.9)	599 (3.2)	1 (0.0)	~ ~
Bulgaria	29 (3.6)	474 (9.0)	65 (3.6)	458 (7.4)	6 (2.3)	477 (20.5)
Russian Federation	28 (2.8)	525 (6.8)	67 (3.2)	509 (4.8)	5 (1.7)	480 (13.0)
Qatar	28 (0.1)	326 (2.5)	70 (0.1)	300 (1.4)	3 (0.1)	301 (6.8)
Egypt	27 (3.7)	402 (8.4)	68 (3.9)	387 (5.0)	6 (2.0)	371 (17.6)
Italy	25 (3.4)	479 (4.7)	73 (3.7)	479 (4.0)	3 (1.3)	495 (4.3)
Bahrain	24 (0.2)	419 (3.5)	72 (0.2)	391 (1.9)	4 (0.1)	392 (7.5)
Lithuania	22 (3.9)	504 (6.0)	76 (3.8)	506 (3.0)	2 (1.2)	~ ~
Norway	22 (3.8)	480 (4.2)	76 (3.9)	466 (2.1)	2 (1.2)	~ ~
Jordan	21 (3.3)	439 (9.4)	70 (3.7)	423 (5.6)	9 (2.0)	428 (18.4)
Palestinian Nat'l Auth.	19 (3.2)	390 (5.9)	67 (3.8)	366 (4.4)	14 (2.7)	340 (11.7)
Armenia	19 (3.3)	489 (7.1)	73 (3.6)	501 (4.3)	8 (2.1)	500 (6.3)
Romania	19 (3.3)	456 (13.5)	75 (3.5)	466 (4.9)	6 (2.2)	432 (26.9)
Colombia	16 (3.5)	399 (13.8)	52 (5.0)	387 (4.4)	31 (4.1)	354 (7.1)
Oman	16 (3.0)	381 (7.5)	65 (4.1)	373 (4.5)	19 (3.4)	364 (8.6)
Serbia	15 (3.1)	504 (10.9)	70 (4.1)	487 (3.8)	15 (2.8)	462 (10.0)
Kuwait	14 (3.0)	360 (8.1)	79 (3.7)	352 (2.9)	7 (2.5)	357 (9.6)
El Salvador	13 (2.6)	381 (8.6)	63 (3.8)	337 (4.2)	24 (3.6)	327 (5.5)
Thailand	13 (2.5)	494 (17.0)	66 (3.7)	433 (5.4)	21 (3.2)	438 (12.5)
Ukraine	13 (2.9)	481 (14.3)	77 (3.8)	460 (4.2)	11 (2.8)	458 (10.4)
Syrian Arab Republic	12 (2.7)	393 (9.9)	82 (3.2)	394 (4.9)	6 (2.0)	398 (19.1)
Cyprus	12 (0.2)	467 (4.1)	79 (0.2)	464 (1.9)	9 (0.1)	466 (5.2)
Algeria	11 (2.6)	387 (6.3)	80 (3.5)	387 (2.5)	9 (2.8)	387 (5.9)
Ghana	11 (2.7)	273 (13.9)	77 (3.7)	314 (5.0)	12 (2.6)	313 (12.1)
Iran, Islamic Rep. of	11 (2.2)	460 (14.8)	72 (3.2)	401 (4.6)	18 (2.7)	379 (9.7)
Saudi Arabia	8 (2.0)	346 (14.3)	77 (3.9)	329 (3.3)	15 (3.6)	319 (8.3)
Turkey	8 (2.3)	500 (17.4)	67 (4.2)	435 (6.0)	25 (3.9)	403 (10.3)
Georgia	7 (2.2)	407 (10.3)	77 (4.9)	411 (7.0)	17 (4.5)	404 (18.3)
Bosnia and Herzegovina	6 (1.8)	473 (16.8)	74 (3.6)	455 (2.9)	20 (3.3)	451 (8.1)
Indonesia	6 (2.0)	458 (21.1)	61 (4.5)	401 (5.8)	33 (4.2)	380 (7.7)
Tunisia	6 (1.6)	433 (9.3)	73 (3.4)	420 (2.8)	21 (3.2)	418 (5.7)
Botswana	4 (1.7)	386 (20.3)	65 (3.6)	361 (3.2)	30 (3.7)	362 (4.4)
¶ Morocco	3 (0.7)	465 (9.2)	48 (6.0)	382 (4.6)	49 (6.0)	372 (4.9)
International Avg.	27 (0.5)	464 (1.4)	62 (0.5)	449 (0.9)	10 (0.4)	420 (2.8)
Benchmarking Participants						
Dubai, UAE s	72 (0.5)	477 (3.7)	25 (0.5)	432 (4.0)	3 (0.1)	399 (7.5)
Basque Country, Spain	69 (4.5)	498 (4.2)	30 (4.6)	502 (4.8)	0 (0.3)	~ ~
British Columbia, Canada	57 (4.8)	511 (4.4)	41 (4.8)	508 (4.9)	2 (1.3)	~ ~
Quebec, Canada	53 (4.9)	545 (6.2)	46 (4.9)	510 (4.6)	1 (0.4)	~ ~
Massachusetts, US	48 (6.8)	561 (8.6)	49 (7.2)	531 (9.4)	2 (2.3)	~ ~
Minnesota, US	48 (9.1)	532 (8.6)	45 (8.7)	536 (4.0)	7 (4.4)	507 (8.9)
Ontario, Canada	36 (4.7)	523 (4.9)	61 (4.8)	516 (4.6)	4 (2.3)	553 (16.2)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on principals' average response to five questions about shortages that affect general capacity to provide instruction: instructional materials (e.g., textbook); budget for supplies (e.g., paper, pencils); school buildings and grounds; heating/cooling and lighting systems; and instructional space (e.g., classrooms); and the average response to five questions about shortages that affect mathematics instruction: computers for mathematics instruction; computer software for mathematics instruction; calculators for mathematics instruction; library materials relevant to mathematics instruction; and audio-visual resources for mathematics instruction. Averages are computed based on a 4-point scale: 1 = none; 2 = a little; 3 = some; and 4 = a lot. High level indicates that both averages are less than 2. Low level indicates that both averages are greater than or equal to 3. Medium level includes all other possible combinations of responses.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

A tilde (~) indicates insufficient data to report achievement.

An "s" indicates data are available for at least 50 but less than 70% of the students.

Exhibit 8.36 Index of teachers' reports on teaching mathematics classes with few or no limitations on instruction due to student factors, grade 8

TIMSS2007 Mathematics 8th Grade

Country	High MCFL (Few or No Limitations)			Medium MCFL (Some Limitations)			Low MCFL (A Lot of Limitations)		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Scotland	71 (2.9)	505 (4.6)	3 (5.3)	21 (2.3)	451 (6.7)	-5 (4.5)	8 (2.0)	435 (13.8)	2 (2.8)
England	64 (3.3)	541 (6.0)	13 (6.6)	31 (3.3)	476 (6.2)	-9 (6.3)	5 (1.5)	398 (10.9)	-4 (3.3)
Armenia	62 (3.9)	499 (4.1)	33 (5.7) ▲	25 (3.8)	502 (8.2)	-19 (5.3) ▼	13 (2.2)	492 (6.5)	-14 (4.1) ▼
Hungary	62 (3.9)	529 (4.9)	4 (5.6)	28 (3.4)	502 (6.8)	-11 (5.3) ▼	10 (2.1)	486 (10.0)	7 (2.5) ▲
Japan	55 (4.0)	580 (3.2)	-8 (5.7)	33 (3.7)	563 (3.9)	1 (5.2)	11 (2.4)	544 (9.9)	7 (3.0) ▲
Ukraine	54 (3.7)	473 (5.4)	◊ ◊	32 (3.8)	452 (6.4)	◊ ◊	14 (2.9)	439 (9.6)	◊ ◊
Slovenia	53 (2.8)	506 (3.3)	14 (4.9) ▲	36 (2.6)	499 (3.4)	-4 (4.6)	10 (1.7)	482 (10.1)	-10 (3.7) ▼
Qatar	50 (0.2)	316 (2.0)	◊ ◊	36 (0.2)	301 (1.9)	◊ ◊	13 (0.1)	281 (3.5)	◊ ◊
United States	49 (2.7)	531 (4.0)	0 (4.0)	35 (2.6)	489 (4.3)	3 (4.0)	15 (2.0)	477 (6.3)	-3 (2.8)
Sweden	49 (3.0)	503 (2.8)	-13 (4.5) ▼	37 (2.9)	485 (3.2)	8 (4.3)	14 (2.2)	470 (6.3)	5 (2.9)
Lebanon	48 (4.8)	452 (6.3)	10 (6.4)	35 (4.4)	453 (7.5)	-13 (6.1) ▼	17 (4.0)	427 (11.5)	3 (4.9)
Colombia	46 (5.3)	385 (5.5)	◊ ◊	26 (4.2)	376 (6.4)	◊ ◊	27 (3.9)	369 (6.5)	◊ ◊
Saudi Arabia	45 (4.3)	333 (4.6)	- -	37 (3.7)	319 (5.0)	- -	18 (3.3)	335 (7.1)	- -
Czech Republic	45 (4.1)	521 (4.0)	◊ ◊	36 (4.2)	493 (5.2)	◊ ◊	19 (2.9)	482 (3.9)	◊ ◊
Georgia	43 (5.3)	418 (9.1)	◊ ◊	45 (5.3)	410 (5.8)	◊ ◊	12 (4.2)	383 (21.2)	◊ ◊
Australia	43 (4.4)	529 (6.8)	2 (5.9)	33 (3.7)	480 (5.7)	-9 (5.4)	24 (3.2)	468 (8.0)	6 (4.6)
Egypt	42 (3.9)	403 (6.1)	-39 (4.9) ▼	41 (3.8)	387 (5.2)	23 (4.7) ▲	17 (2.7)	366 (11.1)	16 (2.7) ▲
Malaysia	41 (3.5)	503 (8.0)	-21 (5.2) ▼	37 (3.7)	454 (7.0)	5 (5.3)	22 (3.5)	452 (10.6)	16 (3.9) ▲
Norway	41 (3.6)	469 (3.5)	11 (5.4) ▲	48 (4.0)	470 (2.5)	-10 (5.9)	12 (2.0)	461 (4.3)	-1 (3.5)
Oman	40 (4.5)	383 (5.7)	◊ ◊	47 (4.3)	369 (5.5)	◊ ◊	13 (3.1)	350 (11.9)	◊ ◊
Korea, Rep. of s	40 (3.5)	603 (4.9)	6 (4.8)	48 (3.6)	599 (4.4)	-2 (5.1)	12 (2.4)	573 (8.0)	-4 (3.7)
Syrian Arab Republic	39 (4.0)	401 (6.0)	◊ ◊	35 (4.0)	385 (7.0)	◊ ◊	25 (4.0)	398 (7.5)	◊ ◊
Jordan	39 (4.0)	445 (8.1)	14 (5.6) ▲	36 (4.5)	422 (7.3)	-12 (6.6)	26 (3.7)	406 (9.5)	-2 (5.4)
Malta	38 (0.2)	525 (1.8)	◊ ◊	30 (0.2)	465 (1.9)	◊ ◊	33 (0.2)	465 (2.0)	◊ ◊
El Salvador	38 (3.8)	349 (6.3)	◊ ◊	40 (4.3)	329 (5.2)	◊ ◊	22 (4.1)	337 (4.7)	◊ ◊
Serbia	37 (4.0)	488 (6.0)	-1 (5.7)	49 (4.1)	488 (4.6)	6 (5.9)	15 (2.6)	477 (4.7)	-5 (4.1)
Bulgaria	36 (3.4)	480 (10.2)	9 (5.0)	46 (3.1)	454 (6.7)	-1 (5.3)	18 (3.3)	454 (11.2)	-8 (5.0)
Lithuania	36 (3.4)	520 (4.9)	-32 (5.0) ▼	48 (3.6)	502 (4.0)	17 (5.1) ▲	15 (2.7)	485 (5.6)	15 (2.7) ▲
Russian Federation	36 (2.6)	524 (6.4)	4 (4.0)	36 (3.5)	513 (6.5)	-7 (5.1)	27 (3.0)	496 (6.0)	3 (4.3)
Indonesia	34 (4.5)	402 (10.1)	-1 (6.0)	40 (4.4)	410 (8.8)	-2 (6.2)	26 (4.0)	404 (8.6)	3 (5.4)
Ghana	33 (4.2)	335 (9.0)	2 (6.1)	41 (4.4)	297 (7.3)	1 (6.4)	25 (3.7)	298 (10.2)	-3 (5.5)
Singapore	33 (2.7)	636 (6.1)	-4 (3.7)	43 (3.0)	591 (6.1)	4 (4.0)	24 (2.0)	535 (11.4)	0 (3.4)
Israel r	31 (3.5)	493 (6.8)	-9 (5.0)	45 (3.4)	464 (7.8)	10 (5.0)	25 (3.2)	438 (12.1)	0 (4.5)
Romania	30 (3.5)	470 (7.8)	-2 (5.1)	40 (4.1)	458 (7.1)	-2 (5.7)	30 (3.7)	460 (7.1)	4 (5.1)
Bosnia and Herzegovina	30 (3.3)	458 (6.2)	◊ ◊	41 (3.6)	451 (3.7)	◊ ◊	29 (3.7)	461 (5.6)	◊ ◊
Bahrain	30 (1.9)	399 (3.2)	-43 (3.7) ▼	43 (2.6)	398 (3.1)	17 (4.1) ▲	27 (2.3)	387 (3.8)	25 (2.4) ▲
Hong Kong SAR	29 (3.8)	620 (6.7)	-4 (5.9)	39 (3.4)	575 (9.8)	2 (5.6)	32 (4.2)	521 (12.6)	2 (5.7)
Tunisia	29 (3.5)	420 (4.0)	0 (5.2)	44 (4.2)	421 (3.4)	6 (6.1)	27 (4.0)	421 (4.6)	-6 (5.8)
Palestinian Nat'l Auth.	26 (3.6)	372 (7.1)	5 (5.2)	42 (3.8)	365 (5.8)	-8 (5.8)	31 (3.5)	367 (8.2)	3 (5.3)
Kuwait r	26 (4.1)	357 (7.6)	◊ ◊	40 (4.5)	356 (4.9)	◊ ◊	34 (4.3)	352 (4.5)	◊ ◊
Algeria	23 (3.8)	390 (3.4)	◊ ◊	48 (4.0)	385 (3.0)	◊ ◊	30 (4.3)	387 (3.8)	◊ ◊
Thailand	18 (2.9)	496 (13.9)	◊ ◊	56 (4.4)	434 (7.3)	◊ ◊	26 (3.5)	418 (8.0)	◊ ◊
Cyprus	18 (2.6)	476 (4.5)	0 (3.8)	49 (2.7)	464 (2.9)	15 (3.7) ▲	33 (2.7)	460 (2.6)	-15 (3.6) ▼
Chinese Taipei	18 (3.4)	631 (8.4)	1 (4.6)	42 (3.6)	605 (6.0)	-8 (5.4)	40 (4.1)	577 (6.6)	7 (5.6)
Iran, Islamic Rep. of	16 (2.6)	423 (10.2)	-38 (4.8) ▼	39 (4.1)	412 (7.2)	-5 (5.8)	45 (3.9)	391 (5.4)	43 (4.1) ▲
Italy	14 (2.3)	493 (5.5)	-7 (4.0)	35 (2.9)	481 (4.4)	-14 (5.3) ▼	51 (3.3)	476 (4.2)	21 (4.8) ▲
Botswana	14 (2.8)	379 (7.7)	-5 (4.6)	44 (4.6)	362 (3.4)	5 (6.7)	42 (4.6)	359 (4.9)	0 (6.5)
Turkey	13 (2.4)	478 (15.8)	◊ ◊	46 (4.3)	428 (7.1)	◊ ◊	41 (4.3)	424 (7.4)	◊ ◊
¶ Morocco	31 (6.7)	396 (9.4)	- -	47 (4.7)	379 (5.0)	- -	22 (6.8)	382 (9.4)	- -
International Avg.	38 (0.5)	466 (1.0)		39 (0.5)	445 (0.8)		23 (0.5)	433 (1.2)	
Benchmarking Participants									
Massachusetts, US	64 (3.5)	566 (7.6)	◊ ◊	22 (3.6)	524 (8.9)	◊ ◊	14 (2.7)	492 (8.8)	◊ ◊
Dubai, UAE s	54 (5.2)	478 (8.8)	◊ ◊	31 (5.2)	436 (9.8)	◊ ◊	15 (3.8)	459 (11.9)	◊ ◊
Ontario, Canada	48 (5.0)	526 (4.7)	-1 (7.0)	38 (4.9)	509 (5.6)	3 (6.7)	15 (2.9)	510 (8.1)	-2 (4.6)
British Columbia, Canada	43 (4.9)	532 (6.0)	◊ ◊	41 (4.6)	498 (4.4)	◊ ◊	16 (3.1)	487 (9.0)	◊ ◊
Basque Country, Spain	36 (4.7)	508 (5.0)	6 (6.8)	33 (4.4)	504 (4.5)	-5 (6.9)	31 (4.3)	483 (4.5)	-1 (6.6)
Quebec, Canada	30 (3.5)	559 (8.5)	-36 (5.4) ▼	48 (3.6)	523 (6.1)	19 (5.5) ▲	23 (3.3)	503 (6.2)	17 (3.8) ▲
Minnesota, US	26 (5.9)	561 (7.7)	◊ ◊	55 (6.7)	527 (8.6)	◊ ◊	19 (3.9)	498 (7.5)	◊ ◊

2007 percent significantly higher ▲ 2007 percent significantly lower ▼

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on teachers' responses to five statements about student factors limiting mathematics instruction: 1) Students with different academic abilities; 2) Students who come from a wide range of backgrounds; 3) Students with special needs; 4) Uninterested students; and 5) Disruptive students. Average is computed across the five statements based on a 4-point scale: 1. Not at all/Not applicable; 2. A little; 3. Some; and 4. A lot. High level indicates average is less than or equal to 2. Medium level indicates average is greater than 2 and less than 3. Low level indicates average is greater than or equal to 3.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

Classroom practice

The mathematics teachers provided information about the various mathematics activities the grade 8 pupils in the TIMSS class take part in. Just under half did basic computations in half their lessons or more, according to their teachers' reports (see Exhibit 8.37). This was less than the international average of 65 per cent. There has been little change in teacher responses to this question since the survey in 2003.

As seen at grade 4, there is some discrepancy between teacher and pupil reports of mathematics classroom activities. A far greater percentage of pupils reported spending lesson time working on shape or data handling, compared with the reports from their teachers. According to the pupil reports, 29 per cent of pupils spend about half of their lessons or more working on shape and 30 per cent report an equivalent time on data handling, whereas teacher reports indicated that only three per cent of pupils in each case do these activities in half or more of lessons. It is not immediately clear why this discrepancy might arise, although the pupils may not categorise activities in the same way that teachers do.

In addition to reports on the content of mathematics activities, teachers we also asked to estimate the percentage of time pupils spent on particular activities in a typical week (see Exhibit 8.38). As was found in the 2003 survey, the largest percentage of time was spent in working on problems with the teacher's guidance, on average over a quarter of class time in a typical week. The trend in responses from 2003 continued: working independently without guidance (23 per cent) and listening to lecture style presentations (17 per cent) are the activities which took up a large percentage of class time. These percentages are very close to those provided to a parallel question by the grade 8 science teachers, which might suggest that the teaching and learning culture of a school may influence both subjects.

Teachers were also asked to report on the tests taken by the pupils in their grade 8 mathematics classes. According to the teacher reports, pupils only spend four per cent of mathematics lessons in a typical week taking tests. This is the same percentage as in 2003.

In addition, teachers were asked to respond to some specific questions about the tests they administer to their pupils, the frequency of test taking and the format of the tests (Exhibit 8.39). The data indicates that grade 8 pupils in England are tested much less frequently than their international counterparts. Over 50 per cent of pupils receive a mathematics test only a few times a year or more. This is over three times the international average. The percentage of pupils administered tests every two weeks or more is far below the international average (46 per cent) which suggests that the commonly held view that pupils in England are over-tested is not supported by teacher reports of mathematics test administration at grade 8. Since 2003, there has been no significant change in the frequency with which grade 8 mathematics teachers administer tests or exams to their pupils. The findings of the current TIMSS survey indicate that grade 8 pupils are tested less frequently in mathematics than they are in science, as was the case in 2003.

In terms of test format, there has been no significant change since 2003. The vast majority of England's pupils (94 per cent) are tested in only or mostly constructed response format (Exhibit 8.40). This remains the most common format for mathematics tests internationally.

Scotland is the only country that has a greater percentage of pupils in this category than England, with all Scotland's pupils tested using only or mostly constructed response questions.

As far as the use of textbooks at grade 8 mathematics is concerned, there have been no significant changes in textbook use since 2003 (Exhibit 8.41). The majority of pupils are taught in grade 8 mathematics lessons where textbooks are used as either a primary basis for lessons (43 per cent) or as a supplementary resource (46 per cent). Only 12 per cent of pupils are taught mathematics without a textbook at grade 8, compared with 21 per cent at grade 4, possibly indicating a greater reliance on mathematics textbooks in secondary schools in England.

There has been a decrease in the availability of computers in mathematics lessons, with 42 per cent of teachers reporting computers are not available. However, this reduction was not significant. Computers are mainly used to practice skills and procedures (see Exhibit 8.42). As in grade 4 mathematics, calculators continue to be commonly used in grade 8 mathematics classes, with only one per cent of grade 8 pupils not permitted to use calculators (see Exhibit 8.43). This percentage has not changed significantly since the 2003 survey. According to teachers' reports, the most common use for calculators in half the lessons or more continues to be for solving complex problems, although around a third of pupils also use them as frequently for completing routine calculations.

Exhibit 8.37 Teachers' reports on mathematics content-related emphasis in students' classroom activities, grade 8

TIMSS2007 Mathematics 8th Grade

Country	Percentage of Students Whose Teachers Reported Students Doing the Activity About Half of the Lessons or More									
	Practice Adding, Subtracting, Multiplying, and Dividing Without Using Calculator		Work on Fractions and Decimals		Write Equations and Functions to Represent Relationships		Use Knowledge of the Properties of Shapes, Lines, and Angles to Solve Problems		Interpret Data in Tables, Charts, or Graphs	
Algeria	40	(4.5)	24	(3.6)	26	(3.7)	38	(4.6)	25	(3.8)
Armenia	51	(3.9)	53	(3.5)	54	(4.0)	61	(3.6)	58	(3.6)
Australia	45	(3.8)	18	(3.2)	15	(2.6)	6	(1.9)	7	(1.9)
Bahrain	82	(1.5)	32	(3.2)	26	(2.2)	26	(2.4)	17	(1.9)
Bosnia and Herzegovina	63	(4.2)	55	(4.0)	36	(3.5)	33	(3.9)	12	(2.4)
Botswana	85	(3.1)	27	(3.8)	14	(3.0)	11	(3.0)	6	(2.2)
Bulgaria	82	(3.5)	71	(3.8)	38	(3.8)	88	(3.0)	15	(2.7)
Chinese Taipei	70	(3.8)	19	(3.5)	28	(3.4)	38	(4.0)	12	(2.7)
Colombia	78	(4.1)	70	(4.5)	42	(4.9)	31	(4.3)	29	(5.3)
Cyprus	71	(2.7)	34	(2.4)	47	(2.5)	31	(2.6)	10	(1.7)
Czech Republic	68	(3.3)	62	(4.4)	24	(3.5)	25	(3.4)	4	(1.7)
Egypt	44	(3.8)	33	(4.0)	28	(3.5)	40	(4.1)	13	(2.3)
El Salvador	69	(4.0)	44	(4.1)	24	(4.0)	14	(3.1)	23	(3.5)
England	48	(4.0)	17	(3.3)	9	(2.2)	3	(1.5)	3	(1.5)
Georgia	60	(4.8)	47	(4.7)	24	(3.8)	28	(4.2)	10	(2.2)
Ghana	90	(2.5)	41	(4.5)	29	(3.7)	22	(3.4)	20	(3.1)
Hong Kong SAR	22	(3.4)	11	(2.7)	31	(3.8)	18	(3.4)	11	(2.7)
Hungary	72	(3.7)	78	(3.2)	44	(4.0)	31	(3.5)	13	(2.3)
Indonesia	64	(3.3)	31	(4.0)	50	(4.4)	34	(4.3)	26	(4.2)
Iran, Islamic Rep. of	70	(3.8)	41	(3.6)	19	(2.9)	28	(3.1)	21	(3.5)
Israel	r 51	(3.7)	r 31	(3.3)	r 44	(4.1)	r 38	(3.8)	r 12	(2.0)
Italy	58	(3.6)	65	(3.4)	27	(2.9)	74	(2.9)	20	(2.5)
Japan	53	(4.1)	16	(2.7)	63	(3.7)	54	(3.7)	23	(3.4)
Jordan	75	(3.3)	55	(4.1)	51	(4.2)	36	(3.9)	19	(3.4)
Korea, Rep. of	53	(3.5)	31	(3.4)	64	(3.4)	56	(3.8)	30	(3.6)
Kuwait	r 71	(4.5)	r 35	(4.1)	r 27	(4.2)	r 24	(4.2)	r 22	(4.1)
Lebanon	55	(3.7)	48	(4.8)	42	(4.8)	64	(4.3)	30	(3.9)
Lithuania	69	(3.1)	70	(3.4)	22	(3.2)	27	(3.1)	12	(2.4)
Malaysia	75	(3.5)	37	(4.1)	37	(3.9)	26	(3.7)	21	(3.3)
Malta	61	(0.2)	30	(0.2)	24	(0.2)	26	(0.2)	3	(0.1)
Norway	9	(2.0)	11	(2.2)	4	(1.2)	5	(1.4)	3	(1.1)
Oman	73	(3.9)	36	(4.3)	34	(4.3)	28	(3.6)	20	(3.1)
Palestinian Nat'l Auth.	76	(3.5)	44	(4.5)	30	(4.0)	37	(4.4)	11	(2.9)
Qatar	72	(0.2)	33	(0.1)	27	(0.2)	21	(0.1)	19	(0.1)
Romania	93	(1.7)	70	(3.8)	38	(3.8)	79	(2.7)	15	(2.7)
Russian Federation	85	(2.4)	77	(3.2)	56	(3.7)	76	(2.6)	26	(3.2)
Saudi Arabia	r 76	(4.0)	r 27	(3.4)	r 39	(4.7)	r 35	(4.0)	r 27	(4.0)
Scotland	73	(3.8)	37	(3.5)	8	(1.7)	6	(1.6)	5	(1.4)
Serbia	81	(3.2)	65	(3.8)	42	(3.9)	50	(3.9)	2	(0.9)
Singapore	41	(2.8)	24	(2.5)	39	(2.7)	12	(2.1)	9	(1.5)
Slovenia	73	(2.6)	64	(3.0)	13	(1.7)	23	(2.6)	14	(1.9)
Sweden	38	(3.0)	29	(3.0)	9	(1.8)	12	(2.1)	6	(1.5)
Syrian Arab Republic	69	(3.7)	33	(4.0)	53	(4.0)	53	(4.3)	27	(3.8)
Thailand	75	(3.5)	43	(4.1)	41	(4.1)	35	(4.0)	37	(4.1)
Tunisia	75	(3.6)	47	(4.1)	26	(3.8)	45	(4.2)	10	(2.6)
Turkey	72	(4.4)	35	(4.3)	48	(4.5)	26	(3.8)	18	(3.6)
Ukraine	83	(3.2)	85	(3.1)	59	(4.3)	62	(4.1)	11	(2.4)
United States	59	(2.7)	44	(3.0)	46	(2.7)	12	(1.8)	16	(2.0)
¶ Morocco	63	(4.5)	42	(5.4)	30	(5.6)	31	(5.9)	16	(5.0)
International Avg	65	(0.5)	42	(0.5)	34	(0.5)	34	(0.5)	17	(0.4)
Benchmarking Participants										
Basque Country, Spain	76	(3.9)	62	(4.2)	35	(4.0)	12	(3.1)	12	(3.0)
British Columbia, Canada	59	(4.2)	39	(4.7)	24	(3.4)	6	(2.0)	5	(1.7)
Dubai, UAE	s 71	(5.0)	s 47	(4.0)	s 32	(4.8)	s 34	(4.9)	s 13	(3.5)
Massachusetts, US	56	(6.4)	38	(6.7)	48	(6.0)	12	(3.7)	23	(5.2)
Minnesota, US	41	(7.5)	31	(5.2)	42	(5.3)	13	(3.7)	18	(5.5)
Ontario, Canada	37	(4.0)	23	(4.1)	23	(3.6)	11	(2.2)	19	(3.1)
Quebec, Canada	22	(3.4)	42	(4.1)	48	(4.6)	20	(3.8)	14	(3.3)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

Exhibit 8.38 Percentage of time in mathematics lessons students spend on various activities in a typical week, grade 8

TIMSS2007 Mathematics 8th Grade

Country	Reviewing Homework		Listening to Lecture-style Presentations		Working Problems with Teacher's Guidance		Working Problems on Their Own Without Teacher's Guidance	
Algeria	s 11	(0.6)	s 15	(1.2)	s 21	(1.2)	s 15	(1.0)
Armenia	10	(0.4)	23	(0.9)	19	(0.6)	16	(0.6)
Australia	7	(0.3)	17	(0.8)	23	(1.0)	24	(1.2)
Bahrain	r 11	(0.3)	r 23	(0.6)	r 18	(0.7)	r 12	(0.3)
Bosnia and Herzegovina	r 7	(0.4)	r 29	(1.5)	r 24	(1.0)	r 15	(0.7)
Botswana	r 13	(0.9)	r 13	(0.8)	r 20	(1.0)	r 21	(1.2)
Bulgaria	8	(0.4)	19	(1.1)	26	(1.0)	17	(0.7)
Chinese Taipei	13	(0.6)	41	(1.3)	13	(0.6)	7	(0.4)
Colombia	10	(0.3)	17	(0.9)	21	(0.8)	17	(0.7)
Cyprus	r 20	(0.6)	r 17	(0.6)	r 23	(0.6)	r 12	(0.4)
Czech Republic	6	(0.3)	20	(0.6)	25	(0.8)	21	(0.7)
Egypt	r 10	(0.4)	r 25	(1.2)	r 17	(0.7)	r 14	(0.8)
El Salvador	10	(0.5)	13	(0.8)	22	(0.8)	20	(0.8)
England	6	(0.3)	17	(0.6)	28	(1.2)	23	(1.2)
Georgia	11	(0.5)	21	(1.0)	19	(0.6)	15	(0.7)
Ghana	r 12	(0.6)	r 16	(1.0)	r 18	(0.7)	r 15	(0.7)
Hong Kong SAR	11	(0.7)	35	(1.6)	16	(0.9)	13	(0.8)
Hungary	11	(0.4)	12	(0.7)	27	(0.9)	22	(0.8)
Indonesia	s 11	(0.5)	s 20	(1.0)	s 19	(0.9)	s 15	(0.8)
Iran, Islamic Rep. of	11	(0.5)	16	(0.8)	19	(0.8)	14	(0.7)
Israel	s 14	(0.5)	s 16	(1.0)	s 22	(0.7)	s 19	(0.8)
Italy	16	(0.6)	22	(0.6)	18	(0.6)	12	(0.4)
Japan	7	(0.4)	30	(0.8)	26	(0.9)	12	(0.9)
Jordan	12	(0.4)	19	(0.7)	18	(0.6)	15	(0.4)
Korea, Rep. of	6	(0.2)	33	(1.1)	18	(0.6)	17	(0.6)
Kuwait	s 11	(0.6)	s 21	(1.6)	s 18	(0.9)	s 14	(0.8)
Lebanon	s 22	(1.2)	s 16	(1.0)	s 20	(1.2)	s 10	(1.0)
Lithuania	9	(0.3)	9	(0.6)	26	(0.8)	25	(0.8)
Malaysia	r 13	(0.8)	r 22	(1.3)	r 18	(0.8)	r 13	(0.7)
Malta	18	(0.0)	19	(0.0)	20	(0.0)	15	(0.0)
Norway	8	(0.4)	22	(0.7)	22	(0.9)	25	(1.0)
Oman	r 11	(0.5)	r 18	(1.1)	r 20	(0.8)	r 14	(0.6)
Palestinian Nat'l Auth.	r 13	(0.7)	r 20	(0.9)	r 18	(0.7)	r 14	(0.8)
Qatar	r 11	(0.0)	r 21	(0.0)	r 20	(0.0)	r 13	(0.0)
Romania	9	(0.4)	18	(0.8)	29	(0.8)	14	(0.5)
Russian Federation	10	(0.2)	18	(0.5)	22	(0.6)	20	(0.5)
Saudi Arabia	r 12	(0.5)	r 22	(1.2)	r 17	(0.9)	r 11	(0.5)
Scotland	8	(0.4)	21	(0.6)	25	(1.2)	24	(1.1)
Serbia	6	(0.3)	24	(1.2)	26	(1.1)	20	(1.0)
Singapore	12	(0.4)	26	(0.8)	19	(0.5)	13	(0.4)
Slovenia	10	(0.3)	21	(0.5)	23	(0.6)	21	(0.6)
Sweden	4	(0.2)	15	(0.6)	33	(1.3)	r 28	(1.6)
Syrian Arab Republic	r 12	(0.6)	r 24	(1.3)	r 16	(0.8)	r 10	(0.5)
Thailand	12	(0.6)	21	(1.0)	15	(0.7)	12	(0.5)
Tunisia	s 15	(1.0)	s 13	(1.2)	s 25	(1.4)	s 16	(1.3)
Turkey	8	(0.6)	20	(1.2)	19	(1.0)	13	(0.7)
Ukraine	11	(0.4)	14	(0.7)	19	(0.6)	18	(0.6)
United States	13	(0.4)	21	(0.6)	19	(0.5)	17	(0.5)
¶ Morocco	r 11	(0.8)	r 13	(1.1)	r 21	(1.3)	r 15	(1.2)
International Avg.	11	(0.1)	20	(0.1)	21	(0.1)	16	(0.1)
Benchmarking Participants								
Basque Country, Spain	21	(1.0)	18	(1.0)	18	(0.7)	18	(1.2)
British Columbia, Canada	11	(0.4)	19	(0.6)	20	(0.8)	23	(1.0)
Dubai, UAE	s 10	(0.7)	s 18	(1.4)	s 22	(1.0)	s 18	(1.0)
Massachusetts, US	13	(0.9)	16	(1.0)	22	(1.3)	18	(0.9)
Minnesota, US	12	(0.9)	21	(1.3)	20	(2.1)	20	(1.5)
Ontario, Canada	14	(0.9)	16	(0.7)	18	(0.8)	22	(1.2)
Quebec, Canada	14	(0.7)	25	(1.3)	19	(1.0)	14	(0.6)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

Exhibit 8.38 Percentage of time in mathematics lessons students spend on various activities in a typical week, grade 8 (continued)

TIMSS2007 Mathematics 8th Grade

Country	Listening to Teacher Re-teach and Clarify Content/Procedures	Taking Tests or Quizzes	Participating in Classroom Management Tasks Not Related to the Lesson's Content / Purpose	Other Student Activities
Algeria	s 18 (1.0)	s 10 (0.8)	s 5 (0.4)	s 5 (0.6)
Armenia	11 (0.4)	10 (0.4)	5 (0.3)	5 (0.7)
Australia	10 (0.5)	7 (0.3)	8 (0.5)	4 (0.4)
Bahrain	r 15 (0.8)	r 11 (0.3)	r 6 (0.2)	r 6 (0.3)
Bosnia and Herzegovi	r 11 (0.6)	r 7 (0.5)	r 3 (0.3)	r 4 (0.5)
Botswana	r 10 (0.6)	r 10 (0.8)	r 6 (0.4)	r 6 (0.7)
Bulgaria	9 (0.4)	14 (0.6)	3 (0.3)	3 (0.3)
Chinese Taipei	10 (0.7)	8 (0.3)	5 (0.5)	3 (0.3)
Colombia	12 (0.7)	12 (0.5)	6 (0.4)	5 (0.5)
Cyprus	r 10 (0.3)	r 9 (0.2)	r 7 (0.2)	r 4 (0.3)
Czech Republic	9 (0.3)	11 (0.4)	4 (0.3)	4 (0.3)
Egypt	r 11 (0.5)	r 9 (0.4)	r 6 (0.4)	r 7 (0.4)
El Salvador	14 (0.6)	10 (0.5)	6 (0.4)	5 (0.3)
England	11 (0.7)	4 (0.3)	7 (0.5)	4 (0.5)
Georgia	11 (0.4)	12 (0.5)	5 (0.4)	6 (0.4)
Ghana	r 11 (0.6)	r 15 (0.7)	r 8 (0.5)	r 6 (0.4)
Hong Kong SAR	10 (0.4)	8 (0.4)	4 (0.4)	3 (0.4)
Hungary	9 (0.5)	11 (0.3)	4 (0.3)	4 (0.4)
Indonesia	s 11 (0.6)	s 14 (0.7)	s 6 (0.3)	s 6 (0.5)
Iran, Islamic Rep. of	16 (0.8)	11 (0.5)	7 (0.5)	7 (0.4)
Israel	s 11 (0.4)	s 10 (0.6)	s 5 (0.3)	s 3 (0.5)
Italy	14 (0.5)	11 (0.5)	5 (0.3)	3 (0.3)
Japan	14 (0.5)	7 (0.4)	2 (0.3)	2 (0.4)
Jordan	14 (0.5)	11 (0.4)	6 (0.3)	6 (0.3)
Korea, Rep. of	11 (0.5)	7 (0.4)	5 (0.3)	4 (0.3)
Kuwait	s 16 (1.1)	s 9 (0.6)	s 7 (0.6)	s 5 (0.5)
Lebanon	s 12 (0.6)	s 11 (0.5)	s 5 (0.5)	s 4 (0.4)
Lithuania	11 (0.4)	14 (0.7)	3 (0.2)	3 (0.3)
Malaysia	r 12 (0.6)	r 9 (0.4)	r 7 (0.5)	r 5 (0.4)
Malta	12 (0.0)	5 (0.0)	8 (0.0)	3 (0.0)
Norway	11 (0.4)	6 (0.2)	4 (0.3)	3 (0.3)
Oman	r 15 (0.9)	r 11 (0.6)	r 6 (0.3)	r 6 (0.4)
Palestinian Nat'l Auth.	r 13 (0.6)	r 9 (0.5)	r 6 (0.4)	r 6 (0.5)
Qatar	r 14 (0.0)	r 10 (0.0)	r 6 (0.0)	r 6 (0.0)
Romania	9 (0.3)	14 (0.7)	3 (0.2)	3 (0.3)
Russian Federation	9 (0.2)	16 (0.4)	1 (0.1)	4 (0.4)
Saudi Arabia	r 15 (0.9)	r 10 (0.5)	r 7 (0.4)	r 7 (0.4)
Scotland	8 (0.3)	3 (0.2)	6 (0.4)	4 (0.5)
Serbia	10 (0.6)	8 (0.5)	3 (0.3)	3 (0.4)
Singapore	10 (0.3)	8 (0.3)	8 (0.4)	5 (0.4)
Slovenia	11 (0.4)	5 (0.3)	4 (0.2)	4 (0.4)
Sweden	r 9 (0.3)	r 6 (0.2)	r 3 (0.2)	r 4 (0.5)
Syrian Arab Republic	r 15 (0.8)	r 12 (0.6)	r 6 (0.4)	r 6 (0.6)
Thailand	15 (0.6)	10 (0.5)	8 (0.4)	7 (0.5)
Tunisia	s 17 (1.0)	s 8 (0.7)	s 4 (0.4)	s 3 (0.3)
Turkey	14 (0.9)	8 (0.6)	10 (1.1)	8 (0.9)
Ukraine	17 (0.9)	14 (0.6)	2 (0.3)	4 (0.4)
United States	10 (0.3)	11 (0.3)	5 (0.3)	5 (0.4)
¶ Morocco	r 19 (1.4)	s 10 (0.7)	r 5 (0.5)	r 6 (0.6)
International Avg.	12 (0.1)	10 (0.1)	5 (0.1)	5 (0.1)
Benchmarking Participants				
Basque Country, Spai	11 (0.6)	7 (0.5)	5 (0.3)	3 (0.4)
British Columbia, Can	9 (0.4)	11 (0.4)	4 (0.3)	4 (0.5)
Dubai, UAE	s 10 (0.8)	s 11 (1.1)	s 5 (0.3)	x x
Massachusetts, US	12 (0.5)	10 (0.5)	4 (0.8)	4 (0.6)
Minnesota, US	8 (0.5)	10 (0.6)	5 (0.4)	3 (0.5)
Ontario, Canada	10 (0.5)	9 (0.4)	5 (0.5)	5 (0.6)
Quebec, Canada	8 (0.4)	9 (0.4)	8 (0.6)	3 (0.4)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 8.39 Frequency of teachers giving mathematics tests with trends, grade 8

TIMSS2007 Mathematics 8th Grade

Country	Percentage of Students Whose Teachers Give a Mathematics Test or Examination								
	Every 2 Weeks or More		About Once a Month		A Few Times a Year or Less	
	Percent in 2007	Difference in Percent from 2003	Percent in 2007	Difference in Percent from 2003	Percent in 2007	Difference in Percent from 2003
Algeria	35 (4.4)	◊ ◊	48 (4.3)	◊ ◊	17 (3.4)	◊ ◊
Armenia r	34 (3.6)	-5 (5.1)	29 (3.1)	-24 (5.0) ▼	37 (4.0)	29 (4.4) ▲
Australia	25 (3.2)	6 (4.8)	61 (4.1)	-3 (6.2)	14 (2.8)	-2 (4.4)
Bahrain	77 (1.9)	-7 (2.5) ▼	17 (1.4)	1 (2.2)	6 (1.4)	6 (1.4) ▲
Bosnia and Herzegovina	13 (2.5)	◊ ◊	50 (3.8)	◊ ◊	37 (4.2)	◊ ◊
Botswana	10 (2.1)	-8 (4.2)	90 (2.1)	9 (4.4) ▲	0 (0.0)	-1 (1.3)
Bulgaria	32 (3.9)	1 (5.8)	46 (4.5)	0 (6.1)	22 (3.4)	-1 (4.6)
Chinese Taipei	99 (1.2)	0 (1.5)	1 (1.2)	0 (1.3)	0 (0.2)	0 (0.2)
Colombia	93 (1.8)	◊ ◊	6 (1.6)	◊ ◊	1 (0.8)	◊ ◊
Cyprus	8 (1.6)	-1 (2.6)	80 (1.8)	1 (3.3)	11 (0.8)	0 (1.9)
Czech Republic	97 (1.5)	◊ ◊	1 (0.8)	◊ ◊	2 (1.3)	◊ ◊
Egypt	60 (4.7)	- -	37 (4.5)	- -	3 (1.4)	- -
El Salvador	63 (4.1)	◊ ◊	32 (3.9)	◊ ◊	5 (2.0)	◊ ◊
England r	9 (2.2)	1 (3.4)	38 (3.3)	0 (7.0)	53 (3.7)	0 (7.4)
Georgia	50 (5.5)	◊ ◊	34 (4.9)	◊ ◊	16 (4.9)	◊ ◊
Ghana	79 (3.5)	5 (5.2)	18 (3.4)	-6 (5.1)	2 (1.1)	2 (1.1)
Hong Kong SAR	56 (4.3)	13 (6.5)	34 (4.0)	-5 (6.2)	10 (2.7)	-8 (4.5)
Hungary	73 (3.8)	6 (5.6)	25 (3.7)	-5 (5.4)	2 (1.1)	0 (1.6)
Indonesia	54 (4.8)	10 (6.3)	41 (4.4)	-6 (6.2)	5 (2.2)	-4 (3.4)
Iran, Islamic Rep. of r	29 (3.6)	-5 (5.1)	61 (3.9)	27 (5.5) ▲	10 (1.8)	-22 (4.8) ▼
Israel r	50 (4.0)	-7 (5.7)	42 (3.9)	7 (5.3)	8 (2.0)	-1 (2.8)
Italy	27 (2.9)	-3 (4.5)	71 (2.9)	4 (4.5)	2 (0.8)	-1 (1.5)
Japan	24 (3.3)	7 (4.7)	37 (3.7)	-1 (5.7)	38 (3.8)	-6 (5.7)
Jordan	70 (4.1)	40 (5.5) ▲	27 (3.9)	-43 (5.4) ▼	3 (1.3)	3 (1.3) ▲
Korea, Rep. of s	54 (3.6)	-8 (4.9)	31 (3.3)	-1 (4.5)	14 (2.2)	10 (2.6) ▲
Kuwait r	53 (4.7)	◊ ◊	22 (3.5)	◊ ◊	25 (4.0)	◊ ◊
Lebanon	89 (3.5)	6 (4.9)	11 (3.5)	-6 (4.9)	0 (0.4)	0 (0.4)
Lithuania	73 (3.6)	-7 (4.8)	27 (3.6)	8 (4.8)	0 (0.0)	0 (0.0)
Malaysia	13 (2.8)	8 (3.1) ▲	39 (4.2)	-9 (5.7)	48 (3.8)	1 (5.5)
Malta	14 (0.2)	◊ ◊	46 (0.2)	◊ ◊	40 (0.2)	◊ ◊
Norway	6 (1.8)	0 (3.1)	72 (3.6)	8 (5.7)	21 (3.2)	-8 (5.2)
Oman	57 (3.8)	◊ ◊	41 (3.7)	◊ ◊	1 (0.8)	◊ ◊
Palestinian Nat'l Auth.	52 (3.9)	-10 (4.7) ▼	46 (3.8)	8 (4.7)	2 (1.2)	2 (1.2)
Qatar	82 (0.1)	◊ ◊	15 (0.1)	◊ ◊	3 (0.1)	◊ ◊
Romania	70 (3.6)	-3 (5.3)	27 (3.4)	2 (5.0)	2 (1.2)	0 (1.7)
Russian Federation	95 (1.6)	7 (2.9) ▲	5 (1.6)	-6 (2.8) ▼	1 (0.5)	-1 (1.0)
Saudi Arabia	45 (4.0)	- -	47 (4.3)	- -	9 (3.0)	- -
Scotland	7 (1.6)	-7 (3.6)	31 (3.4)	0 (5.6)	62 (3.7)	7 (5.9)
Serbia	25 (4.0)	10 (4.9) ▲	57 (4.4)	-9 (6.0)	18 (3.3)	-1 (4.6)
Singapore	35 (2.5)	4 (3.1)	47 (2.6)	-10 (3.5) ▼	18 (1.7)	6 (2.3) ▲
Slovenia	3 (0.9)	1 (1.4)	17 (2.3)	-30 (4.4) ▼	80 (2.5)	28 (4.6) ▲
Sweden	0 (0.3)	-1 (1.0)	39 (3.1)	11 (4.7) ▲	61 (3.1)	-10 (4.6) ▼
Syrian Arab Republic	39 (4.4)	◊ ◊	41 (4.2)	◊ ◊	19 (3.4)	◊ ◊
Thailand	66 (4.0)	◊ ◊	29 (3.9)	◊ ◊	4 (1.6)	◊ ◊
Tunisia s	12 (2.9)	-9 (5.3)	71 (3.8)	-2 (6.3)	17 (3.0)	11 (3.9) ▲
Turkey	19 (3.8)	◊ ◊	79 (3.8)	◊ ◊	2 (1.3)	◊ ◊
Ukraine	80 (3.0)	◊ ◊	18 (2.9)	◊ ◊	2 (1.0)	◊ ◊
United States	69 (2.4)	-5 (3.6)	28 (2.6)	4 (3.7)	3 (0.9)	0 (1.4)
¶ Morocco	21 (5.3)	- -	76 (5.6)	- -	3 (1.7)	- -
International Avg.	46 (0.5)		39 (0.5)		16 (0.3)	
Benchmarking Participants						
Basque Country, Spain	37 (4.8)	-14 (6.7) ▼	56 (5.0)	9 (6.8)	6 (2.3)	5 (2.7)
British Columbia, Canada	68 (3.9)	◊ ◊	32 (3.9)	◊ ◊	0 (0.0)	◊ ◊
Dubai, UAE s	71 (5.3)	◊ ◊	27 (5.4)	◊ ◊	3 (1.1)	◊ ◊
Massachusetts, US	60 (7.0)	◊ ◊	38 (6.6)	◊ ◊	2 (1.3)	◊ ◊
Minnesota, US r	74 (6.2)	◊ ◊	25 (6.1)	◊ ◊	0 (0.2)	◊ ◊
Ontario, Canada	85 (3.5)	0 (4.8)	14 (3.4)	0 (4.5)	1 (1.0)	0 (1.4)
Quebec, Canada	54 (3.9)	-7 (5.8)	43 (4.0)	10 (5.8)	3 (1.7)	-3 (2.9)

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

Exhibit 8.40 Item formats used by teachers in mathematics tests or examinations with trends, grade 8

TIMSS2007 Mathematics 8th Grade

Country	Only or Mostly Constructed-response						About Half Constructed-response and Half Multiple-choice						Only or Mostly Multiple-choice					
	2007 Percent of Students		Average Achievement		Difference in Percent from 2003		2007 Percent of Students		Average Achievement		Difference in Percent from 2003		2007 Percent of Students		Average Achievement		Difference in Percent from 2003	
Algeria	16	(2.8)	394	(5.5)	◊	◊	51	(4.2)	388	(3.0)	◊	◊	33	(4.2)	383	(3.0)	◊	◊
Armenia r	3	(1.3)	493	(10.2)	-73	(4.0) ▼	30	(4.0)	500	(7.4)	12	(5.2) ▲	68	(4.0)	499	(3.8)	61	(4.7) ▲
Australia	61	(3.9)	498	(5.0)	-8	(5.5)	30	(3.4)	501	(8.0)	8	(4.3)	9	(2.3)	489	(20.0)	0	(3.8)
Bahrain	42	(2.7)	405	(2.6)	1	(4.0)	50	(2.9)	390	(3.0)	-2	(4.3)	8	(1.6)	386	(5.8)	1	(2.5)
Bosnia and Herzegovina	17	(2.8)	463	(6.0)	◊	◊	26	(3.2)	445	(5.8)	◊	◊	57	(3.9)	461	(3.7)	◊	◊
Botswana	27	(4.7)	370	(5.7)	5	(6.3)	48	(4.6)	360	(3.8)	0	(6.4)	24	(3.8)	362	(5.8)	-5	(5.3)
Bulgaria	44	(3.9)	467	(6.1)	-8	(6.2)	39	(3.7)	458	(10.6)	12	(5.2) ▲	17	(3.0)	470	(15.8)	-4	(5.0)
Chinese Taipei	22	(3.5)	607	(10.4)	-3	(5.0)	72	(4.0)	598	(4.9)	2	(5.4)	6	(1.9)	568	(13.3)	1	(2.7)
Colombia	29	(4.3)	385	(7.8)	◊	◊	52	(5.2)	379	(5.6)	◊	◊	19	(3.7)	375	(12.1)	◊	◊
Cyprus	39	(2.9)	470	(3.3)	1	(3.8)	30	(2.8)	461	(3.4)	7	(3.7)	31	(2.4)	462	(2.8)	-8	(3.1) ▼
Czech Republic	78	(2.9)	507	(2.9)	◊	◊	10	(2.4)	486	(8.3)	◊	◊	12	(2.5)	499	(6.6)	◊	◊
Egypt	7	(2.3)	389	(14.4)	-	-	79	(3.8)	389	(4.3)	-	-	15	(3.3)	402	(10.7)	-	-
El Salvador	18	(3.4)	343	(6.8)	◊	◊	65	(4.1)	336	(3.8)	◊	◊	17	(3.3)	350	(4.9)	◊	◊
England s	94	(1.8)	515	(4.9)	-3	(2.7)	5	(1.7)	507	(27.5)	3	(2.6)	1	(0.6)	~	~	1	(0.6)
Georgia	11	(2.9)	439	(8.1)	◊	◊	60	(5.4)	416	(7.7)	◊	◊	29	(4.9)	389	(13.2)	◊	◊
Ghana	30	(3.8)	311	(8.5)	6	(5.4)	66	(4.1)	307	(5.7)	-9	(5.7)	4	(1.7)	344	(68.6)	3	(1.8)
Hong Kong SAR	65	(4.1)	570	(8.1)	-7	(5.4)	34	(4.1)	580	(10.5)	7	(5.4)	0	(0.0)	~	~	0	(0.8)
Hungary	84	(2.3)	518	(3.9)	-2	(3.4)	15	(2.4)	509	(11.5)	3	(3.6)	1	(0.6)	~	~	-1	(1.1)
Indonesia	65	(4.5)	399	(6.7)	13	(6.2) ▲	27	(3.8)	424	(9.5)	-13	(5.9) ▼	8	(2.8)	405	(23.9)	0	(3.4)
Iran, Islamic Rep. of s	45	(4.1)	400	(5.5)	-2	(6.7)	49	(3.8)	404	(6.0)	3	(6.2)	6	(2.0)	392	(20.7)	-1	(3.3)
Israel r	76	(2.9)	476	(5.7)	18	(4.6) ▲	19	(2.6)	440	(10.1)	-15	(4.5) ▼	5	(1.6)	451	(25.4)	-3	(2.7)
Italy	40	(3.1)	481	(3.4)	-8	(5.2)	45	(3.4)	475	(5.2)	2	(5.4)	15	(2.6)	498	(5.4)	5	(3.2)
Japan	83	(3.0)	570	(2.7)	-6	(3.7)	13	(2.7)	563	(8.7)	4	(3.5)	4	(1.2)	614	(26.2)	2	(1.5)
Jordan	21	(3.4)	420	(9.6)	-17	(5.6) ▼	75	(3.6)	431	(5.4)	16	(6.0) ▲	5	(1.7)	403	(19.0)	1	(2.4)
Korea, Rep. of s	16	(2.6)	601	(8.5)	-12	(4.2) ▼	35	(2.7)	596	(5.5)	1	(4.8)	49	(3.1)	598	(3.7)	12	(4.7) ▲
Kuwait s	6	(2.0)	352	(15.2)	◊	◊	79	(3.9)	356	(2.8)	◊	◊	15	(3.5)	352	(10.3)	◊	◊
Lebanon	31	(4.3)	457	(9.4)	6	(6.0)	41	(5.1)	448	(6.8)	-4	(6.9)	28	(4.5)	438	(9.8)	-2	(6.3)
Lithuania	96	(1.5)	505	(2.4)	11	(3.4) ▲	4	(1.5)	522	(9.2)	-11	(3.4) ▼	0	(0.0)	~	~	0	(0.0)
Malaysia	13	(2.9)	478	(16.4)	5	(3.7)	83	(3.1)	473	(5.0)	-6	(4.2)	4	(1.6)	477	(33.3)	1	(2.2)
Malta	77	(0.2)	489	(1.3)	◊	◊	10	(0.1)	471	(2.4)	◊	◊	13	(0.2)	496	(2.6)	◊	◊
Norway	80	(2.9)	469	(2.4)	9	(4.8)	17	(2.6)	470	(4.0)	-8	(4.7)	3	(1.2)	472	(4.8)	-1	(2.2)
Oman	8	(2.2)	364	(13.9)	◊	◊	81	(3.2)	375	(3.8)	◊	◊	11	(2.3)	359	(13.2)	◊	◊
Palestinian Nat'l Auth.	14	(3.0)	350	(13.6)	-10	(4.5) ▼	72	(3.9)	373	(3.4)	3	(5.5)	14	(2.6)	361	(10.9)	7	(3.3) ▲
Qatar	14	(0.1)	302	(2.7)	◊	◊	78	(0.1)	312	(1.6)	◊	◊	8	(0.1)	286	(4.0)	◊	◊
Romania	37	(3.5)	466	(6.4)	2	(5.3)	46	(3.9)	451	(6.2)	0	(5.6)	17	(2.8)	485	(10.4)	-2	(4.0)
Russian Federation	61	(3.6)	516	(4.5)	-17	(6.3) ▼	34	(3.0)	510	(6.8)	13	(6.0) ▲	4	(2.0)	479	(13.4)	4	(2.1)
Saudi Arabia	4	(1.4)	295	(17.0)	-	-	76	(3.7)	330	(3.6)	-	-	20	(3.6)	327	(7.3)	-	-
Scotland	100	(0.1)	488	(3.9)	1	(1.1)	0	(0.1)	~	~	-1	(1.1)	0	(0.0)	~	~	0	(0.0)
Serbia	60	(4.2)	493	(4.7)	-28	(5.1) ▼	29	(4.0)	476	(6.5)	18	(4.9) ▲	11	(2.3)	477	(6.9)	9	(2.5) ▲
Singapore	83	(1.7)	594	(4.4)	-3	(2.6)	3	(0.8)	587	(18.1)	-1	(1.4)	14	(1.6)	585	(11.5)	4	(2.2)
Slovenia	81	(2.5)	502	(2.4)	-6	(3.4)	17	(2.3)	501	(5.3)	5	(3.4)	1	(0.8)	~	~	1	(0.8)
Sweden	86	(2.1)	492	(2.5)	2	(3.5)	8	(1.8)	475	(6.6)	-3	(3.1)	6	(1.3)	511	(7.4)	1	(2.1)
Syrian Arab Republic	12	(2.5)	418	(9.5)	◊	◊	68	(4.0)	390	(4.5)	◊	◊	20	(3.6)	397	(9.2)	◊	◊
Thailand	39	(4.0)	448	(7.6)	◊	◊	49	(3.9)	438	(8.8)	◊	◊	12	(2.8)	436	(16.4)	◊	◊
Tunisia s	18	(3.3)	416	(4.2)	10	(4.4) ▲	44	(4.0)	428	(4.8)	24	(5.9) ▲	38	(3.8)	417	(3.8)	-34	(5.9) ▼
Turkey	58	(4.3)	428	(6.4)	◊	◊	27	(3.6)	439	(9.3)	◊	◊	15	(2.9)	433	(15.1)	◊	◊
Ukraine	62	(4.3)	464	(4.5)	◊	◊	38	(4.3)	458	(6.8)	◊	◊	0	(0.0)	~	~	◊	◊
United States	50	(2.5)	521	(4.5)	-5	(4.2)	34	(2.6)	497	(4.7)	2	(4.0)	16	(2.0)	495	(8.2)	2	(2.8)
¶ Morocco	25	(4.1)	381	(8.0)	-	-	39	(7.2)	384	(8.8)	-	-	36	(7.7)	389	(9.8)	-	-
International Avg.	44	(0.4)	453	(1.1)			41	(0.5)	448	(1.2)			15	(0.4)	440	(2.6)		
Benchmarking Participants																		
Basque Country, Spain	34	(4.8)	506	(5.0)	2	(6.6)	8	(2.9)	513	(12.8)	-9	(4.9)	57	(4.4)	494	(3.4)	7	(7.0)
British Columbia, Canada	66	(3.5)	511	(4.5)	◊	◊	26	(3.0)	509	(6.2)	◊	◊	8	(2.5)	515	(12.1)	◊	◊
Dubai, UAE s	43	(4.9)	479	(8.0)	◊	◊	45	(4.8)	443	(7.9)	◊	◊	12	(3.0)	475	(19.2)	◊	◊
Massachusetts, US	57	(5.7)	554	(8.3)	◊	◊	30	(5.8)	536	(8.9)	◊	◊	13	(3.9)	536	(18.1)	◊	◊
Minnesota, US	60	(9.2)	541	(7.0)	◊	◊	24	(7.5)	522	(8.0)	◊	◊	16	(5.7)	509	(12.6)	◊	◊
Ontario, Canada r	67	(4.8)	520	(3.9)	-15	(6.2) ▼	29	(4.4)	514	(7.9)	13	(5.9) ▲	4	(1.9)	510	(14.4)	3	(1.9)
Quebec, Canada	91	(1.9)	529	(4.2)	-	-	9	(1.9)	535	(11.1)	-	-	0	(0.3)	~	~	-	-

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

Background data provided by teachers.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 8.41 Textbook use in teaching mathematics with trends, grade 8

TIMSS2007 Mathematics 8th Grade

Country	Percentage of Students Taught by Teachers Reporting Textbook Use											
	Use Textbook to Teach Mathematics								Do Not Use Textbook to Teach Mathematics			
	As Primary Basis for Lessons				As Supplementary Resource							
	Percent in 2007		Difference in Percent from 2003		Percent in 2007		Difference in Percent from 2003		Percent in 2007		Difference in Percent from 2003	
Algeria	76	(3.8)	◊	◊	21	(3.8)	◊	◊	3	(1.4)	◊	◊
Armenia r	73	(4.0)	1	(5.5)	20	(4.0)	0	(5.3)	7	(2.2)	-1	(2.9)
Australia	53	(4.1)	1	(6.0)	41	(4.2)	-2	(5.9)	6	(1.9)	1	(2.7)
Bahrain	50	(2.4)	-25	(3.9) ▼	29	(2.7)	5	(4.1)	21	(2.1)	21	(2.1) ▲
Bosnia and Herzegovina	62	(4.1)	◊	◊	38	(4.1)	◊	◊	0	(0.0)	◊	◊
Botswana	59	(4.1)	15	(5.9) ▲	36	(4.1)	-16	(5.9) ▼	4	(1.9)	1	(2.5)
Bulgaria	82	(3.1)	6	(4.8)	14	(2.7)	-8	(4.4)	4	(1.8)	2	(2.1)
Chinese Taipei	77	(3.1)	-4	(4.7)	17	(3.2)	4	(4.4)	6	(1.7)	0	(2.6)
Colombia	12	(2.5)	◊	◊	66	(4.2)	◊	◊	23	(3.5)	◊	◊
Cyprus	48	(2.7)	-14	(3.7) ▼	42	(3.0)	8	(3.9) ▲	9	(1.9)	6	(2.1) ▲
Czech Republic	56	(3.9)	◊	◊	43	(3.8)	◊	◊	1	(0.5)	◊	◊
Egypt	57	(4.4)	8	(6.1)	41	(4.5)	-10	(6.1)	2	(0.6)	2	(0.6) ▲
El Salvador	7	(2.4)	◊	◊	82	(3.6)	◊	◊	11	(2.9)	◊	◊
England r	43	(4.1)	-3	(7.7)	46	(3.8)	5	(7.9)	12	(2.8)	-2	(4.9)
Georgia	87	(3.1)	◊	◊	13	(3.1)	◊	◊	0	(0.0)	◊	◊
Ghana	33	(4.1)	-10	(6.2)	65	(4.1)	11	(6.1)	2	(1.2)	-2	(1.9)
Hong Kong SAR	76	(3.8)	-7	(5.2)	24	(3.7)	7	(5.1)	1	(0.7)	0	(0.7)
Hungary	55	(4.3)	-5	(5.6)	43	(4.2)	4	(5.5)	1	(0.9)	1	(1.0)
Indonesia	57	(5.2)	-6	(6.4)	43	(5.2)	6	(6.4)	0	(0.0)	0	(0.0)
Iran, Islamic Rep. of	83	(3.4)	8	(4.7)	16	(3.1)	6	(3.8)	2	(0.1)	-14	(3.0) ▼
Israel r	57	(3.9)	1	(5.3)	42	(4.0)	0	(5.4)	2	(0.7)	0	(1.1)
Italy	38	(2.9)	4	(4.8)	55	(3.0)	-6	(4.9)	6	(1.4)	2	(1.8)
Japan	77	(3.1)	1	(4.8)	21	(2.8)	-2	(4.7)	2	(0.9)	0	(1.5)
Jordan	58	(4.2)	-26	(5.2) ▼	38	(4.1)	22	(5.2) ▲	4	(1.2)	4	(1.2) ▲
Korea, Rep. of s	92	(1.7)	3	(2.7)	4	(1.4)	-3	(2.1)	3	(1.0)	0	(1.7)
Kuwait r	23	(4.0)	◊	◊	35	(4.3)	◊	◊	42	(4.8)	◊	◊
Lebanon	50	(4.8)	-2	(6.9)	32	(4.6)	-4	(6.5)	18	(3.4)	6	(4.4)
Lithuania	91	(2.0)	-9	(2.0) ▼	9	(2.0)	9	(2.0) ▲	0	(0.0)	0	(0.0)
Malaysia	66	(4.4)	2	(6.1)	28	(4.1)	3	(5.8)	6	(2.0)	-5	(3.3)
Malta	35	(0.3)	◊	◊	63	(0.3)	◊	◊	2	(0.1)	◊	◊
Norway	88	(2.5)	-3	(3.5)	11	(2.4)	2	(3.4)	1	(0.8)	1	(0.8)
Oman	53	(4.3)	◊	◊	41	(4.3)	◊	◊	6	(1.4)	◊	◊
Palestinian Nat'l Auth.	64	(3.9)	-16	(5.5) ▼	29	(4.1)	11	(5.6)	7	(2.4)	5	(2.7)
Qatar	70	(0.2)	◊	◊	26	(0.2)	◊	◊	4	(0.0)	◊	◊
Romania	49	(3.9)	-10	(5.8)	49	(4.0)	10	(5.8)	2	(0.8)	0	(1.6)
Russian Federation	87	(2.1)	1	(3.3)	13	(2.1)	-1	(3.3)	0	(0.0)	0	(0.4)
Saudi Arabia	77	(3.5)	-	-	19	(3.4)	-	-	4	(1.5)	-	-
Scotland	72	(3.2)	-7	(4.9)	27	(3.0)	11	(4.4) ▲	1	(0.0)	-3	(1.8)
Serbia	54	(4.1)	7	(5.9)	43	(4.1)	-9	(5.9)	3	(1.3)	2	(1.3)
Singapore	51	(2.6)	-23	(3.5) ▼	39	(2.7)	14	(3.5) ▲	9	(1.2)	9	(1.2) ▲
Slovenia	55	(2.7)	0	(5.3)	44	(2.7)	0	(5.3)	1	(0.3)	0	(0.4)
Sweden	95	(1.0)	5	(2.4)	4	(0.9)	-6	(2.4) ▼	1	(0.5)	1	(0.6)
Syrian Arab Republic	50	(4.4)	◊	◊	36	(4.2)	◊	◊	14	(3.1)	◊	◊
Thailand	59	(4.1)	◊	◊	25	(3.7)	◊	◊	15	(3.1)	◊	◊
Tunisia	48	(4.1)	25	(5.5) ▲	49	(4.1)	-27	(5.5) ▼	2	(1.4)	2	(1.4)
Turkey	39	(4.3)	◊	◊	53	(4.3)	◊	◊	8	(2.7)	◊	◊
Ukraine	62	(3.7)	◊	◊	38	(3.7)	◊	◊	0	(0.0)	◊	◊
United States	57	(2.7)	-7	(4.0)	36	(2.8)	2	(4.1)	7	(1.3)	5	(1.6) ▲
¶ Morocco r	59	(5.0)	-	-	40	(4.9)	-	-	1	(1.1)	-	-
International Avg.	60	(0.5)			34	(0.5)			6	(0.3)		
Benchmarking Participants												
Basque Country, Spain	74	(3.7)	17	(6.5) ▲	22	(3.3)	-12	(6.0)	5	(1.6)	-6	(3.7)
British Columbia, Canada	42	(4.2)	◊	◊	50	(4.6)	◊	◊	8	(2.4)	◊	◊
Dubai, UAE s	69	(3.9)	◊	◊	26	(3.4)	◊	◊	4	(1.9)	◊	◊
Massachusetts, US	57	(5.6)	◊	◊	42	(6.0)	◊	◊	1	(1.2)	◊	◊
Minnesota, US	89	(5.5)	◊	◊	9	(5.2)	◊	◊	2	(1.1)	◊	◊
Ontario, Canada	58	(4.3)	3	(6.6)	40	(4.1)	-3	(6.5)	2	(1.1)	0	(1.7)
Quebec, Canada	51	(4.3)	4	(6.1)	45	(4.4)	-5	(6.3)	4	(1.6)	0	(2.3)

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by teachers.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

Exhibit 8.42 Computer use in mathematics class with trends, grade 8

TIMSS2007 Mathematics 8th Grade

Country	National Curriculum Contains Policies / Statements About the Use of Computers	Trends in Percentage of Students Whose Teachers Reported That Computers Are Available		Percentage of Students Whose Teachers Reported on Computer Use About Half of the Lessons or More			
		2007 Percent of Students	Difference in Percent from 2003	Discovering Principles and Concepts	Practicing Skills and Procedures	Looking Up Ideas and Information	Processing and Analyzing Data
Algeria	●	r 29 (4.2)	◊	r 3 (1.5)	r 5 (2.1)	r 4 (1.8)	r 6 (2.1)
Armenia	●	r 17 (3.2)	-3 (4.6)	4 (1.0)	4 (1.1)	5 (1.2)	5 (1.1)
Australia	●	51 (4.3)	-4 (6.0)	0 (0.0)	2 (0.9)	1 (0.0)	0 (0.0)
Bahrain	○	24 (2.8)	-10 (4.5) ▼	2 (1.0)	2 (1.0)	4 (0.6)	1 (0.4)
Bosnia and Herzegovina	○	19 (3.1)	◊	2 (0.9)	2 (0.9)	3 (1.5)	2 (1.3)
Botswana	●	r 13 (3.2)	7 (4.1)	1 (0.0)	1 (0.0)	1 (0.0)	1 (0.0)
Bulgaria	○	46 (3.5)	38 (4.2) ▲	1 (1.1)	1 (0.9)	6 (2.2)	3 (1.5)
Chinese Taipei	●	27 (3.4)	-3 (4.7)	3 (1.2)	2 (1.2)	2 (1.2)	1 (1.0)
Colombia	○	16 (3.1)	◊	2 (0.7)	1 (0.6)	3 (2.3)	2 (0.9)
Cyprus	○	10 (1.9)	2 (2.7)	0 (0.0)	1 (0.3)	1 (0.0)	0 (0.0)
Czech Republic	○	r 59 (4.5)	◊	r 1 (0.5)	r 4 (1.7)	r 1 (0.5)	r 1 (0.9)
Egypt	○	-	-	-	-	-	-
El Salvador	○	25 (3.8)	◊	0 (0.0)	2 (1.2)	3 (1.3)	1 (0.0)
England	●	r 58 (4.0)	-8 (7.7)	3 (1.4)	4 (1.7)	3 (1.6)	2 (1.1)
Georgia	○	30 (4.2)	◊	1 (0.8)	2 (0.9)	2 (1.2)	3 (1.4)
Ghana	○	7 (2.1)	-8 (4.1) ▼	1 (0.0)	2 (1.2)	2 (1.2)	2 (1.4)
Hong Kong SAR	●	42 (4.9)	3 (6.5)	7 (2.5)	8 (2.7)	6 (2.4)	5 (1.9)
Hungary	●	39 (3.9)	12 (5.2) ▲	0 (0.0)	1 (0.8)	1 (0.8)	2 (1.2)
Indonesia	○	16 (3.4)	5 (4.2)	0 (0.0)	1 (0.6)	3 (1.7)	2 (1.7)
Iran, Islamic Rep. of	○	5 (1.6)	3 (1.8)	0 (0.0)	1 (0.7)	1 (0.7)	0 (0.0)
Israel	●	r 41 (3.6)	-6 (5.3)	r 7 (1.8)	r 8 (1.9)	r 4 (1.5)	r 7 (1.8)
Italy	●	30 (3.2)	-3 (4.9)	1 (0.8)	2 (1.0)	2 (1.1)	2 (1.0)
Japan	●	69 (3.9)	-17 (5.0) ▼	1 (0.7)	1 (0.8)	0 (0.0)	0 (0.0)
Jordan	●	24 (3.5)	14 (4.5) ▲	2 (0.9)	4 (1.3)	5 (1.8)	4 (1.5)
Korea, Rep. of	●	s 56 (3.5)	-17 (4.9) ▼	7 (2.0)	4 (1.5)	3 (1.1)	5 (1.5)
Kuwait	○	r 17 (3.6)	◊	r 3 (1.7)	r 5 (2.0)	r 5 (2.0)	r 4 (1.9)
Lebanon	○	28 (3.6)	4 (5.2)	8 (2.1)	5 (2.1)	7 (2.4)	6 (1.9)
Lithuania	●	73 (3.2)	3 (4.8)	2 (0.9)	3 (1.3)	4 (1.5)	5 (1.8)
Malaysia	●	44 (4.4)	39 (4.7) ▲	5 (1.7)	6 (1.8)	6 (1.9)	4 (1.6)
Malta	●	81 (0.2)	◊	7 (0.1)	8 (0.1)	3 (0.1)	1 (0.0)
Norway	●	71 (3.3)	15 (5.3) ▲	2 (0.7)	4 (1.5)	2 (1.1)	4 (1.2)
Oman	●	34 (4.0)	◊	1 (0.1)	3 (1.5)	6 (2.2)	6 (2.1)
Palestinian Nat'l Auth.	●	31 (4.1)	2 (5.8)	2 (1.4)	2 (1.1)	4 (1.8)	3 (1.6)
Qatar	●	r 22 (0.1)	◊	r 8 (0.1)	r 8 (0.1)	r 7 (0.1)	r 6 (0.1)
Romania	○	50 (3.9)	37 (4.7) ▲	2 (0.9)	4 (1.5)	3 (0.9)	3 (0.9)
Russian Federation	●	40 (4.0)	28 (4.8) ▲	2 (0.9)	3 (1.6)	3 (1.3)	1 (0.6)
Saudi Arabia	○	24 (3.7)	-	3 (1.5)	6 (2.7)	7 (2.7)	5 (2.5)
Scotland	●	37 (3.6)	-3 (6.0)	1 (0.9)	3 (1.1)	1 (0.4)	0 (0.0)
Serbia	○	17 (3.6)	9 (4.4) ▲	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Singapore	●	54 (2.5)	-12 (3.7) ▼	3 (0.8)	7 (1.4)	4 (1.0)	4 (0.9)
Slovenia	●	52 (2.6)	15 (4.9) ▲	1 (1.0)	1 (1.0)	0 (0.3)	3 (1.1)
Sweden	●	40 (3.2)	-5 (4.9)	1 (0.3)	1 (0.3)	1 (0.4)	1 (0.4)
Syrian Arab Republic	○	18 (3.4)	◊	4 (1.8)	3 (1.5)	5 (1.9)	3 (1.6)
Thailand	○	20 (3.5)	◊	3 (1.3)	3 (1.3)	3 (1.4)	3 (1.5)
Tunisia	○	11 (2.1)	-12 (4.0) ▼	0 (0.0)	0 (0.0)	0 (0.0)	2 (1.2)
Turkey	●	30 (4.1)	◊	4 (1.5)	7 (2.3)	6 (2.0)	5 (1.6)
Ukraine	○	14 (3.0)	◊	1 (0.6)	1 (0.7)	1 (0.6)	1 (0.6)
United States	○	42 (2.6)	-3 (3.9)	2 (0.8)	6 (1.1)	1 (0.5)	2 (0.7)
¶ Morocco	○	r 33 (8.8)	-	r 3 (1.6)	r 2 (1.2)	r 3 (1.9)	r 1 (0.0)
International Avg.		34 (0.5)		2 (0.2)	3 (0.2)	3 (0.2)	3 (0.2)
Benchmarking Participants							
Basque Country, Spain	○	40 (5.3)	5 (7.0)	1 (1.4)	0 (0.0)	0 (0.0)	0 (0.0)
British Columbia, Canada	●	38 (4.5)	◊	2 (1.5)	2 (1.5)	2 (1.4)	1 (0.0)
Dubai, UAE	○	s 50 (6.2)	◊	s 9 (5.3)	s 11 (5.4)	s 12 (5.6)	s 10 (5.5)
Massachusetts, US	●	57 (7.8)	◊	1 (0.0)	1 (0.8)	1 (0.8)	1 (0.0)
Minnesota, US	-	28 (7.9)	◊	1 (0.7)	2 (1.2)	1 (0.7)	1 (0.7)
Ontario, Canada	●	60 (4.9)	14 (7.1)	1 (0.7)	0 (0.2)	2 (1.0)	1 (0.7)
Quebec, Canada	○	27 (4.2)	16 (5.0) ▲	0 (0.0)	1 (0.0)	0 (0.0)	0 (0.0)

● Yes ○ No

▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

Background data provided by National Research Coordinators and by teachers.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 8.43 Calculator use in mathematics class with trends, grade 8

TIMSS2007 Mathematics 8th Grade

Country	National Curriculum Contains Policies / Statements About the Use of Calculators	Trends in Percentage of Students Whose Teachers Reported That Calculators Are Not Permitted		Percentage of Students Whose Teachers Reported on Calculator Use About Half of the Lessons or More			
		2007 Percent of Students	Difference in Percent from 2003	Checking Answers	Doing Routine Computations	Solving Complex Problems	Exploring Number Concepts
Algeria	●	2 (1.2)	◊ ◊	56 (4.4)	44 (4.2)	47 (4.2)	r 32 (4.0)
Armenia	●	r 11 (2.8)	3 (3.8)	37 (3.7)	50 (3.8)	36 (4.1)	35 (3.5)
Australia	●	1 (0.7)	-3 (2.3)	65 (3.8)	70 (3.6)	59 (3.6)	38 (3.0)
Bahrain	○	r 75 (2.0)	7 (3.3) ▲	7 (1.5)	5 (1.2)	8 (0.9)	r 3 (1.1)
Bosnia and Herzegovina	○	41 (4.4)	◊ ◊	18 (3.2)	19 (3.6)	15 (3.0)	r 9 (2.5)
Botswana	●	38 (4.6)	1 (6.4)	3 (1.6)	4 (1.7)	10 (2.7)	7 (2.1)
Bulgaria	○	24 (3.1)	-4 (5.2)	9 (2.3)	17 (3.1)	20 (3.6)	7 (2.0)
Chinese Taipei	●	34 (4.1)	0 (5.8)	0 (0.0)	1 (0.0)	1 (1.0)	2 (1.1)
Colombia	○	17 (3.3)	◊ ◊	18 (3.8)	12 (3.0)	24 (4.6)	12 (2.8)
Cyprus	○	r 70 (2.4)	5 (3.7)	4 (1.1)	r 2 (0.9)	r 6 (1.3)	r 1 (0.6)
Czech Republic	●	5 (2.0)	◊ ◊	36 (4.0)	36 (4.2)	61 (4.1)	12 (2.6)
Egypt	●	2 (1.0)	2 (1.0)	30 (4.0)	31 (3.8)	33 (3.8)	19 (3.2)
El Salvador	○	26 (4.3)	◊ ◊	31 (4.0)	23 (3.5)	32 (4.4)	22 (3.7)
England	●	r 1 (0.8)	1 (0.8)	28 (3.4)	32 (3.6)	43 (3.7)	19 (2.9)
Georgia	○	12 (3.5)	◊ ◊	10 (3.2)	14 (3.1)	7 (2.1)	r 6 (2.3)
Ghana	●	r 79 (3.9)	18 (6.4) ▲	3 (1.4)	5 (2.2)	5 (2.3)	4 (1.4)
Hong Kong SAR	●	1 (0.0)	-1 (1.1)	59 (4.4)	72 (4.4)	63 (4.6)	26 (4.1)
Hungary	●	27 (3.4)	8 (4.6)	23 (3.1)	24 (3.2)	32 (3.7)	6 (1.7)
Indonesia	○	22 (4.1)	-6 (5.7)	11 (3.1)	10 (2.9)	21 (3.5)	9 (2.6)
Iran, Islamic Rep. of	○	45 (4.1)	-7 (5.8)	11 (2.2)	10 (2.4)	15 (3.0)	3 (1.2)
Israel	●	r 11 (2.5)	4 (3.3)	r 57 (3.7)	r 60 (3.7)	r 47 (3.5)	r 31 (3.6)
Italy	○	16 (2.1)	0 (3.6)	36 (2.9)	41 (3.0)	53 (3.1)	12 (2.0)
Japan	●	41 (3.9)	4 (5.6)	0 (0.0)	1 (0.5)	2 (1.1)	3 (1.3)
Jordan	●	21 (3.6)	-35 (5.7) ▼	19 (3.2)	12 (2.8)	27 (3.6)	13 (2.9)
Korea, Rep. of	●	s 42 (3.5)	7 (4.8)	1 (0.2)	1 (0.6)	6 (1.3)	0 (0.0)
Kuwait	○	r 80 (4.2)	◊ ◊	r 4 (1.8)	r 7 (2.0)	r 7 (1.8)	r 6 (1.8)
Lebanon	○	6 (1.9)	1 (2.6)	53 (4.7)	34 (3.8)	36 (3.8)	39 (4.3)
Lithuania	●	3 (1.2)	1 (1.4)	61 (3.7)	63 (3.9)	69 (3.6)	23 (3.5)
Malaysia	●	0 (0.0)	-46 (3.9) ▼	68 (3.9)	49 (4.1)	59 (3.8)	40 (4.1)
Malta	●	0 (0.0)	◊ ◊	78 (0.2)	83 (0.2)	77 (0.2)	38 (0.2)
Norway	●	1 (0.8)	1 (0.8)	71 (2.9)	71 (3.1)	73 (2.9)	33 (3.6)
Oman	●	5 (1.6)	◊ ◊	41 (4.4)	20 (3.5)	52 (4.4)	23 (3.9)
Palestinian Nat'l Auth.	●	4 (1.5)	3 (1.7)	25 (3.6)	19 (3.4)	41 (4.4)	17 (3.4)
Qatar	●	r 52 (0.2)	◊ ◊	r 26 (0.1)	r 21 (0.2)	r 28 (0.2)	r 16 (0.1)
Romania	●	48 (3.6)	-3 (5.4)	8 (2.1)	7 (1.7)	3 (1.5)	3 (1.3)
Russian Federation	●	24 (3.3)	4 (4.1)	12 (2.8)	9 (2.5)	15 (2.2)	10 (2.8)
Saudi Arabia	○	r 66 (4.5)	- -	10 (3.1)	r 9 (3.1)	r 9 (2.4)	r 6 (2.7)
Scotland	●	2 (1.1)	0 (1.8)	11 (2.4)	21 (3.1)	37 (3.5)	8 (2.0)
Serbia	○	53 (4.6)	17 (6.2) ▲	8 (2.6)	10 (2.0)	8 (2.6)	3 (1.3)
Singapore	●	0 (0.0)	0 (0.0)	63 (2.7)	65 (2.6)	67 (2.9)	33 (2.8)
Slovenia	●	8 (1.6)	-32 (4.7) ▼	11 (1.7)	12 (1.9)	24 (2.6)	10 (1.9)
Sweden	●	0 (0.3)	0 (0.5)	r 42 (3.0)	58 (3.5)	r 67 (2.9)	r 23 (2.6)
Syrian Arab Republic	○	r 65 (4.4)	◊ ◊	9 (2.6)	9 (2.5)	7 (2.1)	7 (2.2)
Thailand	○	61 (4.2)	◊ ◊	7 (2.1)	4 (1.6)	11 (2.6)	5 (1.7)
Tunisia	●	r 32 (4.1)	-12 (6.1)	3 (1.3)	0 (0.0)	6 (2.1)	7 (2.2)
Turkey	●	41 (3.9)	◊ ◊	6 (2.1)	3 (1.9)	5 (2.2)	2 (1.5)
Ukraine	○	15 (3.2)	◊ ◊	26 (3.9)	10 (2.2)	37 (3.8)	13 (2.4)
United States	●	11 (1.9)	5 (2.4) ▲	45 (2.7)	43 (2.6)	57 (2.8)	43 (2.9)
¶ Morocco	○	5 (3.4)	- -	r 28 (5.5)	r 24 (5.4)	r 37 (5.7)	r 23 (5.2)
International Avg.		25 (0.4)		26 (0.4)	25 (0.4)	31 (0.5)	16 (0.4)
Benchmarking Participants							
Basque Country, Spain	●	26 (4.4)	-1 (6.2)	21 (4.3)	14 (2.9)	35 (4.4)	17 (3.9)
British Columbia, Canada	●	9 (2.8)	◊ ◊	56 (4.2)	51 (4.2)	62 (4.4)	39 (4.7)
Dubai, UAE	●	s 36 (2.4)	◊ ◊	s 33 (4.2)	s 32 (4.5)	s 36 (4.7)	s 19 (4.2)
Massachusetts, US	●	2 (2.3)	◊ ◊	48 (7.6)	40 (7.0)	64 (6.3)	33 (6.0)
Minnesota, US	-	1 (1.2)	◊ ◊	70 (5.7)	72 (4.9)	76 (6.8)	59 (5.0)
Ontario, Canada	●	0 (0.0)	-1 (1.0)	66 (4.2)	58 (4.7)	78 (4.1)	55 (4.5)
Quebec, Canada	●	0 (0.0)	0 (0.0)	86 (2.6)	91 (2.4)	95 (2.0)	67 (3.7)

● Yes ○ No

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by National Research Coordinators and by teachers.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

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

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the

A diamond (◊) indicates the country did not participate in the assessment.

8.5 The teachers and schools: summary

The headteacher, teacher and pupil responses about schools and teachers from the 2007 TIMSS survey are broadly positive. They show that pupils in England at both grade 4 and grade 8 are taught in schools that are perceived to be increasingly safe and continue to be considered well resourced. These findings are particularly relevant because they come from data provided by a stringently sampled group of individuals who are exposed to the school environment on a daily basis. They therefore provide us with an invaluable insight into life at the chalk-face of English education. Below are the key findings from the school- and teacher-level variables.

Grade 4

- Teachers and headteachers continue to perceive school climate in a positive light. The percentage of pupils taught in schools concentrated at the high and medium parts of the scale is greater than the international average.
- There has been a significant increase in the percentage of pupils taught at schools where teachers' perception of school safety is high. This is a very positive outcome, suggesting that schools in England are perceived to be safe environments for the teachers who work in them.
- Pupil and teacher perceptions of safety differed. Ratings of school safety from pupils were lower than those given by teachers. However, this phenomenon was not only seen in England's data.
- Schools in England are well-resourced, with almost all pupils taught at schools that are resourced at a high or medium level. This finding is true for both science and mathematics resources.
- The more 'hands-on' approach to science in England continues, with 58 per cent of pupils in England carrying out investigations in half of their lessons or more, compared to the international average of 32 per cent.
- The percentage of pupils doing computations and fraction work in half of mathematics lessons or more reflects the international picture. However, teachers report that pupils in England are less likely to engage in measuring, data handling and shape activities. This finding is also reflected pupils' views in a number of other countries.
- In both science and mathematics, around three-quarters of pupils have computers available during their lessons. The percentage who have access to computers is much higher than the international average.

Grade 8

- There has been no significant change in headteachers' perceptions of school climate since 2003. This is a positive outcome, as only four per cent of grade 8 pupils are taught at schools where the headteachers' rating of school climate is low.
- The percentage of pupils taught in schools where the teachers give a high rating of school climate has increased significantly since 2003.

- Teachers' perceptions of school safety have also been subject to significant changes since 2003, with nearly all pupils now taught in schools where teachers' perceptions of safety are high or medium.
- There has also been a significant increase in the percentage of pupils who gave their schools a high rating for safety. However, as with grade 4, there is a discrepancy between the perceptions of teachers and pupils, although the difference is not as large as at grade 4.
- Grade 8 headteachers, mathematics and science teachers indicate that their schools are well resourced. Although there have been no significant gains in resourcing since 2003, England's data indicate that a greater percentage of pupils are taught in schools that are resourced to a medium or high level than is seen internationally.
- England's grade 8 science pupils are more likely to spend their lesson time doing practical science activities than many of their international counterparts. However, pupils in England do not necessarily relate the science they cover in lessons to their daily lives.
- Grade 8 mathematics pupils in England have a different view from their teachers about the amount of time they spend on practical maths activities. Reports from pupils suggest that a greater percentage of pupil time is spent on practical activities than is suggested by the teacher reports.
- Pupils of science and mathematics at grade 8 continue to be tested less frequently than pupils in other participating countries.
- The use of computers in mathematics and science lessons at grade 8 has remained stable with no significant changes since 2003.

9 The pupils and the home

This chapter examines the factors relating to the pupils and their home life. The following are some of the important findings from the analysis of pupil and home factors.

- The majority of grade 4 and grade 8 pupils in England have access to a variety of educational resources in the home including books, computers, calculators, dictionaries and encyclopaedias.
- Pupils in England receive less homework than pupils in most of the other countries taking part in TIMSS 2007.

When considering the factors that affect the achievement of pupils in England, it is vital that we include the pupil perspective and any information they provide that may be relevant to their academic progress.

The same pupils took part in both the mathematics and the science survey, therefore the information in this section is presented in a different format from the previous sections: that is, the responses for mathematics and science are not separated. The first section (9.1) describes the pupil and home factors at grade 4 and section 9.2 describes the factors at grade 8.

9.1 The pupils and the home: grade 4

Language spoken

Pupils taking these tests were drawn from year 5 (grade 4). Their average age was 10.2 and the vast majority of them (93 per cent) reported speaking English at home always or almost always (see Exhibit 9.1). This is very similar to the percentage reported in the 2003 survey.

Resources in the home

Pupils were asked to estimate, with the help of pictures of bookcases, how many books there were in their home (Exhibit 9.2). Forty-one per cent estimated that they had at least 100 books in the home; this is nearly double the international average. In addition, another 33 per cent had between 26 and 100 books in the home. This is a positive outcome and indicates that the majority of grade 4 pupils have access to a sizeable number of books in the home. There have been no significant changes in the estimations of books in the home made by grade 4 pupils since 2003.

TIMSS 2007 International Reports available at http://timssandpirls.bc.edu/TIMSS2007

Exhibit 9.1 Students speak the language of the test at home with trends

TIMSS2007 Mathematics 4th Grade

Country	Always or Almost Always			Sometimes			Never		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	56 (2.4)	382 (5.4)	◊ ◊	32 (1.9)	382 (8.4)	◊ ◊	12 (1.0)	368 (8.4)	◊ ◊
Armenia	95 (0.6)	501 (4.5)	0 (0.8)	4 (0.4)	470 (6.9)	0 (0.6)	1 (0.4)	~ ~	1 (0.4)
Australia	90 (1.0)	519 (3.2)	-1 (1.5)	8 (1.0)	498 (11.5)	1 (1.4)	1 (0.2)	~ ~	0 (0.3)
Austria	88 (0.7)	510 (1.8)	◊ ◊	10 (0.6)	465 (3.9)	◊ ◊	2 (0.3)	~ ~	◊ ◊
Chinese Taipei	84 (0.8)	582 (1.7)	12 (1.4) ↗	15 (0.8)	550 (3.4)	-11 (1.4) ↘	1 (0.2)	~ ~	0 (0.2)
Colombia	89 (0.9)	363 (4.9)	◊ ◊	8 (0.8)	323 (8.9)	◊ ◊	3 (0.3)	298 (9.7)	◊ ◊
Czech Republic	97 (0.3)	487 (2.8)	◊ ◊	2 (0.3)	~ ~	◊ ◊	0 (0.1)	~ ~	◊ ◊
Denmark	94 (0.9)	527 (2.3)	◊ ◊	6 (0.9)	473 (11.4)	◊ ◊	1 (0.2)	~ ~	◊ ◊
El Salvador	93 (0.8)	336 (3.7)	◊ ◊	5 (0.6)	287 (13.4)	◊ ◊	2 (0.3)	~ ~	◊ ◊
England	93 (0.6)	545 (3.0)	-2 (1.0)	6 (0.6)	493 (7.8)	2 (0.9) ↗	1 (0.1)	~ ~	0 (0.2)
Georgia	92 (0.7)	442 (4.1)	◊ ◊	8 (0.6)	421 (9.5)	◊ ◊	0 (0.1)	~ ~	◊ ◊
Germany	92 (0.6)	532 (2.3)	◊ ◊	7 (0.6)	483 (4.7)	◊ ◊	1 (0.1)	~ ~	◊ ◊
Hong Kong SAR	82 (0.9)	614 (3.4)	7 (1.5) ↗	15 (0.9)	582 (4.9)	-5 (1.3) ↘	3 (0.3)	542 (8.6)	-2 (0.5) ↘
Hungary	98 (0.4)	512 (3.4)	-1 (0.5)	2 (0.4)	~ ~	1 (0.5)	0 (0.1)	~ ~	0 (0.1)
Iran, Islamic Rep. of	62 (2.1)	421 (4.6)	4 (4.0)	21 (1.9)	381 (5.4)	0 (2.7)	16 (1.6)	365 (6.1)	-4 (3.0)
Italy	96 (0.2)	508 (3.2)	5 (0.6) ↗	3 (0.2)	477 (8.2)	-3 (0.5) ↘	0 (0.1)	~ ~	-2 (0.3) ↘
Japan	99 (0.2)	570 (2.1)	0 (0.3)	1 (0.1)	~ ~	0 (0.2)	0 (0.1)	~ ~	0 (0.1)
Kazakhstan	93 (1.3)	548 (7.3)	◊ ◊	7 (1.3)	561 (10.1)	◊ ◊	0 (0.1)	~ ~	◊ ◊
Kuwait	74 (1.8)	322 (4.4)	◊ ◊	18 (1.3)	328 (4.9)	◊ ◊	8 (1.2)	305 (8.9)	◊ ◊
Latvia	88 (1.5)	540 (2.1)	-2 (2.1)	9 (1.1)	511 (6.8)	2 (1.5)	3 (0.6)	532 (13.6)	0 (0.8)
Lithuania	98 (0.4)	531 (2.3)	1 (0.8)	2 (0.3)	~ ~	-1 (0.7)	0 (0.1)	~ ~	0 (0.2)
Morocco	50 (2.6)	334 (5.7)	4 (3.5)	29 (2.1)	369 (8.0)	1 (2.7)	21 (2.4)	335 (12.8)	-6 (3.4)
Netherlands	89 (1.2)	538 (2.3)	-3 (1.4) ↘	8 (0.8)	507 (5.2)	1 (1.2)	3 (0.6)	523 (10.9)	2 (0.6) ↗
New Zealand	87 (0.8)	498 (2.1)	-2 (1.1) ↘	12 (0.7)	458 (5.9)	2 (1.0) ↗	1 (0.2)	~ ~	0 (0.2)
Norway	94 (0.5)	476 (2.5)	1 (0.7)	5 (0.4)	435 (7.2)	-1 (0.6)	1 (0.2)	~ ~	0 (0.3)
Qatar	71 (0.6)	307 (1.5)	◊ ◊	20 (0.6)	286 (3.2)	◊ ◊	9 (0.3)	264 (3.4)	◊ ◊
Russian Federation	92 (1.4)	547 (5.0)	2 (2.5)	7 (1.2)	524 (16.7)	-2 (2.1)	2 (0.6)	~ ~	0 (0.8)
Scotland	91 (0.8)	498 (2.3)	4 (1.2) ↗	6 (0.5)	466 (5.3)	-3 (0.9) ↘	3 (0.6)	437 (9.5)	0 (0.7)
Singapore	50 (0.9)	623 (3.9)	4 (2.0) ↗	45 (0.9)	580 (4.0)	-2 (1.8)	5 (0.4)	539 (8.2)	-2 (0.7) ↘
Slovak Republic	87 (1.5)	505 (3.2)	◊ ◊	11 (1.3)	451 (11.9)	◊ ◊	3 (0.7)	438 (22.2)	◊ ◊
Slovenia	90 (0.8)	506 (2.1)	0 (1.3)	8 (0.7)	471 (5.5)	0 (1.2)	2 (0.4)	~ ~	0 (0.5)
Sweden	92 (1.0)	506 (2.4)	◊ ◊	8 (1.0)	467 (4.9)	◊ ◊	1 (0.1)	~ ~	◊ ◊
Tunisia	26 (1.7)	327 (7.0)	- -	49 (2.0)	343 (5.0)	- -	25 (1.8)	320 (6.5)	- -
Ukraine	74 (2.1)	466 (3.3)	◊ ◊	21 (1.7)	483 (5.9)	◊ ◊	5 (0.6)	476 (8.6)	◊ ◊
United States	87 (0.8)	535 (2.3)	0 (1.2)	12 (0.8)	493 (4.4)	0 (1.1)	2 (0.1)	~ ~	0 (0.2)
Yemen	85 (1.7)	233 (6.2)	◊ ◊	11 (1.3)	212 (10.6)	◊ ◊	4 (0.9)	175 (14.5)	◊ ◊
International Avg.	84 (0.2)	478 (0.6)		12 (0.2)	445 (1.4)		4 (0.1)	395 (2.8)	
Benchmarking Participants									
Alberta, Canada	87 (1.4)	507 (3.0)	◊ ◊	11 (1.2)	497 (4.9)	◊ ◊	2 (0.3)	~ ~	◊ ◊
British Columbia, Canada	87 (1.2)	507 (2.7)	◊ ◊	12 (1.1)	502 (6.4)	◊ ◊	1 (0.3)	~ ~	◊ ◊
Dubai, UAE	55 (2.4)	463 (3.3)	◊ ◊	39 (2.1)	438 (5.5)	◊ ◊	6 (0.8)	405 (9.5)	◊ ◊
Massachusetts, US	93 (1.0)	576 (3.2)	◊ ◊	6 (1.0)	533 (12.8)	◊ ◊	1 (0.2)	~ ~	◊ ◊
Minnesota, US	89 (2.5)	561 (5.0)	◊ ◊	10 (2.3)	493 (15.2)	◊ ◊	1 (0.4)	~ ~	◊ ◊
Ontario, Canada	85 (1.0)	514 (2.7)	-1 (1.5)	13 (0.9)	508 (5.5)	0 (1.4)	2 (0.4)	~ ~	1 (0.5)
Quebec, Canada	90 (0.9)	521 (3.1)	-1 (1.3)	8 (0.8)	508 (6.4)	1 (1.1)	1 (0.2)	~ ~	0 (0.3)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

↗ 2007 percent significantly higher

↘ 2007 percent significantly lower

Background data provided by students.

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

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

A diamond (◊) indicates the country did not participate in the assessment.

Exhibit 9.2 Books in the home with trends

TIMSS2007 Mathematics 4th Grade

Country	More than 200 Books			101-200 Books			26-100 Books		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	2 (0.3)	~ ~	◊ ◊	3 (0.3)	384 (10.0)	◊ ◊	12 (0.9)	399 (6.3)	◊ ◊
Armenia r	17 (1.2)	499 (4.2)	-1 (1.6)	12 (0.7)	514 (6.5)	-2 (1.0) ▼	25 (1.0)	501 (4.3)	-5 (1.5) ▼
Australia	22 (1.0)	531 (5.1)	-2 (1.6)	22 (1.0)	540 (5.3)	-1 (1.5)	36 (0.9)	517 (3.3)	2 (1.4)
Austria	12 (0.7)	535 (3.7)	◊ ◊	13 (0.6)	533 (3.1)	◊ ◊	35 (1.0)	515 (2.3)	◊ ◊
Chinese Taipei	14 (0.6)	606 (2.8)	-1 (1.0)	13 (0.6)	605 (3.3)	-1 (0.9)	32 (0.9)	588 (2.4)	1 (1.1)
Colombia	5 (0.4)	339 (8.5)	◊ ◊	5 (0.4)	364 (11.9)	◊ ◊	19 (0.9)	379 (8.5)	◊ ◊
Czech Republic	11 (0.9)	505 (5.7)	◊ ◊	16 (0.8)	515 (4.2)	◊ ◊	40 (1.0)	495 (2.5)	◊ ◊
Denmark	12 (1.0)	544 (5.6)	◊ ◊	18 (0.8)	547 (3.2)	◊ ◊	38 (1.2)	526 (2.8)	◊ ◊
El Salvador	3 (0.4)	336 (11.4)	◊ ◊	4 (0.3)	330 (10.2)	◊ ◊	14 (0.7)	355 (5.4)	◊ ◊
England	19 (1.0)	575 (4.9)	0 (1.6)	22 (1.0)	567 (5.0)	2 (1.4)	33 (1.0)	542 (3.0)	-2 (1.6)
Georgia	17 (1.3)	448 (5.6)	◊ ◊	13 (1.0)	456 (7.9)	◊ ◊	29 (1.4)	452 (4.7)	◊ ◊
Germany	14 (0.8)	561 (3.4)	◊ ◊	17 (0.8)	554 (3.3)	◊ ◊	35 (1.0)	535 (2.4)	◊ ◊
Hong Kong SAR	12 (0.7)	628 (4.5)	5 (0.9) ▲	15 (0.9)	621 (5.3)	5 (1.2) ▲	34 (0.9)	611 (3.6)	6 (1.3) ▲
Hungary	16 (1.0)	557 (4.8)	-2 (1.5)	17 (0.7)	545 (3.9)	0 (1.1)	32 (1.2)	523 (4.2)	-3 (1.5)
Iran, Islamic Rep. of	5 (0.5)	449 (8.4)	-1 (0.8)	5 (0.5)	438 (7.6)	1 (0.7)	12 (1.0)	445 (5.0)	-1 (1.3)
Italy	12 (0.7)	517 (4.8)	2 (1.1)	12 (0.5)	521 (4.2)	1 (0.8)	31 (0.8)	517 (3.4)	4 (1.1) ▲
Japan	7 (0.4)	599 (5.7)	0 (0.6)	13 (0.6)	603 (3.6)	-1 (0.9)	38 (1.0)	579 (2.7)	-2 (1.3)
Kazakhstan	6 (0.6)	560 (11.0)	◊ ◊	9 (0.9)	558 (7.2)	◊ ◊	28 (2.9)	548 (9.7)	◊ ◊
Kuwait r	14 (0.9)	300 (6.7)	◊ ◊	10 (0.5)	325 (9.6)	◊ ◊	24 (1.0)	344 (4.8)	◊ ◊
Latvia	13 (0.9)	556 (5.5)	-6 (1.4) ▼	16 (0.8)	559 (3.9)	-5 (1.4) ▼	41 (1.2)	542 (2.7)	3 (1.7)
Lithuania	6 (0.5)	540 (7.3)	-1 (0.7)	9 (0.6)	555 (5.3)	-2 (0.9) ▼	34 (1.0)	548 (2.7)	-2 (1.4)
Morocco r	5 (1.2)	377 (22.1)	4 (1.2) ▲	5 (0.7)	368 (17.4)	2 (0.8) ▲	13 (1.0)	364 (7.7)	3 (1.4) ▲
Netherlands	11 (0.9)	547 (6.0)	-3 (1.4) ▼	15 (0.7)	554 (3.9)	-4 (1.2) ▼	40 (1.1)	543 (2.4)	3 (1.6)
New Zealand	17 (0.8)	524 (3.7)	0 (1.1)	22 (0.7)	519 (3.0)	0 (1.0)	34 (0.7)	498 (3.2)	-2 (1.3)
Norway	13 (0.7)	489 (5.2)	-4 (1.1) ▼	19 (0.8)	493 (3.8)	-2 (1.1) ▼	37 (1.2)	480 (2.8)	1 (1.5)
Qatar	22 (0.4)	297 (3.0)	◊ ◊	14 (0.4)	313 (3.1)	◊ ◊	25 (0.5)	319 (2.6)	◊ ◊
Russian Federation	11 (0.7)	556 (6.7)	-1 (1.0)	14 (0.7)	564 (5.6)	-1 (1.1)	39 (1.1)	553 (5.3)	4 (1.6) ▲
Scotland	17 (0.9)	518 (5.2)	-4 (1.4) ▼	19 (0.9)	519 (3.3)	1 (1.2)	33 (1.0)	503 (2.5)	2 (1.4)
Singapore	13 (0.5)	627 (5.1)	2 (0.8) ▲	18 (0.8)	629 (4.4)	1 (1.2)	37 (0.8)	608 (4.0)	-2 (1.2)
Slovak Republic	8 (0.5)	517 (7.6)	◊ ◊	12 (0.6)	527 (3.9)	◊ ◊	36 (1.0)	514 (3.8)	◊ ◊
Slovenia	10 (0.6)	519 (5.1)	-3 (1.1) ▼	13 (0.6)	523 (3.4)	-2 (1.1)	38 (1.0)	515 (2.2)	1 (1.4)
Sweden	17 (1.0)	530 (3.1)	◊ ◊	21 (0.8)	517 (3.1)	◊ ◊	35 (1.0)	504 (2.6)	◊ ◊
Tunisia r	3 (0.4)	359 (13.6)	-1 (0.7)	5 (0.5)	386 (12.0)	-3 (0.9) ▼	18 (1.1)	375 (6.3)	1 (1.6)
Ukraine	9 (0.6)	488 (6.3)	◊ ◊	12 (0.7)	501 (4.5)	◊ ◊	37 (1.0)	481 (3.3)	◊ ◊
United States	15 (0.6)	552 (3.8)	1 (0.9)	16 (0.5)	554 (3.3)	-1 (0.7)	34 (0.6)	538 (2.4)	0 (0.9)
Yemen r	4 (0.6)	201 (18.4)	◊ ◊	4 (0.4)	213 (10.6)	◊ ◊	10 (1.0)	235 (9.5)	◊ ◊
International Avg.	12 (0.1)	494 (1.3)		13 (0.1)	495 (1.1)		30 (0.2)	486 (0.8)	
Benchmarking Participants									
Alberta, Canada	18 (1.0)	519 (4.2)	◊ ◊	23 (1.0)	517 (3.9)	◊ ◊	36 (0.8)	509 (3.2)	◊ ◊
British Columbia, Canada	19 (0.8)	525 (3.9)	◊ ◊	21 (0.7)	519 (3.9)	◊ ◊	37 (0.9)	509 (3.0)	◊ ◊
Dubai, UAE r	11 (0.6)	463 (6.3)	◊ ◊	12 (0.8)	493 (5.3)	◊ ◊	31 (0.9)	470 (3.5)	◊ ◊
Massachusetts, US	22 (1.8)	599 (5.4)	◊ ◊	23 (1.1)	587 (3.9)	◊ ◊	37 (1.4)	567 (3.8)	◊ ◊
Minnesota, US	17 (1.0)	581 (7.6)	◊ ◊	22 (1.2)	574 (5.5)	◊ ◊	36 (1.2)	560 (5.4)	◊ ◊
Ontario, Canada	18 (1.0)	533 (4.2)	-2 (1.8)	23 (1.2)	526 (4.2)	1 (1.6)	34 (1.2)	514 (3.1)	-2 (1.8)
Quebec, Canada	11 (0.8)	531 (4.9)	4 (1.0) ▲	15 (0.9)	535 (4.1)	4 (1.1) ▲	39 (1.1)	528 (2.5)	-4 (1.5) ▼

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Background data provided by students.

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

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

TIMSS 2007 International Reports available at http://timssandpirls.bc.edu/TIMSS2007

Exhibit 9.2 Books in the home with trends (continued)

TIMSS2007 Mathematics 4th Grade

Country	11-25 Books			0-10 Books		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	29 (1.4)	395 (6.5)	◊ ◊	54 (1.9)	374 (6.8)	◊ ◊
Armenia ↑	23 (1.6)	502 (9.9)	1 (1.8)	23 (1.5)	507 (7.8)	6 (1.9) ↗
Australia	13 (0.8)	486 (5.8)	0 (1.2)	6 (0.6)	458 (8.1)	0 (1.0)
Austria	29 (0.9)	490 (2.7)	◊ ◊	11 (0.6)	458 (4.1)	◊ ◊
Chinese Taipei	25 (0.8)	557 (2.8)	1 (1.1)	16 (0.8)	537 (3.6)	-1 (1.1)
Colombia	26 (0.9)	371 (6.3)	◊ ◊	44 (1.4)	345 (4.4)	◊ ◊
Czech Republic	26 (1.2)	466 (2.6)	◊ ◊	6 (0.7)	424 (7.0)	◊ ◊
Denmark	23 (1.1)	509 (3.9)	◊ ◊	9 (0.7)	483 (7.7)	◊ ◊
El Salvador	26 (0.9)	349 (4.8)	◊ ◊	52 (1.3)	318 (4.9)	◊ ◊
England	17 (0.8)	513 (3.9)	0 (1.3)	9 (0.7)	473 (5.6)	1 (1.1)
Georgia	24 (1.4)	439 (4.7)	◊ ◊	17 (1.2)	414 (7.5)	◊ ◊
Germany	25 (1.0)	506 (3.1)	◊ ◊	8 (0.7)	465 (5.1)	◊ ◊
Hong Kong SAR	22 (0.9)	597 (4.4)	-8 (1.2) ↘	16 (1.0)	588 (5.3)	-9 (1.7) ↘
Hungary	25 (1.0)	484 (3.9)	3 (1.3) ↗	10 (0.9)	429 (7.5)	2 (1.1)
Iran, Islamic Rep. of	25 (1.2)	419 (5.2)	3 (1.7) ↗	53 (1.9)	380 (4.7)	-2 (2.9)
Italy	31 (0.8)	500 (3.9)	-2 (1.3)	14 (0.9)	483 (5.7)	-4 (1.3) ↘
Japan	28 (0.9)	556 (2.6)	1 (1.2)	14 (0.7)	522 (4.3)	2 (1.1) ↗
Kazakhstan	34 (2.9)	541 (10.0)	◊ ◊	22 (2.7)	558 (9.1)	◊ ◊
Kuwait ↑	30 (1.2)	328 (4.7)	◊ ◊	22 (1.2)	317 (5.6)	◊ ◊
Latvia	22 (1.1)	518 (4.3)	5 (1.4) ↗	8 (0.7)	501 (6.3)	2 (1.0) ↗
Lithuania	36 (1.3)	522 (3.0)	2 (1.7)	15 (0.8)	493 (5.9)	3 (1.2) ↗
Morocco ↑	23 (1.3)	357 (6.8)	-2 (2.0)	53 (2.2)	336 (7.1)	-7 (3.1) ↘
Netherlands	25 (1.1)	519 (3.2)	3 (1.5) ↗	9 (0.8)	502 (6.4)	0 (1.1)
New Zealand	18 (0.6)	460 (3.4)	1 (0.9)	10 (0.6)	432 (6.3)	1 (0.9)
Norway	23 (0.8)	460 (3.2)	6 (1.1) ↗	7 (0.6)	420 (5.0)	0 (0.8)
Qatar	19 (0.5)	300 (3.4)	◊ ◊	19 (0.5)	287 (3.4)	◊ ◊
Russian Federation	26 (1.0)	535 (5.4)	-1 (1.8)	10 (1.8)	494 (13.8)	0 (1.9)
Scotland	20 (0.8)	475 (3.4)	0 (1.4)	12 (0.8)	439 (4.6)	1 (1.1)
Singapore	21 (0.8)	578 (4.9)	-1 (1.2)	10 (0.6)	540 (5.1)	0 (1.0)
Slovak Republic	32 (0.9)	489 (4.4)	◊ ◊	11 (1.3)	434 (8.7)	◊ ◊
Slovenia	30 (1.0)	487 (2.4)	2 (1.5)	9 (0.6)	459 (4.7)	2 (0.8) ↗
Sweden	21 (0.9)	483 (3.7)	◊ ◊	7 (0.7)	454 (6.4)	◊ ◊
Tunisia ↑	29 (1.3)	354 (5.7)	0 (2.0)	44 (2.1)	304 (5.1)	3 (3.1)
Ukraine	31 (1.1)	459 (3.8)	◊ ◊	11 (0.8)	425 (6.3)	◊ ◊
United States	21 (0.5)	512 (2.6)	-1 (0.8)	14 (0.7)	480 (3.0)	1 (0.9)
Yemen ↑	22 (1.8)	244 (9.4)	◊ ◊	60 (2.4)	229 (7.0)	◊ ◊
International Avg	25 (0.2)	466 (0.8)		20 (0.2)	438 (1.1)	
Benchmarking Participants						
Alberta, Canada	18 (0.9)	481 (4.0)	◊ ◊	6 (0.6)	472 (5.5)	◊ ◊
British Columbia, Canada	18 (0.8)	478 (4.2)	◊ ◊	6 (0.5)	463 (5.6)	◊ ◊
Dubai, UAE ↑	29 (1.2)	441 (3.8)	◊ ◊	17 (1.2)	410 (8.1)	◊ ◊
Massachusetts, US	13 (1.2)	538 (6.4)	◊ ◊	5 (0.8)	522 (7.9)	◊ ◊
Minnesota, US	17 (1.1)	522 (5.9)	◊ ◊	9 (1.3)	492 (7.5)	◊ ◊
Ontario, Canada	19 (1.3)	493 (4.4)	3 (1.8)	6 (0.9)	454 (9.4)	-1 (1.3)
Quebec, Canada	23 (0.9)	506 (4.9)	-4 (1.2) ↘	11 (0.9)	488 (6.4)	0 (1.1)

↗ 2007 percent significantly higher
↘ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

As in 2003, the vast majority of pupils have a computer in their home (Exhibit 9.3), 95 per cent of pupils compared with the international average of 70 per cent. A high proportion of grade 4 pupils in England (86 per cent) also have an internet connection in their home. This is 30 per cent higher than the international average. The percentage of pupils in England with an internet connection in their home was higher than the percentage of pupils in Germany, Italy, Japan and Singapore. Among all participating countries, only Denmark, Norway, the Netherlands and Sweden had a higher percentage of pupils with an internet connection than England.

In terms of trends in computer use, there has been no significant change in the percentage of grade 4 pupils who use a computer both at home and at school. The majority of pupils (78 per cent) reported that they use a computer in both locations. This is more than double the international average, indicating that pupils in England have more opportunities to access computers than their international counterparts. However, there have been some significant changes in the patterns of computer use amongst grade 4 pupils in England. There has been a significant increase in the percentage of pupils who use a computer at

Exhibit 9.3 Computer and internet connection in the home

TIMSS2007 Mathematics 4th Grade

Country	Have Computer		Do Not Have Computer		Have Internet Connection		Do Not Have Internet Connection	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Algeria	32 (1.5)	391 (6.6)	68 (1.5)	375 (5.4)	13 (1.0)	369 (7.6)	87 (1.0)	382 (5.3)
Armenia	38 (1.6)	499 (4.5)	62 (1.6)	504 (5.4)	21 (1.3)	506 (13.6)	79 (1.3)	500 (3.9)
Australia	95 (0.6)	521 (3.3)	5 (0.6)	446 (11.0)	84 (0.8)	527 (3.3)	16 (0.8)	470 (6.0)
Austria	93 (0.5)	509 (2.0)	7 (0.5)	471 (4.4)	73 (1.2)	516 (2.0)	27 (1.2)	478 (2.9)
Chinese Taipei	87 (0.6)	583 (1.7)	13 (0.6)	535 (3.9)	80 (0.7)	582 (1.8)	20 (0.7)	554 (3.7)
Colombia	39 (1.2)	379 (6.8)	61 (1.2)	346 (4.8)	16 (0.9)	382 (10.1)	84 (0.9)	354 (4.8)
Czech Republic	90 (0.7)	491 (2.5)	10 (0.7)	449 (6.0)	65 (1.2)	498 (3.0)	35 (1.2)	467 (3.6)
Denmark	95 (0.4)	526 (2.4)	5 (0.4)	482 (9.1)	93 (0.4)	527 (2.4)	7 (0.4)	483 (6.7)
El Salvador	26 (1.3)	358 (6.2)	74 (1.3)	325 (4.2)	14 (0.9)	348 (8.7)	86 (0.9)	331 (4.1)
England	95 (0.4)	545 (2.7)	5 (0.4)	489 (8.7)	86 (0.7)	549 (2.8)	14 (0.7)	499 (4.6)
Georgia	33 (1.5)	439 (4.8)	67 (1.5)	443 (5.0)	17 (1.5)	432 (6.1)	83 (1.5)	443 (4.6)
Germany	93 (0.5)	532 (2.3)	7 (0.5)	489 (5.9)	81 (0.8)	536 (2.2)	19 (0.8)	495 (4.0)
Hong Kong SAR	94 (0.5)	609 (3.6)	6 (0.5)	580 (7.2)	86 (0.8)	611 (3.6)	14 (0.8)	583 (5.0)
Hungary	81 (0.7)	525 (3.5)	19 (0.7)	462 (6.1)	54 (1.3)	531 (4.0)	46 (1.3)	488 (3.8)
Iran, Islamic Rep. of	29 (1.7)	444 (5.3)	71 (1.7)	388 (4.5)	18 (1.3)	450 (6.4)	82 (1.3)	394 (4.3)
Italy	88 (0.8)	510 (3.0)	12 (0.8)	482 (5.9)	54 (1.0)	513 (2.7)	46 (1.0)	499 (4.5)
Japan	82 (0.9)	577 (2.1)	18 (0.9)	539 (3.5)	70 (1.2)	579 (2.2)	30 (1.2)	545 (2.8)
Kazakhstan	28 (1.8)	555 (6.4)	72 (1.8)	547 (8.7)	16 (1.6)	547 (7.9)	84 (1.6)	549 (7.9)
Kuwait	82 (1.0)	331 (3.4)	18 (1.0)	281 (6.0)	64 (1.4)	328 (4.2)	36 (1.4)	310 (4.8)
Latvia	76 (1.2)	547 (2.4)	24 (1.2)	512 (4.0)	57 (1.3)	548 (2.5)	43 (1.3)	523 (3.5)
Lithuania	77 (0.9)	538 (2.4)	23 (0.9)	505 (4.8)	58 (1.4)	545 (2.4)	42 (1.4)	512 (3.3)
Morocco	32 (2.0)	370 (6.9)	68 (2.0)	336 (5.4)	26 (1.7)	361 (7.9)	74 (1.7)	342 (4.9)
Netherlands	95 (0.5)	537 (2.2)	5 (0.5)	494 (6.3)	96 (0.4)	537 (2.2)	4 (0.4)	498 (6.7)
New Zealand	91 (0.5)	499 (2.2)	9 (0.5)	445 (5.3)	77 (0.9)	507 (2.2)	23 (0.9)	449 (3.7)
Norway	95 (0.4)	478 (2.4)	5 (0.4)	413 (7.4)	95 (0.4)	477 (2.6)	5 (0.4)	429 (7.2)
Qatar	80 (0.5)	310 (1.2)	20 (0.5)	268 (2.8)	58 (0.6)	308 (1.3)	42 (0.6)	294 (2.4)
Russian Federation	51 (1.8)	558 (4.5)	49 (1.8)	532 (6.6)	26 (1.4)	560 (4.9)	74 (1.4)	540 (5.7)
Scotland	94 (0.5)	498 (2.2)	6 (0.5)	447 (8.3)	85 (0.7)	502 (2.3)	15 (0.7)	453 (4.2)
Singapore	90 (0.5)	606 (3.7)	10 (0.5)	543 (6.0)	80 (0.7)	612 (3.6)	20 (0.7)	552 (4.8)
Slovak Republic	77 (1.2)	507 (3.8)	23 (1.2)	471 (6.8)	43 (1.1)	509 (4.0)	57 (1.1)	489 (5.0)
Slovenia	85 (0.6)	512 (2.1)	15 (0.6)	463 (3.8)	75 (0.8)	508 (1.9)	25 (0.8)	486 (2.9)
Sweden	98 (0.2)	503 (2.6)	2 (0.2)	~ ~	93 (0.5)	506 (2.5)	7 (0.5)	468 (6.1)
Tunisia	34 (1.3)	358 (6.6)	66 (1.3)	319 (4.1)	21 (1.1)	323 (6.8)	79 (1.1)	336 (4.7)
Ukraine	40 (1.3)	491 (3.1)	60 (1.3)	459 (3.3)	24 (1.1)	484 (4.0)	76 (1.1)	468 (3.1)
United States	90 (0.5)	534 (2.5)	10 (0.5)	489 (4.0)	78 (0.9)	541 (2.4)	22 (0.9)	492 (2.9)
Yemen	18 (1.5)	225 (8.5)	82 (1.5)	228 (6.9)	11 (1.3)	216 (7.0)	89 (1.3)	229 (6.5)
International Avg.	70 (0.2)	483 (0.7)	30 (0.2)	444 (1.2)	56 (0.2)	483 (0.8)	44 (0.2)	455 (0.8)
Benchmarking Participants								
Alberta, Canada	94 (0.5)	508 (2.8)	6 (0.5)	470 (6.8)	88 (0.9)	509 (2.8)	12 (0.9)	480 (5.5)
British Columbia, Canada	95 (0.5)	508 (2.7)	5 (0.5)	467 (7.3)	89 (0.8)	510 (2.7)	11 (0.8)	475 (6.2)
Dubai, UAE	89 (0.7)	455 (2.6)	11 (0.7)	398 (6.8)	78 (0.8)	461 (2.6)	22 (0.8)	408 (5.2)
Massachusetts, US	96 (0.7)	575 (3.3)	4 (0.7)	529 (11.5)	91 (1.1)	577 (3.3)	9 (1.1)	529 (8.2)
Minnesota, US	92 (0.9)	558 (5.9)	8 (0.9)	514 (5.8)	81 (1.6)	565 (5.3)	19 (1.6)	506 (9.1)
Ontario, Canada	96 (0.4)	514 (3.1)	4 (0.4)	475 (9.9)	89 (1.0)	518 (2.9)	11 (1.0)	470 (5.5)
Quebec, Canada	95 (0.6)	521 (3.0)	5 (0.6)	486 (6.2)	87 (1.0)	524 (2.8)	13 (1.0)	488 (5.3)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by students.

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

A tilde (~) indicates insufficient data to report achievement.

home but not at school, and a significant decrease in the number of pupils who use a computer at school but not at home (see Exhibit 9.4). This is an interesting finding, as it supports teacher reports of a reduction in the availability of computers during science and mathematics lessons, as discussed in Chapter 8. It is not clear why this reduction in the use of computers in school may have come about. It is possible that certain computer equipment, e.g. interactive whiteboards, have become so well integrated into lessons that teachers and pupils alike do not consider that, when they are interacting with this technology, they are using a computer.

In order to establish a clearer picture of how well resourced the homes of England's grade 4 pupils are, pupils were asked about other items they possessed. Pupils were asked to report whether they had the following items: calculator (95 per cent), desk (82 per cent), dictionary (90 per cent), own bedroom (78 per cent), mobile phone (79 per cent) and encyclopaedia (78 per cent). Pupil reports indicate that the vast majority of England's

TIMSS 2007 International Reports available at http://timssandpirls.bc.edu/TIMSS2007

Exhibit 9.4 Computer use with trends

TIMSS2007 Mathematics 4th Grade

Country	Use Computer Both at Home and at School			Use Computer at Home but Not at School			Use Computer at School but Not at Home		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Chinese Taipei	84 (0.7)	582 (2.0)	3 (1.6)	8 (0.4)	554 (4.9)	2 (1.3)	7 (0.5)	544 (5.7)	-5 (0.9) ▼
Scotland	79 (1.0)	502 (2.2)	2 (1.4)	12 (0.7)	474 (5.7)	5 (1.0) ▲	7 (0.5)	461 (6.6)	-6 (0.9) ▼
Australia	79 (1.4)	525 (3.7)	-2 (2.1)	13 (1.2)	493 (6.2)	7 (1.5) ▲	7 (0.6)	471 (8.9)	-4 (1.2) ▼
England	78 (1.0)	551 (2.9)	-1 (1.5)	13 (0.9)	521 (5.2)	6 (1.1) ▲	7 (0.6)	489 (8.5)	-4 (1.0) ▼
Hong Kong SAR	78 (1.1)	613 (3.6)	2 (1.7)	16 (0.8)	587 (5.0)	7 (1.2) ▲	4 (0.4)	591 (8.3)	-8 (1.0) ▼
Netherlands	77 (1.3)	540 (2.2)	-2 (2.4)	16 (1.3)	521 (4.0)	4 (2.1)	3 (0.3)	517 (9.3)	-1 (0.5)
Denmark	75 (1.4)	528 (2.6)	◊ ◊	21 (1.3)	515 (4.7)	◊ ◊	3 (0.4)	495 (10.3)	◊ ◊
Singapore	67 (1.1)	614 (3.5)	-4 (1.7) ▼	22 (0.8)	584 (4.8)	5 (1.3) ▲	7 (0.5)	548 (6.9)	0 (0.7)
New Zealand	66 (1.0)	506 (2.3)	-5 (1.5) ▼	20 (0.9)	483 (4.4)	8 (1.2) ▲	10 (0.5)	446 (4.9)	-2 (0.9) ▼
Kuwait	61 (1.6)	330 (3.8)	◊ ◊	23 (1.2)	313 (6.1)	◊ ◊	11 (0.7)	291 (6.9)	◊ ◊
Norway	59 (1.8)	482 (3.2)	-1 (2.5)	34 (1.7)	469 (3.2)	6 (2.4) ▲	3 (0.3)	437 (10.9)	-2 (0.6) ▼
United States	58 (1.0)	540 (2.6)	-16 (1.5) ▼	26 (1.0)	524 (3.2)	14 (1.4) ▲	10 (0.5)	496 (3.5)	-1 (0.8)
Sweden	53 (2.0)	508 (2.6)	◊ ◊	42 (2.0)	498 (3.3)	◊ ◊	3 (0.3)	493 (8.9)	◊ ◊
Japan	47 (1.4)	587 (2.3)	-8 (1.8) ▼	19 (1.2)	565 (3.2)	10 (1.4) ▲	26 (1.0)	550 (3.0)	-5 (1.4) ▼
Czech Republic	44 (2.5)	498 (3.4)	◊ ◊	46 (2.4)	483 (3.0)	◊ ◊	6 (0.7)	448 (8.0)	◊ ◊
Qatar	44 (0.6)	314 (1.8)	◊ ◊	38 (0.6)	297 (3.0)	◊ ◊	11 (0.3)	267 (5.5)	◊ ◊
Italy	37 (1.4)	523 (3.1)	7 (2.3) ▲	24 (1.3)	505 (4.1)	-14 (2.3) ▼	5 (0.4)	501 (7.0)	-6 (1.0) ▼
Hungary	33 (2.0)	527 (5.7)	9 (2.9) ▲	49 (2.1)	516 (4.4)	6 (2.9) ▲	7 (0.8)	450 (9.2)	-2 (1.3)
Germany	30 (1.5)	533 (3.8)	◊ ◊	55 (1.5)	528 (2.6)	◊ ◊	3 (0.3)	486 (9.8)	◊ ◊
Slovak Republic	30 (1.7)	517 (5.0)	◊ ◊	46 (1.7)	496 (4.3)	◊ ◊	13 (1.0)	478 (5.5)	◊ ◊
Slovenia	28 (1.5)	508 (2.7)	-4 (2.4)	64 (1.4)	503 (2.0)	18 (2.4) ▲	2 (0.3)	~ ~	-3 (0.7) ▼
Austria	27 (1.5)	515 (2.7)	◊ ◊	56 (1.6)	505 (2.5)	◊ ◊	4 (0.3)	478 (6.5)	◊ ◊
Tunisia	18 (1.4)	336 (9.2)	11 (1.6) ▲	28 (1.5)	353 (6.5)	3 (2.1)	23 (2.1)	323 (7.2)	16 (2.3) ▲
Colombia	15 (1.0)	383 (10.2)	◊ ◊	18 (1.3)	369 (8.4)	◊ ◊	30 (1.8)	357 (6.1)	◊ ◊
Kazakhstan	14 (1.9)	560 (13.2)	◊ ◊	22 (2.0)	543 (6.6)	◊ ◊	26 (2.6)	547 (12.4)	◊ ◊
Latvia	14 (1.2)	546 (6.5)	4 (1.8) ▲	61 (1.6)	546 (2.4)	34 (2.3) ▲	8 (1.0)	504 (8.7)	-9 (2.3) ▼
Morocco r	13 (2.2)	346 (21.1)	-3 (2.5)	25 (1.5)	354 (4.8)	0 (2.3)	6 (0.7)	310 (8.2)	-1 (1.0)
Lithuania	13 (1.2)	537 (5.0)	3 (1.7)	64 (1.7)	538 (2.4)	29 (2.2) ▲	7 (0.9)	495 (8.2)	-11 (1.8) ▼
El Salvador	11 (1.3)	356 (12.4)	◊ ◊	20 (1.2)	332 (5.4)	◊ ◊	17 (1.6)	338 (6.4)	◊ ◊
Russian Federation	11 (1.4)	568 (7.9)	7 (1.5) ▲	45 (2.2)	554 (4.4)	25 (2.4) ▲	12 (1.7)	537 (15.0)	1 (2.3)
Yemen r	9 (0.9)	209 (9.6)	◊ ◊	23 (1.7)	229 (7.1)	◊ ◊	9 (0.9)	201 (11.9)	◊ ◊
Algeria	8 (1.1)	328 (20.0)	◊ ◊	25 (1.7)	385 (5.8)	◊ ◊	4 (0.5)	332 (15.4)	◊ ◊
Armenia	7 (0.8)	489 (7.3)	2 (0.9)	44 (1.9)	493 (4.3)	14 (2.3) ▲	15 (1.6)	508 (8.2)	6 (2.0) ▲
Ukraine	6 (0.7)	493 (7.0)	◊ ◊	34 (1.3)	489 (3.5)	◊ ◊	8 (1.2)	463 (7.6)	◊ ◊
Georgia	6 (0.6)	404 (10.0)	◊ ◊	37 (1.8)	428 (4.5)	◊ ◊	6 (0.9)	427 (10.9)	◊ ◊
Iran, Islamic Rep. of	2 (0.5)	~ ~	-1 (0.6)	19 (1.3)	457 (4.2)	8 (1.9) ▲	1 (0.2)	~ ~	-2 (0.5) ▼
International Avg.	38 (0.2)	483 (1.3)		31 (0.2)	472 (0.8)		9 (0.2)	449 (1.5)	
Benchmarking Participants									
Alberta, Canada	77 (1.2)	512 (2.8)	◊ ◊	13 (0.9)	483 (5.2)	◊ ◊	7 (0.5)	484 (5.1)	◊ ◊
Ontario, Canada	73 (1.6)	517 (3.0)	-5 (2.6)	20 (1.5)	504 (4.3)	7 (2.2) ▲	5 (0.6)	481 (9.4)	-2 (0.8) ▼
British Columbia, Canada	72 (1.4)	512 (3.0)	◊ ◊	19 (1.2)	496 (4.1)	◊ ◊	6 (0.5)	474 (6.6)	◊ ◊
Minnesota, US	66 (1.8)	564 (5.4)	◊ ◊	22 (1.9)	547 (9.8)	◊ ◊	8 (1.0)	510 (7.7)	◊ ◊
Quebec, Canada	66 (1.7)	526 (3.1)	-10 (2.2) ▼	26 (1.5)	511 (4.5)	14 (1.9) ▲	5 (0.6)	491 (6.7)	-4 (1.0) ▼
Dubai, UAE	63 (1.6)	459 (2.6)	◊ ◊	29 (1.2)	440 (4.4)	◊ ◊	6 (0.7)	386 (14.0)	◊ ◊
Massachusetts, US	62 (2.4)	581 (3.9)	◊ ◊	31 (2.4)	564 (4.0)	◊ ◊	4 (0.8)	526 (13.4)	◊ ◊

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Background data provided by students.

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

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

grade 4 pupils have access to these resources at their home. The number of books and other resources in the home may be seen as a measure socio-economic status.

Homework

Pupils were asked about the frequency with which they are given mathematics homework and science homework, and also the amount of time they spend on this homework. Pupil responses were used to create two indices: the Index of Time Spent Doing Mathematics Homework and a parallel index for science, the Index of Time Spent Doing Science Homework, see Exhibit 9.5 for the pupil index of mathematics homework and Exhibit 9.6 for pupil index of science homework. Pupil responses were rated as 'high', 'medium' or 'low' depending on their answers to the questions about homework. A high rating indicates homework is assigned at least three or four times a week and pupils spend more than 30

Exhibit 9.4 Computer use with trends (continued)

TIMSS2007 Mathematics 4th Grade

Country	Use Computer Only at Places Other than Home and School			Do Not Use Computer at All		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Chinese Taipei	1 (0.1)	~ ~	0 (0.2)	1 (0.1)	~ ~	0 (0.2)
Scotland	1 (0.2)	~ ~	0 (0.3)	1 (0.2)	~ ~	-1 (0.3)
Australia	1 (0.2)	~ ~	-1 (0.3)	1 (0.2)	~ ~	0 (0.2)
England	1 (0.2)	~ ~	0 (0.2)	1 (0.2)	~ ~	0 (0.3)
Hong Kong SAR	1 (0.2)	~ ~	-1 (0.3)	2 (0.3)	~ ~	-1 (0.5)
Netherlands	0 (0.1)	~ ~	0 (0.2)	4 (0.5)	515 (5.8)	0 (0.7)
Denmark	1 (0.2)	~ ~	◊ ◊	1 (0.2)	~ ~	◊ ◊
Singapore	1 (0.2)	~ ~	0 (0.3)	2 (0.2)	~ ~	0 (0.3)
New Zealand	2 (0.2)	~ ~	-1 (0.4)	2 (0.2)	~ ~	0 (0.3)
Kuwait	2 (0.2)	~ ~	◊ ◊	3 (0.5)	327 (12.3)	◊ ◊
Norway	1 (0.1)	~ ~	-1 (0.4)	2 (0.3)	~ ~	-3 (0.7) ▼
United States	3 (0.2)	502 (5.5)	1 (0.3)	3 (0.3)	515 (5.6)	1 (0.3)
Sweden	1 (0.1)	~ ~	◊ ◊	2 (0.3)	~ ~	◊ ◊
Japan	2 (0.3)	~ ~	0 (0.4)	6 (0.6)	533 (6.4)	2 (0.7) ▲
Czech Republic	3 (0.3)	460 (8.7)	◊ ◊	2 (0.2)	~ ~	◊ ◊
Qatar	3 (0.2)	267 (8.4)	◊ ◊	4 (0.2)	310 (9.0)	◊ ◊
Italy	1 (0.1)	~ ~	-8 (0.6) ▼	33 (1.0)	491 (4.3)	21 (1.2) ▲
Hungary	4 (0.6)	477 (7.0)	-8 (1.0) ▼	7 (0.5)	488 (8.5)	-5 (1.0) ▼
Germany	1 (0.2)	~ ~	◊ ◊	11 (0.6)	535 (4.4)	◊ ◊
Slovak Republic	4 (0.6)	481 (7.8)	◊ ◊	7 (1.0)	478 (11.7)	◊ ◊
Slovenia	1 (0.1)	~ ~	-4 (0.6) ▼	4 (0.4)	487 (5.7)	-7 (1.0) ▼
Austria	1 (0.2)	~ ~	◊ ◊	12 (0.8)	503 (4.0)	◊ ◊
Tunisia	6 (0.6)	352 (7.6)	-9 (1.2) ▼	25 (2.6)	317 (6.9)	-21 (3.4) ▼
Colombia	9 (0.9)	362 (7.6)	◊ ◊	28 (1.9)	338 (6.0)	◊ ◊
Kazakhstan	12 (1.4)	543 (7.5)	◊ ◊	26 (3.4)	561 (8.4)	◊ ◊
Latvia	10 (0.8)	524 (5.2)	-14 (2.0) ▼	7 (0.7)	519 (6.2)	-16 (2.0) ▼
Morocco	9 (0.7)	362 (6.6)	-6 (1.4) ▼	46 (2.4)	339 (7.0)	9 (4.0) ▲
Lithuania	8 (0.7)	522 (4.8)	-15 (1.3) ▼	7 (0.6)	504 (7.4)	-6 (1.2) ▼
El Salvador	12 (0.9)	341 (6.5)	◊ ◊	40 (2.4)	327 (5.2)	◊ ◊
Russian Federation	14 (0.9)	543 (5.4)	-16 (1.6) ▼	19 (2.0)	522 (9.0)	-16 (2.6) ▼
Yemen	4 (0.5)	212 (14.1)	◊ ◊	55 (3.0)	232 (8.3)	◊ ◊
Algeria	7 (1.0)	382 (14.6)	◊ ◊	55 (2.5)	385 (5.1)	◊ ◊
Armenia	12 (0.9)	516 (9.4)	-12 (1.4) ▼	21 (1.5)	508 (7.8)	-10 (2.1) ▼
Ukraine	12 (0.8)	496 (5.6)	◊ ◊	40 (1.4)	450 (3.6)	◊ ◊
Georgia	10 (1.0)	455 (5.9)	◊ ◊	42 (2.3)	459 (5.6)	◊ ◊
Iran, Islamic Rep. of	4 (0.5)	425 (7.0)	-4 (1.1) ▼	75 (1.7)	386 (4.4)	-1 (2.6)
International Avg	5 (0.1)	433 (1.9)		17 (0.2)	441 (1.4)	
Benchmarking Participants						
Alberta, Canada	1 (0.2)	~ ~	◊ ◊	1 (0.2)	~ ~	◊ ◊
Ontario, Canada	1 (0.3)	~ ~	0 (0.5)	1 (0.2)	~ ~	0 (0.3)
British Columbia, Canada	1 (0.2)	~ ~	◊ ◊	1 (0.3)	~ ~	◊ ◊
Minnesota, US	2 (0.3)	~ ~	◊ ◊	2 (0.3)	~ ~	◊ ◊
Quebec, Canada	1 (0.3)	~ ~	0 (0.4)	2 (0.3)	~ ~	1 (0.4)
Dubai, UAE	1 (0.2)	~ ~	◊ ◊	1 (0.2)	~ ~	◊ ◊
Massachusetts, US	2 (0.3)	~ ~	◊ ◊	1 (0.3)	~ ~	◊ ◊

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

minutes on their homework. According to their own reports, England's grade 4 pupils receive less homework than pupils in other countries. Only three per cent of pupils gave a high rating for the maths homework index, compared with the international average of 21 per cent. This finding is as in the 2003 survey, in which grade 4 pupils reported receiving less homework than pupils in comparison countries.

A similar picture is seen in the pupil index of science homework. Pupils in England report receiving less science homework than pupils in most other countries. However, there is less difference between England's data for science homework and the data from the rest of the international sample. Grade 4 pupils across the international sample report that they do not receive a lot of science homework. In 2003 it was found that mathematics homework was given more frequently than science homework. This is also maintained in 2007 with only one per cent of grade 4 pupils giving a high level rating for the pupil index of science homework.

Exhibit 9.5 Index of time students spend doing mathematics homework (TMH) in a normal school week

TIMSS2007 Mathematics 4th Grade

Country		High TMH		Medium TMH		Low TMH	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Kazakhstan		42 (2.0)	549 (9.3)	56 (1.9)	552 (7.3)	2 (0.3)	~ ~
Russian Federation		37 (1.4)	541 (5.7)	61 (1.3)	550 (5.0)	1 (0.3)	~ ~
Ukraine		37 (1.3)	475 (3.3)	61 (1.3)	475 (3.4)	1 (0.2)	~ ~
Algeria	r	35 (1.7)	397 (6.6)	54 (1.5)	385 (6.0)	11 (1.0)	373 (9.1)
Latvia		34 (1.3)	534 (3.2)	65 (1.3)	545 (2.6)	1 (0.2)	~ ~
Iran, Islamic Rep. of		34 (1.7)	424 (5.8)	51 (1.6)	401 (4.5)	15 (1.4)	386 (6.9)
Singapore		34 (0.9)	607 (4.4)	52 (0.9)	603 (3.7)	15 (0.8)	581 (5.6)
Tunisia	r	33 (1.7)	362 (5.5)	53 (1.4)	352 (4.8)	14 (1.2)	342 (7.7)
Armenia	r	31 (1.5)	510 (5.3)	64 (1.4)	503 (3.7)	5 (0.7)	509 (24.8)
Yemen	s	30 (2.4)	243 (9.7)	64 (2.5)	245 (6.6)	6 (1.0)	218 (11.8)
Colombia	r	29 (1.5)	384 (5.5)	58 (1.4)	369 (4.8)	13 (1.4)	354 (6.9)
Lithuania		29 (1.3)	526 (3.5)	68 (1.3)	537 (2.5)	3 (0.5)	530 (10.7)
Georgia	r	27 (1.5)	451 (5.6)	71 (1.5)	449 (4.4)	2 (0.4)	~ ~
El Salvador	r	24 (1.2)	345 (6.3)	62 (1.2)	340 (4.6)	14 (1.1)	346 (6.5)
Morocco	r	24 (1.6)	360 (9.1)	61 (1.9)	352 (5.3)	16 (1.7)	350 (12.7)
Denmark		23 (1.2)	514 (3.3)	52 (1.2)	524 (2.7)	25 (1.4)	538 (3.8)
Hungary		21 (1.0)	517 (4.3)	75 (1.1)	518 (3.5)	4 (0.7)	493 (16.6)
Qatar	s	20 (0.6)	301 (3.1)	61 (0.7)	315 (2.3)	19 (0.5)	311 (3.3)
Germany	r	19 (0.8)	517 (3.4)	76 (0.9)	534 (2.4)	5 (0.6)	496 (10.0)
Slovenia		19 (0.9)	487 (3.2)	79 (1.0)	510 (2.1)	3 (0.3)	479 (9.0)
Hong Kong SAR		18 (1.1)	599 (6.2)	78 (1.1)	613 (3.5)	4 (0.5)	562 (6.2)
Italy		18 (1.3)	498 (4.7)	62 (1.6)	508 (3.8)	19 (1.8)	515 (3.9)
Kuwait	r	17 (0.9)	313 (6.4)	63 (1.7)	336 (3.8)	20 (1.4)	350 (6.9)
Chinese Taipei		17 (0.9)	568 (4.0)	63 (1.4)	584 (1.7)	20 (1.3)	569 (3.8)
Austria		16 (0.8)	493 (3.9)	76 (1.0)	511 (2.1)	8 (0.8)	501 (5.0)
United States		12 (0.5)	522 (3.6)	65 (1.2)	535 (2.8)	23 (1.3)	528 (3.2)
Norway		12 (1.0)	465 (7.4)	53 (1.8)	478 (2.9)	35 (2.1)	487 (3.4)
Japan		11 (0.9)	542 (4.6)	64 (1.9)	573 (2.4)	25 (1.9)	572 (3.5)
Slovak Republic		10 (0.6)	481 (4.0)	79 (1.2)	508 (3.2)	11 (1.0)	496 (9.1)
Czech Republic		8 (0.6)	473 (4.7)	65 (2.0)	489 (2.9)	28 (1.9)	491 (4.6)
New Zealand		8 (0.5)	469 (5.3)	38 (1.1)	487 (3.7)	54 (1.4)	509 (2.4)
Australia		7 (0.7)	508 (10.6)	42 (1.5)	517 (3.9)	51 (1.8)	525 (4.4)
Sweden		5 (0.6)	472 (6.4)	34 (1.2)	493 (2.9)	60 (1.4)	513 (3.0)
England		3 (0.4)	525 (11.2)	31 (1.6)	547 (5.0)	66 (1.6)	544 (2.9)
Scotland		3 (0.3)	453 (10.7)	30 (1.7)	484 (3.1)	67 (1.8)	505 (2.9)
Netherlands		1 (0.2)	~ ~	10 (0.9)	507 (4.7)	89 (0.9)	541 (2.3)
International Avg.		21 (0.2)	469 (1.0)	58 (0.2)	479 (0.7)	21 (0.2)	468 (1.5)
Benchmarking Participants							
Dubai, UAE	r	17 (1.2)	456 (5.9)	62 (1.8)	450 (2.8)	21 (1.7)	469 (6.9)
Massachusetts, US		16 (1.3)	573 (5.4)	75 (1.5)	574 (3.4)	9 (1.6)	569 (12.6)
British Columbia, Canada		15 (0.9)	493 (4.4)	49 (1.3)	506 (3.2)	37 (1.6)	513 (3.6)
Ontario, Canada		13 (1.1)	513 (6.7)	52 (1.8)	514 (2.9)	35 (2.2)	515 (4.4)
Alberta, Canada		11 (0.8)	499 (5.3)	45 (1.5)	502 (3.5)	44 (1.9)	512 (3.4)
Minnesota, US		11 (1.5)	543 (12.6)	59 (3.7)	560 (6.5)	31 (4.3)	555 (8.4)
Quebec, Canada		6 (0.6)	488 (5.4)	41 (1.6)	510 (3.5)	53 (1.8)	533 (3.4)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on students' reports on the frequency of mathematics homework they are given and the amount of time they spend on that homework. High level indicates mathematics homework assigned at least 3 or 4 times a week and students spend more than 30 minutes on that homework. Low level indicates mathematics homework assigned no more than twice a week and students spend no more than 30 minutes on that homework. Medium level includes all other possible combinations of responses.

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

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

As in 2003, teachers' responses to questions about homework were used to create an index of Teacher Emphasis on Homework; there was an index for mathematics homework (see Exhibit 9.7) and science homework (see Exhibit 9.8). The trend data indicates that there has been no significant change at grade 4 in teachers' emphasis on homework. This is the case for both mathematics and science. This finding is interesting, and could feed into the debate about the amount of homework that pupils in England are required to complete. It is often reported that pupils in England are expected to do too much homework and are unable to spend time on other after school activities, but the data gathered in this survey would suggest the neither pupils nor teachers feel that there is a large emphasis on homework at grade 4, and in reality England's pupils do much less homework than pupils in other countries. This clearly does not impact on attainment, since England's grade 4 pupils performed well in both mathematics and science in TIMSS 2007.

Exhibit 9.6 Index of time students spend doing science homework (TSH) in a normal school week

TIMSS2007 Science 4th Grade

Country		High TSH		Medium TSH		Low TSH	
		Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Colombia	r	23 (1.1)	423 (6.5)	55 (1.2)	407 (5.5)	22 (1.4)	426 (6.1)
Yemen	r	21 (2.0)	232 (11.3)	57 (2.6)	222 (7.5)	22 (2.6)	189 (15.2)
El Salvador	r	20 (1.0)	403 (5.0)	59 (1.3)	398 (4.1)	21 (1.4)	413 (4.2)
Tunisia	r	19 (1.4)	357 (9.8)	50 (1.5)	347 (6.7)	31 (1.8)	347 (8.9)
Singapore		17 (0.7)	585 (5.7)	47 (0.9)	587 (4.9)	36 (0.9)	594 (4.5)
Algeria	r	17 (1.1)	364 (9.3)	47 (1.4)	359 (9.9)	36 (1.7)	369 (6.6)
Qatar	s	16 (0.6)	287 (7.3)	54 (0.8)	306 (3.2)	30 (0.7)	327 (3.1)
Italy		15 (1.2)	525 (5.6)	48 (2.2)	535 (3.7)	36 (2.7)	546 (4.5)
Kazakhstan		15 (1.5)	512 (13.6)	45 (2.6)	529 (6.0)	41 (3.0)	545 (5.1)
Latvia		13 (1.0)	527 (5.0)	43 (1.1)	541 (2.8)	44 (1.4)	554 (3.3)
Slovenia		13 (0.8)	505 (4.9)	66 (1.2)	523 (2.2)	21 (1.2)	524 (3.4)
Morocco	r	13 (1.0)	289 (9.1)	46 (2.2)	305 (7.8)	42 (2.2)	328 (9.3)
Armenia	r	12 (0.9)	476 (8.4)	51 (1.6)	495 (7.5)	37 (1.7)	494 (6.5)
Iran, Islamic Rep. of		12 (0.9)	438 (8.7)	44 (1.5)	435 (5.4)	45 (2.0)	437 (4.7)
Kuwait	r	12 (0.8)	328 (10.1)	54 (1.5)	361 (4.5)	35 (1.5)	390 (6.7)
Georgia		10 (1.1)	415 (11.8)	45 (1.9)	415 (4.8)	46 (2.0)	440 (5.2)
Ukraine		8 (0.7)	449 (6.3)	40 (1.3)	471 (3.8)	52 (1.4)	490 (3.7)
Lithuania		8 (0.5)	496 (4.8)	35 (1.0)	511 (3.3)	57 (1.2)	524 (2.7)
Russian Federation		6 (0.7)	508 (9.6)	34 (1.3)	539 (5.2)	60 (1.6)	558 (4.9)
Hungary		6 (0.5)	520 (6.8)	33 (1.2)	532 (4.1)	61 (1.3)	549 (3.7)
Hong Kong SAR		5 (0.5)	547 (8.8)	43 (1.8)	562 (4.4)	52 (2.0)	554 (3.3)
Germany	r	4 (0.4)	512 (6.5)	30 (1.3)	527 (3.4)	66 (1.4)	536 (2.6)
Slovak Republic		3 (0.3)	498 (10.2)	24 (1.0)	513 (4.5)	73 (1.2)	540 (3.7)
New Zealand		3 (0.3)	463 (12.6)	23 (1.0)	503 (4.0)	74 (1.1)	515 (3.0)
United States		3 (0.2)	502 (8.1)	23 (1.0)	532 (3.3)	75 (1.1)	549 (2.8)
Chinese Taipei		2 (0.3)	~ ~	19 (0.9)	538 (4.2)	79 (1.0)	567 (1.9)
Denmark		2 (0.3)	~ ~	13 (1.0)	501 (4.8)	85 (1.0)	522 (2.9)
Austria		2 (0.3)	~ ~	14 (0.9)	493 (6.0)	84 (1.0)	537 (2.7)
Norway		1 (0.3)	~ ~	16 (1.2)	467 (5.4)	83 (1.3)	486 (3.4)
Czech Republic		1 (0.3)	~ ~	16 (0.9)	496 (5.6)	83 (0.9)	523 (3.2)
Australia		1 (0.2)	~ ~	17 (1.5)	520 (6.9)	81 (1.6)	536 (3.1)
Sweden		1 (0.2)	~ ~	19 (1.1)	514 (5.4)	80 (1.2)	533 (2.7)
Japan		1 (0.2)	~ ~	15 (1.1)	539 (3.9)	84 (1.2)	551 (2.2)
England		1 (0.2)	~ ~	16 (1.4)	540 (8.4)	83 (1.4)	547 (2.8)
Scotland		1 (0.1)	~ ~	10 (0.9)	490 (5.8)	89 (0.9)	507 (2.4)
Netherlands		1 (0.2)	~ ~	9 (1.0)	509 (5.5)	91 (1.1)	527 (2.8)
International Avg.		9 (0.1)	446 (2.2)	35 (0.2)	474 (1.2)	57 (0.3)	488 (1.2)
Benchmarking Participants							
Dubai, UAE	r	10 (1.0)	450 (7.7)	37 (1.4)	461 (4.3)	53 (1.6)	488 (4.7)
Alberta, Canada		3 (0.4)	503 (11.4)	22 (1.2)	532 (4.9)	75 (1.5)	550 (3.6)
British Columbia, Canada		3 (0.4)	496 (10.2)	24 (1.4)	529 (5.3)	73 (1.5)	544 (3.0)
Ontario, Canada		3 (0.5)	527 (15.9)	26 (1.4)	522 (5.7)	71 (1.6)	544 (3.8)
Minnesota, US		2 (0.3)	~ ~	16 (2.1)	537 (8.4)	83 (2.3)	560 (5.6)
Massachusetts, US		1 (0.3)	~ ~	17 (1.6)	572 (10.2)	82 (1.7)	575 (3.8)
Quebec, Canada		1 (0.2)	~ ~	12 (1.0)	511 (5.4)	87 (1.0)	522 (2.5)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on students' reports on the frequency of science homework they are given and the amount of time they spend on that homework. High level indicates science homework assigned at least 3 or 4 times a week and students spend more than 30 minutes on that homework. Low level indicates science homework assigned no more than twice a week and students spend no more than 30 minutes on that homework. Medium level includes all other possible combinations of responses.

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

A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

Exhibit 9.7 Index of teachers' emphasis on mathematics homework (EMH) with trends

TIMSS2007 Mathematics 4th Grade

Country	Have Policy to Assign Mathematics Homework		High EMH			Medium EMH			Low EMH		
			2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Armenia	O	r	41 (4.3)	504 (8.6)	-6 (6.1)	49 (3.9)	496 (4.3)	-3 (5.9)	11 (2.4)	507 (8.1)	8 (2.8) ▲
Algeria	●		40 (5.0)	378 (12.3)	◊ ◊	43 (4.7)	381 (7.3)	◊ ◊	17 (3.4)	369 (12.4)	◊ ◊
Italy	O		35 (3.0)	501 (5.1)	3 (4.6)	35 (2.8)	508 (5.3)	2 (4.7)	29 (2.9)	512 (3.4)	-5 (4.6)
Singapore	O		32 (2.8)	590 (6.6)	-3 (5.1)	47 (2.9)	610 (5.3)	-3 (4.8)	21 (2.5)	590 (8.3)	5 (3.7)
Kazakhstan	O		28 (3.9)	559 (9.9)	◊ ◊	70 (4.0)	545 (8.4)	◊ ◊	2 (1.0)	~ ~	◊ ◊
Georgia	●		28 (4.1)	437 (9.5)	◊ ◊	67 (4.4)	441 (4.9)	◊ ◊	5 (2.1)	424 (24.1)	◊ ◊
Hong Kong SAR	O		26 (3.6)	610 (7.2)	-7 (5.9)	63 (4.1)	611 (4.2)	0 (6.3)	11 (2.9)	576 (9.1)	7 (3.4) ▲
Russian Federation	O		24 (3.8)	545 (7.2)	-1 (5.0)	72 (4.0)	542 (6.3)	-1 (5.3)	4 (1.2)	573 (30.2)	2 (1.5)
Iran, Islamic Rep. of	O		23 (2.9)	398 (8.5)	-9 (5.8)	36 (3.8)	411 (5.8)	3 (6.0)	41 (3.8)	397 (7.4)	6 (6.0)
Colombia	O		22 (3.6)	370 (8.5)	◊ ◊	68 (4.2)	350 (6.9)	◊ ◊	10 (3.2)	360 (27.3)	◊ ◊
Morocco	●		19 (3.9)	339 (12.8)	- -	44 (4.3)	353 (6.9)	- -	36 (3.9)	331 (10.3)	- -
Chinese Taipei	O		18 (3.2)	582 (5.5)	7 (4.2)	64 (3.7)	574 (2.2)	12 (5.6) ▲	18 (2.8)	571 (3.3)	-19 (4.8) ▼
Germany	●		14 (2.0)	529 (4.4)	◊ ◊	79 (2.4)	526 (2.5)	◊ ◊	7 (1.6)	507 (16.0)	◊ ◊
Ukraine	●		14 (2.9)	468 (9.9)	◊ ◊	83 (3.2)	468 (3.8)	◊ ◊	4 (1.5)	497 (5.8)	◊ ◊
Norway	O		13 (2.5)	476 (5.9)	6 (3.2)	45 (3.5)	473 (4.4)	-1 (5.8)	42 (3.5)	472 (4.0)	-5 (5.7)
Yemen	●		12 (3.2)	215 (12.1)	◊ ◊	65 (4.1)	227 (8.4)	◊ ◊	22 (3.6)	220 (9.8)	◊ ◊
Austria	●		11 (1.8)	494 (5.6)	◊ ◊	73 (2.7)	508 (2.5)	◊ ◊	16 (2.4)	505 (4.3)	◊ ◊
El Salvador	O		11 (2.9)	334 (12.4)	◊ ◊	67 (4.1)	329 (5.7)	◊ ◊	22 (3.6)	329 (7.5)	◊ ◊
Tunisia	O		11 (2.3)	308 (15.6)	-3 (4.0)	35 (4.0)	328 (7.8)	2 (5.5)	54 (4.4)	327 (6.6)	1 (6.1)
Japan	O		9 (2.2)	574 (7.2)	5 (2.6) ▲	52 (3.8)	569 (2.7)	12 (5.8) ▲	39 (3.9)	566 (3.6)	-18 (5.9) ▼
United States	O		7 (1.4)	525 (10.8)	-1 (1.9)	68 (2.5)	531 (3.3)	0 (3.7)	25 (2.2)	525 (4.3)	0 (3.5)
Denmark	O		5 (1.6)	527 (8.4)	◊ ◊	61 (4.6)	526 (3.3)	◊ ◊	35 (4.4)	521 (4.0)	◊ ◊
Australia	O		5 (2.2)	535 (15.5)	1 (2.5)	18 (3.1)	519 (10.3)	-9 (5.1)	78 (2.6)	516 (4.5)	8 (4.9)
Qatar	●	r	4 (0.0)	312 (4.8)	◊ ◊	29 (0.2)	301 (3.0)	◊ ◊	67 (0.1)	293 (1.4)	◊ ◊
Slovenia	O		3 (1.1)	489 (17.3)	0 (2.0)	87 (2.2)	502 (1.9)	1 (3.3)	10 (1.9)	499 (7.0)	0 (2.9)
Sweden	O		3 (0.9)	515 (12.1)	◊ ◊	20 (3.3)	503 (5.9)	◊ ◊	77 (3.4)	503 (2.8)	◊ ◊
England	O	r	3 (1.2)	591 (20.2)	-2 (2.8)	18 (3.2)	546 (8.9)	5 (4.5)	80 (3.2)	538 (2.9)	-3 (5.1)
Lithuania	●		3 (1.2)	520 (12.7)	0 (1.6)	79 (3.0)	533 (2.6)	5 (3.9)	19 (2.8)	520 (6.3)	-6 (3.7)
Scotland	O	s	1 (0.9)	~ ~	1 (1.1)	11 (2.7)	507 (10.9)	-8 (5.1)	87 (2.8)	493 (2.8)	8 (5.2)
Czech Republic	O		1 (0.7)	~ ~	◊ ◊	17 (3.0)	489 (4.5)	◊ ◊	82 (3.0)	486 (3.2)	◊ ◊
New Zealand	O		1 (0.6)	~ ~	0 (0.7)	15 (2.0)	482 (5.7)	4 (3.1)	84 (2.1)	494 (2.6)	-4 (3.3)
Hungary	O		1 (0.6)	~ ~	-7 (2.4) ▼	93 (1.6)	510 (3.6)	5 (3.2)	6 (1.5)	508 (26.2)	2 (2.3)
Latvia	O		1 (0.4)	~ ~	-6 (2.2) ▼	91 (2.1)	539 (2.3)	3 (3.9)	9 (2.1)	531 (4.5)	3 (3.1)
Netherlands	O		1 (0.4)	~ ~	1 (0.4)	3 (0.5)	511 (19.1)	0 (1.5)	97 (0.8)	535 (2.5)	-1 (1.6)
Kuwait	-	r	0 (0.0)	~ ~	◊ ◊	18 (3.5)	308 (12.4)	◊ ◊	82 (3.5)	319 (4.4)	◊ ◊
Slovak Republic	●		0 (0.0)	~ ~	◊ ◊	68 (3.3)	498 (4.1)	◊ ◊	32 (3.3)	492 (10.0)	◊ ◊
International Avg.			13 (0.4)	472 (2.0)		51 (0.6)	474 (1.1)		36 (0.5)	469 (1.9)	
Benchmarking Participants											
Massachusetts, US	O		17 (4.7)	583 (10.6)	◊ ◊	71 (6.4)	569 (4.4)	◊ ◊	12 (4.3)	577 (6.3)	◊ ◊
Dubai, UAE	O	s	13 (4.8)	420 (19.5)	◊ ◊	70 (5.0)	437 (4.5)	◊ ◊	17 (2.5)	463 (11.8)	◊ ◊
Ontario, Canada	O		6 (1.9)	508 (7.8)	1 (3.2)	43 (4.3)	512 (5.5)	1 (6.2)	50 (4.4)	512 (5.1)	-2 (6.5)
Quebec, Canada	O	r	6 (1.9)	505 (5.1)	-2 (3.2)	15 (2.7)	503 (6.2)	-3 (4.5)	79 (3.0)	523 (3.4)	6 (5.0)
Minnesota, US	O		4 (2.1)	568 (25.9)	◊ ◊	61 (7.1)	551 (8.3)	◊ ◊	34 (7.2)	561 (11.9)	◊ ◊
British Columbia, Canada	O	r	2 (1.1)	~ ~	◊ ◊	29 (3.6)	507 (5.1)	◊ ◊	68 (3.6)	505 (3.8)	◊ ◊
Alberta, Canada	O		2 (0.7)	~ ~	◊ ◊	19 (3.4)	504 (5.4)	◊ ◊	80 (3.5)	505 (3.7)	◊ ◊

● Yes O No ▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by National Research Coordinators and by teachers.

Index based on teachers' responses to two questions about how often they usually assign mathematics homework and how many minutes of mathematics homework they usually assign. High level indicates the assignment of more than 30 minutes of homework about half of the lessons or more. Low level indicates no assignment or the assignment of less than 30 minutes of homework about half of the lessons or less. Medium level includes all other possible combinations of responses.

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

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

9.2 The pupils and the home: grade 8

Language spoken

The pupils taking these tests were drawn from year 9 (grade 8). Their average age was 14.2 and the majority of them (97 per cent) reported speaking English at home always or almost always (see Exhibit 9.9). The percentage of grade 8 pupils in England speaking the language of the test at home has not changed since 2003.

Exhibit 9.8 Index of teachers' emphasis on science homework (ESH) with trends

TIMSS2007 Science 4th Grade

Country	Have Policy to Assign Science Homework		High ESH			Medium ESH			Low ESH		
			2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Italy	O		30 (3.0)	533 (5.0)	6 (4.3)	34 (3.0)	531 (4.9)	1 (4.2)	36 (3.1)	542 (4.5)	-7 (4.8)
Singapore	O		25 (2.6)	576 (8.9)	12 (3.9) ▲	30 (2.5)	600 (7.4)	5 (4.1)	45 (2.5)	585 (6.1)	-17 (4.9) ▼
Kazakhstan	O		24 (3.8)	534 (7.8)	◊ ◊	75 (3.9)	533 (7.0)	◊ ◊	1 (1.0)	~ ~	◊ ◊
Colombia	O		23 (3.7)	390 (12.4)	◊ ◊	49 (4.6)	397 (8.9)	◊ ◊	28 (4.4)	417 (14.8)	◊ ◊
Algeria	●		19 (3.1)	357 (8.3)	◊ ◊	38 (4.9)	341 (14.3)	◊ ◊	43 (4.7)	364 (9.0)	◊ ◊
Armenia	O		17 (3.6)	487 (17.5)	- -	32 (3.3)	482 (10.1)	- -	50 (4.3)	488 (9.1)	- -
Russian Federation	O		16 (3.3)	527 (14.0)	0 (4.5)	79 (3.4)	552 (5.5)	-1 (4.8)	5 (1.3)	510 (10.1)	2 (1.8)
Tunisia	O		15 (3.0)	322 (15.8)	4 (4.1)	30 (3.9)	319 (11.9)	0 (5.6)	55 (4.0)	311 (9.7)	-4 (6.1)
Georgia	●		13 (3.1)	443 (9.9)	◊ ◊	49 (5.1)	415 (6.9)	◊ ◊	38 (4.6)	410 (6.0)	◊ ◊
El Salvador	O		11 (2.8)	406 (9.6)	◊ ◊	56 (4.4)	384 (6.5)	◊ ◊	33 (4.4)	391 (7.3)	◊ ◊
Iran, Islamic Rep. of	●		11 (2.5)	418 (13.0)	-2 (4.0)	27 (3.5)	453 (8.5)	-4 (5.9)	62 (3.7)	431 (5.9)	5 (6.2)
Morocco	●		9 (2.6)	303 (33.9)	- -	25 (3.6)	283 (16.9)	- -	66 (4.3)	304 (7.9)	- -
Yemen	●		8 (2.9)	206 (26.0)	◊ ◊	55 (4.6)	197 (10.5)	◊ ◊	36 (4.4)	194 (12.5)	◊ ◊
Ukraine	●		7 (2.2)	482 (11.6)	◊ ◊	89 (2.5)	473 (3.2)	◊ ◊	3 (1.4)	489 (8.5)	◊ ◊
Latvia	-		3 (1.4)	548 (18.4)	- -	56 (3.9)	545 (3.0)	- -	40 (4.1)	541 (3.8)	- -
Slovenia	O		3 (1.1)	526 (18.1)	-1 (2.0)	11 (1.8)	522 (5.6)	0 (3.3)	87 (2.0)	518 (2.0)	0 (3.8)
Kuwait	-	r	2 (1.5)	~ ~	◊ ◊	15 (3.2)	373 (14.9)	◊ ◊	83 (3.0)	340 (6.2)	◊ ◊
Hungary	O		2 (0.9)	~ ~	1 (1.1)	59 (4.1)	542 (4.7)	-4 (6.1)	39 (4.2)	529 (7.0)	3 (6.1)
United States	O	r	2 (0.9)	~ ~	1 (1.1)	14 (2.2)	547 (5.5)	1 (3.0)	84 (2.3)	538 (3.2)	-2 (3.2)
Qatar	●	r	2 (0.0)	~ ~	◊ ◊	36 (0.2)	294 (3.3)	◊ ◊	63 (0.2)	281 (3.1)	◊ ◊
England	O	r	2 (1.3)	~ ~	-1 (1.9)	10 (2.5)	538 (8.0)	-2 (4.5)	88 (2.6)	540 (3.1)	3 (4.8)
Slovak Republic	●		2 (0.9)	~ ~	◊ ◊	16 (2.9)	521 (9.8)	◊ ◊	82 (2.9)	528 (5.0)	◊ ◊
Lithuania	●		2 (1.0)	~ ~	0 (1.3)	21 (2.6)	519 (4.1)	3 (3.5)	77 (2.7)	513 (2.6)	-4 (3.7)
Netherlands	O	r	1 (0.9)	~ ~	1 (1.0)	10 (2.9)	518 (9.5)	2 (4.1)	89 (3.0)	523 (3.1)	-3 (4.2)
Czech Republic	O		1 (1.0)	~ ~	◊ ◊	3 (1.3)	522 (16.9)	◊ ◊	96 (1.6)	514 (3.1)	◊ ◊
Chinese Taipei	O		1 (0.8)	~ ~	-7 (2.6) ▼	16 (3.1)	556 (4.4)	-3 (4.5)	83 (3.0)	556 (2.3)	9 (4.5) ▲
Norway	O		1 (0.7)	~ ~	-2 (1.6)	5 (1.9)	483 (6.6)	2 (2.4)	94 (2.0)	476 (3.6)	0 (2.8)
Sweden	O		0 (0.3)	~ ~	◊ ◊	9 (2.4)	535 (8.6)	◊ ◊	90 (2.4)	524 (2.9)	◊ ◊
New Zealand	O	r	0 (0.3)	~ ~	-1 (0.7)	5 (1.3)	516 (12.0)	1 (1.6)	95 (1.3)	505 (2.7)	0 (1.7)
Scotland	O	s	0 (0.0)	~ ~	0 (0.0)	4 (2.0)	472 (11.2)	1 (2.7)	95 (2.1)	502 (2.5)	-1 (2.8)
Germany	O		0 (0.0)	~ ~	◊ ◊	13 (2.2)	525 (5.2)	◊ ◊	87 (2.2)	528 (2.6)	◊ ◊
Hong Kong SAR	O	r	0 (0.4)	~ ~	-1 (1.0)	8 (2.5)	552 (16.9)	-27 (5.2) ▼	92 (2.5)	554 (3.7)	27 (5.3) ▲
Denmark	O	r	0 (0.3)	~ ~	◊ ◊	2 (0.7)	~ ~	◊ ◊	98 (0.8)	518 (3.1)	◊ ◊
Australia	O	r	0 (0.0)	~ ~	0 (0.4)	2 (1.2)	~ ~	-3 (1.8)	98 (1.2)	527 (4.1)	3 (1.9)
Austria	O		0 (0.0)	~ ~	◊ ◊	1 (0.4)	~ ~	◊ ◊	99 (0.4)	525 (2.8)	◊ ◊
Japan	O		0 (0.0)	~ ~	0 (0.0)	8 (2.1)	559 (3.5)	-1 (3.2)	92 (2.1)	547 (2.2)	1 (3.2)
International Avg			7 (0.3)	441 (4.0)		28 (0.5)	473 (1.6)		65 (0.5)	473 (1.0)	
Benchmarking Participants											
Dubai, UAE	●	s	2 (1.7)	~ ~	◊ ◊	53 (4.8)	450 (9.0)	◊ ◊	45 (4.9)	445 (8.8)	◊ ◊
British Columbia, Canada	O	r	1 (1.1)	~ ~	◊ ◊	8 (2.1)	538 (12.3)	◊ ◊	91 (2.4)	536 (3.3)	◊ ◊
Ontario, Canada	O		0 (0.4)	~ ~	-2 (1.9)	9 (2.3)	537 (15.3)	-3 (4.2)	91 (2.3)	534 (4.1)	5 (4.6)
Quebec, Canada	O	r	0 (0.0)	~ ~	-2 (1.2)	5 (1.8)	503 (11.3)	-3 (3.1)	95 (1.8)	520 (2.9)	5 (3.3)
Alberta, Canada	O		0 (0.0)	~ ~	◊ ◊	4 (1.4)	553 (9.8)	◊ ◊	96 (1.4)	542 (4.1)	◊ ◊
Massachusetts, US	O		0 (0.0)	~ ~	◊ ◊	7 (3.6)	585 (19.4)	◊ ◊	93 (3.6)	571 (4.4)	◊ ◊
Minnesota, US	O	r	0 (0.0)	~ ~	◊ ◊	3 (2.5)	564 (7.1)	◊ ◊	97 (2.5)	557 (5.8)	◊ ◊

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

● Yes O No ▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

Background data provided by National Research Coordinators and by teachers.
Index based on teachers' responses to two questions about how often they usually assign science homework and how many minutes of science homework they usually assign. High level indicates the assignment of more than 30 minutes of homework about half of the lessons or more. Low level indicates no assignment or the assignment of less than 30 minutes of homework about half of the lessons or less. Medium level includes all other possible combinations of responses.
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.
A diamond (◊) indicates the country did not participate in the assessment.

Resources in the home

Pupils at grade 8 were asked about the number of books they have in the home. Unlike the responses at grade 4, there have been some significant changes in the estimations of books in the home made by grade 8 pupils since 2003 (see Exhibit 9.10). The percentage of pupils reporting that they have more than 200 books in the home has decreased from 25 per cent to 18 per cent. However, this is still above the international average (12 per cent), and is among the highest proportions internationally. Countries with fewer pupils than England reporting that they have more than 200 books in the home include Japan, Scotland, Singapore and Hong Kong. Those with more pupils than England in this category include Australia, Hungary, Sweden and Korea. Only 15 per cent of pupils at grade 8 have access to between 0 and 10 books, lower than in many other countries, including Hong Kong and Scotland, and similar to Singapore and Chinese Taipei. These

Exhibit 9.9 Students speak the language of the test at home with trends

TIMSS2007 Mathematics 8th Grade

Country	Always or Almost Always			Sometimes			Never		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	57 (1.7)	388 (2.5)	◊ ◊	31 (1.2)	389 (2.5)	◊ ◊	11 (1.1)	378 (3.5)	◊ ◊
Armenia	97 (0.5)	499 (3.5)	1 (0.8)	3 (0.4)	479 (9.0)	-1 (0.7)	0 (0.1)	~ ~	0 (0.2)
Australia	96 (0.5)	498 (3.9)	4 (1.6) ▲	4 (0.5)	480 (13.4)	-3 (1.4) ▼	1 (0.1)	~ ~	-1 (0.4)
Bahrain	81 (0.8)	397 (1.8)	0 (1.3)	14 (0.6)	408 (4.5)	-1 (0.9)	5 (0.5)	397 (7.1)	1 (0.7)
Bosnia and Herzegovina	98 (0.4)	456 (2.7)	◊ ◊	2 (0.3)	~ ~	◊ ◊	0 (0.1)	~ ~	◊ ◊
Botswana	34 (1.0)	371 (3.3)	23 (1.2) ▲	62 (1.0)	365 (2.3)	-18 (1.2) ▼	5 (0.4)	316 (6.7)	-4 (0.7) ▼
Bulgaria	89 (1.7)	472 (4.6)	-2 (2.4)	10 (1.6)	401 (12.8)	2 (2.2)	1 (0.3)	~ ~	0 (0.4)
Chinese Taipei	83 (1.2)	609 (4.2)	3 (1.8)	16 (1.1)	546 (7.8)	-3 (1.7)	1 (0.2)	~ ~	0 (0.3)
Colombia	96 (0.3)	382 (3.7)	◊ ◊	4 (0.3)	337 (7.4)	◊ ◊	0 (0.1)	~ ~	◊ ◊
Cyprus	91 (0.5)	469 (1.7)	-1 (0.8)	6 (0.4)	440 (5.8)	0 (0.6)	2 (0.3)	~ ~	0 (0.4)
Czech Republic	98 (0.3)	504 (2.4)	◊ ◊	2 (0.3)	~ ~	◊ ◊	0 (0.1)	~ ~	◊ ◊
Egypt	82 (1.2)	391 (3.7)	7 (1.6) ▲	15 (1.0)	402 (6.4)	-7 (1.4) ▼	3 (0.4)	384 (12.2)	0 (0.5)
El Salvador	97 (0.3)	342 (2.7)	◊ ◊	2 (0.3)	~ ~	◊ ◊	1 (0.2)	~ ~	◊ ◊
England	97 (0.4)	514 (4.9)	0 (0.7)	2 (0.3)	~ ~	0 (0.6)	0 (0.1)	~ ~	0 (0.2)
Georgia	95 (0.9)	411 (5.9)	◊ ◊	5 (0.9)	402 (18.1)	◊ ◊	0 (0.1)	~ ~	◊ ◊
Ghana	31 (1.2)	309 (5.8)	-2 (1.8)	66 (1.3)	314 (4.3)	3 (1.8)	3 (0.5)	259 (12.6)	-2 (1.0)
Hong Kong SAR	91 (1.0)	580 (5.2)	-2 (1.2)	8 (0.7)	513 (12.7)	1 (0.9)	2 (0.4)	~ ~	0 (0.4)
Hungary	99 (0.3)	518 (3.4)	-1 (0.4)	1 (0.2)	~ ~	0 (0.3)	1 (0.2)	~ ~	0 (0.2)
Indonesia	35 (2.8)	397 (6.1)	2 (3.6)	58 (2.5)	397 (4.7)	0 (3.2)	7 (0.6)	402 (7.9)	-3 (1.0) ▼
Iran, Islamic Rep. of	63 (2.2)	423 (4.9)	-2 (3.9)	22 (1.7)	373 (4.9)	1 (2.5)	15 (1.3)	367 (6.0)	0 (2.3)
Israel	92 (0.7)	467 (4.0)	-1 (0.9)	6 (0.6)	444 (10.7)	1 (0.8)	1 (0.3)	~ ~	0 (0.3)
Italy	99 (0.1)	480 (3.1)	3 (0.4) ▲	1 (0.1)	~ ~	-2 (0.3) ▼	0 (0.1)	~ ~	-1 (0.2)
Japan	98 (0.2)	571 (2.4)	0 (0.3)	1 (0.2)	~ ~	0 (0.3)	0 (0.1)	~ ~	0 (0.1)
Jordan	89 (0.9)	429 (4.1)	4 (1.4) ▲	8 (0.7)	418 (10.0)	-3 (1.0) ▼	3 (0.4)	414 (12.7)	-1 (0.7)
Korea, Rep. of	95 (0.4)	600 (2.7)	-4 (0.5) ▼	5 (0.4)	549 (7.5)	4 (0.4) ▲	0 (0.1)	~ ~	0 (0.1)
Kuwait	67 (1.2)	355 (2.4)	◊ ◊	19 (0.8)	359 (4.4)	◊ ◊	14 (0.9)	344 (6.2)	◊ ◊
Lebanon	20 (1.2)	456 (7.4)	4 (1.5) ▲	64 (1.7)	450 (3.8)	-5 (2.0) ▼	16 (1.2)	443 (5.9)	1 (1.5)
Lithuania	98 (0.4)	506 (2.3)	0 (0.8)	2 (0.4)	~ ~	0 (0.6)	0 (0.1)	~ ~	0 (0.3)
Malaysia	64 (2.1)	465 (5.6)	-2 (3.2)	28 (1.6)	486 (6.9)	0 (2.5)	9 (0.9)	504 (11.0)	2 (1.2)
Malta	17 (0.4)	505 (3.1)	◊ ◊	46 (0.7)	488 (1.9)	◊ ◊	38 (0.7)	481 (2.2)	◊ ◊
Norway	96 (0.4)	472 (2.0)	0 (0.6)	3 (0.3)	434 (6.4)	0 (0.5)	1 (0.2)	~ ~	0 (0.3)
Oman	76 (1.9)	373 (3.5)	◊ ◊	19 (1.6)	377 (5.4)	◊ ◊	5 (0.6)	378 (8.9)	◊ ◊
Palestinian Nat'l Auth.	87 (1.4)	369 (3.7)	3 (1.8)	10 (1.1)	369 (9.8)	-3 (1.4) ▼	3 (0.5)	355 (12.7)	1 (0.6)
Qatar	72 (0.4)	312 (1.5)	◊ ◊	20 (0.4)	307 (3.9)	◊ ◊	8 (0.3)	266 (5.5)	◊ ◊
Romania	98 (0.3)	463 (4.1)	5 (1.7) ▲	1 (0.3)	~ ~	-3 (1.0) ▼	0 (0.0)	~ ~	-2 (1.0) ▼
Russian Federation	93 (1.8)	513 (4.0)	-2 (2.2)	6 (1.6)	497 (11.2)	2 (1.9)	1 (0.3)	~ ~	0 (0.4)
Saudi Arabia	72 (2.2)	328 (3.1)	- -	18 (1.5)	338 (4.7)	- -	11 (1.1)	325 (7.5)	- -
Scotland	96 (0.5)	490 (3.6)	-1 (0.6)	3 (0.4)	463 (10.5)	0 (0.5)	1 (0.2)	~ ~	0 (0.3)
Serbia	97 (0.8)	487 (3.2)	-1 (0.9)	2 (0.6)	~ ~	0 (0.7)	1 (0.2)	~ ~	0 (0.2)
Singapore	47 (0.9)	616 (3.7)	4 (1.3) ▲	46 (0.8)	576 (4.6)	-3 (1.1) ▼	7 (0.4)	553 (9.0)	-1 (0.6)
Slovenia	90 (1.1)	506 (2.0)	-1 (1.5)	7 (0.7)	465 (6.5)	0 (1.0)	3 (0.6)	455 (8.4)	1 (0.8)
Sweden	94 (0.6)	494 (2.1)	1 (1.0)	4 (0.5)	455 (7.9)	-1 (0.8)	1 (0.2)	~ ~	0 (0.3)
Syrian Arab Republic	86 (1.0)	397 (3.8)	◊ ◊	11 (0.8)	388 (7.6)	◊ ◊	3 (0.4)	378 (11.5)	◊ ◊
Thailand	67 (1.9)	456 (6.0)	◊ ◊	30 (1.6)	414 (7.1)	◊ ◊	3 (0.6)	395 (16.8)	◊ ◊
Tunisia	22 (0.9)	406 (3.6)	- -	49 (1.0)	423 (2.7)	- -	29 (1.1)	426 (2.8)	- -
Turkey	89 (1.2)	440 (5.0)	◊ ◊	10 (1.2)	370 (5.5)	◊ ◊	1 (0.2)	~ ~	◊ ◊
Ukraine	69 (2.6)	460 (4.3)	◊ ◊	23 (1.9)	470 (4.6)	◊ ◊	8 (1.0)	459 (7.5)	◊ ◊
United States	91 (0.7)	512 (2.8)	-3 (0.9) ▼	8 (0.7)	474 (5.3)	3 (0.8) ▲	1 (0.1)	~ ~	0 (0.2)
¶ Morocco	52 (1.7)	374 (3.3)	- -	37 (1.5)	387 (5.0)	- -	11 (0.8)	392 (6.3)	- -
International Avg.	78 (0.2)	454 (0.6)		17 (0.1)	427 (1.2)		5 (0.1)	394 (1.9)	
Benchmarking Participants									
Basque Country, Spain	93 (0.5)	501 (3.0)	4 (1.2) ▲	6 (0.5)	504 (5.8)	-2 (0.9) ▼	1 (0.3)	~ ~	-1 (0.6)
British Columbia, Canada	85 (1.8)	506 (3.0)	◊ ◊	10 (0.9)	533 (7.5)	◊ ◊	5 (1.2)	517 (6.6)	◊ ◊
Dubai, UAE	58 (1.2)	463 (3.3)	◊ ◊	37 (1.1)	466 (3.9)	◊ ◊	5 (0.7)	471 (11.8)	◊ ◊
Massachusetts, US	92 (0.9)	552 (4.3)	◊ ◊	7 (0.8)	490 (11.5)	◊ ◊	1 (0.3)	~ ~	◊ ◊
Minnesota, US	95 (1.2)	535 (4.2)	◊ ◊	4 (1.1)	488 (15.7)	◊ ◊	1 (0.2)	~ ~	◊ ◊
Ontario, Canada	90 (1.3)	518 (3.2)	1 (1.7)	9 (1.1)	515 (14.3)	0 (1.4)	1 (0.3)	~ ~	-1 (0.4)
Quebec, Canada	91 (1.2)	529 (3.3)	0 (1.7)	7 (0.9)	522 (10.7)	0 (1.3)	2 (0.4)	~ ~	0 (0.6)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Background data provided by students.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

A diamond (◊) indicates the country did not participate in the assessment.

findings are broadly positive, as they indicate that the majority of grade 8 pupils in England have access to a number of books in the home.

Grade 8 pupils in England have ready access to computers at home. The vast majority (98 per cent) have a computer at home and 92 per cent of pupils also reported having an internet connection (see Exhibit 9.11). Both these figures are much higher than the international averages, and are among the highest ownership and internet access figures internationally.

Exhibit 9.10 Books in the home with trends

TIMSS2007 Mathematics 8th Grade

Country	More than 200 Books			101-200 Books			26-100 Books		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	2 (0.3)	~ ~	◊ ◊	4 (0.3)	395 (5.6)	◊ ◊	17 (0.8)	398 (2.7)	◊ ◊
Armenia	19 (0.9)	511 (3.8)	-1 (1.3)	13 (0.7)	511 (6.1)	0 (0.9)	28 (1.0)	503 (4.7)	0 (1.3)
Australia	22 (1.1)	532 (5.9)	-9 (1.8) ▼	22 (0.8)	516 (4.7)	-1 (1.2)	32 (1.1)	492 (4.4)	2 (1.4)
Bahrain	11 (0.5)	409 (4.3)	-6 (0.7) ▼	13 (0.6)	428 (4.3)	-1 (0.9)	32 (0.7)	411 (2.7)	1 (1.1)
Bosnia and Herzegovina	3 (0.3)	500 (8.5)	◊ ◊	4 (0.4)	487 (7.5)	◊ ◊	22 (0.8)	475 (3.4)	◊ ◊
Botswana	6 (0.4)	376 (6.8)	1 (0.6)	5 (0.4)	376 (6.9)	0 (0.5)	14 (0.7)	383 (4.9)	1 (0.9)
Bulgaria	23 (1.0)	504 (5.6)	-6 (1.7) ▼	15 (0.7)	497 (5.7)	-3 (1.1) ▼	24 (0.9)	474 (5.0)	-1 (1.4)
Chinese Taipei	18 (1.2)	649 (4.9)	3 (1.5)	13 (0.7)	636 (5.1)	-1 (0.9)	31 (0.9)	611 (4.3)	1 (1.1)
Colombia	3 (0.3)	443 (10.4)	◊ ◊	4 (0.5)	429 (9.4)	◊ ◊	20 (1.2)	406 (3.9)	◊ ◊
Cyprus	13 (0.6)	490 (4.1)	2 (0.8) ▲	17 (0.7)	499 (3.4)	2 (1.0)	34 (0.6)	474 (2.4)	-1 (1.1)
Czech Republic	12 (0.6)	543 (4.3)	◊ ◊	21 (0.8)	527 (3.2)	◊ ◊	40 (0.8)	506 (2.4)	◊ ◊
Egypt	5 (0.4)	386 (9.1)	-1 (0.6)	5 (0.4)	417 (8.9)	-1 (0.6)	21 (0.7)	411 (4.8)	4 (1.0) ▲
El Salvador	3 (0.4)	348 (9.9)	◊ ◊	4 (0.5)	380 (11.7)	◊ ◊	16 (0.8)	367 (4.7)	◊ ◊
England	18 (1.0)	568 (5.8)	-7 (1.5) ▼	18 (0.9)	536 (5.6)	0 (1.4)	28 (0.9)	521 (4.9)	1 (1.3)
Georgia	20 (1.5)	443 (6.0)	◊ ◊	15 (0.9)	436 (8.2)	◊ ◊	27 (1.0)	410 (7.8)	◊ ◊
Ghana	6 (0.5)	315 (10.1)	-4 (0.8) ▼	4 (0.4)	314 (10.9)	-2 (0.6) ▼	13 (0.7)	328 (6.8)	-3 (1.0) ▼
Hong Kong SAR	10 (0.6)	610 (6.7)	1 (0.9)	9 (0.5)	598 (6.4)	1 (0.7)	26 (1.0)	591 (5.8)	-1 (1.1)
Hungary	26 (1.1)	560 (4.3)	-5 (1.6) ▼	21 (0.7)	538 (4.4)	-1 (1.0)	30 (0.9)	510 (3.5)	1 (1.3)
Indonesia	1 (0.2)	~ ~	0 (0.2)	2 (0.3)	~ ~	0 (0.4)	17 (0.8)	425 (6.2)	-3 (1.1) ▼
Iran, Islamic Rep. of	6 (0.5)	445 (9.5)	-1 (0.7)	5 (0.5)	453 (10.0)	0 (0.6)	16 (1.1)	442 (6.2)	-1 (1.3)
Israel	21 (1.1)	493 (5.5)	-1 (1.4)	19 (0.8)	485 (5.3)	-3 (1.1) ▼	31 (1.0)	466 (4.7)	-2 (1.3)
Italy	22 (1.2)	505 (3.5)	3 (1.5)	16 (0.7)	498 (4.4)	2 (0.9) ▲	28 (0.8)	482 (3.0)	3 (1.0) ▲
Japan	16 (0.8)	604 (4.6)	-1 (1.0)	16 (0.8)	588 (3.9)	0 (0.9)	32 (0.8)	577 (3.3)	0 (1.2)
Jordan	9 (0.6)	463 (6.7)	0 (0.9)	10 (0.6)	453 (7.5)	2 (0.7) ▲	29 (0.8)	444 (4.5)	2 (1.2)
Korea, Rep. of	26 (1.0)	643 (3.6)	7 (1.3) ▲	25 (0.7)	613 (2.9)	3 (1.0) ▲	29 (0.8)	584 (3.0)	-4 (1.1) ▼
Kuwait	10 (0.5)	354 (5.5)	◊ ◊	9 (0.4)	373 (5.2)	◊ ◊	24 (0.7)	367 (3.6)	◊ ◊
Lebanon	10 (0.7)	464 (7.6)	2 (0.9) ▲	10 (0.6)	473 (6.1)	2 (1.0)	28 (1.1)	466 (5.2)	3 (1.5) ▲
Lithuania	10 (0.6)	544 (4.2)	-2 (1.0)	13 (0.5)	544 (4.2)	-2 (0.8) ▼	33 (0.8)	520 (3.0)	-1 (1.2)
Malaysia	5 (0.6)	532 (9.0)	0 (0.8)	9 (0.7)	510 (6.0)	1 (0.9)	29 (0.8)	493 (5.2)	0 (1.1)
Malta	19 (0.5)	519 (3.3)	◊ ◊	19 (0.5)	516 (3.0)	◊ ◊	37 (0.7)	491 (2.4)	◊ ◊
Norway	25 (0.9)	493 (2.9)	-2 (1.5)	20 (0.7)	482 (2.3)	-2 (1.0)	30 (0.7)	471 (2.7)	-3 (1.1) ▼
Oman	9 (0.7)	395 (6.7)	◊ ◊	11 (0.8)	399 (5.3)	◊ ◊	28 (1.0)	394 (4.1)	◊ ◊
Palestinian Nat'l Auth.	7 (0.6)	380 (9.0)	0 (0.8)	7 (0.4)	398 (7.6)	0 (0.6)	23 (0.9)	386 (4.7)	-1 (1.1)
Qatar	16 (0.5)	317 (3.9)	◊ ◊	13 (0.4)	329 (3.5)	◊ ◊	27 (0.6)	326 (2.4)	◊ ◊
Romania	9 (0.7)	524 (6.4)	-3 (1.4) ▼	11 (0.6)	513 (7.2)	-2 (1.2)	30 (1.1)	485 (3.9)	1 (1.6)
Russian Federation	16 (0.8)	540 (5.9)	-6 (1.5) ▼	21 (0.8)	533 (4.7)	-5 (1.3) ▼	37 (0.9)	511 (5.0)	4 (1.6) ▲
Saudi Arabia	8 (0.8)	342 (6.0)	- -	7 (0.6)	358 (6.3)	- -	25 (1.0)	348 (4.8)	- -
Scotland	15 (0.8)	540 (5.7)	-3 (1.3) ▼	14 (0.7)	527 (4.6)	-2 (1.0) ▼	25 (0.8)	499 (3.6)	-4 (1.2) ▼
Serbia	8 (0.6)	532 (6.3)	2 (0.8)	9 (0.6)	520 (6.8)	0 (0.8)	26 (0.9)	514 (3.9)	0 (1.4)
Singapore	14 (0.6)	636 (3.6)	-1 (0.8)	15 (0.6)	625 (3.9)	-1 (0.7)	32 (0.8)	607 (3.8)	-2 (1.1)
Slovenia	11 (0.6)	535 (4.1)	-2 (1.0)	15 (0.7)	529 (3.9)	0 (1.0)	37 (0.9)	509 (2.4)	0 (1.3)
Sweden	26 (1.0)	521 (2.8)	-5 (1.6) ▼	20 (0.7)	502 (3.0)	-1 (0.9)	29 (0.8)	486 (2.8)	2 (1.2)
Syrian Arab Republic	5 (0.4)	401 (8.1)	◊ ◊	7 (0.4)	409 (6.7)	◊ ◊	22 (0.8)	409 (4.3)	◊ ◊
Thailand	3 (0.5)	538 (14.5)	◊ ◊	4 (0.4)	506 (13.4)	◊ ◊	21 (1.0)	471 (7.0)	◊ ◊
Tunisia	3 (0.3)	461 (8.0)	-1 (0.5)	5 (0.5)	477 (6.3)	-1 (0.8)	21 (1.0)	441 (3.3)	-1 (1.4)
Turkey	5 (0.5)	494 (10.8)	◊ ◊	9 (0.6)	497 (7.9)	◊ ◊	23 (0.9)	467 (5.4)	◊ ◊
Ukraine	12 (0.9)	500 (7.0)	◊ ◊	16 (0.7)	489 (4.5)	◊ ◊	35 (0.9)	472 (3.8)	◊ ◊
United States	18 (0.8)	546 (3.4)	-6 (1.2) ▼	17 (0.6)	538 (3.3)	-1 (0.8)	28 (0.7)	515 (2.4)	1 (0.9)
¶ Morocco	6 (0.7)	400 (7.4)	- -	8 (0.8)	406 (5.1)	- -	22 (1.4)	395 (5.9)	- -
International Avg.	12 (0.1)	486 (1.0)		12 (0.1)	481 (0.9)		27 (0.1)	464 (0.6)	
Benchmarking Participants									
Basque Country, Spain	26 (1.3)	527 (3.9)	1 (1.9)	22 (1.1)	510 (3.4)	2 (1.4)	33 (1.3)	493 (3.8)	-3 (1.8)
British Columbia, Canada	24 (1.0)	531 (3.7)	◊ ◊	21 (0.8)	519 (3.5)	◊ ◊	31 (0.8)	513 (3.3)	◊ ◊
Dubai, UAE	11 (0.9)	501 (6.6)	◊ ◊	14 (0.9)	500 (5.1)	◊ ◊	29 (0.9)	481 (3.0)	◊ ◊
Massachusetts, US	26 (2.0)	587 (5.3)	◊ ◊	19 (1.1)	564 (4.1)	◊ ◊	27 (1.5)	551 (5.1)	◊ ◊
Minnesota, US	23 (1.9)	560 (6.1)	◊ ◊	21 (1.5)	551 (5.4)	◊ ◊	30 (1.6)	528 (3.9)	◊ ◊
Ontario, Canada	23 (1.3)	544 (3.8)	-5 (2.0) ▼	22 (1.0)	528 (4.0)	1 (1.3)	31 (0.9)	517 (3.6)	1 (1.5)
Quebec, Canada	12 (0.9)	567 (7.6)	-1 (1.2)	13 (0.7)	553 (6.1)	-3 (1.1) ▼	32 (1.0)	533 (3.6)	-2 (1.3)

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Background data provided by students.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

A diamond (◊) indicates the country did not participate in the assessment.

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Exhibit 9.10 Books in the home with trends (continued)

TIMSS2007 Mathematics 8th Grade

Country	11-25 Books			0-10 Books		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Algeria	41 (0.8)	386 (2.8)	◊ ◊	36 (1.2)	382 (2.5)	◊ ◊
Armenia	24 (1.0)	487 (4.9)	0 (1.3)	16 (0.9)	485 (7.1)	0 (1.3)
Australia	15 (1.0)	464 (4.9)	4 (1.2) ▲	9 (0.6)	438 (5.5)	4 (0.8) ▲
Bahrain	27 (0.8)	381 (2.8)	1 (1.1)	17 (0.7)	375 (4.0)	6 (0.8) ▲
Bosnia and Herzegovi	45 (1.0)	454 (2.9)	◊ ◊	26 (1.0)	435 (3.8)	◊ ◊
Botswana	37 (1.0)	364 (2.5)	7 (1.3) ▲	39 (0.8)	358 (3.0)	-10 (1.5) ▼
Bulgaria	16 (0.9)	444 (7.1)	1 (1.1)	22 (1.4)	410 (9.7)	8 (2.1) ▲
Chinese Taipei	21 (0.9)	577 (5.6)	-3 (1.2) ▼	17 (1.1)	518 (5.8)	0 (1.4)
Colombia	35 (1.1)	383 (4.4)	◊ ◊	37 (1.9)	351 (3.3)	◊ ◊
Cyprus	25 (0.7)	444 (3.1)	-2 (1.0)	10 (0.5)	407 (4.9)	-1 (0.7)
Czech Republic	20 (0.7)	469 (3.4)	◊ ◊	7 (0.5)	451 (5.5)	◊ ◊
Egypt	38 (0.9)	390 (4.3)	0 (1.2)	31 (1.1)	381 (4.8)	-2 (1.6)
El Salvador	32 (1.0)	348 (3.6)	◊ ◊	44 (1.4)	322 (3.1)	◊ ◊
England	21 (0.9)	485 (5.3)	4 (1.3) ▲	15 (1.0)	452 (6.4)	2 (1.5)
Georgia	25 (1.3)	389 (8.8)	◊ ◊	13 (1.4)	375 (8.6)	◊ ◊
Ghana	39 (1.3)	306 (4.4)	5 (1.6) ▲	38 (1.7)	308 (5.6)	3 (2.2)
Hong Kong SAR	30 (0.8)	568 (6.3)	1 (1.1)	26 (1.0)	537 (7.4)	-2 (1.3)
Hungary	15 (0.9)	469 (4.5)	2 (1.1)	7 (0.6)	431 (7.5)	3 (0.9) ▲
Indonesia	55 (1.2)	389 (3.8)	10 (1.5) ▲	25 (1.3)	393 (5.4)	-7 (1.6) ▼
Iran, Islamic Rep. of	30 (1.2)	402 (5.1)	-1 (1.4)	43 (1.8)	379 (3.9)	4 (2.2)
Israel	20 (1.0)	440 (5.0)	3 (1.3)	9 (0.6)	417 (9.4)	3 (0.8) ▲
Italy	23 (0.8)	458 (4.3)	-6 (1.1) ▼	11 (0.6)	439 (6.3)	-2 (0.9) ▼
Japan	21 (0.7)	551 (4.0)	0 (0.9)	15 (0.8)	526 (4.4)	1 (1.1)
Jordan	35 (0.9)	417 (5.1)	2 (1.3)	17 (0.9)	395 (7.5)	-6 (1.2) ▼
Korea, Rep. of	11 (0.6)	548 (4.9)	0 (0.8)	9 (0.6)	528 (4.6)	-6 (0.9) ▼
Kuwait	30 (0.8)	354 (3.6)	◊ ◊	27 (0.9)	341 (3.7)	◊ ◊
Lebanon	30 (1.1)	442 (4.8)	-6 (1.6) ▼	22 (1.3)	425 (4.4)	-1 (1.9)
Lithuania	32 (1.0)	483 (3.1)	3 (1.5)	12 (0.9)	458 (6.1)	2 (1.2)
Malaysia	38 (1.0)	460 (4.6)	-2 (1.4)	19 (1.0)	439 (5.7)	2 (1.4)
Malta	18 (0.6)	460 (3.6)	◊ ◊	8 (0.3)	401 (4.2)	◊ ◊
Norway	17 (0.8)	443 (3.4)	6 (1.0) ▲	7 (0.5)	415 (3.9)	1 (0.6)
Oman	31 (0.9)	366 (4.0)	◊ ◊	21 (1.0)	338 (4.6)	◊ ◊
Palestinian Nat'l Auth.	35 (1.0)	369 (4.3)	-1 (1.3)	29 (1.2)	349 (4.7)	2 (1.6)
Qatar	25 (0.5)	295 (2.3)	◊ ◊	19 (0.5)	275 (2.8)	◊ ◊
Romania	33 (1.1)	442 (5.9)	7 (1.7) ▲	17 (1.1)	398 (6.2)	-3 (2.1)
Russian Federation	22 (0.8)	484 (5.1)	5 (1.3) ▲	5 (0.6)	467 (9.7)	1 (0.8)
Saudi Arabia	32 (0.9)	328 (4.0)	- -	27 (1.1)	306 (4.7)	- -
Scotland	24 (0.9)	469 (4.1)	3 (1.3) ▲	22 (1.1)	439 (4.5)	6 (1.4) ▲
Serbia	39 (1.3)	470 (3.6)	1 (1.6)	18 (1.0)	443 (5.0)	-3 (1.5)
Singapore	24 (0.8)	568 (5.0)	0 (1.0)	16 (0.8)	536 (6.6)	4 (1.0) ▲
Slovenia	29 (0.9)	479 (3.1)	3 (1.2) ▲	7 (0.5)	449 (4.5)	0 (0.8)
Sweden	16 (0.7)	468 (3.0)	2 (1.0)	8 (0.5)	442 (5.1)	2 (0.7) ▲
Syrian Arab Republic	39 (0.8)	393 (4.1)	◊ ◊	27 (1.1)	386 (4.8)	◊ ◊
Thailand	42 (1.2)	434 (4.3)	◊ ◊	30 (1.5)	413 (5.5)	◊ ◊
Tunisia	41 (1.0)	412 (2.5)	-3 (1.5) ▼	30 (1.4)	406 (3.0)	7 (1.8) ▲
Turkey	37 (1.0)	427 (4.9)	◊ ◊	26 (1.5)	378 (4.1)	◊ ◊
Ukraine	30 (1.1)	435 (4.3)	◊ ◊	7 (0.5)	406 (7.3)	◊ ◊
United States	20 (0.7)	482 (3.0)	2 (0.9) ▲	17 (0.9)	461 (3.6)	4 (1.0) ▲
¶ Morocco	38 (1.2)	374 (4.0)	- -	25 (1.7)	367 (4.6)	- -
International Avg.	29 (0.1)	436 (0.6)		20 (0.2)	413 (0.8)	
Benchmarking Participants						
Basque Country, Spai	15 (1.0)	468 (5.3)	-1 (1.3)	5 (0.6)	429 (8.1)	0 (0.8)
British Columbia, Can	15 (0.8)	485 (6.2)	◊ ◊	9 (0.6)	460 (5.9)	◊ ◊
Dubai, UAE	29 (1.4)	445 (3.8)	◊ ◊	17 (0.9)	414 (4.9)	◊ ◊
Massachusetts, US	15 (0.7)	509 (6.1)	◊ ◊	12 (1.0)	478 (9.6)	◊ ◊
Minnesota, US	16 (1.1)	511 (7.5)	◊ ◊	10 (0.9)	483 (6.4)	◊ ◊
Ontario, Canada	16 (1.0)	489 (4.9)	3 (1.3) ▲	8 (0.9)	474 (10.7)	1 (1.1)
Quebec, Canada	26 (1.0)	515 (3.6)	2 (1.4)	18 (0.8)	501 (3.0)	3 (1.1) ▲

▲ 2007 percent significantly higher
▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

In terms of trends of computer use, there has been a significant change in grade 8 pupils' use of computers (see Exhibit 9.12). The majority of pupils report using computers both at home and at school. However, compared with the equivalent questions in 2003, a lower proportion of pupils reported using a computer at home and at school (76 per cent in 2007 compared with 81 per cent in 2003); a higher proportion of pupils reported using a computer at home but not at school (10 per cent in 2003 compared with 20 per cent in 2007); and a lower proportion of pupils reported using a computer at school but not at

Exhibit 9.11 Computer and internet connection in the home

TIMSS2007 Mathematics 8th Grade

Country	Have Computer		Do Not Have Computer		Have Internet Connection		Do Not Have Internet Connection	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Algeria	53 (1.7)	386 (2.4)	47 (1.7)	389 (3.0)	15 (0.9)	386 (3.2)	85 (0.9)	388 (2.2)
Armenia	34 (1.2)	508 (6.3)	66 (1.2)	495 (3.2)	17 (0.9)	513 (9.0)	83 (0.9)	497 (3.0)
Australia	97 (0.3)	499 (4.0)	3 (0.3)	425 (9.3)	89 (0.7)	503 (3.9)	11 (0.7)	443 (6.2)
Bahrain	86 (0.8)	401 (1.7)	14 (0.8)	390 (3.8)	74 (0.8)	405 (2.0)	26 (0.8)	381 (3.2)
Bosnia and Herzegovina	72 (1.1)	468 (2.7)	28 (1.1)	427 (3.7)	31 (1.3)	485 (3.3)	69 (1.3)	445 (2.7)
Botswana	26 (0.8)	371 (3.5)	74 (0.8)	364 (2.4)	13 (0.7)	357 (5.2)	87 (0.7)	367 (2.4)
Bulgaria	70 (1.3)	480 (5.1)	30 (1.3)	434 (7.3)	57 (1.3)	486 (4.8)	43 (1.3)	438 (6.8)
Chinese Taipei	94 (0.4)	605 (4.3)	6 (0.4)	505 (9.8)	89 (0.7)	605 (4.3)	11 (0.7)	542 (7.4)
Colombia	37 (1.7)	405 (4.5)	63 (1.7)	366 (3.7)	15 (1.4)	423 (7.1)	85 (1.4)	373 (3.8)
Cyprus	94 (0.3)	471 (1.5)	6 (0.3)	395 (6.9)	65 (0.9)	479 (1.9)	35 (0.9)	443 (2.8)
Czech Republic	94 (0.5)	506 (2.4)	6 (0.5)	459 (6.6)	76 (1.1)	512 (2.3)	24 (1.1)	478 (3.8)
Egypt	48 (1.2)	407 (3.9)	52 (1.2)	384 (4.3)	25 (1.2)	405 (4.4)	75 (1.2)	390 (3.8)
El Salvador	30 (1.3)	362 (4.3)	70 (1.3)	333 (2.8)	10 (0.9)	375 (6.8)	90 (0.9)	338 (2.6)
England	98 (0.2)	515 (4.9)	2 (0.2)	~ ~	92 (0.6)	518 (4.8)	8 (0.6)	467 (8.8)
Georgia	26 (1.4)	420 (5.1)	74 (1.4)	408 (6.5)	14 (1.0)	423 (7.0)	86 (1.0)	409 (6.2)
Ghana	25 (1.2)	310 (6.9)	75 (1.2)	313 (4.4)	10 (0.7)	259 (7.7)	90 (0.7)	318 (4.0)
Hong Kong SAR	99 (0.3)	574 (5.7)	1 (0.3)	~ ~	97 (0.4)	575 (5.7)	3 (0.4)	514 (14.1)
Hungary	90 (0.8)	525 (3.4)	10 (0.8)	458 (6.3)	62 (1.6)	538 (3.7)	38 (1.6)	484 (4.0)
Indonesia	17 (1.3)	433 (8.7)	83 (1.3)	393 (3.8)	8 (0.8)	407 (14.1)	92 (0.8)	398 (3.7)
Iran, Islamic Rep. of	39 (1.9)	440 (6.3)	61 (1.9)	384 (3.6)	25 (1.6)	450 (6.9)	75 (1.6)	389 (3.4)
Israel	95 (0.7)	469 (3.9)	5 (0.7)	391 (12.3)	84 (1.2)	474 (4.2)	16 (1.2)	421 (7.5)
Italy	95 (0.4)	482 (2.9)	5 (0.4)	435 (8.9)	70 (1.1)	491 (3.0)	30 (1.1)	453 (3.9)
Japan	88 (0.7)	577 (2.4)	12 (0.7)	529 (4.4)	77 (0.9)	581 (2.5)	23 (0.9)	534 (3.5)
Jordan	66 (1.3)	445 (3.7)	34 (1.3)	395 (5.3)	24 (1.2)	453 (5.0)	76 (1.2)	421 (4.4)
Korea, Rep. of	99 (0.2)	599 (2.7)	1 (0.2)	~ ~	96 (0.3)	601 (2.6)	4 (0.3)	502 (9.7)
Kuwait	94 (0.5)	358 (2.2)	6 (0.5)	312 (7.6)	71 (0.7)	360 (2.5)	29 (0.7)	343 (2.9)
Lebanon	77 (1.4)	459 (4.4)	23 (1.4)	422 (4.0)	36 (1.6)	463 (5.6)	64 (1.6)	443 (4.1)
Lithuania	85 (0.8)	514 (2.3)	15 (0.8)	462 (4.3)	66 (1.2)	521 (2.5)	34 (1.2)	477 (3.2)
Malaysia	59 (1.7)	496 (5.5)	41 (1.7)	442 (4.5)	27 (1.7)	517 (6.3)	73 (1.7)	458 (4.6)
Malta	- -	- -	- -	- -	- -	- -	- -	- -
Norway	99 (0.2)	471 (1.9)	1 (0.2)	~ ~	97 (0.3)	471 (2.0)	3 (0.3)	427 (7.4)
Oman	67 (1.1)	388 (3.3)	33 (1.1)	348 (4.4)	35 (1.3)	393 (4.0)	65 (1.3)	365 (3.5)
Palestinian Nat'l Auth.	66 (1.3)	382 (3.5)	34 (1.3)	346 (4.9)	31 (1.2)	386 (4.5)	69 (1.2)	363 (3.9)
Qatar	92 (0.3)	313 (1.4)	8 (0.3)	252 (4.5)	74 (0.5)	315 (1.9)	26 (0.5)	289 (2.5)
Romania	64 (1.3)	481 (4.2)	36 (1.3)	436 (5.5)	33 (1.6)	498 (4.7)	67 (1.6)	447 (4.6)
Russian Federation	61 (1.8)	528 (4.4)	39 (1.8)	487 (4.5)	32 (1.4)	534 (5.1)	68 (1.4)	502 (3.9)
Saudi Arabia	81 (1.2)	335 (2.9)	19 (1.2)	313 (5.1)	41 (1.5)	350 (3.2)	59 (1.5)	318 (3.5)
Scotland	98 (0.3)	490 (3.7)	2 (0.3)	~ ~	92 (0.5)	492 (3.7)	8 (0.5)	446 (6.6)
Serbia	77 (1.0)	499 (3.5)	23 (1.0)	447 (5.0)	47 (1.4)	514 (3.7)	53 (1.4)	464 (3.8)
Singapore	94 (0.5)	599 (3.5)	6 (0.5)	509 (6.6)	87 (0.7)	604 (3.5)	13 (0.7)	514 (5.7)
Slovenia	97 (0.3)	504 (2.0)	3 (0.3)	435 (7.1)	86 (0.7)	506 (2.0)	14 (0.7)	473 (4.4)
Sweden	99 (0.2)	492 (2.3)	1 (0.2)	~ ~	97 (0.3)	493 (2.2)	3 (0.3)	455 (6.5)
Syrian Arab Republic	62 (1.3)	400 (3.8)	38 (1.3)	393 (4.7)	19 (1.1)	411 (5.2)	81 (1.1)	394 (3.7)
Thailand	41 (1.6)	478 (7.7)	59 (1.6)	417 (4.4)	20 (1.4)	503 (10.6)	80 (1.4)	426 (4.3)
Tunisia	39 (2.0)	444 (3.1)	61 (2.0)	409 (2.2)	18 (1.2)	444 (4.5)	82 (1.2)	417 (2.2)
Turkey	43 (1.6)	467 (5.6)	57 (1.6)	408 (4.5)	20 (1.2)	491 (7.3)	80 (1.2)	418 (4.2)
Ukraine	46 (1.6)	491 (4.0)	54 (1.6)	439 (3.8)	22 (1.2)	486 (5.3)	78 (1.2)	458 (3.5)
United States	94 (0.4)	511 (2.8)	6 (0.4)	463 (4.8)	87 (0.6)	514 (2.8)	13 (0.6)	472 (3.9)
¶ Morocco	45 (1.8)	399 (4.2)	55 (1.8)	368 (3.0)	37 (1.6)	391 (3.7)	63 (1.6)	376 (3.8)
International Avg.	70 (0.2)	462 (0.7)	30 (0.2)	409 (1.1)	50 (0.2)	466 (0.9)	50 (0.2)	429 (0.9)
Benchmarking Participants								
Basque Country, Spain	96 (0.5)	502 (2.9)	4 (0.5)	431 (10.9)	84 (1.0)	504 (2.9)	16 (1.0)	471 (5.2)
British Columbia, Canada	98 (0.2)	511 (3.1)	2 (0.2)	~ ~	96 (0.5)	513 (3.1)	4 (0.5)	451 (5.9)
Dubai, UAE	95 (0.5)	469 (2.6)	5 (0.5)	396 (7.2)	84 (0.6)	473 (2.6)	16 (0.6)	415 (4.1)
Massachusetts, US	97 (0.4)	549 (4.4)	3 (0.4)	490 (11.3)	93 (0.7)	552 (4.1)	7 (0.7)	482 (10.5)
Minnesota, US	96 (0.5)	535 (4.2)	4 (0.5)	474 (12.1)	89 (1.2)	537 (4.0)	11 (1.2)	492 (8.7)
Ontario, Canada	99 (0.2)	518 (3.5)	1 (0.2)	~ ~	96 (0.5)	519 (3.6)	4 (0.5)	479 (8.7)
Quebec, Canada	97 (0.4)	530 (3.5)	3 (0.4)	490 (8.1)	93 (0.6)	531 (3.5)	7 (0.6)	500 (6.2)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by students.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

home (seven per cent in 2003 compared with three per cent in 2007). These findings indicate that at grade 8, as at grade 4, pupils in England report a reduction in the use of computers in school. However, in England the percentage of pupils who use a computer both at home and at school is well above the international average of 42 per cent, and only four other countries have higher percentages in this category (Chinese Taipei, Hong Kong, Malta, Australia).

Exhibit 9.12 Computer use with trends

TIMSS2007 Mathematics 8th Grade

Country	Use Computer Both at Home and at School			Use Computer at Home but Not at School			Use Computer at School but Not at Home		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Chinese Taipei	87 (0.7)	608 (4.2)	-1 (1.1)	8 (0.5)	562 (7.6)	6 (0.5) ▲	3 (0.4)	511 (10.8)	-6 (0.9) ▼
Hong Kong SAR	84 (1.0)	582 (5.1)	-4 (1.2) ▼	13 (0.9)	537 (9.1)	5 (1.1) ▲	1 (0.3)	~ ~	-1 (0.4)
Malta	84 (0.6)	495 (1.4)	◊ ◊	12 (0.5)	473 (3.8)	◊ ◊	3 (0.3)	376 (8.1)	◊ ◊
Australia	77 (1.0)	506 (4.0)	-6 (1.4) ▼	17 (0.9)	480 (5.8)	7 (1.3) ▲	4 (0.4)	435 (9.4)	-1 (0.6)
England	76 (1.1)	526 (4.9)	-5 (1.4) ▼	20 (1.0)	486 (5.5)	10 (1.2) ▲	3 (0.4)	450 (10.1)	-4 (0.8) ▼
Czech Republic	76 (1.1)	511 (2.3)	◊ ◊	15 (0.9)	497 (4.4)	◊ ◊	8 (0.6)	458 (6.3)	◊ ◊
Cyprus	74 (0.7)	477 (1.7)	3 (1.0) ▲	17 (0.6)	459 (4.6)	10 (0.7) ▲	6 (0.3)	410 (7.1)	-10 (0.7) ▼
Scotland	71 (1.1)	498 (3.9)	-7 (1.5) ▼	25 (1.0)	473 (4.8)	13 (1.3) ▲	3 (0.3)	442 (9.4)	-6 (0.7) ▼
United States	69 (1.0)	519 (2.7)	-10 (1.4) ▼	22 (0.9)	496 (4.0)	10 (1.3) ▲	6 (0.4)	468 (4.5)	-2 (0.6) ▼
Norway	67 (1.2)	477 (2.3)	-3 (2.0)	30 (1.2)	459 (2.3)	8 (1.9) ▲	1 (0.2)	~ ~	-3 (0.5) ▼
Singapore	67 (1.0)	609 (3.6)	-12 (1.2) ▼	25 (0.8)	579 (4.5)	11 (1.0) ▲	5 (0.4)	503 (7.7)	0 (0.6)
Hungary	67 (1.1)	531 (3.6)	6 (1.8) ▲	21 (0.9)	511 (4.0)	13 (1.3) ▲	10 (0.7)	456 (6.0)	-16 (1.3) ▼
Sweden	67 (1.4)	498 (2.4)	-11 (1.9) ▼	31 (1.4)	485 (2.7)	14 (1.9) ▲	1 (0.1)	~ ~	-2 (0.4) ▼
Qatar	65 (0.5)	323 (1.8)	◊ ◊	23 (0.5)	290 (2.9)	◊ ◊	8 (0.3)	265 (4.7)	◊ ◊
Kuwait	63 (1.0)	363 (2.7)	◊ ◊	26 (1.0)	349 (3.4)	◊ ◊	6 (0.5)	322 (6.2)	◊ ◊
Japan	58 (1.6)	585 (2.5)	3 (2.0)	23 (1.5)	572 (4.6)	7 (1.9) ▲	17 (0.9)	532 (4.2)	-10 (1.2) ▼
Italy	54 (1.9)	490 (3.3)	16 (2.7) ▲	36 (1.9)	478 (3.0)	-2 (2.7)	2 (0.3)	~ ~	-7 (0.7) ▼
Jordan	53 (1.5)	451 (3.7)	17 (2.1) ▲	14 (1.2)	418 (6.8)	5 (1.4) ▲	26 (1.4)	392 (5.8)	-18 (2.0) ▼
Slovenia	51 (1.5)	511 (2.6)	1 (2.1)	46 (1.5)	495 (2.4)	12 (2.3) ▲	2 (0.2)	~ ~	-6 (0.8) ▼
Israel	50 (2.0)	476 (4.0)	-22 (2.7) ▼	43 (2.1)	471 (5.3)	25 (2.6) ▲	4 (0.6)	391 (13.8)	-2 (0.8) ▼
Lebanon	50 (2.3)	473 (4.3)	11 (2.7) ▲	27 (2.1)	434 (6.6)	11 (2.5) ▲	11 (1.4)	430 (5.7)	-10 (2.4) ▼
Palestinian Nat'l Auth.	48 (1.5)	387 (4.1)	23 (2.1) ▲	16 (1.2)	352 (5.3)	-2 (1.7)	26 (1.2)	350 (5.4)	-7 (2.0) ▼
Bosnia and Herzegovina	46 (1.3)	471 (2.8)	◊ ◊	25 (1.3)	463 (4.4)	◊ ◊	22 (1.0)	426 (4.2)	◊ ◊
Russian Federation	41 (2.0)	536 (4.3)	29 (2.3) ▲	21 (1.8)	509 (6.3)	3 (2.9)	25 (1.9)	487 (4.8)	-3 (2.6)
Oman	38 (1.9)	391 (4.6)	◊ ◊	27 (1.7)	378 (3.9)	◊ ◊	18 (1.3)	349 (6.5)	◊ ◊
Serbia	36 (1.7)	507 (4.6)	21 (2.2) ▲	40 (1.8)	491 (4.2)	17 (2.4) ▲	14 (1.0)	450 (6.0)	-9 (2.2) ▼
Bahrain	36 (0.9)	415 (2.5)	5 (1.7) ▲	50 (1.0)	397 (2.1)	5 (1.7) ▲	5 (0.4)	348 (7.4)	-3 (0.5) ▼
Syrian Arab Republic	36 (1.3)	405 (4.1)	◊ ◊	14 (0.9)	399 (6.0)	◊ ◊	34 (1.5)	384 (5.0)	◊ ◊
Lithuania	33 (1.8)	514 (3.1)	7 (2.3) ▲	49 (1.8)	517 (3.1)	27 (2.3) ▲	9 (0.7)	466 (5.1)	-25 (1.8) ▼
Korea, Rep. of	31 (1.5)	613 (3.1)	-4 (2.2)	64 (1.6)	596 (3.1)	3 (2.3)	1 (0.1)	~ ~	0 (0.2)
Romania	30 (1.9)	482 (6.0)	15 (2.6) ▲	37 (2.3)	477 (5.1)	22 (2.6) ▲	18 (1.7)	436 (8.6)	-8 (2.7) ▼
Malaysia	30 (2.0)	508 (5.5)	4 (2.6)	29 (1.7)	489 (6.8)	4 (2.5)	23 (1.4)	445 (5.9)	-1 (2.2)
Thailand	29 (1.4)	491 (8.2)	◊ ◊	8 (0.6)	483 (10.3)	◊ ◊	50 (1.6)	419 (4.7)	◊ ◊
Turkey	26 (1.3)	486 (6.6)	◊ ◊	12 (1.0)	449 (8.9)	◊ ◊	46 (1.9)	414 (4.5)	◊ ◊
Egypt	23 (1.0)	403 (4.9)	5 (1.2) ▲	19 (0.9)	402 (4.8)	13 (1.0) ▲	41 (1.5)	379 (4.9)	-20 (2.0) ▼
Colombia	21 (1.3)	420 (4.8)	◊ ◊	10 (0.9)	404 (6.2)	◊ ◊	48 (1.7)	365 (3.9)	◊ ◊
Bulgaria	21 (1.7)	478 (8.8)	16 (1.9) ▲	47 (1.5)	482 (4.9)	25 (2.0) ▲	17 (1.2)	433 (11.3)	8 (1.6) ▲
Saudi Arabia	18 (1.7)	331 (6.0)	- -	51 (1.6)	338 (3.3)	- -	7 (0.7)	298 (7.1)	- -
Ukraine	16 (1.4)	503 (7.5)	◊ ◊	32 (1.8)	481 (4.1)	◊ ◊	22 (1.7)	445 (5.6)	◊ ◊
Indonesia	14 (1.2)	450 (8.6)	7 (1.9) ▲	2 (0.3)	~ ~	0 (0.4)	66 (2.5)	400 (3.8)	35 (4.1) ▲
Botswana r	13 (0.8)	389 (5.6)	8 (1.1) ▲	3 (0.4)	370 (11.0)	-2 (0.6) ▼	57 (1.6)	372 (2.3)	34 (2.9) ▲
El Salvador	13 (1.3)	384 (5.5)	◊ ◊	12 (0.8)	352 (6.0)	◊ ◊	27 (2.2)	340 (4.2)	◊ ◊
Ghana	11 (1.0)	317 (12.8)	1 (1.3)	13 (1.0)	312 (8.8)	4 (1.2) ▲	20 (1.7)	300 (8.6)	-1 (2.3)
Armenia	10 (0.8)	502 (6.0)	3 (1.1) ▲	30 (1.3)	506 (7.2)	16 (1.5) ▲	21 (1.9)	496 (6.0)	6 (2.7) ▲
Georgia	6 (1.1)	427 (11.3)	◊ ◊	20 (1.4)	413 (8.9)	◊ ◊	17 (2.2)	394 (9.2)	◊ ◊
Algeria	6 (0.7)	378 (4.3)	◊ ◊	27 (1.5)	395 (2.8)	◊ ◊	6 (0.8)	372 (5.5)	◊ ◊
Iran, Islamic Rep. of	4 (1.0)	515 (16.7)	2 (1.2)	30 (1.8)	437 (6.1)	13 (2.2) ▲	2 (0.7)	~ ~	1 (0.8)
Tunisia	3 (0.5)	400 (6.7)	-2 (0.7) ▼	39 (1.9)	442 (3.1)	19 (2.4) ▲	7 (0.7)	382 (4.5)	-8 (1.7) ▼
¶ Morocco	20 (1.3)	402 (6.4)	- -	24 (1.5)	390 (5.0)	- -	19 (1.5)	367 (5.4)	- -
International Avg	42 (0.2)	470 (0.8)		25 (0.2)	453 (0.8)		16 (0.2)	409 (1.1)	
Benchmarking Participants									
Ontario, Canada	80 (1.3)	522 (3.7)	-5 (1.7) ▼	17 (1.4)	506 (5.7)	6 (1.7) ▲	1 (0.3)	~ ~	-2 (0.6) ▼
Minnesota, US	79 (1.5)	539 (4.5)	◊ ◊	15 (1.3)	522 (5.4)	◊ ◊	4 (0.5)	487 (12.0)	◊ ◊
Massachusetts, US	71 (1.6)	556 (4.2)	◊ ◊	25 (1.7)	536 (5.4)	◊ ◊	2 (0.4)	~ ~	◊ ◊
Basque Country, Spain	67 (2.2)	503 (3.5)	-3 (3.0)	27 (2.1)	501 (4.4)	11 (2.8) ▲	3 (0.4)	451 (9.1)	-8 (0.9) ▼
Dubai, UAE	66 (1.2)	477 (3.1)	◊ ◊	28 (1.4)	449 (3.6)	◊ ◊	3 (0.5)	409 (9.6)	◊ ◊
British Columbia, Canada	65 (1.4)	513 (2.9)	◊ ◊	32 (1.3)	511 (4.6)	◊ ◊	2 (0.3)	~ ~	◊ ◊
Quebec, Canada	61 (1.8)	541 (4.0)	-9 (2.6) ▼	34 (1.7)	516 (3.7)	12 (2.5) ▲	3 (0.4)	488 (7.4)	-3 (0.7) ▼

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

▲ 2007 percent significantly higher

▼ 2007 percent significantly lower

Background data provided by students.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

Grade 8 pupils were asked about other resources in the home that, like book ownership, could be considered to be indicators of socio-economic status. These included, calculator (97 per cent), desk (87 per cent), dictionary (92 per cent), own bedroom (86 per cent), mobile phone (96 per cent) and encyclopaedia (77 per cent). As at grade 4, pupil reports indicated that the majority of pupils at grade 8 possess these resources.

Exhibit 9.12 Computer use with trends (continued)

TIMSS2007 8th Mathematics Grade

Country	Use Computer Only at Places Other than Home and School			Do Not Use Computer at All		
	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Chinese Taipei	1 (0.2)	~ ~	0 (0.2)	1 (0.1)	~ ~	0 (0.2)
Hong Kong SAR	0 (0.1)	~ ~	0 (0.1)	1 (0.1)	~ ~	0 (0.2)
Malta	0 (0.1)	~ ~	◊ ◊	1 (0.1)	~ ~	◊ ◊
Australia	1 (0.2)	~ ~	0 (0.3)	0 (0.1)	~ ~	0 (0.2)
England	1 (0.2)	~ ~	0 (0.2)	0 (0.1)	~ ~	-1 (0.2)
Czech Republic	1 (0.2)	~ ~	◊ ◊	1 (0.2)	~ ~	◊ ◊
Cyprus	0 (0.1)	~ ~	-2 (0.3) ▼	3 (0.2)	408 (8.4)	-2 (0.4) ▼
Scotland	1 (0.2)	~ ~	0 (0.3)	0 (0.1)	~ ~	-1 (0.2)
United States	3 (0.2)	461 (6.6)	1 (0.3)	1 (0.1)	~ ~	0 (0.2)
Norway	0 (0.1)	~ ~	-1 (0.2)	1 (0.1)	~ ~	-1 (0.2)
Singapore	2 (0.2)	~ ~	1 (0.3)	0 (0.1)	~ ~	0 (0.1)
Hungary	1 (0.2)	~ ~	-1 (0.4)	1 (0.2)	~ ~	-2 (0.5) ▼
Sweden	0 (0.1)	~ ~	-1 (0.2)	1 (0.1)	~ ~	-1 (0.3)
Qatar	2 (0.2)	~ ~	◊ ◊	2 (0.2)	~ ~	◊ ◊
Kuwait	3 (0.3)	308 (10.2)	◊ ◊	2 (0.2)	~ ~	◊ ◊
Japan	1 (0.2)	~ ~	0 (0.3)	1 (0.2)	~ ~	0 (0.3)
Italy	0 (0.1)	~ ~	-5 (0.4) ▼	8 (0.5)	433 (6.4)	-1 (0.7)
Jordan	1 (0.2)	~ ~	-6 (0.8) ▼	5 (0.5)	422 (9.1)	1 (0.7)
Slovenia	1 (0.1)	~ ~	-3 (0.4) ▼	1 (0.1)	~ ~	-4 (0.4) ▼
Israel	1 (0.2)	~ ~	-1 (0.3)	1 (0.2)	~ ~	1 (0.3)
Lebanon	7 (1.1)	418 (7.0)	-6 (1.6) ▼	4 (0.8)	424 (9.1)	-5 (1.5) ▼
Palestinian Nat'l Auth.	3 (0.3)	348 (9.1)	-10 (1.1) ▼	7 (0.8)	366 (8.1)	-3 (1.2) ▼
Bosnia and Herzegovina	4 (0.4)	444 (6.5)	◊ ◊	3 (0.3)	429 (7.5)	◊ ◊
Russian Federation	8 (1.0)	499 (6.6)	-13 (1.5) ▼	5 (1.0)	484 (11.7)	-15 (2.0) ▼
Oman	3 (0.4)	354 (8.2)	◊ ◊	14 (1.1)	364 (6.6)	◊ ◊
Serbia	5 (0.6)	457 (7.5)	-14 (1.3) ▼	4 (0.5)	443 (6.7)	-15 (1.2) ▼
Bahrain	2 (0.3)	~ ~	-7 (0.6) ▼	6 (0.4)	389 (5.9)	0 (0.6)
Syrian Arab Republic	2 (0.2)	~ ~	◊ ◊	14 (1.1)	405 (5.8)	◊ ◊
Lithuania	4 (0.4)	475 (7.2)	-8 (1.1) ▼	5 (0.4)	460 (6.6)	0 (0.7)
Korea, Rep. of	2 (0.2)	~ ~	0 (0.3)	2 (0.3)	~ ~	2 (0.3) ▲
Romania	8 (0.8)	438 (7.5)	-16 (1.6) ▼	7 (1.3)	419 (7.5)	-13 (2.2) ▼
Malaysia	10 (0.9)	448 (4.6)	-3 (1.3) ▼	8 (0.8)	428 (7.1)	-3 (1.4) ▼
Thailand	4 (0.5)	432 (9.4)	◊ ◊	9 (0.9)	397 (6.8)	◊ ◊
Turkey	13 (1.2)	401 (8.5)	◊ ◊	4 (0.7)	366 (7.9)	◊ ◊
Egypt	10 (0.7)	404 (5.8)	2 (0.9) ▲	7 (0.5)	406 (6.2)	0 (0.9)
Colombia	12 (0.9)	380 (4.6)	◊ ◊	9 (0.8)	346 (7.4)	◊ ◊
Bulgaria	8 (0.7)	436 (9.3)	-32 (1.9) ▼	7 (0.7)	435 (9.9)	-17 (1.8) ▼
Saudi Arabia	3 (0.4)	309 (8.1)	- -	20 (1.0)	327 (4.2)	- -
Ukraine	19 (1.0)	451 (4.7)	◊ ◊	11 (0.9)	422 (5.8)	◊ ◊
Indonesia	3 (0.4)	385 (12.8)	-16 (1.3) ▼	15 (2.0)	367 (6.5)	-26 (3.4) ▼
Botswana	2 (0.2)	~ ~	-3 (0.5) ▼	25 (1.4)	339 (3.8)	-36 (2.9) ▼
El Salvador	21 (1.4)	339 (4.7)	◊ ◊	28 (1.9)	327 (2.6)	◊ ◊
Ghana	14 (1.0)	326 (6.1)	-12 (1.8) ▼	42 (2.5)	314 (5.9)	8 (3.5) ▲
Armenia	19 (1.1)	502 (4.6)	0 (1.6)	20 (1.2)	491 (4.3)	-25 (2.5) ▼
Georgia	12 (1.1)	420 (9.5)	◊ ◊	44 (2.6)	419 (8.4)	◊ ◊
Algeria	11 (0.8)	394 (4.0)	◊ ◊	49 (1.9)	387 (2.6)	◊ ◊
Iran, Islamic Rep. of	7 (0.6)	408 (6.8)	-5 (1.0) ▼	57 (2.1)	380 (3.8)	-11 (2.7) ▼
Tunisia	18 (0.9)	416 (3.3)	-5 (1.4) ▼	32 (1.5)	414 (2.3)	-4 (2.3)
¶ Morocco	19 (1.5)	380 (5.8)	- -	18 (1.7)	369 (4.6)	- -
International Avg.	6 (0.1)	409 (1.4)		10 (0.1)	399 (1.2)	
Benchmarking Participants						
Ontario, Canada	1 (0.2)	~ ~	0 (0.2)	0 (0.1)	~ ~	0 (0.1)
Minnesota, US	2 (0.4)	~ ~	◊ ◊	0 (0.2)	~ ~	◊ ◊
Massachusetts, US	2 (0.3)	~ ~	◊ ◊	0 (0.1)	~ ~	◊ ◊
Basque Country, Spain	2 (0.3)	~ ~	-1 (0.5)	1 (0.2)	~ ~	0 (0.3)
Dubai, UAE	1 (0.3)	~ ~	◊ ◊	2 (0.2)	~ ~	◊ ◊
British Columbia, Canada	1 (0.2)	~ ~	◊ ◊	1 (0.1)	~ ~	◊ ◊
Quebec, Canada	1 (0.3)	~ ~	0 (0.4)	1 (0.2)	~ ~	0 (0.2)

▲ 2007 percent significantly higher
▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Homework

Both pupils and teachers were asked about homework, in mathematics and science, using the same indices as at grade 4. England's grade 8 pupils report receiving less homework than pupils in most of the other countries taking part in TIMSS 2007 (see Exhibits 9.13 and 9.14). Pupils at grade 8 reported receiving more homework for science than mathematics. However, this is different from the findings of the 2003 survey in which grade 8 pupils reported receiving similar amounts of homework for both subjects. The trend data indicates that there has been no significant change at grade 8 in mathematics

Exhibit 9.13 Index of time students spend doing mathematics homework (TMH) in a normal school week

TIMSS2007 Mathematics 8th Grade

Country	High TMH		Medium TMH		Low TMH	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
Romania	66 (1.3)	488 (4.0)	29 (1.3)	433 (5.1)	5 (0.5)	432 (11.4)
Russian Federation	50 (1.3)	510 (4.4)	49 (1.2)	520 (4.2)	2 (0.3)	~ ~
El Salvador	46 (1.4)	351 (3.2)	45 (1.0)	337 (3.3)	9 (0.7)	337 (5.2)
Tunisia	45 (1.3)	425 (2.8)	44 (1.0)	419 (2.9)	11 (0.9)	417 (4.1)
Italy	45 (1.3)	475 (3.1)	47 (1.2)	488 (4.1)	7 (0.6)	483 (5.5)
Syrian Arab Republic r	44 (1.1)	408 (3.9)	48 (0.9)	399 (3.8)	8 (0.6)	409 (6.8)
Singapore	42 (1.0)	616 (3.2)	43 (0.9)	595 (4.3)	16 (0.9)	547 (6.9)
Malaysia	41 (1.1)	486 (5.1)	47 (1.0)	473 (5.1)	12 (0.9)	446 (9.1)
Ukraine	40 (1.2)	468 (4.5)	53 (1.1)	467 (3.5)	7 (0.7)	466 (6.8)
Thailand	39 (1.4)	461 (5.6)	45 (1.1)	435 (5.4)	15 (1.0)	419 (6.7)
Colombia	36 (1.3)	386 (4.5)	48 (0.9)	379 (3.8)	16 (1.0)	378 (6.0)
Bulgaria	36 (1.4)	475 (6.4)	48 (1.2)	472 (5.4)	15 (1.5)	458 (8.1)
Israel	34 (1.5)	485 (4.9)	53 (1.4)	472 (4.1)	13 (0.9)	448 (9.0)
Hong Kong SAR	34 (1.6)	589 (4.9)	48 (1.2)	576 (5.9)	18 (1.4)	555 (9.0)
Georgia r	34 (1.5)	432 (5.1)	62 (1.6)	414 (7.0)	4 (0.5)	372 (14.2)
Armenia r	32 (1.2)	501 (4.6)	64 (1.2)	502 (4.4)	4 (0.5)	499 (12.7)
Serbia	31 (1.4)	490 (5.0)	40 (1.3)	496 (4.3)	28 (1.4)	481 (4.3)
Chinese Taipei	31 (1.9)	628 (4.0)	46 (1.3)	613 (4.1)	23 (1.7)	563 (8.7)
Egypt	30 (1.1)	381 (4.6)	58 (1.1)	404 (3.6)	13 (1.0)	416 (6.8)
Botswana	29 (0.9)	383 (3.0)	50 (0.9)	365 (2.8)	20 (1.0)	356 (3.4)
Indonesia	29 (1.1)	417 (5.0)	53 (0.9)	397 (4.0)	18 (0.8)	384 (5.1)
Ghana	28 (1.2)	332 (5.2)	55 (1.0)	307 (4.8)	16 (1.0)	313 (5.4)
Lithuania	27 (1.1)	498 (2.8)	69 (1.1)	515 (2.7)	4 (0.8)	481 (8.8)
United States	26 (1.1)	522 (3.8)	62 (1.2)	510 (3.0)	12 (1.2)	484 (4.3)
Jordan	26 (1.2)	424 (5.0)	62 (1.1)	439 (4.4)	12 (0.9)	422 (7.1)
Norway	25 (1.5)	466 (2.6)	53 (1.3)	474 (2.0)	22 (1.6)	473 (3.5)
Lebanon r	25 (1.3)	445 (6.0)	67 (1.4)	460 (3.9)	8 (0.9)	434 (9.0)
Palestinian Nat'l Auth.	24 (1.1)	374 (4.4)	68 (1.2)	378 (3.8)	7 (0.8)	345 (9.1)
Malta	24 (0.7)	508 (2.8)	71 (0.7)	498 (1.7)	5 (0.3)	402 (7.4)
Bosnia and Herzegovina	24 (1.2)	466 (4.0)	51 (1.2)	458 (3.2)	25 (1.4)	459 (3.8)
Turkey	22 (1.1)	428 (5.8)	49 (1.0)	433 (5.0)	29 (1.2)	443 (5.9)
Slovenia	20 (1.1)	503 (2.6)	64 (1.3)	505 (2.4)	16 (1.0)	498 (4.1)
Cyprus	20 (0.9)	463 (4.1)	70 (0.9)	480 (1.8)	11 (0.7)	451 (4.8)
Iran, Islamic Rep. of	19 (1.4)	440 (7.7)	55 (1.6)	404 (3.8)	26 (1.5)	378 (5.0)
Hungary	16 (0.9)	517 (5.6)	78 (1.2)	524 (3.4)	6 (1.0)	488 (8.0)
Qatar	16 (0.4)	300 (3.2)	67 (0.5)	319 (1.5)	17 (0.4)	308 (4.0)
Bahrain	15 (0.7)	391 (4.0)	67 (1.1)	404 (1.8)	18 (1.0)	405 (5.2)
Australia	15 (1.1)	523 (6.6)	44 (1.5)	511 (5.2)	42 (2.0)	481 (4.6)
Kuwait	14 (0.7)	334 (5.1)	58 (1.3)	358 (2.7)	27 (1.5)	373 (3.9)
Saudi Arabia	13 (0.8)	316 (4.8)	61 (1.8)	339 (3.3)	26 (1.8)	334 (4.4)
Oman	12 (0.7)	374 (5.2)	73 (1.3)	383 (3.1)	15 (1.4)	367 (7.9)
Japan	8 (1.1)	566 (10.0)	36 (1.3)	569 (3.3)	57 (2.0)	574 (3.3)
Scotland	8 (0.7)	519 (7.2)	41 (1.8)	505 (4.4)	51 (2.1)	478 (4.3)
Korea, Rep. of	6 (0.7)	591 (5.8)	31 (1.5)	595 (3.7)	62 (1.7)	605 (3.1)
Czech Republic	5 (0.6)	473 (6.4)	46 (2.1)	504 (4.1)	49 (2.4)	511 (3.4)
England	5 (0.6)	518 (11.0)	31 (1.3)	530 (6.8)	65 (1.7)	513 (4.9)
Sweden r	3 (0.4)	461 (7.7)	35 (1.2)	490 (3.1)	62 (1.3)	498 (2.4)
Algeria	- -	- -	- -	- -	- -	- -
¶ Morocco r	34 (1.3)	396 (5.0)	57 (1.2)	383 (4.2)	9 (0.7)	360 (7.9)
International Avg.	27 (0.2)	458 (0.9)	53 (0.2)	457 (0.7)	20 (0.2)	441 (1.1)
Benchmarking Participants						
British Columbia, Canada	33 (1.3)	508 (3.9)	55 (1.2)	514 (3.3)	11 (1.1)	507 (5.9)
Basque Country, Spain	33 (1.9)	494 (3.8)	58 (2.1)	508 (3.1)	9 (1.5)	486 (12.5)
Massachusetts, US	31 (3.0)	564 (7.3)	63 (2.8)	546 (4.5)	6 (1.3)	500 (11.3)
Minnesota, US	30 (2.5)	542 (7.6)	62 (2.4)	535 (4.3)	8 (1.6)	495 (7.1)
Quebec, Canada	30 (1.7)	545 (5.5)	47 (1.6)	529 (4.0)	23 (2.0)	517 (4.9)
Ontario, Canada	29 (1.5)	508 (3.5)	59 (1.6)	526 (3.8)	12 (1.5)	505 (12.3)
Dubai, UAE r	29 (1.3)	461 (5.1)	57 (1.3)	463 (2.9)	15 (1.1)	488 (6.0)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on students' reports on the frequency of mathematics homework they are given and the amount of time they spend on that homework. High level indicates mathematics homework assigned at least 3 or 4 times a week and students spend more than 30 minutes on that homework. Low level indicates mathematics homework assigned no more than twice a week and students spend no more than 30 minutes on that homework. Medium level includes all other possible combinations of responses.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students.

Exhibit 9.14 Index of time students spend doing science homework (TSH) in a normal school week

TIMSS2007 8th Science Grade

General/Integrated Science

Country	High TSH		Medium TSH		Low TSH	
	Percent of Students	Average Achievement	Percent of Students	Average Achievement	Percent of Students	Average Achievement
El Salvador	33 (1.2)	395 (3.2)	50 (0.9)	386 (3.3)	17 (1.0)	389 (4.6)
Colombia	30 (1.3)	419 (4.3)	50 (1.0)	420 (3.6)	21 (1.2)	411 (5.4)
Malaysia	27 (1.0)	480 (6.2)	46 (0.8)	471 (5.9)	27 (1.2)	469 (7.7)
Egypt	25 (1.0)	392 (4.8)	64 (1.2)	425 (3.4)	11 (1.0)	417 (8.4)
Ghana	23 (0.9)	321 (7.3)	54 (0.9)	302 (5.4)	23 (1.0)	318 (6.0)
Jordan	22 (1.1)	477 (5.3)	57 (1.1)	490 (3.9)	21 (1.4)	490 (6.3)
Singapore	21 (0.7)	586 (3.8)	45 (1.0)	579 (4.9)	34 (1.2)	552 (5.7)
Thailand	21 (0.9)	472 (5.5)	48 (0.8)	473 (4.6)	30 (1.2)	469 (5.2)
Turkey	18 (1.1)	458 (5.4)	45 (1.0)	456 (4.0)	37 (1.5)	456 (4.8)
Palestinian Nat'l Auth.	17 (1.2)	406 (5.1)	52 (1.5)	405 (4.4)	31 (1.8)	424 (4.9)
Botswana	15 (0.8)	364 (5.6)	45 (1.0)	359 (3.3)	40 (1.1)	364 (4.0)
Chinese Taipei	15 (1.3)	591 (5.0)	40 (1.4)	576 (3.6)	46 (2.1)	552 (4.4)
Qatar	13 (0.4)	321 (4.8)	54 (0.6)	329 (2.3)	33 (0.6)	322 (2.5)
Norway	11 (0.9)	486 (3.3)	43 (1.3)	488 (2.4)	45 (1.8)	492 (3.1)
Kuwait	11 (0.6)	403 (5.9)	47 (1.5)	427 (3.4)	41 (1.7)	427 (3.5)
Italy	11 (0.7)	485 (5.4)	42 (1.2)	496 (4.3)	47 (1.3)	501 (2.8)
Tunisia	11 (0.7)	435 (4.0)	37 (1.1)	444 (3.0)	52 (1.3)	450 (2.2)
Bahrain	11 (0.6)	465 (5.0)	50 (1.0)	470 (2.3)	39 (1.0)	477 (3.0)
Oman	10 (0.6)	408 (6.3)	69 (1.4)	433 (3.1)	21 (1.5)	421 (4.4)
Israel	10 (0.7)	456 (9.4)	40 (1.3)	465 (5.9)	50 (1.3)	490 (4.3)
Saudi Arabia	9 (0.6)	384 (8.7)	61 (1.4)	414 (2.8)	30 (1.6)	403 (4.3)
United States	9 (0.7)	503 (5.4)	41 (1.3)	526 (3.1)	50 (1.5)	524 (3.4)
Hong Kong SAR	8 (0.8)	523 (7.3)	43 (1.4)	540 (4.7)	48 (1.6)	531 (5.7)
Iran, Islamic Rep. of	8 (0.7)	476 (8.6)	45 (1.4)	462 (3.9)	47 (1.5)	454 (4.0)
England	7 (0.9)	588 (8.6)	31 (1.1)	558 (5.0)	62 (1.4)	536 (4.7)
Australia	6 (0.6)	539 (8.9)	32 (1.1)	529 (4.3)	62 (1.4)	511 (4.1)
Korea, Rep. of	2 (0.4)	~ ~	20 (1.4)	556 (3.6)	77 (1.6)	556 (2.2)
Scotland	2 (0.3)	~ ~	22 (0.9)	500 (4.2)	76 (1.0)	500 (3.5)
Japan	1 (0.2)	~ ~	20 (1.1)	550 (3.7)	79 (1.2)	558 (2.1)
International Avg.	14 (0.2)	455 (1.2)	45 (0.2)	466 (0.8)	41 (0.3)	464 (0.9)
Benchmarking Participants						
British Columbia, Canada	27 (1.3)	523 (3.7)	46 (1.2)	529 (3.2)	27 (1.7)	533 (4.2)
Dubai, UAE r	20 (1.1)	509 (5.4)	41 (1.7)	501 (3.5)	39 (1.8)	482 (4.6)
Basque Country, Spain	15 (1.5)	491 (5.4)	44 (2.0)	499 (3.7)	40 (2.3)	502 (3.7)
Massachusetts, US	13 (1.8)	546 (8.1)	52 (3.2)	564 (6.0)	35 (4.3)	552 (6.6)
Minnesota, US	12 (2.3)	526 (8.1)	45 (2.3)	540 (5.7)	43 (3.3)	543 (4.9)
Ontario, Canada	8 (0.9)	526 (9.2)	37 (1.7)	534 (4.1)	55 (2.1)	526 (4.2)
Quebec, Canada	3 (0.4)	511 (10.0)	20 (1.1)	519 (5.5)	77 (1.3)	508 (2.7)

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Index based on students' reports on the frequency of science homework they are given and the amount of time they spend on that homework. High level indicates science homework assigned at least 3 or 4 times a week and students spend more than 30 minutes on that homework. Low level indicates science homework assigned no more than twice a week and students spend no more than 30 minutes on that homework. Medium level includes all other possible combinations of responses.

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

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

teachers' reports of the emphasis they put on homework (see Exhibit 9.15). However, compared with 2003 there has been a significant decrease in the percentage of grade 8 science teachers who place a lot of emphasis on homework (18 per cent in 2007 compared with 29 per cent in 2003). This brings England's data closer to the international average (14 per cent) (see Exhibit 9.16). This percentage is below many other countries, including Singapore, Chinese Taipei and Norway. Conversely, this is higher than that of other high scoring countries, including Hong Kong, Korea and Japan.

Exhibit 9.15 Index of teachers' emphasis on mathematics homework (EMH) with trends

TIMSS2007 Mathematics 8th Grade

Country	Have Policy to Assign Mathematics Homework	High EMH			Medium EMH			Low EMH		
		2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Romania	○	70 (4.2)	472 (4.9)	-8 (5.4)	28 (4.2)	440 (9.2)	8 (5.4)	1 (0.8)	~ ~	0 (1.0)
Italy	○	70 (3.3)	481 (3.2)	-2 (4.8)	29 (3.1)	480 (5.3)	4 (4.4)	1 (0.7)	~ ~	-2 (1.7)
Georgia	●	63 (4.4)	413 (7.8)	◊ ◊	35 (4.4)	406 (7.9)	◊ ◊	2 (1.3)	~ ~	◊ ◊
Iran, Islamic Rep. of	○	59 (3.8)	406 (5.0)	-3 (5.8)	27 (3.6)	395 (8.2)	1 (5.4)	13 (2.9)	412 (11.9)	2 (4.0)
Israel	●	r 53 (3.3)	489 (5.4)	3 (5.0)	40 (3.3)	454 (8.5)	-3 (5.3)	7 (1.4)	404 (21.7)	1 (2.2)
Colombia	○	48 (4.9)	382 (5.1)	◊ ◊	37 (5.2)	383 (7.3)	◊ ◊	16 (3.2)	366 (11.0)	◊ ◊
Syrian Arab Republic	●	47 (4.1)	396 (5.5)	◊ ◊	30 (3.9)	392 (7.8)	◊ ◊	22 (3.8)	397 (8.0)	◊ ◊
Armenia	○	r 46 (4.4)	503 (4.7)	-18 (6.4) ▼	43 (3.7)	494 (5.6)	13 (6.0) ▲	10 (2.5)	498 (12.7)	6 (3.3)
Russian Federation	○	46 (2.9)	516 (6.5)	-10 (4.5) ▼	54 (2.9)	509 (4.3)	11 (4.5) ▲	0 (0.0)	~ ~	-1 (0.5)
Lebanon	●	45 (4.4)	440 (6.0)	-4 (6.3)	45 (4.2)	456 (6.8)	1 (6.1)	10 (2.4)	438 (14.5)	3 (3.0)
Thailand	○	43 (4.3)	448 (7.8)	◊ ◊	48 (4.2)	436 (9.0)	◊ ◊	9 (2.2)	438 (14.1)	◊ ◊
Singapore	○	43 (2.8)	612 (5.7)	-17 (3.7) ▼	39 (2.7)	595 (6.5)	6 (3.7)	18 (2.3)	542 (12.8)	11 (2.6) ▲
Ukraine	●	43 (3.2)	466 (5.9)	◊ ◊	56 (3.3)	459 (5.6)	◊ ◊	1 (0.7)	~ ~	◊ ◊
Indonesia	○	41 (4.9)	403 (9.2)	-4 (6.3)	50 (4.9)	409 (7.9)	5 (6.6)	9 (2.5)	386 (13.7)	-1 (3.6)
Chinese Taipei	○	38 (4.2)	613 (8.0)	9 (5.7)	37 (4.6)	608 (5.0)	-1 (6.1)	25 (3.5)	562 (7.4)	-8 (5.3)
Ghana	●	36 (4.3)	309 (9.2)	-11 (6.7)	42 (4.3)	309 (7.8)	5 (6.6)	21 (3.4)	312 (7.6)	6 (4.5)
Turkey	●	35 (4.1)	432 (9.6)	◊ ◊	37 (4.2)	427 (8.8)	◊ ◊	28 (3.3)	433 (10.5)	◊ ◊
Norway	○	34 (3.9)	467 (3.5)	9 (5.2)	48 (3.6)	474 (3.0)	2 (5.6)	18 (3.1)	465 (5.0)	-11 (5.3) ▼
Malaysia	○	34 (4.0)	478 (8.6)	-26 (6.0) ▼	54 (4.2)	475 (6.7)	20 (5.9) ▲	11 (2.3)	458 (15.7)	6 (3.0) ▲
Tunisia	●	34 (4.1)	418 (3.3)	22 (4.8) ▲	60 (4.2)	424 (3.3)	-24 (5.2) ▼	6 (2.0)	421 (10.7)	3 (2.6)
Botswana	○	33 (3.8)	370 (4.5)	-11 (5.9)	57 (4.1)	361 (3.6)	9 (6.1)	10 (2.6)	352 (8.0)	2 (3.6)
Serbia	●	33 (3.8)	484 (6.9)	-1 (5.6)	40 (4.3)	488 (4.7)	-5 (6.1)	27 (3.9)	484 (7.0)	6 (5.3)
Hong Kong SAR	○	31 (4.5)	586 (10.9)	6 (5.9)	52 (4.6)	582 (9.0)	2 (6.5)	17 (3.5)	532 (16.1)	-8 (5.3)
Algeria	●	31 (4.0)	389 (3.3)	◊ ◊	55 (4.4)	385 (3.0)	◊ ◊	14 (2.7)	388 (4.1)	◊ ◊
Bulgaria	○	28 (3.3)	499 (8.9)	-25 (5.3) ▼	66 (3.7)	451 (6.5)	28 (5.6) ▲	6 (1.8)	452 (10.6)	-3 (3.1)
El Salvador	○	26 (4.1)	335 (7.4)	◊ ◊	50 (4.1)	345 (3.9)	◊ ◊	24 (3.9)	333 (6.6)	◊ ◊
Cyprus	○	23 (2.7)	472 (3.9)	-12 (4.1) ▼	77 (2.7)	462 (2.0)	12 (4.1) ▲	1 (0.0)	~ ~	1 (0.0)
Malta	●	20 (0.2)	510 (2.2)	◊ ◊	73 (0.2)	488 (1.3)	◊ ◊	6 (0.2)	407 (3.6)	◊ ◊
United States	○	20 (2.1)	533 (6.0)	-7 (3.2) ▼	67 (2.6)	507 (3.9)	5 (3.9)	14 (2.2)	475 (5.8)	2 (3.2)
Bosnia and Herzegovina	○	19 (3.1)	449 (8.0)	◊ ◊	56 (4.0)	463 (3.7)	◊ ◊	25 (3.4)	444 (5.3)	◊ ◊
England	○	r 18 (3.1)	552 (11.7)	-6 (6.8)	23 (3.3)	520 (11.0)	2 (5.5)	59 (4.2)	499 (6.5)	3 (7.2)
Korea, Rep. of	●	s 17 (2.8)	609 (7.7)	8 (3.5) ▲	28 (2.8)	591 (5.8)	-3 (4.6)	56 (3.3)	597 (4.0)	-4 (4.9)
Egypt	○	16 (2.8)	391 (8.5)	-7 (4.3)	52 (4.4)	390 (5.3)	-6 (5.8)	32 (4.1)	395 (6.9)	12 (5.3) ▲
Jordan	○	14 (2.7)	426 (12.0)	-16 (4.6) ▼	58 (4.2)	431 (5.8)	2 (6.1)	28 (3.9)	415 (9.0)	14 (4.8) ▲
Sweden	○	11 (1.8)	492 (8.1)	-6 (3.4)	26 (2.8)	499 (3.9)	2 (4.2)	63 (3.1)	488 (2.5)	4 (4.8)
Palestinian Nat'l Auth.	○	10 (2.7)	356 (12.7)	-21 (4.8) ▼	63 (4.0)	375 (4.8)	5 (5.8)	28 (3.6)	351 (6.5)	16 (4.4) ▲
Lithuania	●	8 (2.1)	499 (6.3)	-5 (3.4)	86 (2.7)	508 (2.6)	10 (4.5) ▲	6 (1.8)	481 (6.5)	-4 (3.2)
Japan	○	8 (2.0)	564 (7.7)	1 (3.0)	33 (3.8)	575 (4.7)	4 (5.3)	59 (3.8)	568 (3.9)	-5 (5.4)
Hungary	○	8 (2.1)	526 (13.6)	0 (2.9)	87 (2.5)	517 (3.9)	-3 (3.4)	5 (1.5)	481 (19.9)	3 (1.8)
Scotland	○	7 (1.8)	534 (15.2)	4 (2.5)	38 (3.5)	511 (6.3)	-7 (5.8)	55 (3.6)	465 (5.5)	3 (5.8)
Slovenia	○	6 (1.3)	506 (8.5)	-7 (3.2) ▼	89 (1.9)	503 (2.4)	4 (3.6)	6 (1.4)	478 (10.8)	3 (1.7)
Oman	●	6 (2.1)	382 (11.7)	◊ ◊	67 (3.7)	377 (4.4)	◊ ◊	27 (3.3)	360 (6.3)	◊ ◊
Qatar	●	5 (0.1)	290 (4.3)	◊ ◊	57 (0.2)	318 (1.7)	◊ ◊	38 (0.2)	296 (2.4)	◊ ◊
Australia	○	5 (2.0)	497 (30.8)	-5 (3.6)	46 (4.0)	520 (5.4)	-10 (5.8)	49 (4.0)	477 (5.9)	16 (5.5) ▲
Bahrain	○	5 (1.5)	373 (5.4)	-10 (2.9) ▼	49 (2.7)	402 (2.5)	-23 (4.5) ▼	47 (2.9)	391 (3.4)	33 (4.2) ▲
Czech Republic	○	4 (1.5)	578 (27.3)	◊ ◊	19 (3.2)	504 (7.8)	◊ ◊	77 (3.3)	500 (3.0)	◊ ◊
Saudi Arabia	●	3 (1.4)	321 (14.2)	- -	50 (3.9)	334 (4.0)	- -	48 (3.8)	323 (4.4)	- -
Kuwait	-	r 2 (1.4)	~ ~	◊ ◊	16 (3.4)	360 (8.5)	◊ ◊	81 (3.7)	356 (2.9)	◊ ◊
¶ Morocco	●	r 24 (6.2)	394 (12.2)	- -	59 (6.8)	387 (6.5)	- -	17 (4.1)	374 (9.9)	- -
International Avg.		28 (0.5)	460 (1.4)		49 (0.5)	453 (0.9)		24 (0.4)	435 (1.5)	
Benchmarking Participants										
Massachusetts, US	○	32 (5.8)	576 (10.1)	◊ ◊	59 (5.9)	537 (6.7)	◊ ◊	9 (2.7)	494 (13.3)	◊ ◊
Minnesota, US	-	23 (6.3)	563 (12.9)	◊ ◊	67 (7.1)	529 (5.0)	◊ ◊	10 (3.6)	489 (12.5)	◊ ◊
Ontario, Canada	○	21 (3.5)	519 (5.2)	-9 (5.6)	51 (5.2)	523 (4.7)	-12 (6.8)	28 (4.4)	506 (9.5)	21 (5.0) ▲
Basque Country, Spain	○	21 (4.4)	504 (6.0)	6 (6.0)	68 (4.8)	500 (3.8)	-3 (7.0)	12 (2.6)	487 (9.9)	-3 (4.2)
Quebec, Canada	○	17 (3.1)	550 (12.8)	-5 (5.1)	58 (4.1)	534 (5.7)	-3 (6.6)	24 (3.6)	506 (5.1)	8 (5.4)
British Columbia, Canada	○	17 (3.1)	521 (9.1)	◊ ◊	64 (4.0)	512 (4.1)	◊ ◊	19 (2.7)	497 (7.9)	◊ ◊
Dubai, UAE	○	s 8 (2.2)	456 (16.9)	◊ ◊	68 (3.9)	468 (5.5)	◊ ◊	24 (3.6)	451 (12.4)	◊ ◊

● Yes ○ No ▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

Background data provided by National Research Coordinators and by teachers.

Index based on teachers' responses to two questions about how often they usually assign mathematics homework and how many minutes of mathematics homework they usually assign. High level indicates the assignment of more than 30 minutes of homework about half of the lessons or more. Low level indicates no assignment or the assignment of less than 30 minutes of homework about half of the lessons or less. Medium level includes all other possible combinations of responses.

¶ Did not satisfy guidelines for sample participation rates (see Appendix A).

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

A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.

An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students.

A diamond (◊) indicates the country did not participate in the assessment.

Exhibit 9.16 Index of teachers' emphasis on science homework (ESH) with trends

TIMSS2007 Science 8th Grade

Country	Have Policy to Assign Science Homework	High ESH			Medium ESH			Low ESH		
		2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003	2007 Percent of Students	Average Achievement	Difference in Percent from 2003
Italy	○	42 (2.8)	495 (4.5)	-1 (4.9)	36 (3.3)	494 (4.9)	1 (5.0)	21 (2.8)	496 (5.8)	0 (4.1)
Colombia	○	39 (4.6)	418 (6.1)	◊ ◊	27 (4.4)	413 (6.1)	◊ ◊	33 (5.0)	416 (8.1)	◊ ◊
Ghana	●	35 (3.8)	300 (9.6)	6 (5.9)	46 (4.0)	309 (9.6)	5 (6.3)	19 (3.3)	293 (15.1)	-10 (4.8) ▼
Thailand	○	28 (3.5)	458 (8.3)	◊ ◊	33 (4.1)	489 (9.9)	◊ ◊	39 (4.2)	464 (6.9)	◊ ◊
Iran, Islamic Rep. of	●	28 (3.1)	444 (7.2)	1 (4.9)	33 (3.6)	462 (4.9)	7 (5.1)	39 (3.7)	467 (7.5)	-8 (5.8)
Singapore	○	27 (1.9)	588 (8.1)	-2 (3.2)	29 (2.3)	580 (8.7)	-3 (3.4)	44 (2.6)	546 (7.2)	5 (3.4)
Indonesia	○	24 (3.4)	434 (7.6)	-3 (4.7)	47 (3.8)	444 (4.5)	5 (4.9)	30 (3.4)	427 (7.8)	-2 (4.5)
Ukraine	●	24 (2.2)	484 (5.1)	◊ ◊	74 (2.2)	486 (3.6)	◊ ◊	2 (0.6)	~ ~	◊ ◊
Turkey	●	23 (3.6)	450 (9.0)	◊ ◊	32 (3.8)	460 (7.1)	◊ ◊	44 (3.8)	451 (6.0)	◊ ◊
Georgia	●	23 (3.2)	409 (9.1)	◊ ◊	54 (3.3)	425 (4.2)	◊ ◊	23 (2.1)	424 (6.7)	◊ ◊
Lebanon	○	23 (3.5)	397 (10.0)	-4 (4.7)	43 (3.6)	424 (7.5)	-11 (5.3) ▼	34 (3.8)	412 (13.5)	15 (4.9) ▲
Norway	○	23 (3.3)	482 (4.6)	8 (4.4)	46 (3.7)	491 (3.1)	-5 (5.9)	31 (4.1)	484 (4.2)	-4 (6.0)
Chinese Taipei	○	23 (3.8)	570 (7.0)	-1 (5.2)	31 (4.0)	572 (6.4)	2 (5.5)	47 (4.4)	550 (5.1)	-1 (6.2)
Syrian Arab Republic	●	22 (3.0)	460 (5.1)	◊ ◊	44 (3.8)	452 (4.7)	◊ ◊	34 (3.2)	444 (4.3)	◊ ◊
Russian Federation	●	22 (1.8)	525 (6.3)	-6 (2.7) ▼	76 (1.8)	531 (3.9)	7 (2.9) ▲	2 (0.5)	~ ~	-1 (1.0)
Armenia	○ r	19 (1.7)	488 (6.5)	-7 (2.7) ▼	56 (2.8)	491 (6.5)	4 (4.1)	25 (2.3)	482 (6.7)	3 (3.2)
England	○ s	18 (2.4)	570 (7.1)	-11 (4.8) ▼	22 (2.7)	557 (7.4)	2 (4.0)	60 (3.1)	528 (6.3)	9 (5.1)
Malta	●	16 (0.2)	491 (2.6)	◊ ◊	33 (0.2)	460 (1.8)	◊ ◊	51 (0.3)	433 (1.8)	◊ ◊
El Salvador	○	16 (3.2)	406 (8.6)	◊ ◊	43 (4.0)	380 (4.9)	◊ ◊	40 (4.0)	388 (5.4)	◊ ◊
Malaysia	○	15 (2.7)	482 (15.6)	-24 (4.8) ▼	50 (4.3)	477 (7.8)	16 (5.8) ▲	35 (4.0)	457 (11.3)	8 (5.5)
Botswana	○	15 (3.0)	343 (6.6)	-2 (3.8)	40 (4.7)	359 (5.3)	1 (6.5)	46 (4.8)	354 (5.5)	2 (6.7)
Hong Kong SAR	○	14 (3.3)	543 (13.1)	2 (4.5)	38 (4.7)	531 (9.5)	-2 (6.4)	48 (5.0)	525 (6.6)	0 (7.0)
Egypt	○	14 (3.0)	410 (9.9)	-14 (4.4) ▼	58 (4.0)	404 (5.2)	5 (5.8)	28 (3.4)	414 (7.7)	9 (5.0)
Tunisia	● r	14 (3.1)	444 (7.6)	7 (3.7) ▲	24 (4.0)	439 (4.5)	5 (5.5)	62 (4.6)	445 (3.1)	-12 (6.0) ▼
Algeria	● r	12 (2.3)	404 (4.5)	◊ ◊	42 (3.6)	409 (2.5)	◊ ◊	46 (3.6)	409 (2.5)	◊ ◊
Jordan	●	11 (2.3)	470 (15.0)	-9 (4.2) ▼	45 (4.0)	489 (5.0)	10 (5.8)	45 (3.9)	478 (7.1)	-1 (5.9)
Israel	●	11 (2.3)	451 (12.2)	-7 (3.8)	55 (3.9)	469 (6.9)	6 (5.4)	34 (3.5)	476 (8.3)	2 (5.0)
Palestinian Nat'l Auth	○	10 (2.7)	384 (10.4)	-4 (4.1)	49 (4.4)	403 (5.0)	-6 (6.1)	41 (4.4)	406 (6.5)	11 (6.0)
United States	○ r	9 (1.6)	497 (8.8)	1 (2.1)	29 (2.4)	519 (5.9)	-5 (3.7)	62 (2.4)	523 (3.6)	4 (3.9)
Australia	○ r	9 (2.5)	546 (12.9)	7 (2.7) ▲	18 (2.2)	541 (7.2)	-14 (4.2) ▼	73 (3.2)	510 (4.9)	7 (4.8)
Sweden	○	8 (1.6)	510 (10.1)	-2 (2.8)	26 (2.9)	513 (4.4)	-8 (4.0)	66 (3.0)	508 (2.9)	10 (4.1) ▲
Cyprus	● r	7 (0.6)	452 (4.5)	1 (1.0)	80 (0.8)	451 (2.1)	4 (1.4) ▲	13 (0.7)	446 (3.8)	-5 (1.0) ▼
Romania	○	7 (1.4)	442 (15.4)	-2 (2.1)	28 (2.0)	463 (5.4)	-3 (2.7)	65 (2.4)	463 (4.2)	5 (3.1)
Kuwait	- r	7 (2.3)	399 (19.1)	◊ ◊	32 (4.6)	416 (8.0)	◊ ◊	61 (4.9)	417 (4.6)	◊ ◊
Qatar	○ r	7 (0.1)	341 (4.3)	◊ ◊	39 (0.2)	335 (2.5)	◊ ◊	54 (0.2)	297 (2.2)	◊ ◊
Bulgaria	○	5 (1.5)	452 (25.5)	- -	33 (2.6)	469 (10.0)	- -	62 (2.9)	470 (6.5)	- -
Serbia	○	4 (1.0)	476 (10.7)	-3 (1.6)	15 (1.8)	473 (5.7)	0 (2.5)	80 (1.8)	469 (3.3)	3 (2.7)
Hungary	○	4 (1.1)	546 (8.7)	2 (1.3)	53 (2.1)	541 (3.6)	8 (3.1) ▲	43 (2.1)	535 (3.7)	-9 (3.2) ▼
Lithuania	●	4 (0.9)	502 (7.8)	-5 (1.5) ▼	53 (2.2)	522 (3.0)	-4 (3.2)	43 (2.1)	516 (2.9)	9 (3.4) ▲
Korea, Rep. of	● s	4 (1.6)	552 (13.2)	1 (2.0)	20 (3.2)	548 (3.6)	-7 (4.7)	76 (3.5)	554 (2.3)	6 (5.0)
Bosnia Herzegovina	○	4 (0.8)	462 (8.1)	◊ ◊	23 (1.9)	459 (4.8)	◊ ◊	73 (2.0)	468 (2.9)	◊ ◊
Japan	○	2 (1.1)	~ ~	0 (1.7)	22 (3.2)	552 (4.9)	4 (4.5)	76 (3.3)	555 (2.8)	-4 (4.6)
Oman	○	2 (1.0)	~ ~	◊ ◊	55 (4.2)	424 (4.6)	◊ ◊	43 (4.3)	422 (5.2)	◊ ◊
Slovenia	○	1 (0.5)	~ ~	-3 (1.1) ▼	20 (2.0)	543 (3.3)	0 (2.6)	79 (2.1)	536 (2.4)	3 (2.8)
Scotland	○ s	1 (0.4)	~ ~	-2 (1.2)	13 (1.5)	521 (9.3)	-1 (2.9)	86 (1.6)	492 (3.9)	2 (3.1)
Bahrain	○	1 (0.1)	~ ~	-4 (0.7) ▼	42 (3.1)	464 (4.1)	-29 (3.9) ▼	57 (3.1)	467 (3.7)	33 (3.9) ▲
Czech Republic	○	0 (0.2)	~ ~	◊ ◊	8 (1.2)	536 (5.3)	◊ ◊	92 (1.2)	538 (2.0)	◊ ◊
Saudi Arabia	○	x x	x x	- -	x x	x x	- -	x x	x x	- -
¶ Morocco	●	16 (3.1)	409 (7.1)	- -	41 (5.6)	399 (4.8)	- -	43 (6.1)	409 (6.7)	- -
International Avg.		14 (0.4)	462 (1.6)		39 (0.5)	471 (0.8)		47 (0.5)	462 (0.9)	
Benchmarking Participants										
Dubai, UAE	○ s	11 (1.5)	473 (13.4)	◊ ◊	60 (2.6)	502 (3.9)	◊ ◊	29 (2.7)	478 (7.2)	◊ ◊
B. Columbia, Canada	○ r	9 (2.3)	523 (17.1)	◊ ◊	39 (4.3)	529 (5.2)	◊ ◊	52 (3.5)	527 (3.6)	◊ ◊
Massachusetts, US	○	8 (3.9)	555 (13.6)	◊ ◊	55 (6.3)	569 (8.6)	◊ ◊	36 (5.9)	530 (9.8)	◊ ◊
Ontario, Canada	○	7 (2.2)	544 (13.9)	-4 (3.6)	30 (4.8)	526 (6.3)	-4 (6.7)	63 (4.7)	527 (3.9)	8 (6.8)
Basque Country, Sp.	○	6 (2.1)	499 (16.1)	-2 (3.5)	46 (4.2)	499 (4.4)	-1 (6.6)	49 (4.2)	498 (3.8)	2 (6.5)
Minnesota, US	○	3 (1.9)	540 (7.3)	◊ ◊	33 (6.0)	541 (10.8)	◊ ◊	64 (5.5)	537 (5.6)	◊ ◊
Quebec, Canada	○ r	3 (1.6)	488 (7.4)	-2 (2.3)	14 (3.5)	536 (7.8)	-12 (5.5) ▼	83 (3.4)	508 (4.2)	14 (5.7) ▲

● Yes ○ No ▲ 2007 percent significantly higher ▼ 2007 percent significantly lower

SOURCE: IEA's Trends in International Mathematics and Science Study (TIMSS) 2007

Background data provided by National Research Coordinators and by teachers.
Index based on teachers' responses to two questions about how often they usually assign science homework and how many minutes of science homework they usually assign. High level indicates the assignment of more than 30 minutes of homework about half of the lessons or more. Low level indicates no assignment or the assignment of less than 30 minutes of homework about half of the lessons or less. Medium level includes all other possible combinations of responses.
¶ Did not satisfy guidelines for sample participation rates (see Appendix A).
( ) Standard errors appear in parentheses. Because results are rounded to the nearest whole number, some totals may appear inconsistent.
A dash (-) indicates comparable data are not available. A tilde (~) indicates insufficient data to report achievement.
An "r" indicates data are available for at least 70 but less than 85% of the students. An "s" indicates data are available for at least 50 but less than 70% of the students. An "x" indicates data are available for less than 50% of the students.
A diamond (◊) indicates the country did not participate in the assessment.

9.4 Pupils and the home: summary

Grade 4

- The majority of grade 4 pupils in England have access to a number of books in the home. Over 40 per cent of grade 4 pupils report that they have at least 100 books in the home; this is nearly double the international average.
- As in 2003, the vast majority of pupils (95 per cent) have a computer in their home and 86 per cent of grade 4 pupils in England have internet connections in their home. In terms of trends in computer use there has been no significant change in the percentage of grade 4 pupils who use a computer both at home and at school, with the majority of pupils (78 per cent) doing so, more than double the international average. However, at grade 4 there has been a significant increase in the percentage of pupils who use a computer at home but not at school, and a significant decrease in the percentage of pupils who use a computer in school but not at home. It is possible that this apparent reduction in the use of computers in school may be a result of better integration of computer technology in normal classroom practice.
- England's grade 4 pupils receive less homework in both science and mathematics than pupils in most other countries. In addition, teachers in England place less emphasis on homework than teachers in other countries.

Grade 8

- The percentage of pupils reporting that they have more than 200 books in the home has decreased significantly since 2003, to 18 per cent. However, this is still above the international average of 12 per cent, and higher than many other countries, indicating that the majority of grade 8 pupils in England have access to a sizeable number of books in the home.
- Mirroring the situation at grade 4, the vast majority of grade 8 pupils in England (98 per cent) have a computer at home and 92 per cent of pupils also reported having an internet connection at home. These figures are higher than the international averages, and are among the highest ownership and internet access figures internationally. However, there has been a significant decrease in the percentage of pupils reporting that they are using computers at home and in school. As at grade 4, it is possible that this is a result of better integration of computer technology by teachers.
- England's grade 8 pupils report receiving less homework than pupils in most of the other countries taking part in TIMSS 2007, only 5 per cent of the pupils reported high ratings on time spent doing mathematics homework and 7 per cent reported high ratings on time spent doing science homework.
- There has been a significant decrease in the percentage of pupils taught in schools where the science teachers placed a high emphasis on homework. This reduction brings England's data closer to the international average. The amount of mathematics homework given has remained stable.

10 Factors associated with mathematics and science achievement

England's results for TIMSS 2007 were analysed further, using a statistical technique called multi-level modelling. This enables relationships between different variables to be explored. It allows us to predict how an outcome might change for one variable if the size of a related variable changes. For example, it allows us to describe relationships such as, the higher pupils' attainment was at the end of key stage 1, the higher their attainment was likely to be in TIMSS at grade 4 (year 5).

The statistical model can separate out the effects of different variables, so that the identified variables can be described as significant over and above the effects of other variables. So, for example, both confidence in mathematics and the value pupils place on science and mathematics were significant positive predictors of enjoyment of mathematics at grade 8. We can therefore say that, for pupils with the same level of confidence, those who value science and mathematics more are likely to enjoy it more. It should be remembered that the models simply describe associations and not causal relationships: they cannot say whether, for example, confidence leads to enjoyment, enjoyment leads to confidence or whether a third factor causes both.

Most variables used in the model were derived from the questionnaires completed by pupils, teachers and headteachers. Their answers to some questions were entered into the model as separate variables; others were combined into 'factors' using a statistical technique called factor analysis. Other variables were derived from alternative sources (such as the IDACI index of deprivation, or pupils' prior attainment in the form of teacher assessment scores at key stage 1 and test scores at key stage 2). These approaches enabled the number of variables in the model to be sufficiently large to capture all areas of potential interest, but in a manageable way.

Six areas were investigated, identifying significant variables associated with:

- Attainment in grade 4 (year 5) science
- Attainment in grade 4 mathematics
- Attitudes to learning at grade 4
- Attainment in grade 8 (year 9) science
- Attainment in grade 8 mathematics
- Attitudes to learning at grade 8.

This chapter summarises the significant findings from the multi-level modelling in these six areas. Complementing the text is a series of bar charts, which show the variables significantly associated with attainment or with attitudes, in order of size. Variables with longer bars were more strongly associated with attainment or attitudes, measured as a

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percentage of the standard deviation. The direction of the bar indicates the direction of the relationship. A positive relationship means that an increase in the variable was associated with higher attainment or a more positive attitude, and a negative relationship that it was associated with lower attainment or a more negative attitude. The variables identified were derived either from responses to the background questionnaires or from other sources. The source of each variable is listed in Appendix 3, the technical appendix. On the bar charts in this chapter, the following acronyms are used:

- SQ – student questionnaire
- HQ – school questionnaire (or headteacher questionnaire)
- TQ – teacher questionnaire (grade 4)
- TQM – mathematics teacher questionnaire (grade 8)
- TQS – science teacher questionnaire (grade 8).

More details on the variables used and the findings, as well as technical information about how the model was run, can be found in Appendix 3. That appendix also contains a series of charts, showing the 'quasi effect size' for each significant variable in each area of investigation, along with confidence intervals.

Although the statistical model can 'control for' variables (that is, separate out the effects of different variables), it can only do this when the variables act independently of each other. Because of the large number of factors in the model, there was the potential for some variables to be highlighted as significant when in fact they were not, simply because they were acting in a similar way to another variable. It is likely that such interference affects only a small number of results, including some of those where the effect was borderline.

This chapter summarises the key findings. Borderline results are presented in the bar charts but may not be discussed. The full list of findings can be found in Appendix 3.

10.1 Attainment in grade 4 science

Positive associations with grade 4 science attainment

The multi-level model (see Appendix 3 for more details) showed that the following variables were positively associated with attainment in science at grade 4 (that is, as each of these variables increased, so too did attainment in science).

- Key stage 1 mathematics and science attainment
- Being taught by a mathematics specialist
- Being born in the UK
- Having access to various resources in the home (books, a calculator, a computer, a study desk, a dictionary, an internet connection, own bedroom, a mobile phone and an encylopaedia in book or CD form) and to computers at home and elsewhere
- Enjoying science and being confident in it

- Being confident in mathematics
- Being encouraged to work independently during lessons
- Involvement in the second of two groups of out of school activities (reading a book for fun, helping with jobs at home, doing homework, doing art, playing a musical instrument).

Thus, it would appear that several factors relating to mathematics are important for attainment in science, in addition to more general factors and factors specifically related to science. This might be because, at grade 4, pupils will generally be taught mathematics and science by the same teacher, so that impact in one area of the curriculum might be carried over into other areas of the curriculum.

Negative associations with grade 4 science attainment

These variables were negatively associated with attainment in science at grade 4 (that is, as the incidence of each of these increased, so attainment decreased). The key findings are reported here. Those variables which were identified in the modelling but felt to be spurious as a result of potential interference or borderline significance are not included, but can be found in Appendix 3.

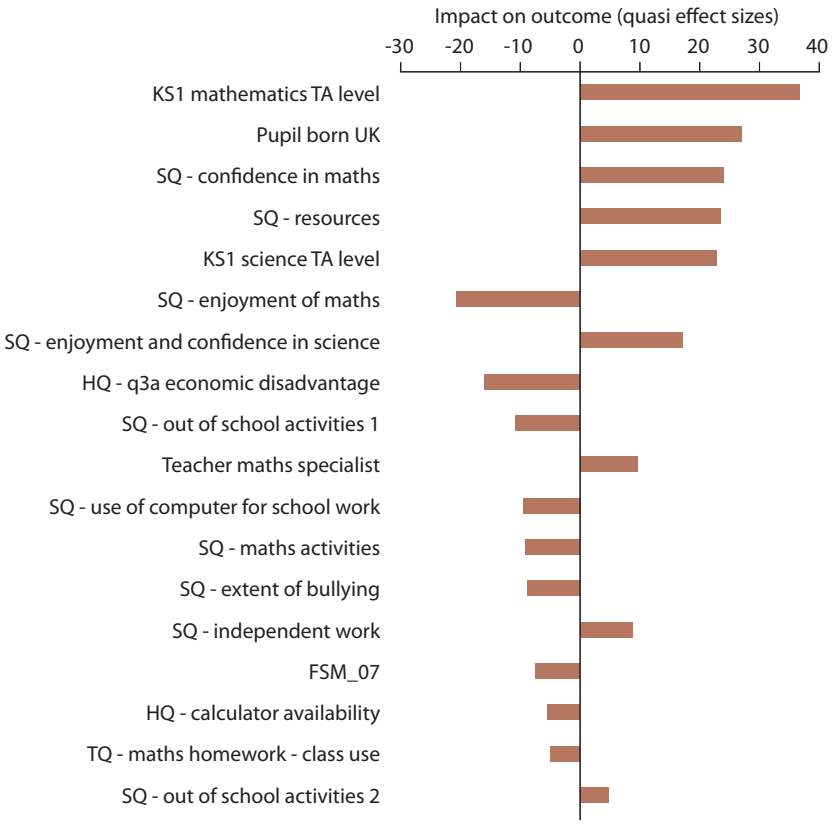
- Percentage of economically disadvantaged pupils in the school
- Eligibility for free school meals
- Extent of bullying (verbal, physical or social exclusion) in the school as perceived by pupils
- Mathematics activities (frequency of doing the following: calculations, fractions, decimals, measurement, data handling, shape activities, memorising solutions, working with other children)
- Computer use for school work
- Having calculators available for school work
- Using homework in class as the basis for discussion
- Involvement in the first of two groups of out of school activities (watching television/videos, playing computer games, playing/talking with friends, playing sports, using the internet, listening to music).

It should be remembered that the model simply describes associations; it cannot say what caused the findings. So, for example, the link between increased computer use and lower attainment does not necessarily imply that lower attainment is a result of using computers at school. It could simply indicate that lower attaining pupils are given more opportunities to use a computer. The same could be true for the findings about mathematics activities, calculator availability and discussion of homework.

Equally, a third variable might influence both variables in the relationship. For example, involvement in the first group of out of school activities might depress attainment, might arise from the lower attainment, or both might be caused by a third, related, factor such as low motivation for learning.

As described earlier, Exhibit 10.1 summarises the associations, in order of effect size (measured as quasi effect sizes; see Appendix 3 for more information).

Exhibit 10.1 Variables significantly associated with grade 4 science attainment



For continuous variables (i.e. those measured on a continuum from less to more) a positive relationship means that an increase in the variable was associated with higher attainment and a negative relationship that it was associated with lower attainment. For binary variables (i.e. those measured as yes/no), a positive relationship means that being one thing rather than the other was associated with higher attainment and a negative relationship that it was associated with lower attainment. (i.e., in this case, being born in the UK was associated with higher attainment). Details of the variables and more information on how to interpret them can be found in Appendix 3.

10.2 Attainment in grade 4 mathematics

Positive associations with grade 4 mathematics attainment

The multi-level model (see Appendix 3 for more details) showed that the following variables were positively associated with attainment in mathematics at grade 4, that is, as each of these variables increased, so too did attainment in mathematics:

- Key stage 1 mathematics and science attainment
- Being taught by a mathematics specialist
- Being confident in mathematics
- Being born in the UK

- Having access to various resources in the home (books, a calculator, a computer, a study desk, a dictionary, an internet connection, own bedroom, a mobile phone and an encyclopaedia in book or CD form) and access to computers at home and elsewhere.
- Teachers' perception of their contribution to school climate (that is, the extent to which they felt that teachers in their school had job satisfaction, understood the school's curricular goals, successfully implemented the curriculum, and had high expectations for children's achievement)
- Being encouraged to work independently during lessons.

Many of the same variables, but not all, that were associated with higher science attainment are also associated with higher mathematics attainment at grade 4. As before, it should be borne in mind that causality cannot be demonstrated. For example, working independently in lessons might result in higher attainment, might arise from higher attainment, or might be caused by a third, related, variable.

Negative associations with grade 4 mathematics attainment

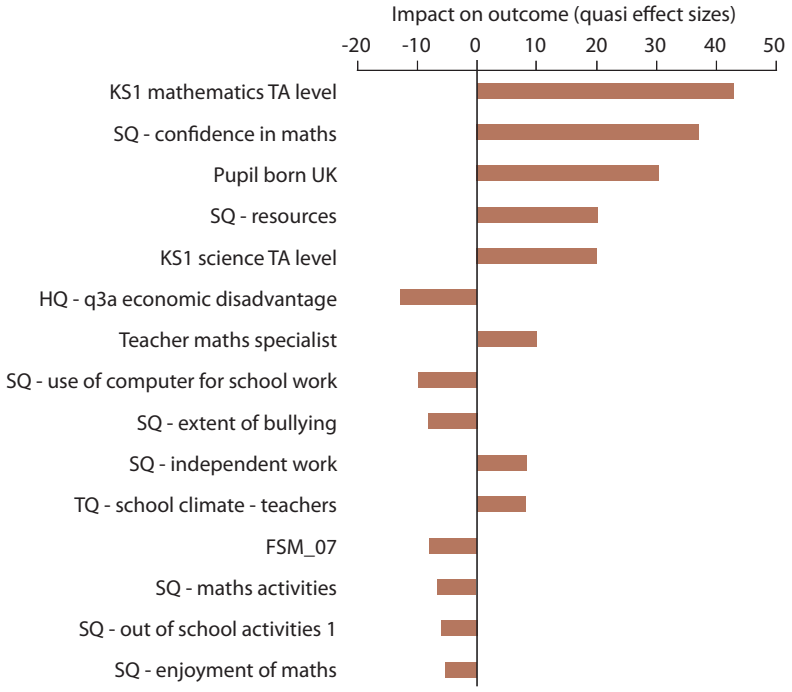
These variables were negatively associated with attainment in mathematics at grade 4 (that is, as the incidence of each of these increased, so attainment decreased). The key findings are reported here. Those variables which were identified in the modelling but felt to be spurious as a result of potential interference or borderline significance are not included, but can be found in Appendix 3.

- Percentage of economically disadvantaged pupils in the school
- Eligibility for free school meals
- Extent of bullying (verbal, physical or social exclusion) in the school as perceived by pupils
- Mathematics activities (frequency of doing the following: calculations, fractions, decimals, measurement, data handling, shape activities, memorising solutions, working with other children)
- Computer use for school work
- Involvement in the first of two groups of out of school activities (watching television/videos, playing computer games, playing/talking with friends, playing sports, using the internet, listening to music).

Again, these are similar to the variables found to be significantly associated with science attainment at this grade. Once again, it is important to remember that the model simply describes associations; it cannot say what caused any given finding. Causality might arise from either associated variable, or might be caused by a third, related, variable. This is particularly important to consider when interpreting the findings about mathematics activities and computer use for school work.

Exhibit 10.2 summarises the associations, in order of effect size (measured as quasi effect sizes; see Appendix 3 for more information).

Exhibit 10.2 Variables significantly associated with grade 4 mathematics attainment



For continuous variables (i.e. those measured on a continuum from less to more) a positive relationship means that an increase in the variable was associated with higher attainment and a negative relationship that it was associated with lower attainment. For binary variables (i.e. those measured as yes/no), a positive relationship means that being one thing rather than the other was associated with higher attainment and a negative relationship that it was associated with lower attainment. (i.e., in this case, being born in the UK was associated with higher attainment). Details of the variables and more information on how to interpret them can be found in Appendix 3.

10.3 Attitudes to learning at grade 4

In this section, the positive associations are listed first for all three attitudinal areas, followed by the negative associations. The bar charts for these areas are presented at the end of this section (see Exhibits 10.3 to 10.5).

Positive associations with attitudes to learning at grade 4

The multi-level model (see Appendix 3 for more details) showed that the following variables were positively associated with attitudes to learning at grade 4 (that is, as each of these variables increased, so attitudes to mathematics and/or science became more positive).

Variables positively associated with enjoyment and confidence in science

- Pupils' perception of school climate (the extent to which pupils like being at school, want to do their best and feel that their teachers want them to do their best)

- Having access to various resources in the home (books, a calculator, a computer, a study desk, a dictionary, an internet connection, own bedroom, a mobile phone and an encyclopaedia in book or CD form) and to computers at home and elsewhere
- Science activities (observing, watching experiments, designing and/or carrying out investigations, working with other children, giving explanations in science)
- Giving explanations in mathematics
- Being encouraged to work independently during lessons
- Involvement in the second of two groups of out of school activities (reading a book for fun, helping with jobs at home, doing homework, doing art, playing a musical instrument)
- Pupil gender (boys were more positive than girls about science).

Many of the same variables, but not all, that were associated with higher science attainment are also associated with enjoyment and confidence in science. In this model, the same caveat applies as discussed above in relation to the attainment models: causality cannot be demonstrated.

Two separate models were run for enjoyment and confidence in mathematics, compared with the single model run for science. This is because, during the factor analysis (see Appendix 3), pupils' responses for enjoyment and confidence in science were correlated to form a single factor, whereas their responses for mathematics split into two separate factors: although enjoyment of mathematics and confidence in mathematics were related, they were not correlated as strongly as was the case for science.

Because enjoyment and confidence in mathematics are associated, these two factors might have interacted in the model to create some spurious results. Any suspect results have, therefore, not been reported here, but are outlined in Appendix 3.

Variables positively associated with enjoyment of mathematics

- Being confident in mathematics
- Pupils' perception of school climate (the extent to which pupils like being at school, want to do their best and feel that their teachers want them to do their best)
- Mathematics activities (frequency of doing the following: calculations, fractions, decimals, measurement, data handling, shape activities, memorising solutions, working with other children)
- Computer use for school work
- Involvement in the second of two groups of out of school activities (reading a book for fun, helping with jobs at home, doing homework, doing art, playing a musical instrument)
- Pupil gender (boys were more positive than girls about enjoying mathematics)
- Eligibility for free school meals.

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Variables positively associated with confidence in mathematics

- Enjoyment of mathematics
- Key stage 1 mathematics and science attainment
- Mathematics activities (frequency of doing the following: calculations, fractions, decimals, measurement, data handling, shape activities, memorising solutions, working with other children)
- Being encouraged to work independently during lessons
- Giving explanations in mathematics
- School materials and budget (access to enough materials, such as textbooks, pens and papers and money to purchase materials)
- Pupil gender (boys were more positive than girls about their abilities in mathematics)
- Having access to various resources in the home (books, a calculator, a computer, a study desk, a dictionary, an internet connection, own bedroom, a mobile phone and an encyclopaedia in book or CD form) and to computers at home and elsewhere
- Eligibility for free school meals.

In these models, enjoyment and confidence in mathematics, the same caveat applies as discussed above in relation to the attainment models: causality cannot be demonstrated.

It is noticeable that, in these models, the frequency of mathematics activities factor is acting positively, where it acted negatively in both attainment models at grade 4. In terms of attitudes, the more often that pupils do this range of activities, the more positive they are about enjoying mathematics and being confident in it. Eligibility for free school meals, unusually, is also a positive variable in these models. This might be related to the link between economic background and attainment, and might reflect positive encouragement given by teachers to support pupils in schools with higher proportions of pupils eligible for free school meals.

These results for mathematics reveal that, although enjoyment and confidence in mathematics are related and share some associated variables, these associated variables are not identical; enjoyment and confidence are clearly not a single construct in mathematics in the same way that they appear to be in science.

Negative associations with attitudes to learning at grade 4

These variables were negatively associated with attitudes to learning at grade 4 (that is, as the incidence of each of these increased, so attitudes to mathematics and/or science became more negative).

The key findings are reported here. Those variables which were identified in the modelling but felt to be spurious as a result of potential interference or borderline significance are not included, but can be found in Appendix 3.

Variables negatively associated with enjoyment and confidence in science

- Extent of bullying (verbal, physical or social exclusion) in the school as perceived by pupils
- Using calculators in mathematics lessons
- Involvement in the first of two groups of out of school activities (watching television/videos, playing computer games, playing/talking with friends, playing sports, using the internet, listening to music).

Variables negatively associated with enjoyment of mathematics

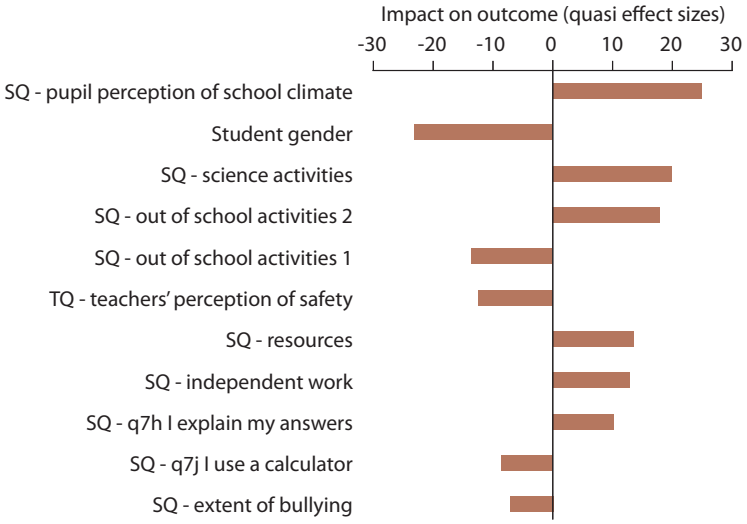
- The extent of perceived severity of behaviour problems (the second of two groups of factors: truanting, breaking uniform rules, cheating, vandalism, theft)
- Science activities (observing, watching experiments, designing and/or carrying out investigations, working with other children, giving explanations in science); this was a borderline effect
- Involvement in the first of two groups of out of school activities (watching television/videos, playing computer games, playing/talking with friends, playing sports, using the internet, listening to music).

Variables negatively associated with confidence in mathematics

- Using calculators in mathematics lessons
- Using a textbook in mathematics lessons
- Extent of bullying (verbal, physical or social exclusion) in the school as perceived by pupils
- Pupils' perception of school climate (the extent to which pupils like being at school, want to do their best and feel that their teachers want them to do their best)
- Percentage of pupils with English as an additional language.

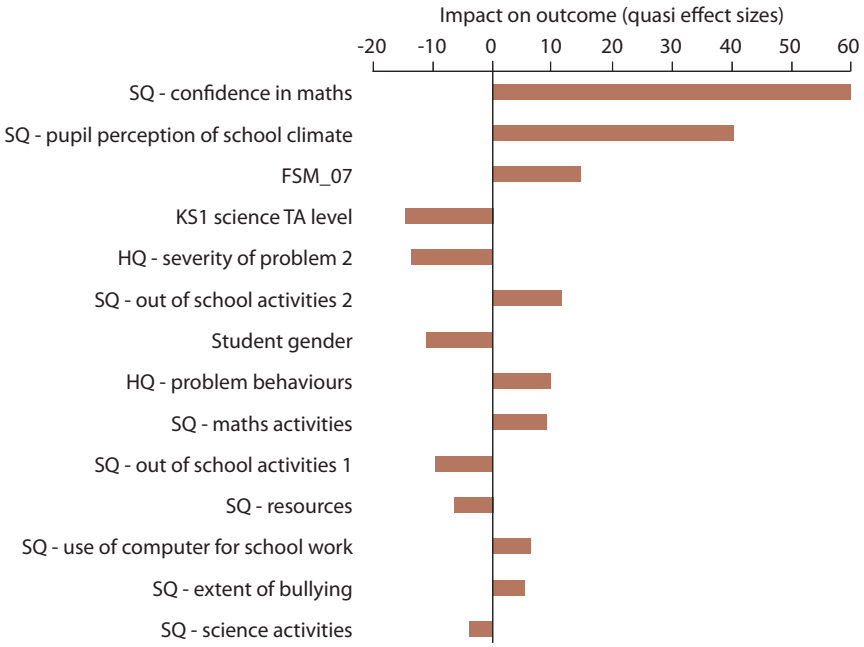
Fewer of these variables were associated negatively with enjoyment and confidence in science and mathematics, compared with those associated positively with each area. As described earlier, it is important to remember that the model simply describes associations; it cannot say what caused any given finding. Causality might arise from either associated variable, or might be caused by a third, related, variable. Some apparently counter-intuitive findings can be explained when thought of in this way. For example, use of calculators and textbooks might be negatively associated with confidence because their use reduces confidence, or because they are used more often by less confident pupils. Alternatively, a third, related, variable might explain this association.

Exhibit 10.3 Variables significantly associated with grade 4 enjoyment and confidence in science



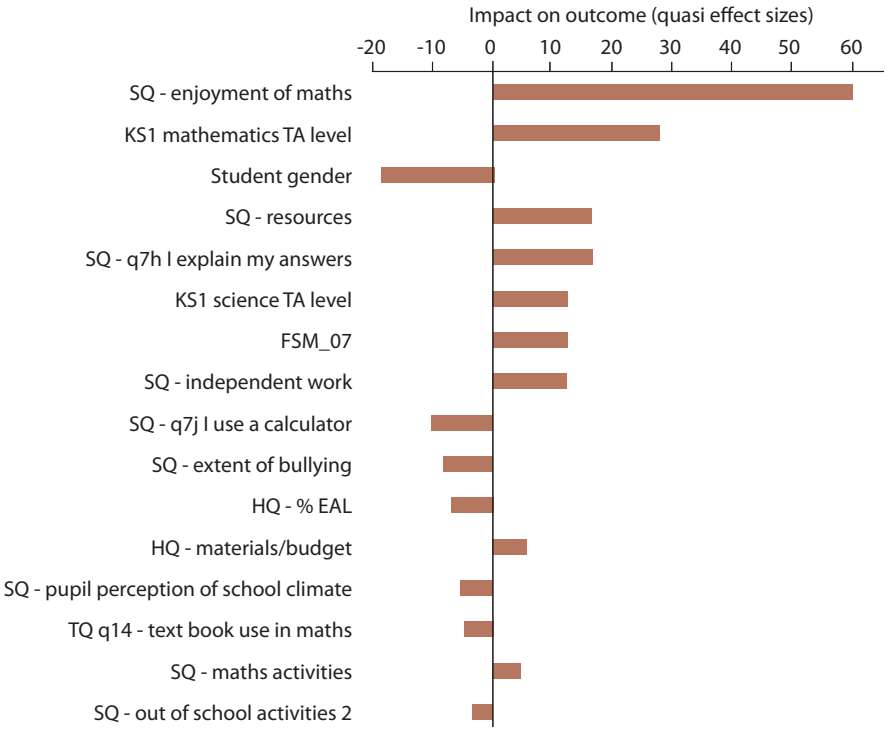
For continuous variables (i.e. those measured on a continuum from less to more) a positive relationship means that an increase in the variable was associated with a more positive attitude and a negative relationship that it was associated with a more negative attitude. For binary variables (i.e. those measured as yes/no), a positive relationship means that being one thing rather than the other was associated with a more positive attitude and a negative relationship that it was associated with a more negative attitude (i.e., in this case, being a boy was associated with more positive attitudes than being a girl). Details of the variables and more information on how to interpret them can be found in Appendix 3.

Exhibit 10.4 Variables significantly associated with grade 4 enjoyment of mathematics



For continuous variables (i.e. those measured on a continuum from less to more) a positive relationship means that an increase in the variable was associated with a more positive attitude and a negative relationship that it was associated with a more negative attitude. For binary variables (i.e. those measured as yes/no), a positive relationship means that being one thing rather than the other was associated with a more positive attitude and a negative relationship that it was associated with a more negative attitude (i.e., in this case, being a boy was associated with more positive attitudes than being a girl). Details of the variables and more information on how to interpret them can be found in Appendix 3.

Exhibit 10.5 Variables significantly associated with grade 4 confidence in mathematics



For continuous variables (i.e. those measured on a continuum from less to more) a positive relationship means that an increase in the variable was associated with a more positive attitude and a negative relationship that it was associated with a more negative attitude. For binary variables (i.e. those measured as yes/no), a positive relationship means that being one thing rather than the other was associated with a more positive attitude and a negative relationship that it was associated with a more negative attitude (i.e., in this case, being a boy was associated with more positive attitudes than being a girl). Details of the variables and more information on how to interpret them can be found in Appendix 3.

10.4 Attainment in grade 8 science

Positive associations with grade 8 science attainment

The multi-level model (see Appendix 3 for more details) showed that the following variables were positively associated with attainment in science at grade 8 (that is, as each of these variables increased, so too did attainment in science).

- Being confident in mathematics
- Enjoyment and confidence in science
- Prior attainment as measured by key stage 2 test results in science and mathematics
- Use of a whole class teaching mode
- Use of a calculator for complex calculations
- Being encouraged to work independently during lessons
- Number of books at home

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- Resources available in the home (a calculator, a computer, a study desk, a dictionary, an internet connection, own bedroom, a mobile phone and an encyclopaedia in book or CD form)
- Educational aspiration (as measured by how far in their education pupils expect to go)
- Involvement in the second of two groups of out of school activities (reading a book for enjoyment, doing homework, playing a musical instrument).

Once again, it is important to remember that the model can only describe, not explain. Findings such as the relationship between attainment and independent work or use of a whole class teaching mode might work in either direction, or be caused by a third, related, variable.

As was the case for science at grade 4, several mathematics variables were highlighted as significant in science attainment at grade 8. Six positive variables are common between the models in science at grade 4 and at grade 8: attainment in the preceding key stage, enjoying science and being confident in it, being confident in mathematics, being encouraged to work independently during lessons, having access to key resources (which may perhaps be seen as a measure of socio-economic status) and involvement in leisure activities such as reading for fun, doing homework and playing a musical instrument.

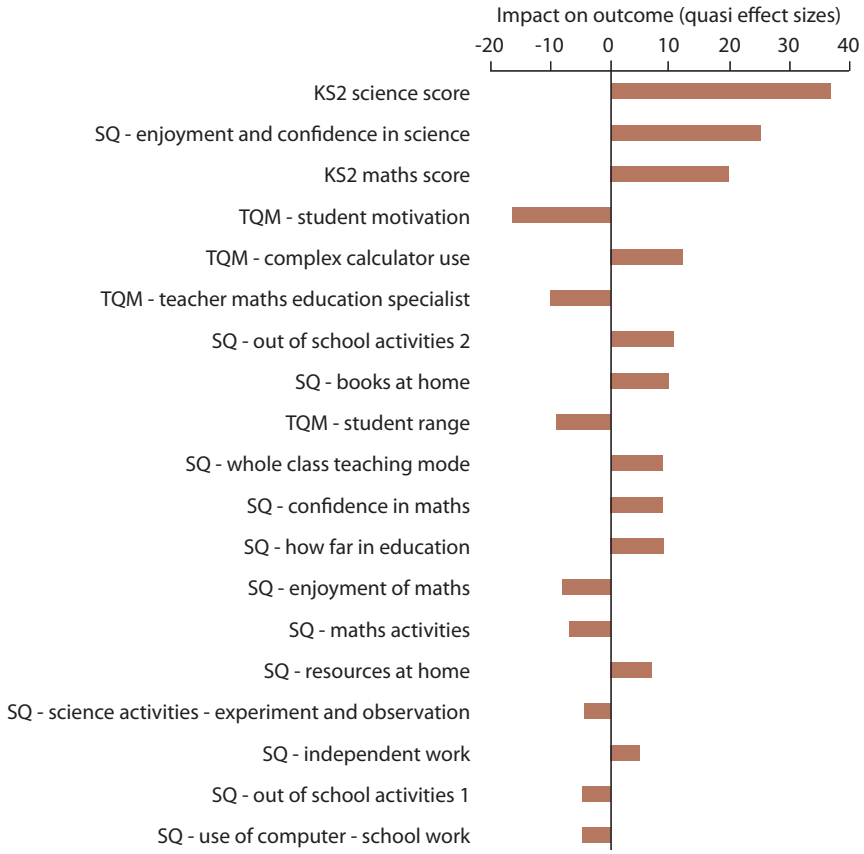
Other variables associated with attainment in science in either grade were unique to that grade. The effect of being born in the UK was only significant at grade 4. Similarly, being taught mathematics by a mathematics specialist was more important for science attainment at grade 4 than at grade 8: by grade 8, the association was weaker and borderline negative. The borderline effect might arise from the fact that, at grade 8, most mathematics teachers will be mathematics specialists, and are unlikely to be also teaching science. In contrast, at grade 4 the same teacher is likely to take pupils for both mathematics and science lessons and a mathematics specialism would therefore be useful in teaching aspects of investigative science.

Negative associations with grade 8 science attainment

The key findings are reported here for variables that were negatively associated with attainment in science at grade 8 (that is, as the incidence of each of these increased, so attainment decreased). Those variables which were identified in the modelling but felt to be spurious as a result of potential interference or borderline significance are not included, but can be found in Appendix 3. Some borderline effects are also reported only in Appendix 3.

- Unmotivated pupils in the mathematics class
- Range of pupils in the mathematics class (in terms of ability, special needs and background, such as language spoken, economic background, etc.)
- Involvement in the first of two groups of out of school activities (watching television/videos, playing computer games, playing/talking with friends, using the internet, listening to music)
- Use of a computer for school work.

Exhibit 10.6 Variables significantly associated with grade 8 science attainment



For continuous variables (i.e. those measured on a continuum from less to more) a positive relationship means that an increase in the variable was associated with higher attainment and a negative relationship that it was associated with lower attainment. No binary variables (i.e. those measured as yes/no) were significant in this model. Details of the variables and more information on how to interpret them can be found in Appendix 3.

Two factors with negative associations to science attainment related to mathematics teachers. There were no parallel effects for science teachers and no such negative effects at grade 4 (although being taught by a mathematics specialist was related positively to grade 4 science attainment). This might be an effect of the sampling mechanism used in TIMSS at grade 8, whereby pupils are sampled by their mathematics class/set. This means that each grade 8 class may have only one or two mathematics teachers associated with it, but potentially more science teachers (assuming that the target pupils are organised into different classes for science). Thus, response patterns from grade 8 science teachers may have become diluted because of their relatively larger number, and teacher effects might therefore have shown up more clearly among mathematics teachers. At grade 4, pupils were sampled by form/class and usually it was the same teacher who responded to questions about both mathematics and science. This might explain why such effects were seen at grade 8 but not at grade 4.

Two of these four negatively-associated variables are common to both grades, computer use for schoolwork and out of school activities including watching television/videos, playing computer games, playing/talking with friends, using the internet and listening to music. The range of pupils and lack of motivation among pupils were only associated negatively with attainment at grade 8.

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It should be remembered that the model simply describes associations; it cannot say what caused the findings. So, for example, the link between out of school activities and lower attainment does not necessarily imply that lower attainment is a result of doing these activities. Involvement in these activities might depress attainment, might arise from the lower attainment, or both might be caused by a third, related, factor such as low motivation for learning. The same would be true of the association between increased use of a computer for schoolwork and lower attainment.

Exhibit 10.6 summarises the associations, in order of effect size (measured as quasi effect sizes; see Appendix 3 for more information).

10.5 Attainment in grade 8 mathematics

Positive associations with grade 8 mathematics attainment

The multi-level model (see Appendix 3 for more details) showed that the following variables were positively associated with attainment in mathematics at grade 8 (that is, as each of these variables increased, so too did attainment in mathematics).

- Frequency of whole class teaching mode in mathematics and science (pupil reported)
- Frequency of use of a calculator for complex calculations (teacher reported)
- Frequency of activities in geometry, data-handling and algebra (teacher reported)
- Prior attainment as measured by key stage 2 test results in science and mathematics
- Being confident in mathematics
- Number of books at home
- Educational aspiration (as measured by how far in their education pupils expect to go)
- Involvement in the second of two groups of out of school activities (reading a book for enjoyment, doing homework, playing a musical instrument).

Unlike science, only two positive variables are common between mathematics at grade 4 and at grade 8: attainment in the preceding key stage, and being confident in mathematics. The number of books in the home was also a common variable (at grade 8, on its own, and at grade 4 as part of the resources factor). Other resources did not have an impact at grade 8. This might be because pupils can more independently access resources elsewhere by that age and so are less reliant on resources at home. Alternatively, it might be because fewer resources are required for pupils to complete their mathematics homework: access to other resources was a significant variable for science attainment at grade 8, but science homework can potentially require a wider range of resources than mathematics.

Other variables associated positively with attainment in mathematics at either grade were unique to that grade. As with science, being taught by a mathematics specialist was more important to mathematics attainment at grade 4 than at grade 8: by grade 8, the association between attainment and having a mathematics education specialist as a teacher was weaker and borderline negative. The borderline effect might arise from the fact that, at

grade 8, most mathematics teachers will be specialists. Similarly, the effect of being born in the UK was only significant at grade 4. Teachers' perception of school climate was associated with mathematics attainment at grade 4 but not at grade 8, and the same was true of being encouraged to work independently.

This latter variable illustrates the caution to be taken in describing the direction of any effect between two variables: independent work might be a cause of higher attainment, or might be a consequence of it. The same caveat applies to the frequency of the whole class teaching mode: teachers might use this mode more because pupils are capable of responding to it, or attainment might be higher because the teacher uses this mode. The model cannot say which is the case, or whether a third variable might cause the association.

Negative associations with grade 8 mathematics attainment

These variables were negatively associated with attainment in mathematics at grade 8 (that is, as the incidence of each of these increased, so attainment decreased). The key findings are reported here. Those variables which were identified in the modelling but felt to be spurious as a result of potential interference or borderline significance are not included, but can be found in Appendix 3.

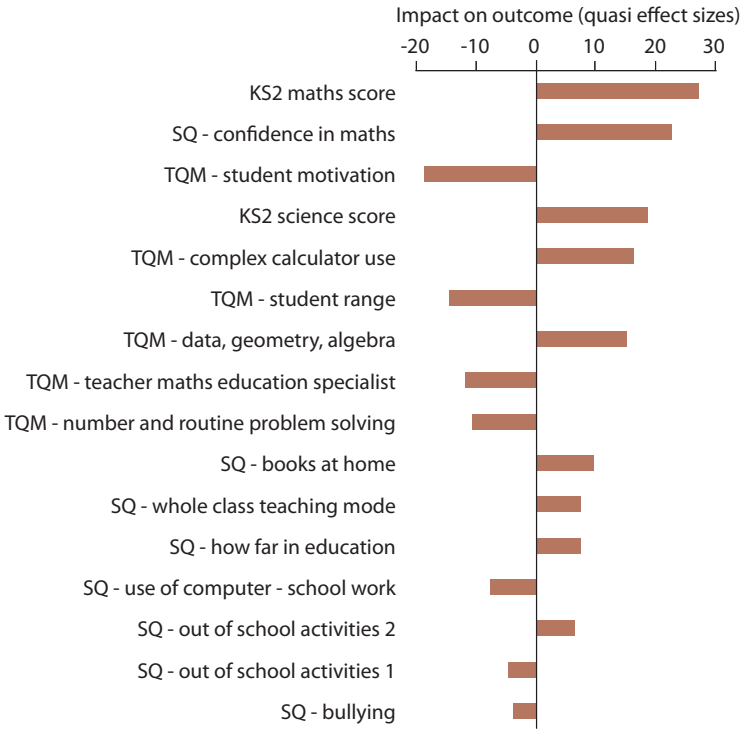
- Unmotivated pupils in the mathematics class
- Range of pupils in the mathematics class (in terms of ability, special needs and background, such as language spoken, economic background, etc)
- Extent of bullying (verbal, physical or social exclusion) in the school as perceived by pupils
- Computer use for school work
- Frequency of number and routine problem-solving activities in the classroom (teacher reported)
- Involvement in the first of two groups of out of school activities (watching television/videos, playing computer games, playing/talking with friends, using the internet, listening to music).

Only three of the negatively-associated variables are common to both grades: extent of bullying, computer use for school work and out of school activities (including watching television/videos, playing computer games, playing/talking with friends, using the internet and listening to music). It is important to remember that these variables do not necessarily cause lower achievement, but might be a consequence of it. So, for example, higher computer use might be associated with lower attainment because lower attaining pupils are given more opportunities to use a computer to practise their skills.

Economic deprivation and eligibility for free school meals were only associated negatively with mathematics attainment at grade 4, as was the frequency of carrying out particular mathematics activities, as reported by pupils. Again, doing these activities more often might not cause lower attainment at grade 4, but might follow from it as pupils are given more opportunity to practise.

Exhibit 10.7 summarises the associations, in order of effect size (measured as quasi effect sizes; see Appendix 3 for more information).

Exhibit 10.7 Variables significantly associated with grade 8 mathematics attainment



For continuous variables (i.e. those measured on a continuum from less to more) a positive relationship means that an increase in the variable was associated with higher attainment and a negative relationship that it was associated with lower attainment. No binary variables (i.e. those measured as yes/no) were significant in this model. Details of the variables and more information on how to interpret them can be found in Appendix 3.

10.6 Attitudes to learning at grade 8

In this section, the positive associations are listed first for all three attitudinal areas, followed by the negative associations. The bar charts for these areas are presented at the end of this section (see Exhibits 10.8 to 10.10).

Positive associations with attitudes to learning at grade 8

The multi-level model (see Appendix 3 for more details) showed that the following variables were positively associated with attitudes to learning at grade 8 (that is, as each of these variables increased, so attitudes to mathematics and/or science became more positive).

Variables positively associated with enjoyment and confidence in science

- Prior attainment as measured by key stage 2 test results in science
- The extent to which pupils value mathematics and science (in how it can help them in their daily lives and in the future)

- Frequency of a range of science activities, including experiments and observation, theory and explanation (by pupil report); and explaining and relating learning to daily life (by science teacher report)
- Frequency of the use of a whole class teaching mode, and use of computers for schoolwork (by pupil report)
- Pupils' perception of school climate (the extent to which pupils like being at school, want to do their best and feel that their teachers want them to do their best)
- Adequacy of school infrastructure and availability of special equipment
- Number of books at home
- Educational aspiration (as measured by how far in their education pupils expect to go)
- Involvement in the second of two groups of out of school activities (reading a book for enjoyment, doing homework, playing a musical instrument)
- Time spent on mathematics and science homework
- Pupil gender (boys were more positive than girls about science).

Two of the variables that were associated with enjoyment and confidence in science at grade 4 also applied at grade 8: pupils' perception of school climate and the second group of out of school activities. The number of books in the home was also a common variable (at grade 8, on its own, and at grade 4 as part of the resources factor). Other resources did not have an impact at grade 8. Science activities were pertinent at each grade, though the relevant combinations were different.

Other variables associated positively with enjoyment and confidence in science, at either grade, were unique to that grade. Pupils were only asked about educational aspiration and the value placed on mathematics and science at grade 8, hence there are no outcomes for those factors at grade 4.

Variables positively associated with enjoyment of mathematics

- Being confident in mathematics
- The extent to which pupils value mathematics and science (in how it can help them in their daily lives and in the future)
- Frequency of mathematics activities from pupils' reports (frequency of doing the following: calculations, fractions, decimals, geometry, data handling, equations, memorising solutions, explaining answers, relating learning to daily life, deciding on problem-solving procedures, having a test)
- Whole class teaching mode
- Use of computers for school work
- Time spent on homework
- Pupils' perception of school climate (the extent to which pupils like being at school, want to do their best and feel that their teachers want them to do their best)

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- Percentage of pupils from relatively affluent families
- Resources available in the home (a calculator, a computer, a study desk, a dictionary, an internet connection, own bedroom, a mobile phone and an encylopaedia in book or CD form)
- Involvement in the second of two groups of out of school activities (reading a book for enjoyment, doing homework, playing a musical instrument).

Several of these variables acted in the same way at both grades: confidence in mathematics, pupils' perception of school climate, mathematics activities, computer use for school work and involvement in the second of the groups of out of school activities. Other variables were unique to one or other grade.

Variables positively associated with confidence in mathematics

- Enjoyment of mathematics
- Key stage 2 mathematics score
- Frequency of mathematics activities from pupils' reports (frequency of doing the following: calculations, fractions, decimals, geometry, data handling, equations, memorising solutions, explaining answers, relating learning to daily life, deciding on problem-solving procedures, having a test)
- The extent to which pupils value mathematics and science (in how it can help them in their daily lives and in the future)
- Sufficiency of computers in the school
- The extent of perceived severity of behaviour problems (first of two groups of factors: lateness, absenteeism, truanting, breaking uniform rules, disruption in class, swearing, intimidation of other pupils)
- Educational aspiration (as measured by how far in their education pupils expect to go)
- Pupil gender (boys were more positive than girls about their abilities in mathematics).

One apparent oddity here is that, as perceptions of the severity of problem behaviours increased, so confidence in mathematics increased. This factor is the first of two factors about perceived severity of behaviour problems: this factor contains the less serious of the two sets of behaviour problems and it may be that schools with the lesser set of problems are considered generally positive learning environments, thus promoting confidence in learning.

Frequency of mathematics activities was positively associated with both enjoyment and confidence in mathematics. This was true across all the attitudinal models: science activities predicted enjoyment and confidence in science at both grades, while mathematics activities did the same for both enjoyment and confidence in mathematics. There was no such widespread effect for the attainment models. Frequency of mathematics activities was a negative predictor of attainment in both science and mathematics at grade 4 (possibly because of extra practice being given to weaker pupils). There was no similar effect for grade 8 science and only one activities factor predicted mathematics attainment at grade 8:

frequency of geometry, data and algebra activities was positively associated with grade 8 mathematics attainment (causality might be in either direction).

As noted for grade 4, although enjoyment and confidence in mathematics are related and share some associated variables, these associated variables are not identical; there are many differences between the two at grade 8, and also many differences between the variables that are significant for each of confidence and enjoyment at each separate grade.

Negative associations with attitudes to learning at grade 8

These variables were negatively associated with attitudes to learning at grade 8 (that is, as the incidence of each of these increased, so attitudes to mathematics and/or science became more negative).

The key findings are reported here. Those variables which were identified in the modelling but felt to be spurious as a result of potential interference or borderline significance are not included, but can be found in Appendix 3.

Variables negatively associated with enjoyment and confidence in science

- Frequency of mathematics activities in the mathematics class
- Prior attainment in mathematics, as measured by key stage 2 test score (this might be a spurious effect caused by a correlation between the mathematics score and science score, the latter having a positive relationship with attitudes to science)
- Involvement in the first of two groups of out of school activities (watching television/videos, playing computer games, playing/talking with friends, using the internet, listening to music)
- Frequency of use of English at home (most pupils, however, reported speaking English at home always or almost always).

Only one of the three negatively acting variables was significant at both grades: the first group of out of school activities.

Variables negatively associated with enjoyment of mathematics

- Key stage 2 science score
- Science experiments and observation
- Independent work
- Wide pupil range
- Science teacher being a mathematics specialist (borderline effect)
- Access to computers at home or elsewhere (excluding gaming)
- Involvement in the first of two groups of out of school activities (watching television/videos, playing computer games, playing/talking with friends, using the internet, listening to music)
- Percentage of pupils with English as an additional language.

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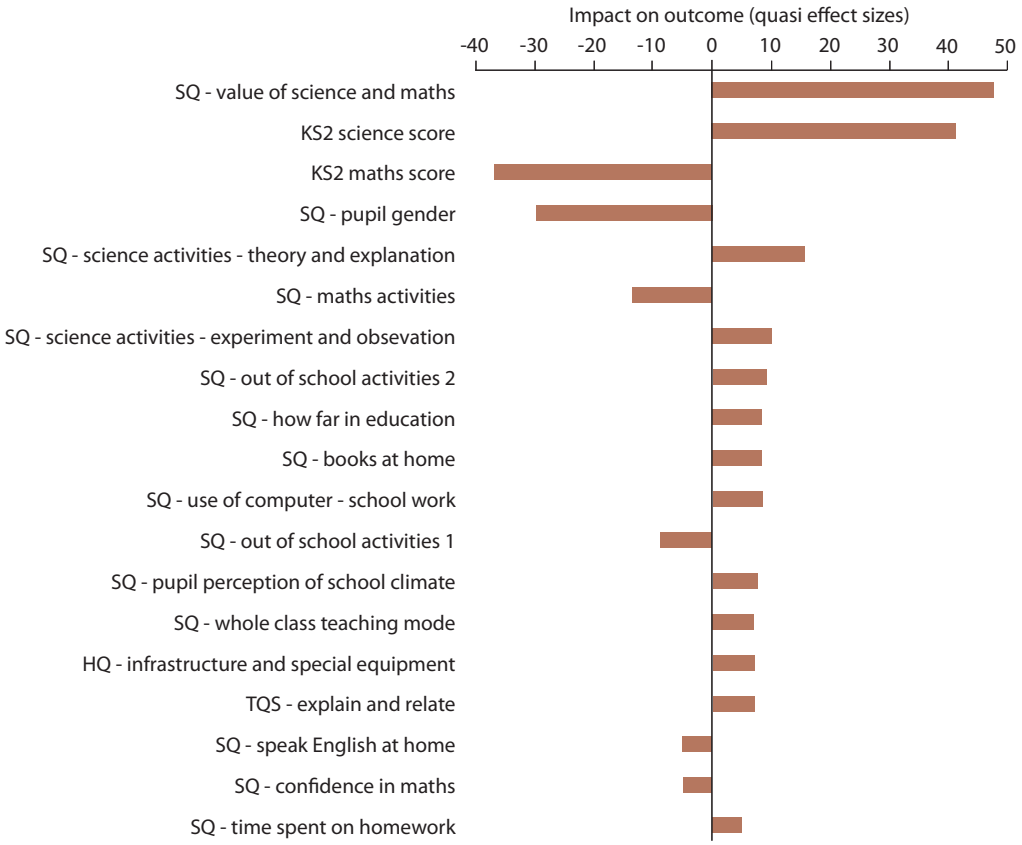
Exhibit 10.8 Variables significantly associated with grade 8 enjoyment and confidence in science



For continuous variables (i.e. those measured on a continuum from less to more) a positive relationship means that an increase in the variable was associated with a more positive attitude and a negative relationship that it was associated with a more negative attitude. For binary variables (i.e. those measured as yes/no), a positive relationship means that being one thing rather than the other was associated with a more positive attitude and a negative relationship that it was associated with a more negative attitude (i.e., in this case, being a boy was associated with more positive attitudes than being a girl). Details of the variables and more information on how to interpret them can be found in Appendix 3.

As before, caution must be exercised in assigning causality, for example, the relationships between independent work and enjoyment and confidence in mathematics might work in either direction.

Once again, the common negatively-acting factor at grades 4 and 8 was the first out of school activity group. Other significant variables were different at each grade.

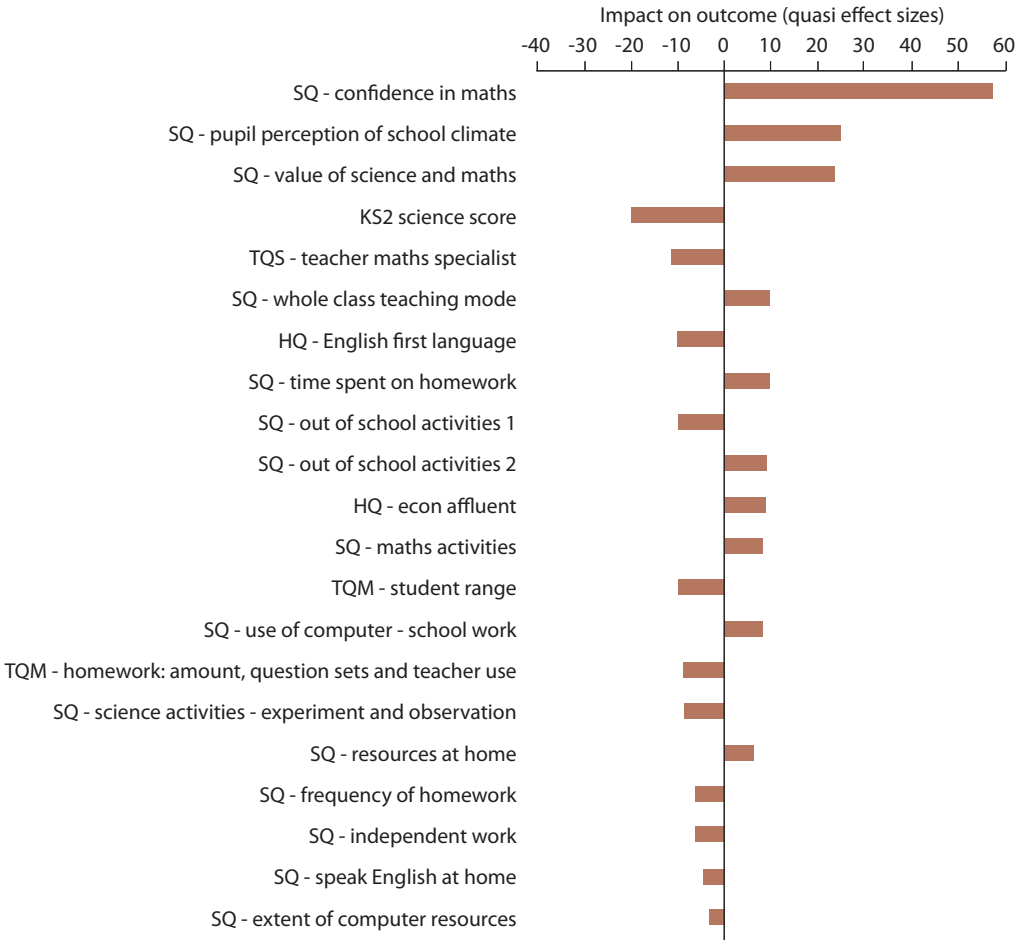
Variables negatively associated with confidence in mathematics

- Extent of bullying (verbal, physical or social exclusion) in the school as perceived by pupils
- The extent of perceived severity of behaviour problems (second of two groups of factors: cheating, vandalism, theft, verbal abuse of teachers, physical injury to other pupils)
- Time spent on homework.

Only one factor was common to both grades regarding confidence in mathematics: the extent to which pupils perceive bullying to affect their school.

As described earlier, it is important to remember that the model simply describes associations; it cannot say what caused any given finding. Causality might arise from either associated variable, or might be caused by a third, related, variable.

Exhibit 10.9 Variables significantly associated with grade 8 enjoyment of mathematics



For continuous variables (i.e. those measured on a continuum from less to more) a positive relationship means that an increase in the variable was associated with a more positive attitude and a negative relationship that it was associated with a more negative attitude. No binary variables (i.e. those measured as yes/no) were significant in this model. Details of the variables and more information on how to interpret them can be found in Appendix 3.

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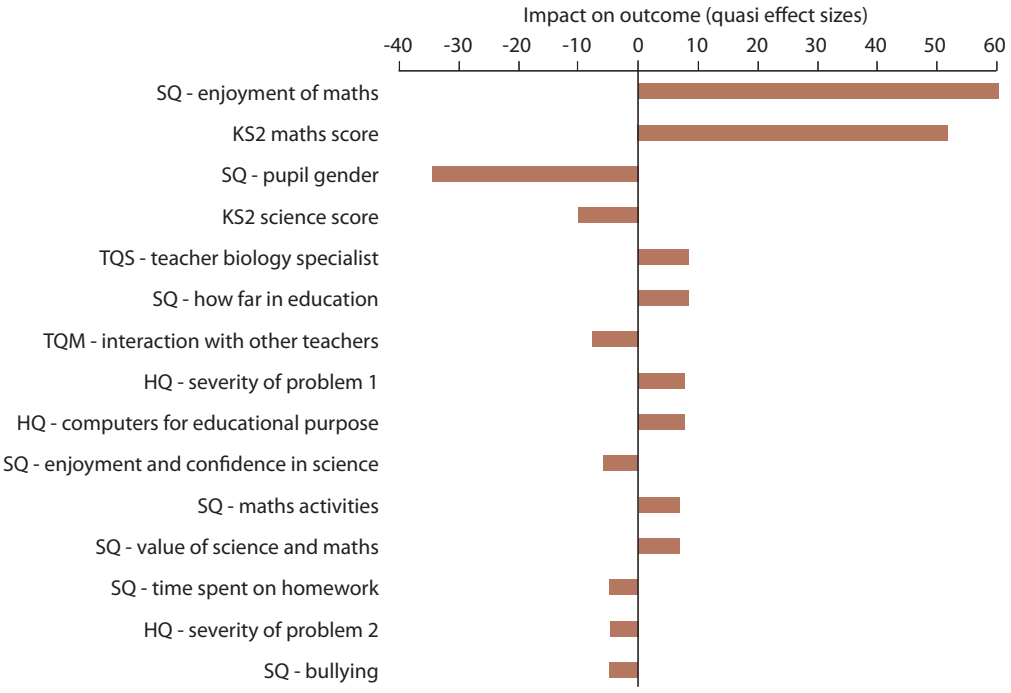
Exhibit 10.10 Variables significantly associated with grade 8 confidence in mathematics



For continuous variables (i.e. those measured on a continuum from less to more) a positive relationship means that an increase in the variable was associated with a more positive attitude and a negative relationship that it was associated with a more negative attitude. For binary variables (i.e. those measured as yes/no), a positive relationship means that being one thing rather than the other was associated with a more positive attitude and a negative relationship that it was associated with a more negative attitude (i.e., in this case being a boy was associated with more positive attitudes than being a girl). Details of the variables and more information on how to interpret them can be found in Appendix 3.

10.7 Summary

The multi-level modelling has produced a large number of findings. Key patterns across the models are summarised below. Appendix 3 gives more information about these and other significant variables. It is important to remember, when reading these findings, that the direction of causality cannot be stated. The relationships described might work in either direction, or be caused by a third, related, variable.

Attainment models

- Three variables predicted attainment across all four models (grade 4 mathematics and science attainment and grade 8 mathematics and science attainment). These variables were:
  - prior attainment in mathematics and/or science
  - confidence in mathematics
  - access to resources and/or books in the home (these variables correlated slightly differently at each grade, but as indicators of socio-economic status, worked in similar ways at each grade).

In all four attainment models, as each of these factors increased, so too did attainment.

- In addition to confidence in mathematics, confidence and enjoyment in science was also important for attainment in science at both grades.
- Two variables were positively related in three of the four attainment models:
  - the second group of out of school activities (these were slightly different at each grade, but covered the frequency of leisure activities such as reading a book for enjoyment, doing homework and playing a musical instrument)
  - independent working in lessons.

  In all but the grade 8 mathematics attainment model, as the frequency of independent working increased, so too did attainment. For the second group of out of school activities, the same was true in all models except grade 4 mathematics. The reasons for these exceptions are not clear.
- Two variables were negatively associated with all four attainment models. These were:
  - extent of computer use for schoolwork
  - the first of two groups of out of school activities (these were slightly different at each grade, but covered the frequency of leisure activities such as watching television/videos, playing computer games, playing/talking with friends, using the internet and listening to music).

  In all four attainment models, as the frequency of these variables increased, so attainment decreased.
- A further variable was negatively related in three of the four attainment models:
  - extent of bullying (verbal, physical or social exclusion), as perceived by pupils.

  In all but the grade 8 science attainment model, as the perception of bullying increased, so attainment decreased. It is not clear why this was not a relevant factor for grade 8 science only.

  In addition to the variables associated with all four attainment models, some were associated with attainment at one grade only. These are outlined below.
- At grade 8 only, three factors were positively associated with attainment in both subjects:
  - whole class teaching mode
  - using calculators for complex calculations
  - pupils' educational aspirations.

  As these increased, so too did attainment.
- Also at grade 8 only, three factors were negatively associated with attainment in both subjects, so that, as these variables increased according to teachers' reports, so attainment declined. These factors were:
  - teachers' rating of the limitations caused to their teaching by having to teach:
    - unmotivated pupils
    - pupils from a range of backgrounds (economic, language, etc.)
  - the teacher being a mathematics education specialist (although this was a borderline and possibly spurious result for each subject).

- At grade 4 only, two factors were positively associated with attainment in both subjects:
  - being born in the UK
  - being taught by a mathematics specialist.

  Pupils who experienced these tended to attain more highly in both mathematics and science, but these effects did not continue into grade 8. At grade 8, most pupils would be taught by a specialist. The effect of birth, however, appears to become weaker as pupils become older.

- Also at grade 4 only, two factors were negatively associated with attainment in both subjects:
  - economic disadvantage
  - eligibility for free school meals

  As these variables increased as measured by teachers' reports, so attainment declined. It would appear that these matter at grade 4 more than at grade 8.

Attitudinal models

There were fewer clear patterns across the six attitudinal models (at each grade, enjoyment and confidence in science, enjoyment of mathematics and confidence in mathematics). Some clear findings were:

- Enjoyment of mathematics and confidence in mathematics were correlated, albeit less strongly than the parallel variables for science.

- Boys generally held more positive attitudes to their learning. Boys were more positive than girls about science and more confident about mathematics at both grades. They also enjoyed mathematics more at grade 4. Despite this, there were no overall differences in attainment in either subject at either grade.

- In all six attitudinal models, one set of factors was positively associated with enjoyment and confidence:
  - The frequency of mathematics activities was positively associated with attitudes to mathematics at both grades.
  - The frequency of science activities was positively associated with attitudes to science at both grades.

  As the frequency of these ranges of activities increased, so pupils enjoyed their lessons more and were more confident in their learning of the subject. It is not possible to say whether the positive attitude followed from a greater frequency of the activities, or whether the reverse was true.

- No variables acted negatively across all six attitudinal models.

- At both grades, in the attitude to science models and also in the enjoyment of mathematics models (but not in the confidence in mathematics models), the second group of out of school activities was associated with positive attitudes. Conversely, in these same models, the first group of out of school activities was associated with negative attitudes. The second group comprises the frequency of leisure activities such as reading a book for enjoyment, doing homework and playing a musical instrument, while the first includes the

frequency of leisure activities such as watching television/videos, playing computer games, playing/talking with friends, using the internet and listening to music. The exact composition of each group of activities was slightly different at each grade, but most activities were common to both grades.

- Independent working was a positive predictor of attitudes to science and confidence in mathematics at grade 4, but a negative predictor of enjoyment of mathematics at grade 8. The direction of causality cannot be defined.
- Pupils' perception of the extent of bullying in their school was a negative predictor of:
  – attitudes to science at grade 4
  – confidence in mathematics at grade 4 and at grade 8.

  As pupils perceived the extent of bullying (verbal, physical or social exclusion) to increase, so attitudes became less positive. It is not clear why grade 8 science should be an exception.
- Prior attainment was a significant positive predictor of:
  – attitudes to science at grade 8
  – confidence in mathematics at both grade 4 and grade 8.

  These findings provide evidence of significant variables related to attainment in, and attitudes towards, learning in mathematics and science. The statistical models cannot say whether the attainment and attitudes are caused by the relevant variable, whether the reverse is true, or whether another factor is responsible for the association. Nevertheless, these findings give further insight into the complex process of education in mathematics and science in England.

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Appendix 1 Sampling

The samples for England met the stringent sampling criteria for TIMSS 2007 and were an improvement on participation in 2003.

A limited number of exclusions (up to five per cent of the target population) are allowed, where it is deemed inappropriate for pupils to participate. In England, it was expected that special schools would be excluded as might some pupils with special educational needs. Very small schools (those with only a handful of pupils of the target age) were also excluded, in line with TIMSS rules. Exclusions at both grades, at both school level and pupil level, were well within the five per cent target (at 2.1 per cent and 2.3 per cent for year 5 and year 9 respectively). These were among the lowest levels of exclusions internationally (see Appendix A of the international report for more information).

In the case of grade 4 (year 5) in England, the sampling targets were met fully, with the target number of original sample schools taking part and an acceptable number of matched replacement schools. In the case of grade 8 (year 9), minimum targets were exceeded: well above the minimum number of original sample schools took part, topped up by an acceptable number of matched replacement schools.

The sample numbers are outlined in Exhibits A1.1 and A1.2.

Exhibit A1.1 The samples of schools

Schools	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
Grade 4	160	159	131	12	143
Grade 8	160	160	126	11	137

Exhibit A1.2 The samples of pupils

Pupils	Within school participation rate	Number of sampled pupils	Number of eligible pupils	Number of pupils absent	Number of pupils assessed
Grade 4	93 %	4784	4623	307	4316
Grade 8	88 %	4768	4600	575	4025

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Appendix 2 Comparability of trend variables

In this appendix, a series of tables is presented showing how responses to particular questions in the student questionnaires have changed over time. Questions were selected because it was thought likely that responses to them might be associated with attainment. These, along with other background variables, have been discussed in Chapters 6 to 10 of the report. The tables presented here show the distribution of responses to each question in two or more cycles of TIMSS, and also indicate whether any changes are statistically significant (to the 5 per cent level). The points of comparison were determined according to the similarity of the question at the relevant time points: the wording of some questions has changed over time, and it is only possible to make a valid comparison of responses when the questions are sufficiently similar to each other. The international questionnaires can be accessed via the international TIMSS website (www.timss.bc.edu).

The questions analysed are as shown in Exhibit A2.1 below.

Exhibit A2.1 Variables compared

Grade 4 variable	**2007 Q no.**	**Compared with**
EAL (English as another language)	Q3	2003, 1995
Enjoyment and confidence	Q6, Q8	2003, 1995
Frequency of doing various classroom tasks	Q7, Q9	2003
Computer use	Q10 AB	2003
Computer games	Q13B	2003 [1995]
Parents born in UK	Q16 AB	2003 [1995]
Grade 8 variable	**2007 Q no.**	**Compared with**
EAL (English as another language)	Q3	2003, 1999, 1995
Enjoyment and boredom	Q8, Q11	2003 [1999, 1995]
Value measures (destinations and future plans etc.)	Q9, Q12	2003 [1999, 1995]
Frequency of doing various classroom tasks	Q10, Q13	2003
Computer use	Q14 AB	2003
Parents born in UK	Q16 AB	2003 [1999, 1995]
Computer games	Q17B	2003 [1999, 1995]

Dates in brackets indicate that the question in this year varied from its 2007 counterpart and so any comparison must be made with caution.

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A2.1 Grade 4 variables

Q3 How often do you speak English at home?

	Always/ almost always	Sometimes	Never	Valid N	Significant
2007	93.0	6.4	0.6	4290	-
2003	94.6	4.6	0.9	3473	*
1995	93.0	6.2	0.9	2810	NS

** indicates a significant difference from 2007*

Q6A I usually do well in maths

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	41.3	48.7	7.2	2.8	4274	-
2003	39.7	49.6	6.5	4.2	3461	*
1995	32.9	56.6	7.5	3.0	2992	*

** indicates a significant difference from 2007*

Q6B I would like to do more maths at school

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	27.2	25.5	21.5	25.8	4239	-
2003	26.5	20.0	20.6	32.8	3431	*
1995	-	-	-	-	-	-

** indicates a significant difference from 2007*

Q6C Maths is harder for me than for many of my classmates

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	12.3	24.8	27.6	35.2	4229	-
2003	14.7	26.8	27.2	31.3	3414	*
1995	-	-	-	-	-	-

** indicates a significant difference from 2007*

Q6D I enjoy learning maths

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	46.4	30.0	12.5	11.0	4224	-
2003	43.0	27.2	14.7	15.1	3420	*
1995	53.2	30.9	10.3	5.6	2901	*

** indicates a significant difference from 2007*

Q6E I am just not good at maths

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	9.3	13.8	24.8	52.2	4217	-
2003	10.1	18.2	24.1	47.7	3423	*
1995	-	-	-	-	-	

** indicates a significant difference from 2007*

Q6F◊I learn things quickly in maths

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	30.8	45.3	16.0	7.8	4230	-
2003	31.7	42.5	16.1	9.7	3439	*
1995	-	-	-	-	-	

** indicates a significant difference from 2007*

Q6G Maths is boring

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	16.1	19.3	22.0	42.6	4248	-
2003	-	-	-	-	-	-
1995	14.0	10.2	25.5	50.4	2776	*

** indicates a significant difference from 2007*

7 How often do you do these things in your maths lessons?

Q7A I practise adding, subtracting, multiplying, and dividing without using a calculator

	Every/almost every lesson	About half the lessons	Some lessons	Never	Valid N	Significant
2007	42.4	22.5	31.9	3.1	4266	-
2003	41.5	21.0	33.3	4.2	3456	*

** indicates a significant difference from 2007*

Q7B I work on fractions and decimals

	Every/almost every lesson	About half the lessons	Some lessons	Never	Valid N	Significant
2007	15.6	29.6	52.7	2.0	4242	-
2003	17.0	25.3	54.9	2.8	3443	*

** indicates a significant difference from 2007*

Q7C I measure things in the classroom and around the school

	Every/almost every lesson	About half the lessons	Some lessons	Never	Valid N	Significant
2007	3.5	6.0	64.7	25.8	4220	-
2003	4.2	7.9	65.2	22.7	3425	*

** indicates a significant difference from 2007*

Q7D I make tables, charts, or graphs

	Every/almost every lesson	About half the lessons	Some lessons	Never	Valid N	Significant
2007	12.1	25.6	58.7	3.5	4224	-
2003	11.3	24.3	60.9	3.4	3418	NS

Q7E I learn about shapes like circles, triangles, rectangles and cubes

	Every/almost every lesson	About half the lessons	Some lessons	Never	Valid N	Significant
2007	12.1	22.4	63.0	2.5	4251	-
2003	12.6	20.8	63.0	3.7	3440	*

** indicates a significant difference from 2007*

Q7G I work with other children in small groups or pairs

	Every/almost every lesson	About half the lessons	Some lessons	Never	Valid N	Significant
2007	27.8	26.0	41.1	5.0	4237	-
2003	26.3	25.7	42.6	5.4	3433	NS

Q7H I explain my answers

	Every/almost every lesson	About half the lessons	Some lessons	Never	Valid N	Significant
2007	30.1	31.3	34.5	4.2	4225	-
2003	27.5	27.1	37.9	7.4	3406	*

** indicates a significant difference from 2007*

Q7I I work by myself to answer questions

	Every/almost every lesson	About half the lessons	Some lessons	Never	Valid N	Significant
2007	39.6	28.9	28.9	2.6	4224	-
2003	45.9	29.1	22.1	2.9	3416	*

** indicates a significant difference from 2007*

Q7J I use a calculator

	Every/almost every lesson	About half the lessons	Some lessons	Never	Valid N	Significant
2007	3.3	9.9	70.3	16.4	4254	-
2003	4.8	12.2	67.3	15.7	3430	*

** indicates a significant difference from 2007*

Q8A I usually do well in science

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	28.7	51.0	14.4	5.8	4285	-
2003	29.3	51.3	13.3	6.1	3461	NS
1995	21.2	61.3	12.8	4.7	2922	*

** indicates a significant difference from 2007*

Q8B I would like to do more science at school

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	26.2	25.5	25.2	23.2	4266	-
2003	24.7	24.1	21.1	30.1	3445	*
1995	-	-	-	-	-	-

** indicates a significant difference from 2007*

Q8C Science is harder for me than for many of my classmates

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	11.5	26.3	30.8	31.4	4248	-
2003	14.3	26.6	29.9	29.2	3440	*
1995	-	-	-	-	-	-

** indicates a significant difference from 2007*

Q8D I enjoy learning science

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	40.2	30.3	15.4	14.0	4244	-
2003	39.3	28.5	15.0	17.1	3416	*
1995	40.6	38.7	11.2	9.5	2819	*

** indicates a significant difference from 2007*

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Q8E I am just not good at science

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	9.9	18.0	30.3	41.8	4238	-
2003	11.8	18.4	28.2	41.7	3424	*
1995	-	-	-	-	-	

** indicates a significant difference from 2007*

Q8F I learn things quickly in science

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	27.7	39.5	22.8	10.0	4244	-
2003	29.9	39.7	19.0	11.3	3457	*
1995	-	-	-	-	-	

** indicates a significant difference from 2007*

Q8G Science is boring

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	15.5	19.7	23.0	41.8	4261	-
2003	-	-	-	-	-	-
1995	12.6	11.4	33.6	42.5	2728	*

** indicates a significant difference from 2007*

9 In school, how often do you do these things? [science activities]

Q9A I look at something like the weather or a plant growing and write down what I see

	At least once a week	Once or twice a month	A few times a year	Never	Valid N	Significant
2007	16.2	29.3	37.5	17.0	4265	-
2003	26.2	38.4	24.7	10.7	3419	*

** indicates a significant difference from 2007*

Q9B I watch the teacher do a science experiment

	At least once a week	Once or twice a month	A few times a year	Never	Valid N	Significant
2007	32.4	40.9	19.1	7.6	4256	-
2003	41.1	36.7	16.6	5.6	3451	*

** indicates a significant difference from 2007*

Q9C I design or plan a science experiment or investigation

	At least once a week	Once or twice a month	A few times a year	Never	Valid N	Significant
2007	29.3	41.4	20.8	8.5	4227	-
2003	30.6	42.2	19.0	8.2	3416	NS

Q9D I do a science experiment or investigation

	At least once a week	Once or twice a month	A few times a year	Never	Valid N	Significant
2007	31.0	44.8	18.8	5.4	4225	-
2003	35.1	43.4	16.5	5.0	3395	*

** indicates a significant difference from 2007*

Q9E I work with other children in a small group or pair on a science experiment or investigation

	At least once a week	Once or twice a month	A few times a year	Never	Valid N	Significant
2007	37.6	42.5	15.8	4.2	4257	-
2003	43.6	39.0	12.5	4.9	3439	*

** indicates a significant difference from 2007*

Q9H I write or give an explanation for something I am studying in science

	At least once a week	Once or twice a month	A few times a year	Never	Valid N	Significant
2007	38.3	38.5	16.8	6.5	4242	-
2003	51.3	33.1	10.6	5.1	3425	*

** indicates a significant difference from 2007*

Q9I I work by myself to answer questions

	least once a week	Once or twice a month	A few times a year	Never	Valid N	Significant
2007	49.1	34.1	12.0	4.8	4255	-
2003	60.8	27.8	6.7	4.8	3443	*

** indicates a significant difference from 2007*

Q10A Do you ever use a computer? (Do not include PlayStationTM, GameCubeTM, XBoxTM, or other TV/video game computers.)

	Yes	No	Valid N	Significant
2007	99.4	0.6	4293	-
2003	98.9	1.1	3483	*

** indicates a significant difference from 2007*

Q10B Where do you use a computer?

a) At home

	Yes	No	Valid N	Significant
2007	91.7	7.6	4271	-
2003	87.3	11.7	3467	*

** indicates a significant difference from 2007*

b) At school

	Yes	No	Valid N	Significant
2007	85.3	14.1	4264	-
2003	90.9	8.1	3469	*

** indicates a significant difference from 2007*

Q13B On a normal school day, how much time do you spend before or after school doing each of these things?

b) I play computer games

	No time	Less than 1 hour	1-2 hours	2-4 / 3-4 hours	4 hours +	Valid N	Significant
2007	18.2	35.7	24.3	10.3	11.5	4233	-
2003	16.2	34.6	24.0	10.2	15.0	3417	*
1995	18.6	38.8	18.1	10.2	14.4	2678	*

** indicates a significant difference from 2007*

Note: wording of question was different in 1995

16A Was your mother (or stepmother or female carer) born in the United Kingdom?

	Yes	No	Valid N	Significant
2007	83.4	16.6	4235	-
2003	85.0	15.0	3410	NS
1995	85.2	14.8	2725	*

** indicates a significant difference from 2007*

Note: wording of question was slightly different in 2003 and more so in 1995

16B Was your father (or stepfather or male carer) born in the United Kingdom?

	Yes	No	Valid N	Significant
2007	81.0	19.0	4193	-
2003	83.7	16.3	3398	*
1995	82.5	17.5	2644	NS

** indicates a significant difference from 2007*

Note: wording of question was slightly different in 2003 and more so in 1995

A2.2 Grade 8 variables

Q3 How often do you speak English at home?

	Always/ almost always	Sometimes	Never	Valid N	Significant
2007	97.1	2.4	0.5	3968	-
2003	97.0	2.4	0.6	2685	NS
1999	95.0	4.8	0.2	2752	*
1995	96.4	3.4	0.2	1665	*

** indicates a significant difference from 2007*

Q8A I usually do well in maths

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	34.6	53.4	9.1	2.9	3956	-
2003	31.6	54.4	10.4	3.7	2679	*
1999	28.1	64.2	7.2	0.5	2827	*
1995	23.6	69.1	6.2	1.2	1739	*

** indicates a significant difference from 20\07*

Note: wording of question and/or response options was different in 1999 and 1995

Q8B I would like to spend more time studying maths at school

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	8.2	30.1	40.5	21.1	3944	-
2003	6.7	26.8	38.4	28.1	2676	*
1999	-	-	-	-	-	-
1995	-	-	-	-	-	-

** indicates a significant difference from 2007*

Note: wording of question and/or response options was different in 1999 and 1995

Q8C Maths is more difficult for me than for many of my classmates

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	7.8	24.0	39.4	28.9	3942	-
2003	9.4	27.6	36.5	26.4	2658	*
1999	8.9	19.7	54.9	16.5	2784	*
1995	-	-	-	-	-	-

** indicates a significant difference from 2007*

Note: wording of question and/or response options was different in 1999 and 1995

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Q8D I enjoy learning maths

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	15.7	44.3	25.2	14.7	3930	-
2003	13.6	39.5	26.5	20.4	2830	*
1999	25.0	54.2	17.7	3.1	2805	*
1995	21.7	58.5	16.6	3.1	1705	*

** indicates a significant difference from 2007*

Note: wording of question and/or response options was different in 1999 and 1995

Q8E Maths is not one of my strengths

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	19.3	22.8	30.3	27.6	3933	-
2003	25.0	25.5	26.8	22.7	2670	*
1999	13.1	27.9	39.8	19.1	2788	*
1995	-	-	-	-	-	-

** indicates a significant difference from 2007*

Note: wording of question and/or response options was different in 1999 and 1995

Q8F I learn things quickly in maths

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	19.9	46.4	25.4	8.3	3939	-
2003	17.2	46.2	26.6	10.0	2668	*
1999	-	-	-	-	-	-
1995	-	-	-	-	-	-

** indicates a significant difference from 2007*

Note: wording of question and/or response options was different in 1999 and 1995

Q8G Maths is boring

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	22.3	31.8	31.8	14.0	3944	-
2003	-	-	-	-	-	-
1999	7.4	23.7	49.2	19.7	2789	*
1995	7.4	20.1	51.1	21.3	1682	*

** indicates a significant difference from 2007*

Note: wording of question and/or response options was different in 1999 and 1995

Q8H I like maths

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	16.2	41.5	23.8	18.4	3952	-
2003	-	-	-	-	-	-
1999	23.4	54.4	16.5	5.7	2824	*
1995	5.4	14.6	55.6	24.3	1736	*

** indicates a significant difference from 2007*

Note: wording of question and/or response options was different in 1999 and 1995

Q9A I think learning maths will help me in my daily life

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	52.4	38.1	7.9	1.7	3957	-
2003	50.7	39.3	7.4	2.6	2676	*

** indicates a significant difference from 2007*

Q9B I need maths to learn other school subjects

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	28.6	49.5	17.5	4.4	3957	-
2003	25.1	50.5	19.1	5.4	2672	*

** indicates a significant difference from 2007*

Q9C I need to do well in maths to get into the college or university of my choice

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	49.9	35.7	11.0	3.3	3943	-
2003	45.3	35.7	13.5	5.6	2659	*
1999	42.7	42.2	13.0	2.1	2797	*
1995	40.9	45.3	10.8	3.0	1709	*

** indicates a significant difference from 2007*

Note: wording of question was slightly different in 1999 and 1995

Q9D I need to do well in maths to get the job I want

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	39.6	37.0	17.2	6.2	3939	-
2003	25.3	36.0	24.8	13.8	2662	*
1999	36.1	41.2	20.1	2.6	2799	*
1995	37.1	42.7	17.2	3.0	1723	*

** indicates a significant difference from 2007*

Note: wording of question was slightly different in 1999 and 1995

10 How often do you do these things in your maths lessons?

Q10A We practice adding, subtracting, multiplying and diving without using a calculator

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	23.7	22.3	48.5	5.5	3953	-
2003	20.7	21.8	50.2	7.3	2669	*

** indicates a significant difference from 2007*

Q10B We work on fractions and decimals

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	9.2	27.0	62.9	0.9	3945	-
2003	6.7	24.1	67.7	1.5	2667	*

** indicates a significant difference from 2007*

Q10D We interpret data in tables, charts, or graphs

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	6.9	23.5	65.5	4.1	3936	-
2003	7.9	25.0	63.9	3.2	2657	NS

Q10E We write equations and functions to represent relationships

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	10.1	27.2	53.2	9.4	3933	-
2003	10.7	27.6	53.9	7.8	2658	NS

Q10G We explain our answers

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	44.4	22.7	26.0	6.9	3932	-
2003	44.0	25.5	25.2	5.3	2653	*

** indicates a significant difference from 2007*

Q10H We relate what we are learning in maths to our daily lives

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	11.7	22.1	41.4	24.7	3923	-
2003	7.8	19.0	45.4	27.8	2652	*

** indicates a significant difference from 2007*

Note: wording of question was slightly different in 2003

Q10I We decide on our own procedures for solving complex problems

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	11.2	23.8	49.1	15.8	3916	-
2003	12.9	29.0	43.9	14.2	2631	*

** indicates a significant difference from 2007*

Q10J We check our homework

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	22.8	23.0	33.4	20.7	3920	-
2003	24.9	24.0	31.4	19.6	2651	NS

Q10K We listen while the teacher teaches the whole class about something

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	54.2	22.5	19.6	3.7	3939	-
2003	56.0	20.7	18.2	5.2	2656	*

* indicates a significant difference from 2007

Q10L We work on problems on our own

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	32.9	35.4	28.0	3.7	3940	-
2003	31.1	34.0	30.0	5.0	2641	*

** indicates a significant difference from 2007*

Q10N We are allowed to start our homework in class

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	5.3	8.6	39.7	46.4	3931	-
2003	7.2	10.2	44.8	37.9	2654	*

* indicates a significant difference from 2007

Q10O We have a test

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	6.4	16.8	71.1	5.7	3940	-
2003	6.4	15.2	72.1	6.3	2657	NS

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Q10P We use calculators

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	14.6	34.5	47.9	3.0	3942	-
2003	14.6	33.7	49.2	2.5	2659	NS

Q11A I usually do well in science

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	33.4	50.0	12.9	3.7	3962	-
2003	32.5	50.7	11.9	4.9	2675	NS
1999	23.6	67.6	8.3	0.5	2823	*
1995	21.3	66.7	10.2	1.8	1732	*

** indicates a significant difference from 2007*

Note: wording of question and/or response options was different in 1999 and 1995

Q11B I would like to spend more time studying science in school

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	16.6	34.0	33.4	16.1	3954	-
2003	17.6	34.7	29.3	18.4	2671	*
1999	-	-	-	-	-	-
1995	-	-	-	-	-	-

** indicates a significant difference from 2007*

Q11C Science is more difficult for me than for many of my classmates

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	7.9	24.0	39.6	28.5	3946	-
2003	7.5	24.5	39.5	28.5	2659	NS
1999	5.1	20.1	57.7	17.1	2794	*
1995	-	-	-	-	-	-

** indicates a significant difference from 2007*

Note: wording of question and/or response options was different in 1999

Q11D I enjoy learning science

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	28.0	41.2	19.9	10.8	3933	-
2003	27.8	40.5	19.6	12.1	2830	NS
1999	29.3	55.9	12.5	2.3	2788	*
1995	26.5	55.0	14.2	4.2	1715	*

** indicates a significant difference from 2007*

Note: wording of question and/or response options was different in 1999 and 1995

Q11E Science is not one of my strengths

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	13.7	24.4	34.0	27.8	3941	-
2003	14.2	25.2	31.5	29.0	2658	NS
1999	6.2	29.5	46.4	17.9	2786	*
1995	-	-	-	-	-	-

** indicates a significant difference from 2007*

Note: wording of question and/or response options was different in 1999

Q11F I learn things quickly in science

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	23.5	41.9	27.8	6.7	3943	-
2003	22.5	46.3	23.9	7.4	2663	*
1999	-	-	-	-	-	-
1995	-	-	-	-	-	-

** indicates a significant difference from 2007*

Q11G Science is boring

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	14.8	24.2	36.7	24.3	3943	-
2003	-	-	-	-	-	-
1999	5.1	16.2	55.0	23.6	2773	*
1995	6.0	17.7	51.8	24.4	1696	*

** indicates a significant difference from 2007*

Note: wording of question and/or response options was different in 1999 and 1995

Q11H I like science

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	28.3	40.8	17.8	13.1	3960	-
2003	-	-	-	-	-	-
1999	27.6	55.8	13.4	3.2	2817	*
1995	6.1	15.8	51.7	26.5	1736	*

** indicates a significant difference from 2007*

Note: wording of question and/or response options was different in 1999 and 1995

Q12A I think learning science will help me in my daily life

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	27.7	46.9	19.7	5.6	3950	-
2003	25.7	46.4	21.1	6.8	2667	NS

Q12B I need science to learn other school subjects

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	17.5	41.4	32.5	8.6	3947	-
2003	15.3	42.1	31.5	11.1	2662	*

** indicates a significant difference from 2007*

Q12C I need to do well in science to get into the college or university of my choice

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	36.8	35.9	20.1	7.2	3943	-
2003	33.2	34.3	22.2	10.3	2655	*
1999	37.1	38.2	20.1	4.6	2765	*
1995	32.3	42.8	18.9	6.1	1704	*

** indicates a significant difference from 2007*

Note: wording of question was slightly different in 1999 and 1995

Q12D I need to do well in science to get the job I want

	Agree a lot	Agree a little	Disagree a little	Disagree a lot	Valid N	Significant
2007	30.8	28.9	26.7	13.6	3946	-
2003	26.6	25.0	26.4	22.0	2665	*
1999	27.8	31.5	34.6	6.1	2768	*
1995	28.0	33.5	30.9	7.6	1707	*

* indicates a significant difference from 2007

Note: wording of question was slightly different in 1999 and 1995

13 How often do you do these things in your science lessons?

Q13B We watch the teacher demonstrate an experiment or investigation

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	22.7	38.2	35.9	3.2	3936	-
2003	20.9	39.4	36.8	2.9	2666	NS

Q13C We design or plan an experiment or investigation

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	16.7	34.1	42.5	6.7	3918	-
2003	17.6	36.7	38.7	7.0	2658	*

** indicates a significant difference from 2007*

Q13D We carry out an experiment or investigation

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	21.0	39.4	35.7	3.8	3898	-
2003	21.3	41.3	33.9	3.5	2657	NS

Q13E We work in small groups or pairs on an experiment or investigation

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	32.3	37.5	27.0	3.2	3918	-
2003	33.6	37.5	25.9	3.0	2655	NS

Q13J We relate what we are learning in science to our daily lives

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	13.0	27.5	41.6	17.9	3907	-
2003	10.9	24.4	45.3	19.4	2656	*

** indicates a significant difference from 2007*

Note: wording of question was slightly different in 2003

Q13K We check our homework

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	17.1	22.5	38.3	22.0	3907	-
2003	13.5	18.4	39.3	28.9	2637	*

** indicates a significant difference from 2007*

Q13L We listen while the teacher teaches the whole class about something

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	55.7	25.0	16.8	2.4	3920	-
2003	52.4	25.1	18.8	3.7	2649	*

** indicates a significant difference from 2007*

Q13M We work on problems on our own

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	20.1	36.3	36.9	6.7	3916	-
2003	16.0	32.8	41.1	10.1	2641	*

** indicates a significant difference from 2007*

Q13N We are allowed to start our homework in class

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	5.2	11.8	39.9	43.1	3924	-
2003	6.4	11.7	42.8	39.1	2652	*

** indicates a significant difference from 2007*

Q13O We have a test

	Almost every lesson	Half the lessons	Some lessons	Never	Valid N	Significant
2007	6.1	20.3	67.9	5.7	3930	-
2003	5.3	17.6	69.5	7.6	2655	*

** indicates a significant difference from 2007*

Q14A Do you ever use a computer? (Do not include PlayStationTM, GameCubeTM, XBoxTM, or other TV/video game computers.)

	Yes	No	Valid N	Significant
2007	100	0	3948	-
2003	99	1	2669	*

** indicates a significant difference from 2007*

Q14B Where do you use a computer?

a) At home

	Yes	No	Valid N	Significant
2007	95.7	3.9	3944	-
2003	91.5	7.4	2668	*

** indicates a significant difference from 2007*

b) At school

	Yes	No	Valid N	Significant
2007	79.2	20.4	4025	-
2003	88.5	10.4	2660	*

** indicates a significant difference from 2007*

Q16A Was your mother (or stepmother or female carer) born in the United Kingdom?

	Yes	No	Valid N	Significant
2007	86.6	13.4	3908	-
2003	88.2	11.8	2632	NS
1999	84.0	16.0	2833	*
1995	87.6	12.4	1710	NS

** indicates a significant difference from 2007*

Note: wording of question was slightly different in 2003 and more so in 1999 and 1995

A 'not sure' option was also available in 1999 and 1995

Q16B Was your father (or stepfather or male carer) born in the United Kingdom?

	Yes	No	Valid N	Significant
2007	84.4	15.6	3886	-
2003	86.9	13.1	2621	*
1999	82.4	17.6	2812	*
1995	86.5	13.5	1699	*

** indicates a significant difference from 2007*

Note: wording of question was slightly different in 2003 and more so in 1999 and 1995

A 'not sure' option was also available in 1999 and 1995

Q17 On a normal school day, how much time do you spend before or after school doing each of these things?

b) I play computer games

	No time	Less than 1 hour	1-2 hours	2-4 / 3-4 hours	4 hours +	Valid N	Significant
2007	27.3	29.4	21.2	13.4	8.8	3905	-
2003	29.6	32.1	21.3	10.0	7.0	2645	*
1999	24.5	33.4	29.6	8.8	3.7	2795	*
1995	36.4	34.4	21.0	5.0	3.2	1699	*

** indicates a significant difference from 2007*

Note: wording of question was different in 1999 and 1995

TIMSS 2007 International Reports available at http://timssandpirls.bc.edu/TIMSS2007

Appendix 3 Technical details

This appendix describes the factor analysis and multi-level modelling that was carried out on the TIMSS 2007 data for England to explore the relationships between key variables.

A3.1 Factor analysis

Factor analysis is a statistical technique for identifying patterns in responses. In the case of TIMSS 2007 in England, it has been used to enable researchers to identify groups of questions which have been answered in a related way. The 'factors' (otherwise known as groups of related questions) which are identified as a result can then be used in more sophisticated analysis (multi-level modelling) to identify variables which are related to pupils' attainment and attitudes. Factor analysis was not done on all questions, only on those referring to variables which it was felt might be associated significantly with attainment or attitudes. This element of selection is designed to maximise the robustness of the models.

This section of Appendix 3 explores the factors derived from some of the questions discussed in Chapters 7, 8 and 9. It compares them across the grades and the two subjects, and discusses some notable differences in response patterns. The factors derived are similar to those derived in national analyses for TIMSS 2003, though not always identical. Any comparison with findings given in the national report for TIMSS 2003 should be made with this in mind.

The subsequent section (A3.2) explores the technical details of the factor analysis and is followed by sections A3.3 and A3.4, outlining the multi-level modelling and its outcomes.

Pupils' attitudes: factors

Exhibit A3.1 shows the factors derived from the questions addressing pupils' attitudes (see Chapter 7). As can be seen, three attitudinal areas were explored: enjoyment and confidence in learning each of the TIMSS subjects and, at grade 8 only, the value that pupils place on their mathematics and science learning.

For the two questions common to both grades, a parallel series of questions was asked for each subject: about how pupils rated their own abilities and how much they enjoyed the subject. Statements to be rated included, for example, 'I enjoy learning science', 'Science is harder for me than for many of my classmates', 'I usually do well in maths' and 'I would like to do more maths at school'.

Exhibit A3.1 shows that, for science, pupils' responses to the statements about enjoyment and confidence were related: at both grades there were strong correlations between responses on all parts of the question. For mathematics, in contrast, pupils' answers fell into two groups: responses to the question parts about enjoyment of mathematics were strongly correlated with each other but not so strongly with the parts about confidence, while responses to the question parts about confidence were strongly correlated with each

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Exhibit A3.1 Attitudinal factors

Theme of question, grade 4	Resulting factors, grade 4	Theme of question, grade 8	Resulting factors, grade 8
Enjoyment and confidence in science	Enjoyment and confidence in science	Enjoyment and confidence in science	Enjoyment and confidence in science
Enjoyment and confidence in mathematics	Enjoyment of mathematics Confidence in mathematics	Enjoyment and confidence in mathematics	Enjoyment of mathematics Confidence in mathematics
('Value' question not asked at grade 4)	n/a	Value of science and mathematics	Value of science and mathematics

other but not so strongly with the parts about enjoyment. Thus, for science, one factor was created in each case while, for mathematics, two factors were created each time.

The teachers and schools: factors

This section describes and compares the factors derived from teachers' and headteachers' questionnaires at each grade (see Chapter 8). These are summarised in Exhibit A3.2 (teacher factors) and A3.3 (headteacher factors).

When the patterns in responses about homework were explored using factor analysis, equivalent factors for science and mathematics were not created. At grade 4, all of the statements about science homework were correlated and formed one factor: Science homework. However, the teachers' responses about mathematics homework created two factors (Mathematics homework: teacher use, and Mathematics homework: class use). The factor related to teacher use incorporated frequency of homework, amount of homework, checking and feeding back on homework and using homework as part of teacher assessment. The second factor incorporated children marking their own homework in class and using homework as a basis for class discussion. The second factor highlights the interactive nature of homework in mathematics, with pupils involved in the process of marking homework and learning from it in class. In this approach, homework is not seen as simply a piece of work that is handed to the teacher and never revisited by the pupil; it is seen as an integral part of learning.

At grade 8, the factors related to homework questions were different for the science and mathematics teachers. The responses from the science teacher questionnaire created two factors (Homework: amount, completing sets of questions and teacher use; and Homework: other types and class use). However, the responses from the grade 8 mathematics teachers indicated that there were three factors (Homework: amount, completing sets of questions and teacher use; Homework: class use; and Homework type: active). For the mathematics teachers, responses to questions about more active approaches to homework (that is, gathering data and reporting; and finding one or more applications of the content area covered) correlated to produce the additional factor. This was not replicated in the science teacher data despite the fact that similar questions were asked. The reason for this is not clear.

Exhibit A3.2 Teacher factors

Theme of question, grade 4	Resulting factors, grade 4	Theme of question, grade 8 science teachers	Resulting factors, grade 8 science teachers	Theme of question, grade 8 mathematics teachers	Resulting factors, grade 8 mathematics teachers
Learning activities	Observation and investigation Number and explanation Mathematics: shape, measure and data	Learning activities	Observation and investigation Explain and relate Passive learning	Learning activities	Problem-solving and investigation Data, geometry and algebra Number and routine problem solving
School climate	School climate: teachers School climate: children and parents	School climate	School climate: teachers School climate: children and parents	School climate	School climate: teachers School climate: children and parents
Calculator use	Routine calculator use Complex calculator use	n/a n/a	n/a n/a	Calculator and computer use	Routine calculator use Complex calculator use
Computer use	Computer access Mathematics discovery and practice Science procedure and practice Look up and simulation	Computer use	Computer use		Computer use
Limitations to teaching the TIMSS class	Student motivation Student range: science Student range: mathematics	Limitations to teaching the TIMSS class	Teaching resources Computer resources Student motivation Student range	Limitations to teaching the TIMSS class	Teaching resources Computer resources Student motivation Student range
Professional develop-ment	Mathematics professional development Science professional development	Professional development	Professional development	Professional development	Professional development
Interaction with other teachers	Interaction with other teachers (Q7 variable)	Interaction with other teachers	Interaction with other teachers	Interaction with other teachers	Interaction with other teachers
Homework	Science homework Mathematics homework: teacher use Mathematics homework: class use	Homework	Homework: amount, question sets and teacher use Homework: other types and class use	Homework	Homework: amount, question sets and teacher use Homework: class use Homework type: active

Exhibit A3.3 shows the outcomes of the factor analysis of question responses from headteachers at grade 4 and grade 8. Patterns of response were quite different at each grade, resulting in different factors.

Exhibit A3.3 Headteacher factors

Theme of question, grade 4	Resulting factors, grade 4	Theme of question, grade 8	Resulting factors, grade 8
Resources which may affect the school's capacity to provide education	Computer and laboratory equipment	Resources which may affect the school's capacity to provide education	Budget, materials and staff
	Calculator availability		Library and audio-visual resources
	Materials/budget		Computers and software
	Infrastructure		Infrastructure and special equipment
	Library/audio-visual resources		
School climate and attendance	Problem behaviours	School climate	Problem behaviours: 1
	School climate		Problem behaviours: 2
	Severity of problem: 1		School climate: teachers and students
	Severity of problem: 2		School climate: parents
	Absenteeism/ lateness	Severity of problem behaviour	Severity of problem: 1
			Severity of problem: 2
Professional development	Professional development	Professional development	Professional development
Teacher recruitment	Difficulty filling vacancies (Q15 variable)	Teacher recruitment	Recruitment incentives
Recruitment incentives	(Not used)		Difficulty filling vacancies

At grade 4, headteachers' response patterns led to the creation of five resourcing factors: Computer/ laboratory equipment (incorporating computers and software for maths and science work, and laboratory equipment and materials); Calculator availability (incorporating calculators for science and maths work, and teachers); Materials/budget (incorporating teaching materials and budget for supplies); Infrastructure (incorporating buildings, grounds, teaching space, and heating and lighting systems); and Library/audio-visual resources (incorporating library and audio-visual equipment for science and mathematics).

Responses about schools' capacity to provide education based on a shortage of teachers and computer support staff were seen, at grade 8, as correlating with other budget and resourcing issues; this was not seen in the grade 4 factor analysis, where these responses did not correlate strongly with any of the factors.

The provision of special equipment was seen as related to infrastructure by headteachers in grade 8, but did not correlate strongly in the grade 4 headteacher responses. It is possible that this reflects the increased numbers of pupils with physical disabilities in individual secondary schools (as compared with the smaller primary schools) and

therefore the lack of specialist equipment might affect individual secondary schools' capacity to provide education for a larger group of pupils with such needs.

Responses to some questions (such as grade 4 headteacher responses on special equipment for physically disabled children and the provision of IT support staff) did not correlate with any of the factors. Such questions were either not entered into the multi-level model or, if they were of particular interest, were entered into the model as separate variables.

At grade 8, headteachers' response patterns led to the creation of four resourcing factors: Budget, materials and staff (incorporating teaching materials, budget for supplies, calculators for maths and science work, science laboratory equipment and materials, teachers and computer support staff); Library and audio-visual resources (incorporating library and audio-visual equipment for science and mathematics); Computers and software (incorporating calculators for science and maths work, and teachers); and Infrastructure and special equipment (incorporating buildings, grounds, teaching space, heating and lighting systems, special equipment for physically disabled pupils). This analysis has resulted in one less factor than at grade 4.

In addition to questions about school climate, headteachers were asked to rate a series of pupil behaviours according to the frequency with which they occurred, as well as the perceived severity of the problem in their school. This included absenteeism, late arrival, truancy, swearing, vandalism, and abuse and injury to staff or other pupils. These ratings, along with responses about school climate, were analysed in order to explore further the relationship between school climate and pupil behaviour. Factor analysis for grade 4 led to the creation of five separate factors. Headteachers' answers to the statements about the frequency of the behaviours as well as their severity were correlated and formed the factor Problem behaviours. However, the first two statements concerning lateness and absenteeism did not fit this factor and were formed into an additional factor.

At grade 8 there were two Problem behaviours factors: Problem behaviours 1 (incorporating arriving late at school, absenteeism, missing lessons, not keeping to the dress code, classroom disturbance, cheating and vandalism); and Problem behaviours 2 (incorporating theft, intimidation or verbal abuse of other pupils, physical injury to other pupils, intimidation or verbal abuse of teachers or staff, and physical injury to teachers or staff). In secondary school (unlike primary school), teachers viewed the possible problem behaviours in two distinct categories, one of which is less severe and seems to involve mostly, though not exclusively, more minor disciplinary issues, and then the more severe behavioural issues which include aggressive behaviour towards other people at the school. In contrast, at grade 4 only a single behaviour factor emerged from the factor analysis. At grade 8, headteachers' severity ratings correlated less strongly with their frequency ratings than at grade 4 and so formed two separate factors.

Interestingly, primary headteachers' response patterns to the statements about school climate did not result in the same number of factors as the analysis of primary teachers' responses. That is, the outcome of the factor analysis on teacher responses showed that there were strong correlations between their responses to each of the four statements about teachers and between their responses to each of the four statements about parents and children, whereas for headteachers at grade 4, there was only a single factor: School

Climate. In order to make the findings from the multi-level model more meaningful, the one factor derived from the analysis of headteacher responses was split into two factors (School climate: teachers and School climate: parents and pupils) in order to make it directly comparable with the teacher data and the headteacher data at grade 8.

Pupils and the home: factor analysis

This section describes and compares the factors obtained from the responses to questions given by pupils at each grade about such matters as the facilities available to them at home and the activities they like to do in their spare time (see Chapter 9).

Exhibit A3.4 Pupils and the home factors

Theme of question, grade 4	Resulting factors, grade 4	Theme of question, grade 8	Resulting factors, grade 8
Frequency of science activities	Science activities	Frequency of science activities	Science activities: experiment and observation
			Science activities: theory and explanation
Frequency of mathematics activities	Mathematics activities	Frequency of mathematics activities	Mathematics activities
Working independently	Independent work	Working independently	Independent work
(Not asked at grade 4)	n/a	Whole class teaching in maths and science	Whole class teaching mode
School climate	Pupil perception of school climate	School climate	Pupil perception of school climate
Time spent on homework	Time spent on homework	Time spent on homework	Time spent on homework
		Frequency of homework	Frequency of homework
		Check homework in class	Check homework in class
Time spent on various activities outside of school	Out of school activities: 1	Time spent on various activities outside of school	Out of school activities: 1
	Out of school activities: 2		Out of school activities: 2
Resources in the home including books and computers	Resources	Resources in the home	(Q5 variable)
		Books at home	(Q4 variable)
Computer use for school work	Use of computer: school work	Computer use for school work	Use of computer: school work

As was the case with headteachers' responses, different response patterns were seen for each grade. For two grade 8 factors (Whole class teaching mode and Check homework in class), the corresponding questions were not asked at grade 4, and so this accounts for the difference.

At grade 4 the responses to all questions about resources in the home, including books and access to computers correlated to form a single factor on home resources, which was used in the multi-level modelling analysis. The responses from grade 8 pupils on all the separate questions about resources in the home did not correlate to form a single factor. Therefore, in order to establish the impact of resources in the home on achievement, the main resources question (question 5) and the books in the home question (question 4) were entered individually into the multi-level model.

At both grade 4 and grade 8 the pupils were asked to indicate how frequently they undertook certain activities in their science and mathematics classes (they completed one question for science and another for mathematics). Interestingly, the factor analysis created only one factor for the mathematics activities at both grade 4 and grade 8. However, for grade 8 science activities two factors were created, while only one arose at grade 4.

Exhibit A3.5 shows how the responses to questions about science activities loaded onto these factors. This factor analysis suggests that the activities that pupils undertake in science lessons at grade 8 seem to fall into two distinct categories in the way that pupils respond to them: the more hands-on investigation-led approach and the more theoretical study of science.

Exhibit A3.5 Factors associated with the frequency of science activities

Factor	Questions from grade 8 pupil questionnaire
Science activities: experiment and observation	We make observations and describe what we see
	We watch the teacher demonstrate an experiment or investigation
	We design or plan an experiment or investigation
	We carry out an experiment or investigation
	We work in small groups or pairs on an experiment or investigation
Science activities: theory and explanation	We read our science textbooks and other resource materials
	We memorise science facts and principles
	We use scientific formulas and laws to solve problems
	We give explanations about what we are studying
	We relate what we are learning in science to our daily lives

Pupils at grade 4 and grade 8 were asked a parallel series of questions about homework in both subjects: how often they are given homework by their teacher and how many minutes they normally spend on their homework. At grade 4 only one factor related to homework was created: time spent on homework. However, at grade 8 the questions about frequency and amount of homework created two separate factors, indicating that for grade 8 pupils the frequency and time spent on homework are less well related.

Both grade 4 and grade 8 pupils were asked about the activities that they do outside school. At both grades, responses about the activities correlated to form two factors. At grade 4, these two factors included all but one of the activities listed, 'Going to a breakfast or after-school club' which was not correlated with any of the other activities. The two factors created from the pattern of pupil responses are Out of school activities: 1 and Out of school activities: 2.

As far as the grade 8 responses on this question are concerned, five activities did not correlate with the two factors. As at grade 4, there was a distinction between Out of school activities: 1 and Out of school activities: 2. The split was similar, but not identical, to that seen at grade 4.

Exhibit A3.6 shows how the responses to questions about outside school activities loaded onto these factors.

Exhibit A3.6 Factors associated with after school activities

Factor	After school activities listed in grade 4 pupil questionnaire	Factor	After school activities listed in grade 8 pupil questionnaire
Out of school activities: 1	I watch television and videos	Out of school activities: 1	I watch television and videos
	I play computer games		I play computer games
	I play or talk with friends		I play or talk with friends
	I play sports		I use the internet
	I use the internet		I listen to music
	I listen to music		
Out of school activities: 2	I do jobs at home	Out of school activities: 2	I read a book for enjoyment
	I read a book for enjoyment		I play a musical instrument
	I do homework		I do homework
	I play a musical instrument		
	I do art (e.g. drawing, colouring or painting)		

A3.2 Technical details of the factor analysis

As part of the national analysis for the TIMSS 2007 data for England, the student, teacher and school questionnaire data for both grades was analysed to develop a set of attitude scales.

The following method was used for developing the scales:

1. Identify groups of attitude items which seem to relate together using exploratory factor analysis
2. Derive composite scores from the values of the original variables re-scored in a scale from 0 to 10.

Although simple, this approach has the advantage that it is possible to compare each scale's mean value with the other scales, and hence evaluate the relative strength of feeling about each.

The scales derived for each of the questionnaires are described in Exhibits A3.7 to A3.13.

Exhibit A3.7 Grade 4 pupil questionnaire factors

Scale name	Scale label	Items	Mean	Std	No. items	Reliability
enjconfs	SQ - enjoyment and confidence in science	q8a q8b q8c_neg q8d q8e_neg q8f q8g_neg q8h	6.28	2.50	8	0.881
enjm	SQ - enjoyment of maths	q6b q6d q6f q6g_neg q6h	6.33	3.08	5	0.850
confm	SQ - confidence in maths	q6a q6c_neg q6e_neg q6f	6.88	2.27	4	0.736
activs	SQ - science activities	q9a q9b q9c q9d q9e q9h	6.42	1.87	6	0.695
activm	SQ - maths activities	q7a q7b q7c q7d q7e q7f q7g	5.31	1.51	7	0.623
spare1	SQ - out of school activities 1	q13a q13b q13c q13e q13g q13i	4.64	1.86	6	0.673
usecomp	SQ - use of computer for school work	q7k q9j q10c1 q10c2	3.27	2.17	4	0.658
resource	SQ - resources	q4 q5 q10ab	7.29	1.63	3	0.473
indepen	SQ - independent work	q7i q9i	7.12	2.35	2	0.461
timehw	SQ - time spent on homework	q14b q15b	3.88	1.40	2	0.581
spare2	SQ - out of school activities 2	q13d q13f q13h q13j q13k	3.04	1.53	5	0.571
schenv	SQ - pupil perception of school climate	q11a q11b q11c	8.11	1.73	3	0.456
safety	SQ - extent of bullying	q12a q12b q12c q12d q12e	2.99	2.88	5	0.635

Exhibit A3.8 Grade 4 teacher questionnaire factors

Scale name	Scale label	Items	Mean	Std	No. items	Reliability
tsciobsinv	TQ - science - observation + investigation	q33a q33c q33d q33e q33h	5.58	1.57	5	0.773
tnumexp	TQ - number and explanation	q20a q20b q20f q20g q20h q20i q33h q33i q33j	6.08	1.35	9	0.742
tmathsmd	TQ - maths - shape, measures + data	q20c q20d q20e	3.52	0.61	3	0.745
tsclkidpar	TQ - school climate - teachers	q10a q10b q10c q10d	7.73	1.18	4	0.737
tsclteach	TQ - school climate - children + parents	q10e q10f q10g q10h	5.97	1.76	4	0.840
tsafety	TQ - teachers' perception of safety	q8a q8b q8c	8.13	1.70	3	0.798
tscihw	TQ - science homework	q38 q39 q39Ba q39Bb q39Bc q39Bd q39Be	3.39	2.87	7	0.938
tmahwtea	TQ - maths homework - teacher use	q24 q25 q25Ba q25Bb q25Be	6.27	1.67	5	0.720
tmahwcla	TQ - maths homework - class use	q25Bc q25Bd	4.50	2.55	2	0.626

Exhibit A3.8 Grade 4 teacher questionnaire factors *cont'd ...*

Scale name	Scale label	Items	Mean	Std	No. items	Reliability
tcalcrout	TQ - routine calculator use	q17c q17d	3.49	1.09	2	0.596
tcalccomp	TQ - complex calculator use	q17a q17b	3.18	1.24	2	0.518
tcompacc	TQ - computer access	q18 q31	6.54	4.13	2	0.747
tmadiscpra	TQ - maths - discover + practice	q19a q19b	3.36	1.48	2	0.696
tsciprocprac	TQ - science - procedures + practice	q32a q32c	2.95	1.46	2	0.665
tlookupsim	TQ - lookup + simulations	q19c q32b q32d	3.25	1.16	3	0.531
tmascimot	TQ - maths + science - motivation	q26d q26e q40d q40e	3.49	2.33	4	0.866
tscistudran	TQ - science - student range	q40a q40b q40c	3.36	2.34	3	0.778
tmastudran	TQ - maths - student range	q26a q26b q26c	3.75	2.34	3	0.689
tmacpd	TQ - maths professional development	q41a q41b q41c q41d q41e q41f	3.25	3.67	6	0.876
tscicpd	TQ - science professional development	q27a q27b q27c q27d q27e q27f	5.34	3.61	6	0.831

Exhibit A3.9 Grade 4 school questionnaire factors

Scale name	Scale label	Items	Mean	Std	No. items	Reliability
hcomlabeq	HQ - computer/lab equipment	q18g q18h q18l q18m q18n	2.84	2.36	5	0.897
hcalcavail	HQ - calculator availability	q18i q18o	0.74	1.40	2	0.758
hmatbud	HQ - materials/budget	q18a q18b	1.78	2.23	2	0.808
hinfrast	HQ - infrastructure	q18c q18d q18e	3.22	2.58	3	0.763
hlibav	HQ - library and audio-visual resources	q18j q18k q18p q18q	2.44	2.22	4	0.885
hprobbehav	HQ - problem behaviours	q17a3 q17a4 q17a5 q17a6 q17a7 q17a8 q17a9 q17a10 q17a11 q17a12 q17a13	2.11	1.22	11	0.865
hschclim1	HQ - school climate - teachers	q8a q8b q8c q8d	7.72	1.29	4	0.840
hsevprob1	HQ - severity of problem 1	q17b5 q17b7 q17b10 q17b11 q17b12	2.07	2.18	5	0.864
hsevprob2	HQ - severity of problem 2	q17b3 q17b4 q17b6 q17b8 q17b9	0.77	1.42	5	0.792
hablate	HQ - absenteeism/lateness	q17a1 q17a2 q17b1 q17b2	3.55	2.30	4	0.789
hschclim2	HQ - school climate - children and parents	q8e q8f q8g q8h	6.48	1.66	4	0.833
hprofdev	HQ - professional development	q13a q13b q13c q13d q13e	7.93	2.51	5	0.890

Exhibit A3.10 Grade 8 pupil questionnaire factors

Scale name	Scale label	Items	Mean	Std	No. items	Reliability
SQencos	SQ - enjoyment and confidence in science	q11a q11b q11c_neg q11d q11e_neg q11f q11g_neg q11h	6.054	2.339	8	0.897
SQvalms	SQ - value of science and maths	q9a q9b q9c q9d q9e q12a q12b q12c q12d q12e	6.301	1.885	10	0.842
SQactm	SQ - maths activities	q10a q10b q10c q10d q10e q10f q10g q10h q10i q10o	4.712	1.552	10	0.786
SQenjm	SQ - enjoyment of maths	q8b q8d q8g_neg q8h	4.832	2.567	4	0.851
SQconm	SQ - confidence in maths	q8a q8c_neg q8e_neg q8f	6.316	2.310	4	0.791
SQsciex	SQ - science activities - experiment and observation	q13a q13b q13c q13d q13e	6.002	2.101	5	0.827
SQindwk	SQ - independent work	q10l q13m	6.090	2.345	2	0.541
SQscith	SQ - science activities - theory and explanation	q13f q13g q13h q13i q13j	5.462	2.088	5	0.757
SQoutac	SQ - out of school activities 2	q17g q17i q17k	2.177	1.525	3	0.458
SQtimhw	SQ - time spent on homework	q18b q19b	4.180	1.304	2	0.720
SQteach	SQ - whole class teaching mode	q10k q13l	7.595	2.486	2	0.632
SQsclim	SQ - pupil perception of school climate	q15a q15b q15c	6.627	1.986	3	0.585
SQcomsw	SQ - use of computer - school work	q10q q13p q14c1 q14c2	3.139	1.744	4	0.584
SQfrehw	SQ - frequency of homework	q18a q19a	4.476	1.584	2	0.574
SQchkhw	SQ - check homework in class	q10j q13k	4.693	2.763	2	0.530
SQoutac1	SQ - out of school activities 1	q17a q17b q17c q17h q17j	5.400	1.765	5	0.591

Exhibit A3.11 Grade 8 maths teacher questionnaire factors

Scale name	Scale label	Items	Mean	Std	No. items	Reliability SQencos
TQMact1	TQM - frequency of activities: problem solving & explanation	mq17h mq17i mq17j mq17k mq17l	5.036	1.611	5	0.670
TQMact2	TQM - frequency of activities: data, geometry, algebra	mq17c mq17d mq17e	3.499	0.702	3	0.593
TQMact3	TQM - frequency of activities: number & routine problem solving	mq17a mq17b mq17g	5.209	1.655	3	0.433
TQMsc1	TQM - school climate: children & parents	mq12e mq12f mq12g mq12h	5.181	1.691	4	0.840

Exhibit A3.11 Grade 8 maths teacher questionnaire factors *cont'd ...*

Scale name	Scale label	Items	Mean	Std	No. items	Reliability
TQMsc2	TQM - school climate: teachers	mq12a mq12b mq12c mq12d	7.032	1.229	4	0.730
TQMsafe	TQM - teacher perception of safety	mq10a mq10b mq10c	7.710	1.762	3	0.802
TQMhw1	TQM - homework: amount, question sets and teacher use	mq26 (inc. mq25) mq27 mq28a mq29a mq29b mq29e	6.181	1.440	6	0.699
TQMhw2	TQM - homework: class use	mq29c mq29d	4.737	2.152	2	0.394
TQMhw3	TQM - homework type: active	mq28b mq28c	2.373	2.067	2	0.402
TQMcc1	TQM - computer use	mq23a mq23b mq24a mq24b mq24c mq24d	2.008	1.912	6	0.908
TQMcc2	TQM - routine calculator use	mq22a mq22b	4.212	2.328	2	0.742
TQMcc3	TQM - complex calculator use	mq22c mq22d	4.235	2.306	2	0.648
TQMlim1	TQM - limitation: teaching resources	mq18i mq18j mq18k mq18l mq18m	1.771	1.750	5	0.770
TQMlim2	TQM - limitation: computer resources	mq18f mq18g mq18h	2.628	2.593	3	0.815
TQMlim3	TQM - limitation: student motivation	mq18d mq18e	4.695	3.010	2	0.886
TQMlim4	TQM - limitation: student range	mq18a mq18b mq18c	2.853	1.856	3	0.548
TQMcpd	TQM - professional development	mq9a mq9b mq9c mq9d mq9e mq9f	5.957	3.179	6	0.745
TQMint	TQM - interaction with other teachers	mq8a mq8b mq8c mq8d	2.923	1.731	4	0.654

Exhibit A3.12 Grade 8 science teacher questionnaire factors

Scale name	Scale label	Items	Mean	Std	No. items	Reliability
TQSact1	TQS - frequency of activities: observe/ investigate	sq17a sq17c sq17d sq17e	4.966	1.494	4	0.676
TQSact2	TQS - frequency of activities: explain & relate	sq17i sq17j	6.812	2.347	2	0.733
TQSact3	TQS - frequency of activities: passive learning	sq17b sq17f sq17g sq17h	4.350	1.429	4	0.541
TQSsc1	TQS - school climate: children and parents	sq12e sq12f sq12g sq12h	5.293	1.770	4	0.844
TQSsc2	TQS - school climate: teachers	sq12a sq12b sq12c sq12d	6.950	1.441	4	0.801
TQSsafe	TQS - teacher perception of safety	sq10a sq10b sq10c	7.691	1.665	3	0.775
TQShw1	TQS - homework: amount, question sets and teacher use	sq24 (inc. sq23) sq25 sq26a sq27a sq27b sq27e	5.922	1.492	6	0.732
TQShw2	TQS - homework: other types and class use	sq26b sq26c sq26d sq26e sq26f sq26g	3.663	1.299	8	0.647

Exhibit A3.12 Grade 8 science teacher questionnaire factors *cont'd ...*

Scale name	Scale label	Items	Mean	Std	No. items	Reliability
TQScom	TQS - computer use	sq21 sq22a sq22b sq22c sq22d sq22e	2.041	1.665	6	0.845
TQSlim1	TQS - limitation: teaching resources	sq18i sq18j sq18k sq18l sq18m	2.562	1.981	5	0.809
TQSlim2	TQS - limitation: computer resources	sq18f sq18g sq18h	3.536	2.738	3	0.851
TQSlim3	TQS - limitation: student motivation	sq18d sq18e	4.580	2.871	2	0.879
TQSlim4	TQS - limitation: student range	sq18a sq18b sq18c	2.813	1.901	3	0.668
TQScpd	TQS - professional development	sq9a sq9b sq9c sq9d sq9e sq9f	5.656	3.488	6	0.816
TQSint	TQS - interaction with other teachers	sq8a sq8b sq8c sq8d	3.248	1.785	4	0.688

Exhibit A3.13 Grade 8 school questionnaire factors

Scale name	Scale label	Items	Mean	Std	No. items	Reliability
HQres1	HQ - resourcing: budget, materials and staff	q19a q19b q19i q19l q19o q19r q19s	2.198	1.856	7	0.822
HQres2	HQ - resourcing: library and audio-visual resources	q19j q19k q19p q19q	2.630	2.218	4	0.909
HQres3	HQ - resourcing: computers and software	q19g q19h q19m q19n	3.765	2.727	4	0.906
HQres4	HQ - resourcing: infrastructure and special equipment	q19c q19d q19e q19f	4.533	2.841	4	0.832
HQvac1	HQ - vacancies: recruitment incentives	q17a q17b q17c	1.976	3.679	3	0.934
HQvac2	HQ - vacancies: difficulty filling vacancies	q16a q16b q16c	5.182	2.806	3	0.704
HQcpd	HQ - professional development	q13a q13b q13c q13d q13e	6.764	2.314	5	0.855
HQsc1	HQ - school climate: problem behaviours 2	q18a8 q18a9 q18a10 q18a11 q18a12 q18a13	2.773	1.327	6	0.854
HQsc2	HQ - school climate: problem behaviours 1	q18a1 q18a2 q18a3 q18a4 q18a5 q18a6 q18a7	5.170	2.115	7	0.866
HQsc3	HQ - school climate: school climate: teachers and students	q8a q8b q8c q8d q8g q8h	7.268	1.273	6	0.859
HQsc4	HQ - school climate: school climate: parents	q8e q8f	5.376	1.787	2	0.771
HQsc5	HQ - school climate: Severity of problem 1	q18b1 q18b2 q18b3 q18b4 q18b5 q18b7 q18b10	3.731	2.040	7	0.863
HQsc6	HQ - school climate: Severity of problem 2	q18b6 q18b8 q18b9 q18b11 q18b12 q18b13	1.751	1.864	6	0.849

TIMSS 2007 International Reports available at http://timssandpirls.bc.edu/TIMSS2007 www

A3.3 Details of multi-level regression analysis

The following types of data were available for the analysis of the international study outcomes in England:

- Internationally derived scales for pupils' performance in mathematics and science (at grade 4 and grade 8)
- Nationally derived factor scores for pupils, teachers and schools derived from questionnaire information
- Pupil background information, both from questionnaires and the National Pupil Database
- Class and school information.

Analysis was undertaken to investigate which factors at the school, class and pupil levels might be associated with the international attainment scales and nationally derived attitudinal factors.

Setting up multi-level models

Multi-level modelling is a development of a common statistical technique known as 'regression analysis'. This is a technique for finding a straight-line relationship which allows us to predict the values of some measure of interest ('dependent variable') given the values of one or more related measures. For example, we may wish to predict schools' average test performance given some background factors, such as free school meals and school size (these are sometimes called 'independent variables').

Multi-level modelling takes account of data which is grouped into similar clusters at different levels. For example, individual pupils are grouped into classes, and those classes are grouped within schools. There may be more in common between pupils within the same class than with other classes, and there may be elements of similarity between different classes in the same school. Multi-level modelling allows us to take account of this hierarchical structure of the data and produce more accurate predictions, as well as estimates of the differences between pupils, between classes, and between schools.

As an improvement on the national analysis of 2003 TIMSS data, prior attainment data from the National Pupil Database has been included in these 2007 models. The analysis reported here is therefore a 'value-added' analysis. This means that any reported association between an independent and dependent variable is acting 'over and above' the effect of prior attainment.

The models fitted to the data incorporated three levels:

1. School

2. Class

3. Pupil

Thus, there are assumed to be variations between schools in their average scores, between classes in the same school, and, within each class, variations between pupils in their

attitudes and cognitive scores. The sizes of these variations at each level of the model are measured in terms of 'random variances', and the relative sizes of these are of interest.

For each outcome measure the fitting process was carried out in two stages:

1. The 'base case', with no background variables

2. Including school-level, class-level and pupil-level variables in the final model, removing those which were clearly not significant.

Pupil, class and school composite variables were derived following factor analysis of selected attitude questions on each instrument (see above).

Internationally derived TIMSS attainment scales have five plausible values for each pupil within each subject. A brief sensitivity analysis was carried out to confirm that taking the mean of these five values leads to an underestimate of model coefficient standard errors. Instead, five multi-level models were run for each subject at each grade: one for each set of plausible values. The final model results were obtained by averaging the results of these five interim models. In order to end up with a model containing broadly significant coefficients, terms had to be significant at the 10 per cent level in all five interim models. In other words, it was important to use a generous significance level in the interim models, so that key variables that might be significant at the five per cent level were not inadvertently lost too early in the modelling process. Items identified as significant in the final model were significant at the five per cent level. To aid interpretation, only those terms which were significant at the five per cent level were plotted in the final charts.

Results of multi-level analysis - relationships with background variables

In technical language, the multi-level model results comprise the random variances at each level at each stage of model fitting, plus the coefficients of the background variables in the final model. From estimated standard errors we may deduce whether or not variances or coefficients are statistically significant at the 5 per cent level, as well as 95 per cent confidence intervals for each parameter.

These results may not be easy to interpret for all readers. To aid in interpretation, therefore, the coefficients which express the estimated relationships between the scales and each of the background variables have been converted into 'Quasi Effect Size coefficients' (Schagen and Elliot, 2004) which represent the expected change (in percentage of the standard deviation) in the outcome for an average switch between low and high values in the background variables.

Quasi Effect Size coefficients are plotted in Exhibits A3.14 to A3.23 for each of the international scales at Grade 4 and Grade 8 in science and mathematics, as well as for each of the attitude scales analysed. For each variable, the estimated Quasi Effect Size coefficient is plotted as a diamond, with a vertical line indicating the 95 per cent confidence interval for the estimate. Any variable whose line intersects the horizontal zero axis can be regarded as not statistically significant (at the 5 per cent level). Positive values imply a positive relationship with the international scale outcome; negative values imply that scale values tend to decrease with higher values of the given background variable. A

list of variables that were used for the modelling at each grade is included in Exhibits A3.24 and A3.25. A summary of the quasi effect sizes for significant variables in each model is found in Exhibits A3.26 to A3.35.

To further aid interpretation, the main findings from each of the models have been summarised as a series of bullet points. These written results can be compared with the tables and figures. Care should be taken when interpreting the coefficients of some variables due to correlations between these variables. For example, attitude measures were included in the attainment models and, since particular attitudes (e.g. confidence in mathematics) are biased towards one gender, the coefficient for gender is often strongly influenced by attitude variables.

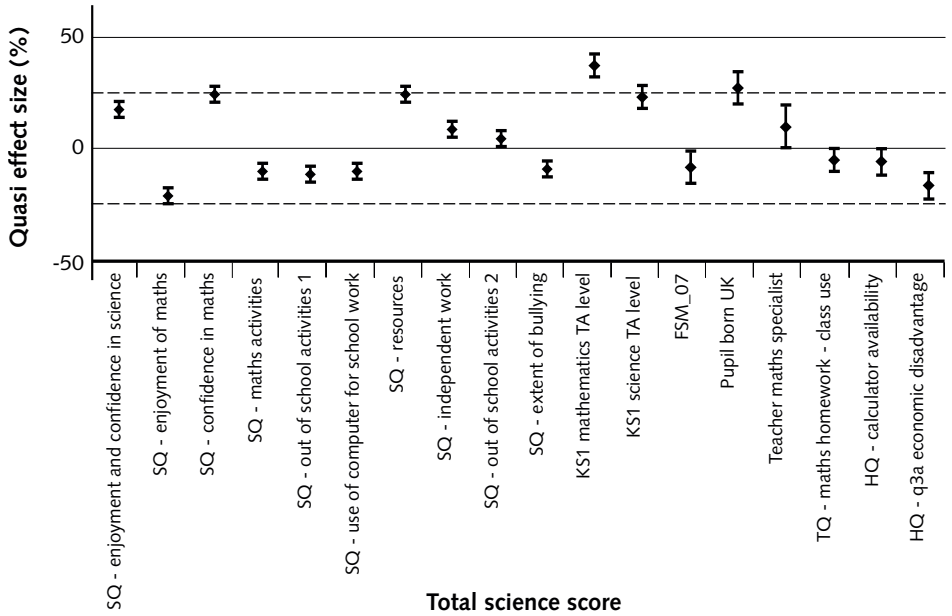
It should be emphasised at this point that *the results of these models document associations and not causal relationships*. Also, since many variables were included in the models, we would always expect some to come out significant that were not genuine associations due to the significance level used. Using a more stringent significance level, however, could have resulted in missing genuine associations, hence it was decided to use the 5 per cent level.

A3.4 Results of multi-level modelling

Grade 4 science

Models were run for the five science plausible values. All available variables, including prior attainment measures, were used in the initial models and those that remained significant (at the 10 per cent level) for all five initial models were selected for the interim models. The final model was derived by averaging the outcomes of the five interim models. The outcomes are summarised in Exhibit A3.14. Only the statistically significant findings are listed below.

Exhibit A3.14 Quasi effect sizes for grade 4 science



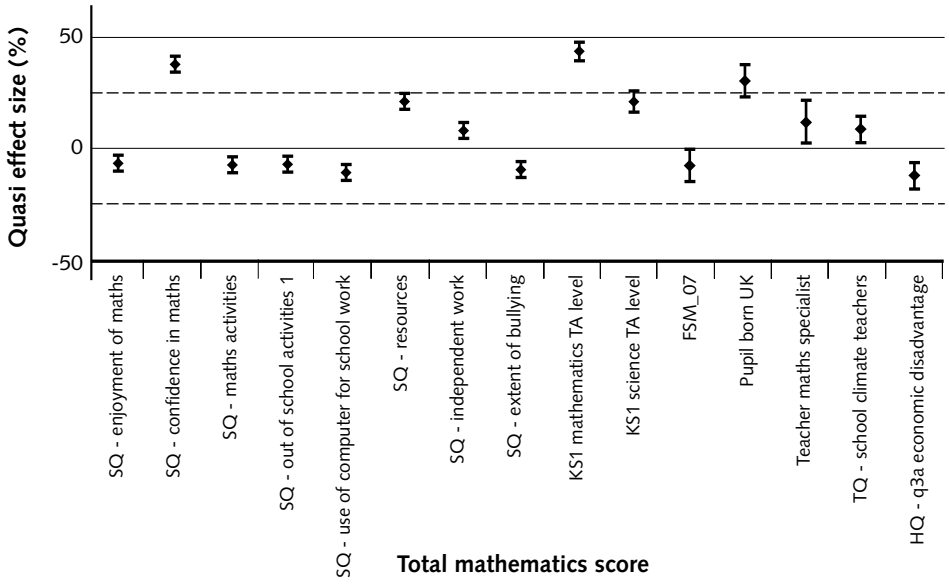
- Taking no background variables into account, the pupil-level variance was greater than both the teacher-level and school-level variances, indicating that differences between individual pupils within a school were larger than those between pupils in different classes or schools. When background variables were controlled for, 86 per cent of the school-level and 68 per cent of the teacher-level variances were explained, but only a 44 per cent reduction was achieved for the pupil-level variance, in terms of science achievement at grade 4.
- Taking other background variables into account, the strongest positive predictor of science attainment was key stage 1 (KS1) mathematics teacher assessment (TA) level. Similarly, KS1 science TA level also had one of the strongest positive effects. The higher the TA levels, the better the pupils did on TIMSS 2007.
- If the pupils' teacher was a mathematics specialist, this had a positive association with pupils' science scores.
- The second strongest positive predictor of attainment in science at grade 4 was being born in the UK.
- Percentage of economically disadvantaged pupils in the school and each pupil's eligibility for free school meals were both significant negative predictors of attainment in science at grade 4. In contrast, resources (i.e. books and other resources at home and computer resources accessible elsewhere) was a significant positive predictor. However, caution must be exercised when looking at these effect sizes from the model, as these three factors were likely to be correlated. In general, pupils from wealthier families were likely to do better in science.
- Enjoyment and confidence in science was one of the strongest positive predictors of science attainment. Confidence in mathematics was also a strong positive predictor of attainment in science, but enjoyment of mathematics turned out to have strong negative effects on science attainment. However, the attitude models showed that the confidence and enjoyment of mathematics were strongly correlated. Therefore, the negative effect of enjoyment of mathematics could be a result of collinearity between these two explanatory variables. On the other hand, enjoyment and confidence in science did not seem to correlate with enjoyment or confidence in mathematics.
- Pupil reports of being bullied were a significant negative predictor of science attainment. The greater the extent of perceived bullying (e.g. verbal or physical bullying, or social exclusion), the lower the science scores. But, unlike the mathematics model, teachers' perception of school climate (i.e. the extent to which parents and children support the school) was not a significant predictor of science attainment at grade 4.
- In the classroom, mathematics activities and computer use for school work were both negative predictors of grade 4 science attainment, while independent work during lessons was a positive predictor. This might indicate that grade 4 pupils who are encouraged to work independently consequently do better in science than those who are not. Conversely, it might indicate that those who do better are consequently encouraged to work independently to a greater extent. The direction of causality cannot be confirmed by these findings.

- Using homework in class and having more calculators available for school work both had borderline significant negative effects on science attainment. These are potentially surprising findings, since using homework as the basis for classroom learning and using a calculator to support learning in mathematics might be seen as a useful means of enhancing learning, even in science where mathematical skills are useful. It is not obvious why this finding should have arisen and it is possible that, being borderline significant, it is a spurious result. It is possible that discussion of homework tasks in class time might follow from lower attainment rather than necessarily being a cause of it or, again, this might be a spurious result.
- 'Time spent on out of school activities 1' (i.e. watch TV, play computer games, use the internet, play sports, listen to music) was a significant negative predictor. On the other hand, 'time spent on out of school activities 2' (i.e. read a book for fun, do homework, do art, play musical instruments, do jobs at home) was a significant positive predictor. Again, it cannot be stated with certainty what the direction of causality is for these findings. All that can be said for sure is that pupils who spend more time on the first group of leisure activities do less well than those who spend more time on the second group.

Grade 4 mathematics

Models were run for the five mathematics plausible values. All available variables, including prior attainment measures, were used in the initial models and those that remained significant (at the 10 per cent level) for all five initial models were selected for the penultimate models. The final model was derived by averaging the outcomes of the five penultimate models.

Exhibit A3.15 Quasi effect sizes for grade 4 mathematics



- Taking no background variables into account, the pupil-level variance was greater than both the teacher-level and school-level variances. When background variables were controlled for, 77 per cent of the school-level and 68 per cent of the teacher-level variance was explained, but only a 50 per cent reduction was achieved for the pupil-level variance.

- Taking other background variables into account, the strongest positive predictor of mathematics attainment at grade 4 was KS1 mathematics TA level. Similarly, KS1 science TA level also had one of the strongest positive effects. As was the case for science, the higher the TA levels, the better the pupils did.
- If the pupils' teacher was a mathematics specialist, this had a positive association with pupils' mathematics scores.
- The second strongest positive predictor was confidence in mathematics, whilst enjoyment of mathematics was a weak but significant negative predictor. However, the attitude models showed that the confidence and enjoyment of mathematics were strongly correlated. Therefore the negative effect of enjoyment of mathematics could be a result of collinearity between these two explanatory variables.
- Being born in the UK was the third strongest positive predictor of pupils' mathematics score.
- Percentage of economically disadvantaged pupils in the school and each pupil's eligibility for free school meals were both significant negative predictors. Resources (i.e. books and other resources at home and computer resources accessible elsewhere) was a significant positive predictor. However, caution must be taken when looking at these effect sizes from the model, as these three factors were likely to be correlated. In general, pupils from wealthier families were likely to do better in mathematics.
- Teachers' perception of their contribution to school climate was a significant positive predictor of mathematics attainment. In other words, where teachers were more positive about the job satisfaction of teachers in their school, thought that they understood the school's curricular goals, were successfully in implementing the curriculum, and had high expectations for children's achievement, so attainment in mathematics rose.
- Conversely, pupils being bullied (verbally, physically or socially) was a significant negative predictor of mathematics attainment. The safer pupils feel, the better their mathematics scores.
- Mathematics activities, together with computer use for school work, were both negative predictors of attainment in mathematics at grade 4. Thus, as pupils do more of the classroom activities listed and as they use computers more for school work, so their attainment in mathematics decreases. This sounds counter-intuitive, but might indicate that additional practice is being offered to lower achieving pupils.
- On the contrary, independent work was a positive predictor. Thus, as pupils more frequently work independently in class, so their attainment rises. This might be either a cause or an effect of higher attainment in mathematics.
- Out of school activities 1' (watch TV, play computer games, use the internet, play sports, listen to music) was a weak but significant negative predictor. The more time a pupil spent on such activities each day, the lower their mathematics score. Such activities might have distracted a pupil from studying at home and hence resulted in negative effects, or they might have been a result of lower attainment. In contrast, 'out of school activities 2' (read a book for fun, do homework, do art, play musical instruments, do jobs at home) was not associated with mathematics attainment at grade 4, although it was associated with science attainment at the same grade.

Grade 4 attitude models

Models were run for each of the three factors derived from the student questionnaire factor analysis:

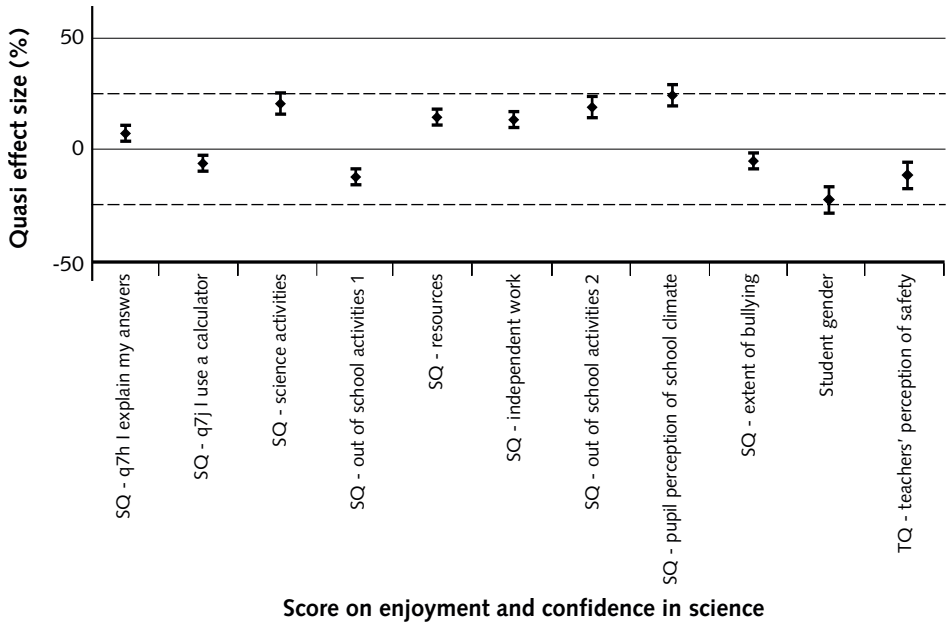
- enjoyment and confidence in science
- enjoyment of mathematics
- confidence in mathematics.

All available variables, including prior attainment measures, were used in the initial models and those that remained significant (at the 5 per cent level) were selected for the final models.

In all three cases, the pupil-level variance was greater than the class-level and school-level variances, indicating that difference between individual pupils were larger compared to those between pupils in different classes/schools.

Enjoyment and confidence in science

Exhibit A3.16 Quasi effect sizes for grade 4 enjoyment and confidence in science

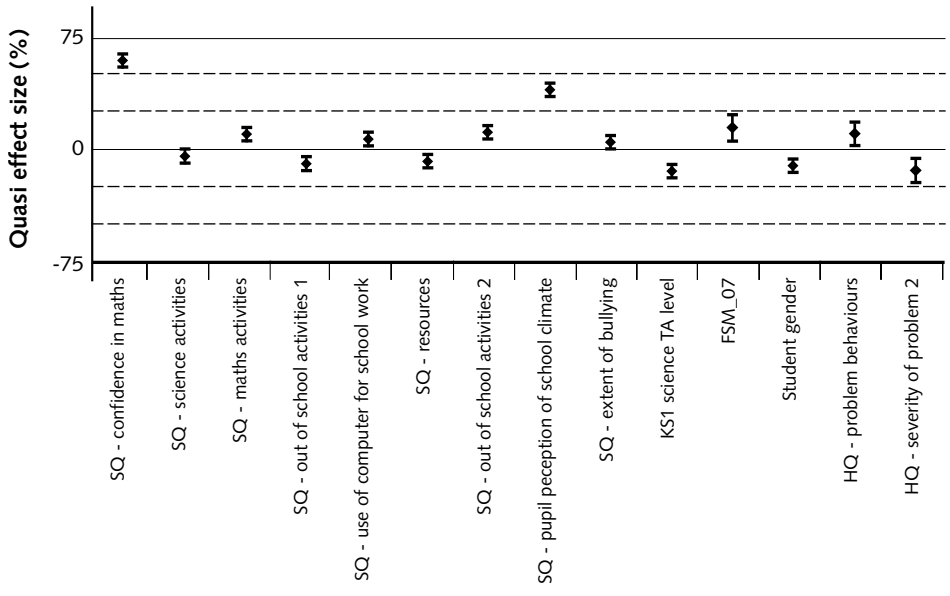


- A strong positive predictor for enjoyment and confidence in science was pupils' perception of school climate (i.e. pupils like being at school and want to do their best, while they believe that teachers also want them to do their best). Being bullied acted as a negative predictor of enjoyment and confidence in science. Having a positive atmosphere at school probably boosts pupils' enjoyment of school and hence impacts on their enjoyment and confidence in science.
- On the other hand, teachers' perception of safety was a significant negative predictor (i.e. the safer teachers feel their school is, the less their pupils enjoy and are confident in science). However, this factor might be correlated to the extent of bullying at school, and to pupils' perception of school climate. Collinearity could be an issue, rendering the reliability of this result suspect.

- Pupil gender turned out to be a strong predictor, with boys scoring significantly higher in enjoyment and confidence in science than girls, when all other background variables were controlled for. This has been discussed in Chapter 7.
- Resources (i.e. books and other resources at home and computer resources accessible elsewhere) was a significant positive predictor. In other words, as the number of available resources rises, so too does enjoyment and confidence in science. This suggests that a positive attitude to learning is associated with access to such resources.
- In the classroom, science activities, independent work and chances for the pupils to explain their own answers in mathematics were all significant positive predictors of enjoyment and confidence in science, suggesting that active engagement is key to a positive attitude. Using calculators in mathematics lessons, however, turned out to be a negative predictor: as use of a calculator in mathematics lessons increased, so enjoyment and confidence in science decreased. This might be because lower attaining pupils depend on their calculators to a greater extent than others, suggesting that this is simply an effect of lower attainment and lower engagement with learning. It is also possible that collinearity could be an issue, if pupils answered from the perspective of independent work and science activities involving calculator use. This seems unlikely, however.
- 'Time spent on out of school activities 1' (i.e. watch TV, play computer games, use the internet, play sports, listen to music) was a significant negative predictor. On the other hand, 'time spent on out of school activities 2' (i.e. read books for fun, do homework, do art, play musical instruments, do work at home) was a significant positive predictor. Although not directly related to science, these activities had positive impacts on pupils' enjoyment and confidence in science. The science attainment model showed that such activities also had a positive association with pupils' science achievement, though not with their mathematics achievement.
- Enjoyment of mathematics and confidence in mathematics were not significant predictors of confidence and enjoyment in science.

Enjoyment of mathematics

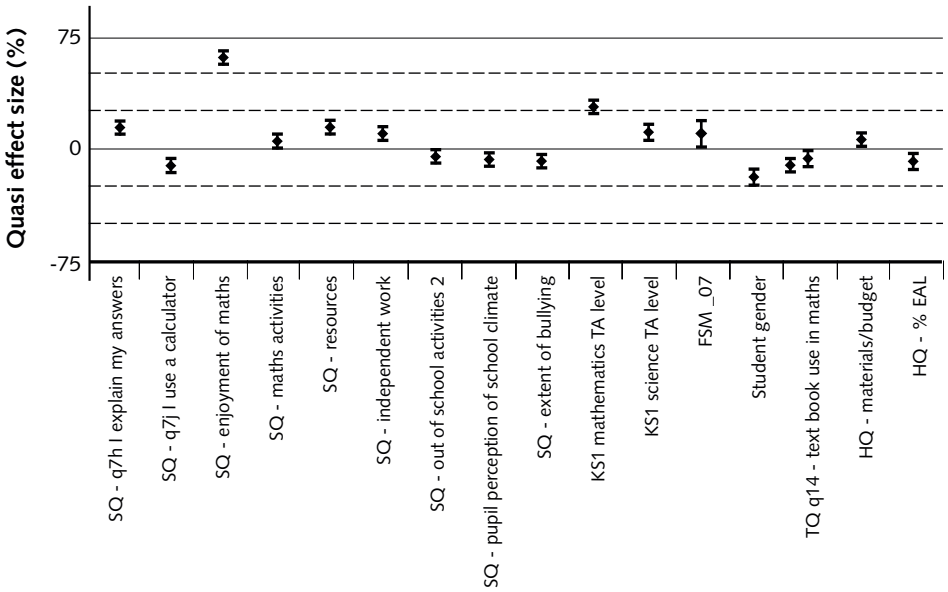
Exhibit A3.17 Quasi effect sizes for grade 4 enjoyment of mathematics



- The strongest positive predictor for enjoyment of mathematics was confidence in mathematics. Enjoyment and confidence in science was not a significant variable.
- Collinearity was an issue for factors concerning the school environment, thus the results for these factors may be less reliable. Pupils' perception of school climate was the second strongest positive predictor as indicated by the results. Thus, as pupils' views of their school as a positive environment increased, so too did their enjoyment of mathematics. 'Severity of problem 2' (i.e. the extent to which headteachers viewed truanting, nonconformity with uniform rules, cheating, vandalism and theft as problematical in school) was a significant negative predictor of enjoyment in mathematics. These findings are as might be expected. Surprisingly, however, the extent of bullying and problem behaviours turned out to have positive effects: as each of these increased, so enjoyment of mathematics also increased. This is counter-intuitive and was likely to arise from collinearity.
- In the classroom, mathematics activities and use of computer for school work were both positive predictors of enjoyment in mathematics.
- Science activities turned out to be a negative predictor of enjoyment in mathematics, but this result was borderline.
- 'Time spent on out of school activities 1' (i.e. watch TV, play computer games, use internet, play sports, listen to music) was a significant negative predictor of enjoyment in mathematics. On the other hand, 'time spent on out of school activities 2' (i.e. read a book for fun, do homework, do art, play musical instruments, do jobs at home) was a significant positive predictor of enjoyment. Although not directly related to mathematics, these activities had positive impacts on pupils' enjoyment of mathematics.
- Boys turned out to enjoy mathematics more than girls did, when all other background variables were controlled for. The difference was significant but not large, although there were no significant differences in achievement overall.
- Eligibility for free school meals was a positive predictor of enjoyment in mathematics: pupils who were eligible for free school meals enjoyed mathematics more, on average, than those who were not eligible, controlling for other variables. The availability at home of resources such as books and other educational resources, however, was a negative predictor. As in other cases, these variables may be correlated and working against each other in the model.
- KS1 science TA level turned out to be a negative predictor of enjoyment in mathematics. However, the mathematics confidence model suggested that there was a significant correlation between confidence in mathematics and KS1 science TA level. As confidence in mathematics played a critical role in predicting the enjoyment of mathematics, it was not surprising that the effect of KS1 science TA level might appear more negative than it really is.

Confidence in mathematics

Exhibit A3.18 Quasi effect sizes for grade 4 confidence in mathematics



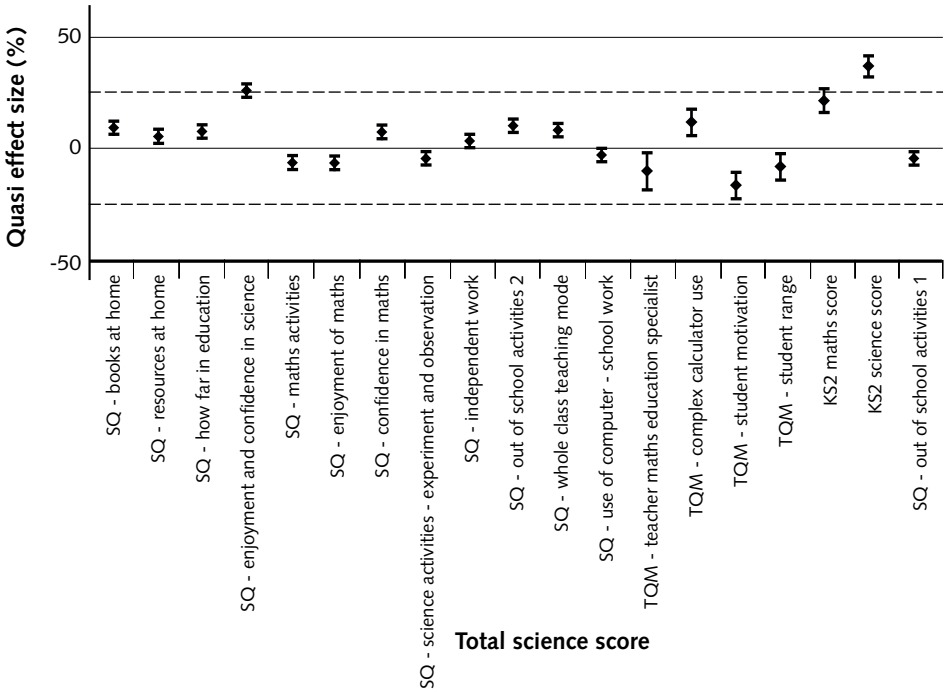
- The strongest positive predictor for confidence in mathematics was enjoyment of mathematics. Enjoyment and confidence in science was not a significant variable.
- KS1 mathematics TA level and KS1 science TA level were both significant positive predictors, with mathematics TA level having the stronger effect on pupils' confidence in mathematics.
- In the classroom, mathematics activities, independent work and chances for the pupils to explain their answers were all significant positive predictors of confidence in mathematics. Use of calculators and use of textbooks, however, turned out to be negative predictors. In the questionnaires it was not specified whether independent work or mathematics activities involved the use of calculators or textbooks. If so, collinearity could be an issue here. However, it is equally possible that these are real effects. It is possible that less confident pupils rely more on their calculators than do more confident pupils. Similarly, textbooks might be associated with poor confidence if their use results in more 'book learning' and less active engagement with mathematics, or if they are used more by less confident pupils using them for additional practise of insecure concepts.
- Outside the classroom, extent of bullying was a significant negative predictor of confidence in mathematics.
- Interestingly, pupils' perception of school climate (i.e. whether they like being at school, want to do their best and believe that their teachers want pupils to do their best) was also a negative predictor of confidence in mathematics, despite being a positive predictor of enjoyment in mathematics. It was not clear whether collinearity exists between this variable and bullying. One possible explanation is that high expectations from teachers could potentially affect confidence in two different ways: pupils could perceive high expectations as following from good performances and hence become more confident; alternatively, pupils might perceive high expectations as pressure and demand, losing confidence in themselves if they felt such expectations were not being met.

- At the school level, materials and budget was a significant positive predictor of confidence in mathematics, while percentage of pupils with English as an additional language was a significant negative predictor.
- 'Time spent on out of school activities 2' (i.e. read a book for fun, do homework, do art, play musical instruments, do work at home) was a significant but borderline negative predictor of confidence in mathematics. From the enjoyment of mathematics model, it was clear that 'out of school activities 2' and enjoyment of mathematics were correlated. This collinearity issue renders the reliability of the estimation of the effect of 'out of school activities 2' on confidence in mathematics suspect.
- Boys turned out to be more confident in mathematics than girls (controlling for all background variables).
- Resources was a positive predictor of confidence in mathematics. In other words, increased access to books and other resources in the home is associated with increased confidence in mathematics.
- Eligibility for free school meals was also a positive predictor of confidence in mathematics. It is not clear why this variable should be working in this way, though, given the general relationship between economic background and attainment, it might reflect positive encouragement given by teachers to lower attainers as a means of motivating them.

Grade 8 science

Models were run for the five science plausible values. All available variables, including prior attainment measures, were used in the initial models and those that remained significant (at the 10 per cent level) for all five initial models were selected for the interim models. The final model was derived by averaging the outcomes of the five interim models.

Exhibit A3.19 Quasi effect sizes for grade 8 science



- Taking no background variables into account, the class-level variance was greater than both the pupil-level and school-level variances. This reflects the policy of many secondary schools (87 per cent of the schools surveyed) to place pupils in sets according to their ability for science.
- However, when background variables were controlled, in all five interim models (and hence the final model), pupil-level variance was greater than both school-level and class-level variances. The background variables explained 90 per cent of the class-level variance, but only 34 per cent of the pupil-level variance.
- Interestingly, none of the variables from the science teacher questionnaire were significant in predicting pupils' science attainment, but some of the variables from the mathematics teachers were. TIMSS pupils were sampled on the basis of their mathematics class. Questionnaires were then sent to all the mathematics and science teachers for each pupil. There are likely to be more science teachers per pupil than mathematics teachers, so science teacher results relating to each pupil are averaged over more teachers. This could mean that the effects of science teacher responses are diluted. Some of the variables in the science and mathematics teacher questionnaires were very similar and this could explain why they are only apparent from the mathematics teachers here. Another possible explanation for this phenomenon could be that science tests tend to be high in mathematics content, so the influence of mathematics teacher responses is more crucial.
- Compared to the mathematics attainment model, more pupil-level variables were significant (pupil level factors are denoted by the prefix SQ in the Exhibits).
- Taking other background variables into account, the strongest negative predictors of attainment in science were unmotivated pupils in the mathematics class and wide range (in terms of ability, special needs, economic and language backgrounds, etc.) of pupils in the mathematics class.
- Other significant but weaker negative predictors of grade 8 science attainment were mathematics activities in class (based on pupils' reports), frequency of science experiments and observations, use of computer for schoolwork and the mathematics teacher being a mathematics education specialist. The latter result is borderline and may be influenced by other variables in the model and, as such, might be spurious. The outcome regarding use of computers might suggest that computers are predominantly used by weaker pupils for extra practice, although this is perhaps more likely to be true for mathematics than for science. Similarly, extra mathematics activities might be undertaken by weaker pupils, accounting for an effect on mathematics attainment, but less obviously on science attainment. It is less clear why being taught mathematics by a specialist teacher would impact negatively on science attainment. It is also unclear why the results regarding frequency of science investigations might impact negatively on science attainment: this is counter-intuitive. It seems likely that these variables are being influenced by others in the model.
- Confidence in mathematics appeared as a significant positive predictor of science attainment, whereas enjoyment of mathematics worked in the opposite direction. However, as enjoyment of mathematics and confidence in mathematics are strong positive predictors for each other (see the attitude models outlined earlier in this appendix), these variables are likely to be 'working against each other' in the model to generate this unexpected result.

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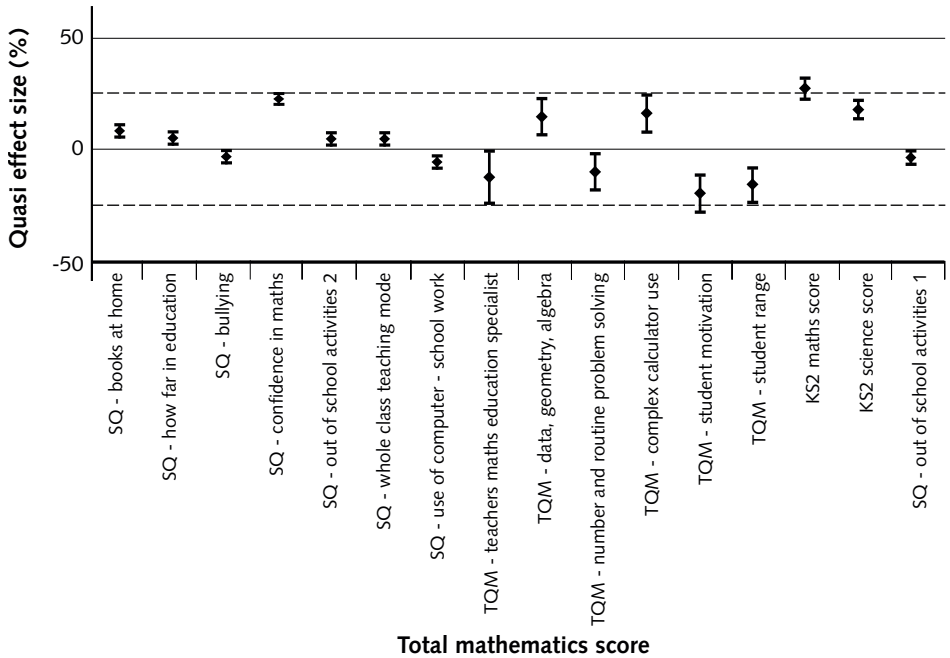
- Enjoyment and confidence in science was a strong positive predictor of attainment in science. However, gender was not a significant predictor of science attainment, even though boys rated significantly higher on enjoyment and confidence in science compared with girls. Since these variables are related, the effect of confidence may be masking the effect of gender.
- Prior attainments (KS2 mathematics and science scores) were also strong positive predictors, as expected, for science especially.
- Significant positive predictors in the classroom included whole class teaching mode, complex calculator use and independent work. It is likely that these are teaching strategies that work particularly well with higher achieving pupils. It cannot be said which is the direction of causality, however. It may be that pupils who are achieving highly are encouraged to use these modes of working to a greater extent, rather than that these modes of working lead to higher achievement.
- Significant positive predictors outside the classroom included number of books at home, resources at home, aspirations in education, and 'out of school activities 2' (read books for enjoyment, do homework, play musical instruments). Conversely, 'out of school activities 1' (television watching, playing computer games, playing with friends, internet usage, listening to music) was negatively associated with grade 8 science attainment. Again, it cannot be stated with certainty what the direction of causality is for these findings.

Grade 8 mathematics

Models were run for the five mathematics plausible values. All available variables, including prior attainment measures, were used in the initial models and those that remained significant (at the 10 per cent level) for all five initial models were selected for the interim models. The final model was derived by averaging the outcomes of the five interim models.

Exhibit A3.20 Quasi effect sizes for grade 8 mathematics



- Taking no background variables into account, the class-level variance was greater than both the pupil-level and school-level variances. This reflects the policy of many schools (96 per cent of the schools surveyed) to place pupils in sets according to their ability for mathematics.
- However, when background variables were controlled for, in all five interim models (and hence the final model), pupil-level variance was greater than both school-level and class-level variances. The background variables explained 80 per cent of the class-level variance, but only 30 per cent of the pupil-level variance.
- Taking other background variables into account, the strongest negative predictors of attainment in mathematics were unmotivated pupils and wide range (in terms of ability, special needs, economic and language backgrounds, etc.) of pupils in the mathematics class.
- Other weaker, but still significant, negative predictors were the extent of bullying in the school, use of computer for schoolwork, frequency of number and routine problem solving activities in the mathematics class (teacher reported), and the mathematics teacher being a mathematics education specialist. The latter result is borderline and may be influenced by other variables in the model and, as such, might be spurious.
- On the other hand, significant positive predictors in the classroom included whole class teaching mode (pupil reported), complex calculator use and activities in data, geometry and algebra (teacher reported). As was the case for science attainment, these may be teaching strategies that work particularly well with higher achieving pupils. As before, it is not possible to assign direction of causality.
- Prior attainments (in both mathematics and science scores at KS2) were strong positive predictors, as expected, of mathematics attainment.
- Confidence in mathematics was also a strong positive predictor of mathematics attainment. Boys were significantly more confident in mathematics than girls, but gender was not a significant predictor of mathematics attainment. Since these variables are related, the effect of confidence may be masking the effect of gender.
- Enjoyment of mathematics was not significant for any of the mathematics attainment models, but was a strong positive predictor of confidence in mathematics (see the attitude models outlined earlier in this appendix).
- Other significant positive predictors included number of books at home and pupils' aspiration in education ('How far in education do you expect to go?').
- 'Out of school activities 2' (book reading for enjoyment, doing homework and playing a musical instrument) was positively associated with grade 8 mathematics attainment whereas 'Out of school activities 1' (television watching, playing computer games, playing with friends, internet usage, listening to music) was a negative predictor. Again, it cannot be stated with certainty what the direction of causality is for these findings.

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Grade 8 attitude models

Models were run for each of the three factors derived from the student questionnaire factor analysis:

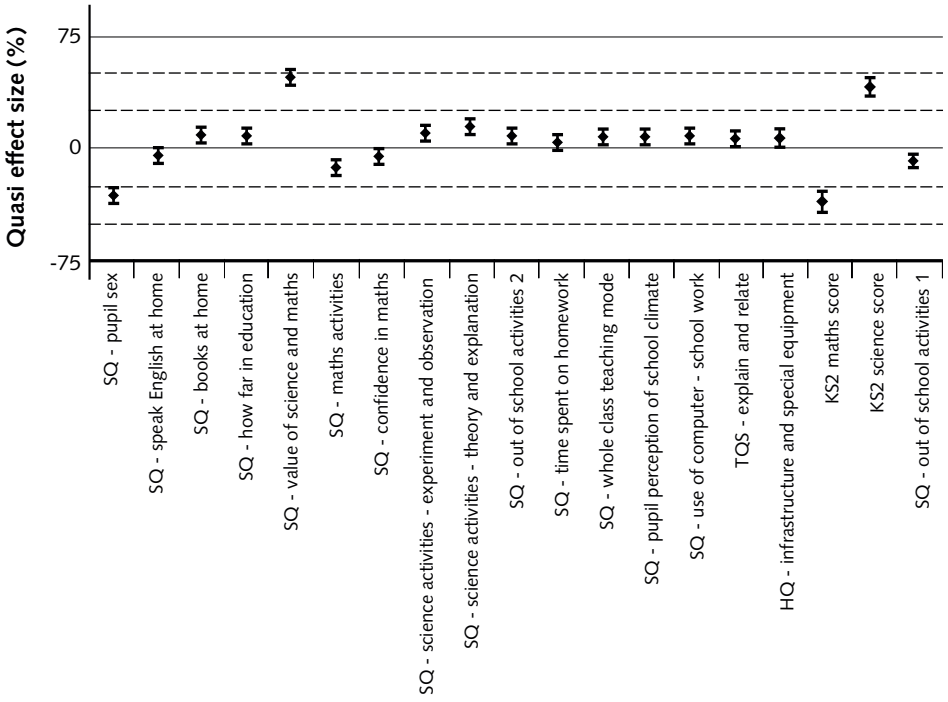
- enjoyment and confidence in science
- enjoyment of mathematics
- confidence in mathematics.

All available variables, including prior attainment measures, were used in the initial models and those that remained significant (at the 5 per cent level) were selected for the final models.

In all three models, the pupil-level variance was greater than the class-level and school-level variances, indicating that the differences between individual pupils were larger compared with those between pupils in different classes or schools.

Enjoyment and confidence in science

Exhibit A3.21 Quasi effect sizes for grade 8 enjoyment and confidence in science

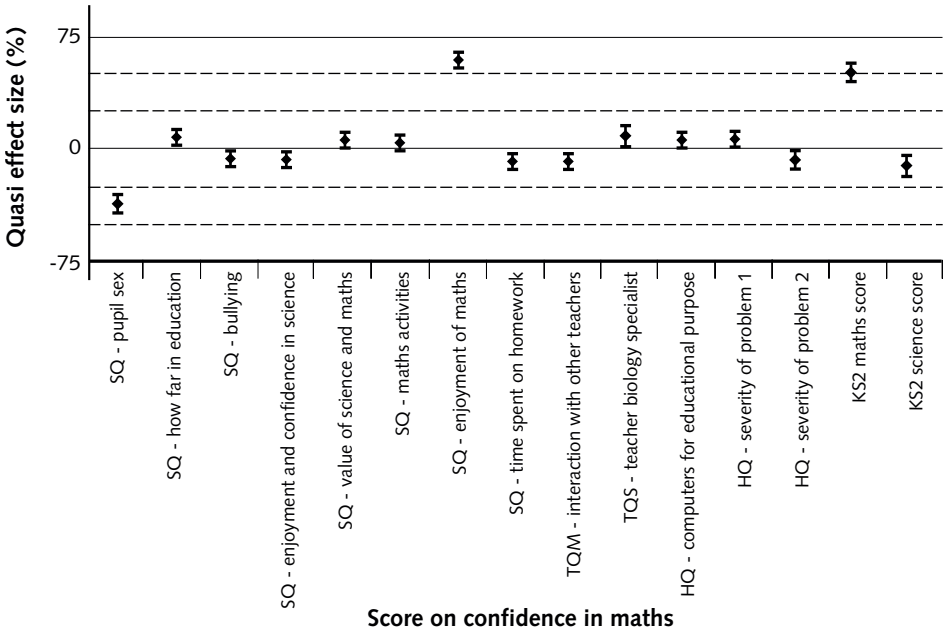


- The strongest positive predictors of enjoyment and confidence in science were pupils' KS2 science score and the extent to which pupils valued mathematics and science.
- KS2 mathematics score turned out to be the strongest negative predictor. This may be a spurious result caused by the correlation between KS2 science and mathematics scores.

- The next strongest predictor was a pupil's gender, with boys scoring higher in confidence and enjoyment of science compared with girls.
- Confidence in mathematics turned out to be a significant negative predictor of enjoyment and confidence in science, but the quasi-effect size was small and this was a borderline effect that can be treated as potentially spurious.
- Activities in the classroom with a significant positive effect on enjoyment and confidence in science included 'experiments and observation', 'theory and explanation', 'explaining and relating to daily life', whole class teaching mode and use of computer for school work. Each of these was derived from the student questionnaire except for 'explaining and relating to daily life', which was drawn from the science teacher questionnaire. The more that pupils experience each of these activities, the greater their enjoyment and confidence in science.
- On the contrary, the frequency of mathematics activities in the mathematics class was a negative predictor of enjoyment and confidence in science.
- At the school level, infrastructure and special equipment acted as a significant positive predictor, as did pupils' perception of school climate. If pupils enjoy school, want to do well and feel that their teachers want them to do well, they will tend to enjoy their science lessons more and be more confident in them. The same applies if their schools are regarded by the headteacher as being well resourced in terms of infrastructure and special equipment.
- Outside the school gate, the number of books at home, a pupil's aspiration in education, time spent on homework, and 'out of school activities 2' (read books, do homework, play musical instruments) were all significant positive predictors of enjoyment and confidence in science. However, 'out of school activities 1' (television watching, playing computer games, playing with friends, internet usage, listening to music) was a negative predictor. Again, it cannot be stated with certainty what the direction of causality is for each of these findings.
- Interestingly, frequency of English usage at home was a negative predictor - the more often a pupil spoke English at home, the lower their score on enjoyment and confidence in science. The vast majority of pupils reported speaking English at home always or almost always. Thus, this finding might simply reflect a higher level of motivation for education among pupils who have recently arrived, or whose families have relatively recently arrived, in England and who are in the earlier stages of acquiring English.

Confidence in mathematics

Exhibit A3.22 Quasi effect sizes for grade 8 confidence in mathematics

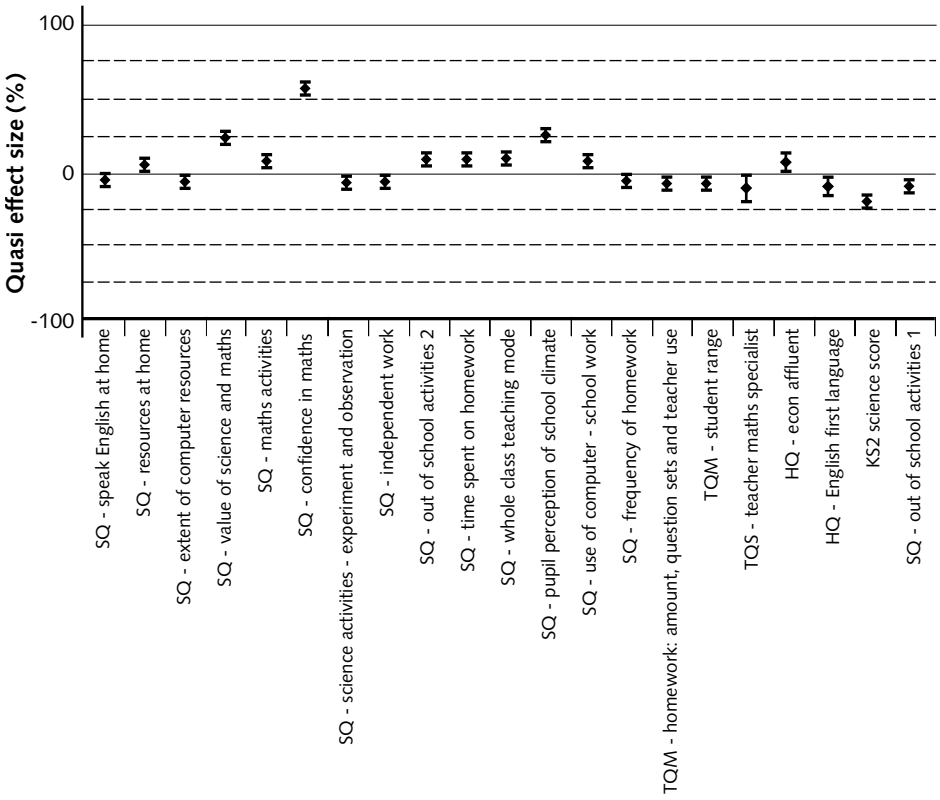


- The strongest positive predictor for confidence in mathematics was enjoyment of mathematics. On the contrary, enjoyment and confidence in science was a significant negative predictor, but this effect was smaller and borderline. These variables might have interacted to produce these findings.
- The second strongest positive predictor of confidence in mathematics was KS2 mathematics score. KS2 science score turned out to be a significant negative predictor. This may be a spurious result caused by the correlation between KS2 science and mathematics scores.
- Pupil's gender again turned out to be a strong predictor. Controlling for other variables, boys were more confident in mathematics than girls, although there was no significant difference in their overall performance in it.
- The value placed by pupils on science and mathematics was a significant positive predictor of confidence in mathematics, as was frequency of mathematics activities in class: the more pupils carried out the range of activities listed, the more confident they were in mathematics.
- At the school level, sufficiency of computers for education purposes was a significant positive predictor of confidence in mathematics. There was evidence to suggest that the science teacher being a biology specialist could have a positive effect on attitudes to mathematics, too. Professional interaction between teachers, however, was negative. Both of these were slight borderline effects and can probably be treated as spurious.
- Being bullied was a negative predictor of confidence in mathematics, as was the 'severity of problem 2' (serious behavioural problems) in the school: the more serious the headteachers felt behaviour problems were, the less confident pupils were in their mathematics abilities. Surprisingly, the factor 'severity of problem 1' (minor behavioural problems) was a positive predictor of confidence in mathematics. It is possible that schools with only the more minor behaviour problems are seen as being generally positive learning environments, thus promoting confidence in learning.

- A pupil's aspiration in education was associated with confidence in mathematics, but time spent on homework worked in the other direction. The longer pupils spent on homework, the less confident they were. This may be because less confident pupils take longer to complete their homework.

Enjoyment of mathematics

Exhibit A3.23 Quasi effect sizes for grade 8 enjoyment of mathematics



- The strongest positive predictor for enjoyment of mathematics was confidence in mathematics. Unlike the model for confidence in mathematics, enjoyment and confidence in science was not significant for enjoyment in mathematics.
- KS2 mathematics score was not significant either, implying that pupils could equally enjoy (or not enjoy) mathematics no matter how able they were in mathematics.
- Perhaps counter-intuitively, KS2 science score was the strongest negative predictor of enjoyment in mathematics. The better pupils did in their science test at key stage 2, the less they were enjoying mathematics at the end of key stage 3.
- The value pupils place on science and mathematics was a positive predictor of enjoyment in mathematics, as in all other attitude models.
- Unlike the other two attitude models, pupil gender was not significant in this case. Boys and girls enjoyed mathematics equally, although boys tended to be more confident in it.
- In the classroom, mathematics activities, whole class teaching mode and use of computers for school work were all significant positive predictors of enjoyment in mathematics. On

the other hand, science experiments and observations, independent work and wide pupil range were all negative predictors of enjoyment in mathematics. The latter two factors may tell us that pupils enjoy their learning more when working with others rather than independently, and that they enjoy their lessons more when teachers are able to focus on their needs rather than dealing with a wide range of needs in one class.

- There was evidence to suggest that the science teacher being a mathematics specialist could reduce pupils' enjoyment of mathematics, the reason for which is unclear. Again, this is a borderline effect.
- Interestingly, time spent on homework was a positive predictor of enjoyment in mathematics, while homework amount, question sets and teacher use was a negative predictor, as was homework frequency. There may be some interaction between these variables.
- At the school level, pupils' perception of school climate and percentage of pupils from economically affluent families were positive predictors of enjoyment in mathematics. Extent of computer resources was a weak but significant negative predictor: as pupils have more access to computers at home, school or elsewhere, their enjoyment of mathematics goes down. Pupils were asked about computers other than game computers. However, it is likely that some responded with gaming in mind, which might have affected the relationship described here. It is also possible that the computer variables might have interacted with the other variables discussed here, so the suggestion of computer use being associated with lower attainment might be a spurious result.
- Outside the school, resources at home and 'out of school activities 2' (read books for fun, do homework, play a musical instrument) were significant positive predictors of enjoyment in mathematics. However, 'out of school activities 1' (television watching, playing computer games, playing with friends, internet usage, listening to music) was a negative predictor. Again, it cannot be stated with certainty what the direction of causality is for these findings.
- English as the first language and speaking more English at home were both significant negative predictors of enjoyment in mathematics. The same finding was obtained for enjoyment and confidence in science and the same suggested reason might apply to enjoyment in mathematics (see the section above).

Exhibit A3.24 Variables used in the Grade 4 models

The variables used in the model comprise the factors described earlier in this appendix and additional variables of interest, some of which were sourced from the teacher, school and student questionnaires and some which came from the National Pupil Database. The derivation of the various factors is described in Exhibits A3.1-A3.6. Where individual questions were used from the TIMSS 2007 questionnaires, the question number is specified. For variables from the National Pupil Database, 'NPD' is stated in brackets.

Variable
SCHOOL ID
CLASS ID
STUDENT ID
Constant
1ST PLAUSIBLE VALUE MATHEMATICS

Exhibit A3.24 Variables used in the Grade 4 models *cont'd ...*

Variable
2ND PLAUSIBLE VALUE MATHEMATICS
3RD PLAUSIBLE VALUE MATHEMATICS
4TH PLAUSIBLE VALUE MATHEMATICS
5TH PLAUSIBLE VALUE MATHEMATICS
1ST PLAUSIBLE VALUE SCIENCE
2ND PLAUSIBLE VALUE SCIENCE
3RD PLAUSIBLE VALUE SCIENCE
4TH PLAUSIBLE VALUE SCIENCE
5TH PLAUSIBLE VALUE SCIENCE
SQ - q7h I explain my answers (mathematics)
SQ - q7j I use a calculator (mathematics)
SQ - enjoyment and confidence in science
SQ - enjoyment of mathematics
SQ - confidence in mathematics
SQ - science activities
SQ - mathematics activities
SQ - out of school activities 1
SQ - use of computer for school work
SQ - resources
SQ - independent work
SQ - time spent on homework
SQ - out of school activities 2
SQ - pupil perception of school climate
SQ - extent of bullying
KS1 mathematics TA level (NPD)
KS1 science TA level (NPD)
IDACI_07 (Income Deprivation Affecting Children Indices, NPD)
FSM_07 (Pupil-level eligibility for free school meals, NPD)
Student gender (SQ - q2)
Mother born in the UK (SQ - q16a)
Father born in the UK (SQ - q16b)
Pupil born in the UK (SQ - q17)
How often speak English at home (SQ - q3)
TQ q7 - teacher interactions
Teacher gender (TQ - q2)
Teacher mathematics specialist (TQ - q6)
Teacher science specialist (TQ - q6)
TQ q16 - calculator use
TQ q14 - text book use in mathematics
TQ q35 - text book use in science
TQ - science - observation and investigation
TQ - number and explanation
TQ - mathematics - shape, measures and data
TQ - school climate - teachers
TQ - school climate - children and parents
TQ - teachers perception of safety
TQ - science homework
TQ - mathematics homework - teacher use
TQ - mathematics homework - class use
TQ - routine calculator use
TQ - complex calculator use
TQ - mathematics computer use
TQ - science computer use
TQ - mathematics and science - motivation
TQ - science - student range
TQ - mathematics - student range

Exhibit A3.24 Variables used in the Grade 4 models *cont'd ...*

Variable
TQ - mathematics professional development
TQ - science professional development
HQ - computer/lab equipment
HQ - calculator availability
HQ - materials/budget
HQ - infrastructure
HQ - library and audio-visual resources
HQ - problem behaviours
HQ - school climate - teachers
HQ - severity of problem 1
HQ - severity of problem 2
HQ - absenteeism/lateness
HQ - school climate - children and parents
HQ - professional development
HQ - q20a number of computers in school
HQ - q3a economic disadvantage
HQ - q3b economic affluence
HQ - % EAL
HQ - q9 mathematics ability grouping
HQ - q11 science ability grouping
HQ - q15 difficulty filling vacancies

Exhibit A3.25 Variables used in the Grade 8 models

The variables used in the model comprise the factors described earlier in this appendix and additional variables of interest, some of which were sourced from the teacher, school and student questionnaires and some which came from the National Pupil Database. The derivation of the various factors is described in Exhibits A3.1-A3.6. Where individual questions were used from the TIMSS 2007 questionnaires, the question number is specified. For variables from the National Pupil Database, 'NPD' is stated in brackets.

Variable
SCHOOL ID
CLASS ID
STUDENT ID
1ST PLAUSIBLE VALUE MATHEMATICS
2ND PLAUSIBLE VALUE MATHEMATICS
3RD PLAUSIBLE VALUE MATHEMATICS
4TH PLAUSIBLE VALUE MATHEMATICS
5TH PLAUSIBLE VALUE MATHEMATICS
1ST PLAUSIBLE VALUE SCIENCE
2ND PLAUSIBLE VALUE SCIENCE
3RD PLAUSIBLE VALUE SCIENCE
4TH PLAUSIBLE VALUE SCIENCE
5TH PLAUSIBLE VALUE SCIENCE
Constant
SQ - pupil gender (q2)
SQ - speak English at home (q3)
SQ - books at home (q4)
SQ - resources at home (q5)
SQ - how far in education (q7)
SQ - extent of computer resources (q14a, q14b)
SQ - bullying (q16)
SQ - mother born in UK (q20a)
SQ - father born in UK (q20b)

Exhibit A3.25 Variables used in the Grade 8 models *cont'd ...*

Variable
SQ - pupil born in UK (q21a)
SQ - time since coming to UK (q21b)
SQ - enjoyment and confidence in science
SQ - value of science and mathematics
SQ - mathematics activities
SQ - enjoyment of mathematics
SQ - confidence in mathematics
SQ - science activities - experiment and observation
SQ - independent work
SQ - science activities - theory and explanation
SQ - out of school activities 1
SQ - out of school activities 2
SQ - time spent on homework
SQ - whole class teaching mode
SQ - pupil perception of school climate
SQ - use of computer - school work
SQ - frequency of homework
SQ - check homework in class
TQM - maths teacher gender (q2)
TQM - teacher mathematics specialist (q5a)
TQM - teacher mathematics education specialist (q5b)
TQM - teacher science specialist (q5c)
TQM - teacher science education specialist (q5d)
TQM - teacher general education specialist (q5e)
TQM - teacher other specialist (q5f)
TQM - textbook use (q15)
TQM - problem solving & explanation
TQM - data, geometry, algebra
TQM - number & routine problem solving
TQM - school climate: children and parents
TQM - school climate: teachers
TQM - teacher perception of safety
TQM - homework: amount, question sets and teacher use
TQM - homework: class use
TQM - homework type: active
TQM - computer use
TQM - routine calculator use
TQM - complex calculator use
TQM - teaching resources
TQM - computer resources
TQM - student motivation
TQM - student range
TQM - professional development
TQM - interaction with other teachers
TQS - science teacher sex (q2)
TQS - teacher biology specialist (q5a)
TQS - teacher physics specialist (q5b)
TQS - teacher chemistry specialist (q5c)
TQS - teacher earth science specialist (q5d)
TQS - teacher science education specialist (q5e)
TQS - teacher mathematics specialist (q5f)
TQS - teacher mathematics education specialist (q5g)
TQS - teacher general education specialist (q5h)
TQS - teacher other specialist (q5i)
TQS - textbook use (q15)
TQS - observe/ investigate
TQS - explain and relate

Exhibit A3.25 Variables used in the Grade 8 models *cont'd ...*

Variable
TQS - passive learning
TQS - school climate: children and parents
TQS - school climate: teachers
TQS - teacher perception of safety
TQS - homework: amount, question sets and teacher use
TQS - homework: other types and class use
TQS - computer use
TQS - teaching resources
TQS - computer resources
TQS - student motivation
TQS - student range
TQS - professional development
TQS - interaction with other teachers
HQ - economic disadvantage (q3a)
HQ - economic affluence (q3b)
HQ - English first language (q4)
HQ - pupils grouped by mathematics ability (q9)
HQ - pupils grouped by science ability (q11)
HQ - computers for educational purpose (q21a)
HQ - computers for educational purpose missing (q21a)
HQ - budget, materials and staff
HQ - library and audio-visual resources
HQ - computers and software
HQ - infrastructure and special equipment
HQ - recruitment incentives
HQ - difficulty filling vacancies
HQ - professional development
HQ - problem behaviours 2
HQ - problem behaviours 1
HQ - school climate: teachers and students
HQ - school climate: parents
HQ - severity of problem 1
HQ - severity of problem 2
Eligibility for free school meals (NPD)
IDACI_07 (Income Deprivation Affecting Children Indices, NPD)
KS2 mathematics score (NPD)
KS2 science score (NPD)

Exhibit A3.26 Quasi effect sizes for science attainment, grade 4

	Variables	Effect sizes
1	KS1 mathematics TA level	36.7
2	Pupil born UK	27.1
3	SQ - confidence in maths	24.1
4	SQ - resources	23.5
5	KS1 science TA level	22.9
6	SQ - enjoyment of maths	-20.6
7	SQ - enjoyment and confidence in science	17.3
8	HQ - q3a economic disadvantage	-15.9
9	SQ - out of school activities 1	-10.9
10	Teacher maths specialist	9.8
11	SQ - use of computer for school work	-9.6
12	SQ - maths activities	-9.3
13	SQ - extent of bullying	-8.7
14	SQ - independent work	8.6
15	FSM_07	-7.6
16	HQ - calculator availability	-5.7
17	TQ - maths homework - class use	-5.1
18	SQ - out of school activities 2	4.8

Exhibit A3.27 Quasi effect sizes for mathematics attainment, grade 4

	Variables	Effect sizes
1	KS1 mathematics TA level	42.9
2	SQ - confidence in maths	37.1
3	Pupil born UK	30.1
4	SQ - resources	21.0
5	KS1 science TA level	21.0
6	HQ - q3a economic disadvantage	-11.7
7	Teacher maths specialist	11.2
8	SQ - use of computer for school work	-9.8
9	SQ - extent of bullying	-8.4
10	SQ - independent work	8.4
11	TQ - school climate - teachers	8.3
12	FSM_07	-7.8
13	SQ - maths activities	-6.8
14	SQ - out of school activities 1	-6.2
15	SQ - enjoyment of maths	-5.8

Exhibit A3.28 Quasi effect sizes for enjoyment and confidence in science, grade 4

	Variables	Effect sizes
1	SQ - pupil perception of school climate	24.5
2	Student gender	-23.1
3	SQ - science activities	19.6
4	SQ - out of school activities 2	18.1
5	SQ - out of school activities 1	-13.9
6	TQ - teachers' perception of safety	-13.0
7	SQ - resources	12.9
8	SQ - independent work	12.2
9	SQ - q7h I explain my answers	7.3
10	SQ - q7j I use a calculator	-7.2
11	SQ - extent of bullying	-6.6

Exhibit A3.29 Quasi effect sizes for confidence in mathematics, grade 4

	Variables	Effect sizes
1	SQ - enjoyment of maths	60.7
2	KS1 mathematics TA level	28.1
3	Student gender	-18.0
4	SQ - resources	15.3
5	SQ - q7h I explain my answers	14.8
6	KS1 science TA level	11.2
7	FSM_07	10.8
8	SQ - independent work	10.7
9	SQ - q7j I use a calculator	-10.4
10	SQ - extent of bullying	-7.7
11	HQ - % EAL	-7.0
12	HQ - materials/budget	6.3
13	SQ - pupil perception of school climate	-6.2
14	TQ q14 - text book use in maths	-5.7
15	SQ - maths activities	5.5
16	SQ - out of school activities 2	-4.5

Exhibit A3.30 Quasi effect sizes for enjoyment in mathematics, grade 4

	Variables	Effect sizes
1	SQ - confidence in maths	59.6
2	SQ - pupil perception of school climate	39.6
3	FSM_07	14.6
4	KS1 science TA level	-13.8
5	HQ - severity of problem 2	-13.6
6	SQ - out of school activities 2	11.7
7	Student gender	-10.9
8	HQ - problem behaviours	10.6
9	SQ - maths activities	9.9
10	SQ - out of school activities 1	-9.7
11	SQ - resources	-6.6
12	SQ - use of computer for school work	6.5
13	SQ - extent of bullying	5.6
14	SQ - science activities	-4.0

Exhibit A3.31 Quasi effect sizes for science attainment, grade 8

	Variables	Effect sizes
1	KS2 science score	37.1
2	SQ - enjoyment and confidence in science	25.5
3	KS2 maths score	20.7
4	TQM - student motivation	-16.3
5	TQM - complex calculator use	11.4
6	TQM - teacher maths education specialist	-9.9
7	SQ - out of school activities 2	9.9
8	SQ - books at home	9.3
9	TQM - student range	-8.7
10	SQ - whole class teaching mode	7.9
11	SQ - confidence in maths	7.7
12	SQ - how far in education	7.4
13	SQ - enjoyment of maths	-7.0
14	SQ - maths activities	-6.2
15	SQ - resources at home	5.3
16	SQ - science activities - experiment and observation	-4.0
17	SQ - independent work	3.9
18	SQ - out of school activities 1	-3.8
19	SQ - use of computer - school work	-3.7

Exhibit A3.32 Quasi effect sizes for mathematics attainment, grade 8

	Variables	Effect sizes
1	KS2 maths score	27.3
2	SQ - confidence in maths	23.1
3	TQM - student motivation	-19.2
4	KS2 science score	18.0
5	TQM - complex calculator use	15.6
6	TQM - student range	-15.4
7	TQM - data, geometry, algebra	14.4
8	TQM - teacher maths education specialist	-12.5
9	TQM - number and routine problem solving	-8.8
10	SQ - books at home	8.5
11	SQ - whole class teaching mode	5.2
12	SQ - how far in education	5.0
13	SQ - use of computer - school work	-5.0
14	SQ - out of school activities 2	4.4
15	SQ - out of school activities 1	-3.3
16	SQ - bullying	-3.1

Exhibit A3.33 Quasi effect sizes for enjoyment and confidence in science, grade 8

	Variables	Effect sizes
1	SQ - value of science and maths	47.3
2	KS2 science score	41.2
3	KS2 maths score	-35.3
4	SQ - pupil gender	-30.9
5	SQ - science activities - theory and explanation	15.5
6	SQ - maths activities	-12.7
7	SQ - science activities - experiment and observation	10.1
8	SQ - out of school activities 2	9.6
9	SQ - how far in education	8.5
10	SQ - books at home	8.3
11	SQ - use of computer - school work	8.3
12	SQ - out of school activities 1	-8.1
13	SQ - pupil perception of school climate	7.8
14	SQ - whole class teaching mode	7.2
15	HQ - infrastucture and special equipment	7.0
16	TQS - explain and relate	6.8
17	SQ - speak English at home	-6.3
18	SQ - confidence in maths	-5.6
19	SQ - time spent on homework	5.1

Exhibit A3.34 Quasi effect sizes for confidence in mathematics, grade 8

	Variables	Effect sizes
1	SQ - enjoyment of maths	60.2
2	KS2 maths score	51.7
3	SQ - pupil gender	-35.5
4	KS2 science score	-10.0
5	TQS - teacher biology specialist	8.0
6	SQ - how far in education	7.8
7	TQM - interaction with other teachers	-7.2
8	HQ - severity of problem 1	7.1
9	HQ - computers for educational purpose	6.6
10	SQ - enjoyment and confidence in science	-6.4
11	SQ - maths activities	6.3
12	SQ - value of science and maths	6.2
13	SQ - time spent on homework	-6.2
14	HQ - severity of problem 2	-6.2
15	SQ - bullying	-5.6

Exhibit A3.35 Quasi effect sizes for enjoyment in mathematics, grade 8

	Variables	Effect sizes
1	SQ - confidence in maths	57.5
2	SQ - pupil perception of school climate	25.8
3	SQ - value of science and maths	24.2
4	KS2 science score	-21.0
5	TQS - teacher maths specialist	-11.6
6	SQ - whole class teaching mode	9.3
7	HQ - English first language	-9.1
8	SQ - time spent on homework	8.8
9	SQ - out of school activities 1	8.6
10	SQ - out of school activities 2	8.3
11	HQ - economic affluence	8.3
12	SQ - maths activities	7.9
13	TQM - student range	-7.8
14	SQ - use of computer - school work	7.7
15	TQM - homework: amount, question sets and teacher use	-7.1
16	SQ - science activities - experiment and observation	-6.6
17	SQ - resources at home	6.0
18	SQ - frequency of homework	-6.0
19	SQ - independent work	-5.9
20	SQ - speak English at home	-4.4
21	SQ - extent of computer resources	-4.0

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Summary of previous international mathematics and science studies

The 2007 TIMSS study is the latest in a series of international studies of mathematics and science performance which began in 1964. The previous studies are listed below, first for mathematics and then for science. Full references for these follow the lists.

Studies involving mathematics

Date of testing	Study	References
1964	*First International Mathematics Study (FIMS)*	Pidgeon (1967) Husen (1967)
1980-82	*Second International Mathematics Study (SIMS)*	Robitaille and Garden (1989) Cresswell and Gubb (1987)
1988	*The first study carried out by the International Association for the Evaluation of Educational Progress (IAEP1)*	Travers and Westbury (1989) Lapointe *et al.* (1989) Keys and Foxman (1989)
1991	*The second study carried out by the International Association for the Evaluation of Educational Progress (IAEP2)*	Lapointe *et al.* (1992a) Foxman (1992)
1994-5	*The Third International Mathematics and Science Study (TIMSS)*	Beaton *et al.* (1996b) Mullis *et al.* (1997) Keys, Harris and Fernandes (1996a and b; 1997a) Harris, Keys and Fernandes (1997) Keys, Harris and Fernandes (1997b)
1998-9	*The Third International Mathematics and Science Study Repeat (TIMSS-R)*	Mullis *et al.* (2000) Ruddock (2000)
2002-3	*The 2003 TIMSS survey*	Mullis *et al.* (2004) Ruddock *et al.* (2004)

Studies involving science

Date of testing	Study	References
1970-71	*First International Science Study (FISS)*	Comber and Keeves (1973)
1984	*Second International Science Study (SISS)*	Postlethwaite and Wiley (1992) International Association for the Evaluation of Educational Achievement (1988) Keys (1987)
1988	*The first study carried out by the International Association for the Evaluation of Educational Progress (IAEP1)*	Lapointe *et al.* (1989) Keys and Foxman (1989)
1991	*The second study carried out by the International Association for the Evaluation of Educational Progress (IAEP2)*	Lapointe *et al.* (1992b) Foxman (1992)
1994-5	*The Third International Mathematics and Science Study (TIMSS)*	Beaton *et al.* (1996b) Martin *et al.* (1997) Keys, Harris and Fernandes (1996a and b; 1997a) Harris, Keys and Fernandes (1997) Keys, Harris and Fernandes (1997b)
1998-9	*The Third International Mathematics and Science Study Repeat (TIMSS-R)*	Martin *et al.* (2000a and b) Ruddock (2000)
2002-3	*The 2003 TIMSS survey*	Martin *et al.* (2004b) Ruddock *et al.* (2004)

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