

Chapter 9 The home environment

Chapter summary

This chapter presents findings relating to pupils' home background in Year 5 (Y5) and Year 9 (Y9), reported by pupils, teachers and headteachers. The chapter first describes pupils' home educational resources and, for Y9, pupils' use of social networking sites. Data is then presented on teachers' reports of the extent to which a number of pupil-level factors (namely lack of prerequisite knowledge or skills, lack of basic nutrition and of sufficient sleep) limit their teaching. Comparison with the findings for other TIMSS participants is made where relevant. Where associations between aspects of the home environment and average achievement in TIMSS 2011 are apparent, these are reported. Findings for Y5 are presented, followed by findings for Y9.

Key findings

- The proportion of Y5 pupils reporting having *more than 100 books* at home was lower than in 2007, while internet access was higher in 2011.
- Y9 pupils with access to more educational resources at home achieved higher average scores in TIMSS 2011 in both subjects¹²⁴. This was the case in England and for the majority of TIMSS participants. However, in England, the difference in average attainment according to resources was greater than the difference on average internationally.
- The extent to which teachers perceived that pupils' lack of prerequisite knowledge or skills limits teaching was similar across age groups and subjects. The majority of pupils (close to 60 per cent in both age groups and subjects) were taught by teachers who reported that this limits their teaching to some extent.
- In England, according to teachers' reports, teaching was more commonly limited by pupils' lack of sleep than by pupils' lack of basic nutrition. This was the case for both age groups and subjects.
- At Y9, in several of the highest performing countries, teachers reported that their teaching was limited by pupils' lack of sleep to a greater extent than in England.
- Just over half of Y9 pupils¹²⁵ reported spending up to 2 hours on a normal school day using social networking sites, with the highest proportion reporting *from 1 to 2 hours per day*. Sixteen per cent of pupils reported spending no time at all using such sites.
- For both mathematics and science, increases in reported use of social networking sites up to six hours a day appeared to have no association with average achievement. However, pupils who reported using social networking sites for more than six hours a day had lower average scores than those who reported using them for less time or not at all.

124 Comparable data is not available for Y5.

125 There was no equivalent question at Year 5.

Interpreting the data: scaled data from teachers and headteachers

Most of the data presented in this chapter is reported by teachers and headteachers. Reported percentages refer to pupils and can usually (unless otherwise indicated) be interpreted as the percentage of pupils whose teacher or headteacher reported a particular practice or gave a particular response to a questionnaire item.

When interpreting the data from pupils, headteachers and teachers it is important to take account of the relative sample sizes. Participants are expected to sample a minimum of 150 schools in each year group and a minimum of 4,000 students for each target year group (these figures represent the numbers *drawn* in the sample; the achieved sample numbers may be less). The achieved ranges for participating schools internationally were 96 to 459 for Y5, and 95 to 501 for Y9.¹²⁶ These wide ranges reflected the fact that some participants had fewer than 150 schools available and some participants chose to over-sample schools. Just over half of participants sampled between 150 and 200 schools for each age group.

For TIMSS 2011 in England, the number of participating schools was 125 at Y5 and 118 at Y9. Numbers of participants within these schools were:

- 3,397 Y5 and 3,482 Y9 pupils.
- 125 and 118 headteachers respectively answered the Y5 and Y9 School Questionnaire.
- 194 Y5 class teachers completed a Teacher Questionnaire for mathematics and 199 for science.
- 213 Y9 teachers completed the Mathematics Teacher Questionnaire.
- 757 Y9 teachers completed the Science Teacher Questionnaire (the number of science teachers was greater as the Y9 pupils were sampled by mathematics class).

See Appendix A for more information about numbers of participants and sampling method.

Year 5

9.1 Home resources for learning

Y5 pupils and their parents were asked to report the availability of resources considered important in relation to educational attainment. The responses from both parents and pupils were used to construct the *Home Resources for Learning scale*. In some countries, including England, parents did not complete a questionnaire,¹²⁷ so data for England is only available for the two components of the scale that were

¹²⁶ These figures refer to countries and exclude benchmarking participants

¹²⁷ At Y5, parent reports regarding home resources were only obtained for TIMSS in countries that administered the TIMSS and PIRLS assessments to the same Y5 pupils; in England, separate samples were drawn for TIMSS and PIRLS.

reported by pupils: number of books in the home, and number of home study supports.¹²⁸ More detail on the components used in the questionnaire is given below Table 9.1.

Table 9.1 shows that 34 per cent of Y5 pupils in England reported having more than 100 books in their home.¹²⁹ Seventy-five per cent of Y5 pupils had both their own room and an internet connection at home.¹³⁰ Across most of the high performing countries and those performing similarly to England, a higher proportion of pupils reported having their own room and an internet connection than reported having more than 100 books in their home. However, in Korea, the opposite was the case, with a higher proportion of pupils reporting having more than 100 books at home than having their own room and an internet connection. Since the questions relating to home resources are not subject-specific, and are reported by pupils, the percentages are the same for Y5 mathematics and Y5 science, for all countries.

Table 9.1 Home resources for learning in Y5

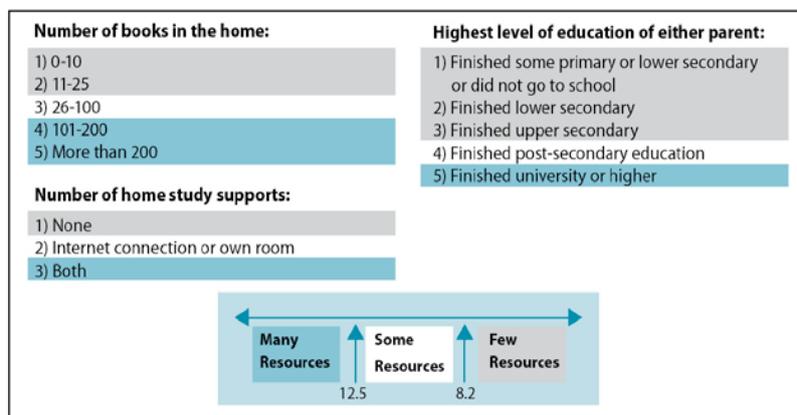
Columns 1-2 Reported by Students and Columns 3-5 Reported by Parents¹³¹

Country	Per cent of students with				
	More than 100 Books in Their Home	Own Room and Internet Connection in Home	At Least One Parent with a University Degree or Higher	At Least One Parent in a Professional Occupation**	More than 25 Children's Books in Their Home
England	34 (1.3)	75 (1.4)			
International Avg.	25 (0.2)	52 (0.2)	30 (0.2)	36 (0.2)	58 (0.2)

* Data reported in columns 3-5 were from the PIRLS Home Questionnaire completed by parents, so data are available only for countries that administered both TIMSS and PIRLS to the same fourth grade pupils.

** Includes corporate manager or senior official, professional, and technician or associate professional.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.



Source: Exhibits 4.1 and 4.2, international mathematics report

128 As a result, only data reported by pupils is shown for England and there are no associated average achievement figures available.

129 For Y5, the question included images of bookshelves, to help pupils visualise the number of books in each response category.

130 Data for these two items is combined in the international reports. Separate percentages are given later in this section.

131 Columns 3 to 5 are intentionally blank for England: see the note marked * on Table 9.1.

Table 9.2 shows the results for *own room* and *internet connection in the home* separately, as well as trends from 2007 for these variables and for *more than 100 books in the home*. The percentage of Y5 pupils with their own room was similar in 2007 and 2011, whereas the percentage of pupils with an internet connection in their home was higher in 2011, and the percentage of pupils with more than 100 books in their home was lower.

Table 9.2 Home resources for learning in Y5, with trends in England

Per cent of Y5 pupils with			
	More than 100 books in their home	Their own room	An internet connection in the home
2007	41	78	86
2011	34	79	94

Source: 2007 national report for England (Sturman et al, 2008)¹³²

9.2 Pupil-level factors that limit Y5 teaching

Teachers were asked to report the extent to which a number of pupil factors limited their teaching. The question to which teachers responded is shown in Figure 9.1. The results relating to the first three statements in this question are spread across Tables 9.3 and 9.4. Table 9.3 presents teachers' reports on the extent to which pupils lacking prerequisite knowledge or skills limit teaching, and Table 9.4 presents the equivalent findings relating to limitations due to pupils suffering from a lack of basic nutrition and pupils suffering from not enough sleep.

It is important to note that, although reported at the pupil level, these figures are based on teachers' reports of the extent to which their teaching is limited by pupils who lack prerequisite skills, basic nutrition or enough sleep. The percentages therefore do not reflect the *proportion* of pupils who may lack prerequisite skills, basic nutrition or enough sleep. Rather, they simply reflect teachers' perceptions of any *impact on the teaching of classes* containing such pupils. The data does not indicate how many pupils might have caused that limitation, only the extent to which the presence of an unspecified number of such pupils is perceived to limit teaching. In relation to achievement, any association observed does not reflect a direct link between, for example, pupils' achievement and a lack of sleep. Instead, it would indicate an association between pupils' achievement and the perceived effect of the presence in their classes of an unspecified number of pupils lacking sufficient sleep.

¹³² The 2007 'own room' data is taken from the 2007 TIMSS national report (Sturman et al, 2008), as it was a national option in 2007 and therefore unavailable in international data. The wording was slightly different ('own bedroom' in 2007) and standard errors are not available. The percentages for 'number of books in the home' and 'internet connection' are also taken from the 2007 national report. Both measures are directly comparable since the question stem and response categories were identical in 2007 and 2011. For 'number of books in the home', the top two response categories were combined to create the category 'more than 100 books', in both 2007 and 2011. Standard errors are available for the individual categories only.

Figure 9.1 Pupil-level factors that limit teaching

G16

In your view, to what extent do the following limit how you teach this class?

Tick **one** circle for each row.

Not applicable Not at all Some A lot

a) Children lacking prerequisite knowledge or skills - - -

b) Children suffering from lack of basic nutrition - - -

c) Children suffering from not enough sleep - - -

d) Children with special needs (e.g. physical disabilities, mental or emotional/psychological impairment) --- - - -

e) Disruptive children - - -

f) Uninterested children - - -

Source: adapted from the international version of the TIMSS 2011 Teacher Questionnaire¹³³

9.2.1 Limitations on teaching due to pupils lacking prerequisite knowledge or skills

Table 9.3 shows that in England, 65 per cent of Y5 pupils were taught mathematics by teachers who reported that their teaching was limited to *some* extent by pupils lacking prerequisite knowledge or skills. The equivalent percentage for science was similar at 62 per cent. In both subjects, England’s percentages in each category were similar to the international averages.

For both subjects, 13 per cent of pupils were taught by teachers who reported that their teaching was limited *a lot* by such pupils. Among the high performing countries in one or both subjects, this percentage was similar in Singapore and Korea but lower in Chinese Taipei, Northern Ireland and Hong Kong. The percentage of pupils whose teachers reported that pupils’ lack of prerequisite knowledge or skills limited their teaching *a lot* was particularly low in Finland (2 per cent), Japan (3 per cent) and the Czech Republic (3 and 4 per cent for mathematics and science respectively). In North Carolina, for mathematics and science, the percentage was particularly high at 32 per cent.

In England, the average mathematics achievement of Y5 pupils whose mathematics teachers reported that their teaching was limited *a lot* by pupils’ lacking prerequisite knowledge or skills was 77 scale points lower than that of pupils whose teachers reported that their teaching was *not at all* limited by this. In science this difference was 67 scale points. Both differences are likely to be statistically significant.¹³⁴

133 <http://timssandpirls.bc.edu/timss2011/index.html>

134 Throughout this report, the term ‘significant’ refers to statistical significance. Tests of statistical significance were not carried out in the international analysis. Based on the size of the standard errors, it is unlikely that any apparent differences are statistically significant.

Table 9.3 Y5 teaching limited by pupils lacking prerequisite knowledge or skills**Mathematics***Reported by Teachers*

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Lacking Prerequisite Knowledge or Skills					
	Not At All		Some		A Lot	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
England	23 (3.3)	578 (7.3)	65 (4.1)	541 (4.3)	13 (2.9)	501 (10.0)
International Avg.	27 (0.5)	506 (1.0)	61 (0.5)	489 (0.6)	12 (0.3)	467 (1.9)

Science*Reported by Teachers*

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Lacking Prerequisite Knowledge or Skills					
	Not At All		Some		A Lot	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
England	26 (3.4)	560 (5.8)	62 (4.2)	525 (4.6)	13 (3.0)	493 (9.2)
International Avg.	28 (0.5)	501 (1.1)	60 (0.5)	485 (0.7)	11 (0.3)	460 (2.1)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 8.19, international mathematics and science reports

9.2.2 Limitations on teaching due to pupils suffering from a lack of basic nutrition

Table 9.4 shows that in England, 22 per cent of pupils were taught mathematics and 21 per cent taught science by teachers who reported that their teaching was limited to *some* extent or a *lot*¹³⁵ by pupils suffering from a lack of basic nutrition. These proportions were lower than the equivalent proportions on average internationally, and were a little higher than the findings in Singapore and Korea. However, in the United States and Alberta, around 40 per cent of pupils were taught in classes by teachers who reported that a lack of basic nutrition limited their teaching to some extent or a lot. In Japan the equivalent figure was just 1 per cent.

In England, the average mathematics achievement of Y5 pupils whose teachers reported that their teaching was limited to *some* extent or a *lot* by pupils suffering from a lack of basic nutrition was 41 scale points lower than that of pupils whose teachers reported that their teaching was *not at all* limited by this; for science achievement the difference was slightly lower at 32 scale points. These differences are likely to be statistically significant.

135 In the international analysis (see Table 9.4), the response categories to some extent and a lot were combined, for both statements relating to nutrition and sleep (statements b) and c) in Figure 9.1).

Table 9.4 Y5 teaching limited by pupils suffering from lack of nutrition or sleep**Mathematics***Reported by Teachers*

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Lack of Basic Nutrition				Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Not Enough Sleep			
	Not at All		Some or A Lot		Not at All		Some or A Lot	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
England	78 (3.1)	554 (4.3)	22 (3.1)	513 (6.5)	36 (4.6)	569 (5.1)	64 (4.6)	531 (4.9)
International Avg.	71 (0.4)	498 (0.7)	29 (0.4)	472 (1.1)	53 (0.5)	497 (0.7)	47 (0.5)	486 (0.8)

Science*Reported by Teachers*

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Lack of Basic Nutrition				Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Not Enough Sleep			
	Not At All		Some or A Lot		Not At All		Some or A Lot	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
England	79 (3.0)	537 (4.4)	21 (3.0)	505 (5.0)	36 (4.3)	545 (6.1)	64 (4.3)	521 (4.4)
International Avg.	71 (0.4)	493 (0.8)	29 (0.4)	467 (1.1)	54 (0.5)	492 (0.7)	46 (0.5)	481 (0.9)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 8.21, international mathematics and science reports

9.2.3 Limitations on teaching due to pupils suffering from not enough sleep

Table 9.4 also shows that in England, 64 per cent of Y5 pupils were taught by teachers who reported that their teaching was limited to *some* extent or *a lot* by pupils suffering from not enough sleep, for both subjects. This is higher than the international average (47 per cent for mathematics, 46 per cent for science). In Chinese Taipei, the equivalent percentage for mathematics was similar to England, but for science it was lower. Among other high performing countries, in Japan, Korea, Singapore and Hong Kong, a lower proportion of pupils than in England were taught by teachers who reported limitations to their teaching due to pupils' lack of sleep to *some* extent or *a lot*, for both subjects. In the United States and North Carolina the proportion of pupils whose teachers reported this was higher than England at over 70 per cent for both subjects, while in the Czech Republic, a high performer in science, it was around half that in England (35 and 33 per cent for mathematics and science respectively).

In England, for both mathematics and science, the average achievement of Y5 pupils taught by teachers who reported that their teaching was limited to *some* extent or *a lot* by pupils suffering from not enough sleep was lower than that of pupils who were taught by teachers who reported that their teaching was *not at all* limited by this. For mathematics this difference was 38 points, while for science it was slightly lower at 24 points. Both these differences are likely to be statistically significant.

Year 9

9.3 Home educational resources in Y9

At Y9, all information relating to home background was provided by pupils themselves (whereas the comparable information at Y5 was designed to be derived from responses from parents as well as pupils). Pupils' responses to particular questions were used to create a Home Educational Resources scale, which included three of the items included in the Y5 Home Resources for Learning scale (number of books in the home, the availability of an own room and an internet connection) as well as parents' education level. Pupils were categorised into three bands based on their reports of the availability of the three resources and their parents' education level: *Many Resources*, *Few Resources* and *Some Resources* (details of how pupils are assigned to each band is provided in Table 9.5). The box beneath Table 9.5 provides detail about the questions forming the scale and the categorisation of responses. The percentages of pupils in each band, reported in Table 9.5, are based on pupil responses and are not subject-specific. Therefore, percentages are the same for mathematics and science.

Table 9.5 shows that England's average scale score was 10.8, which puts pupils in England in the *Some Resources* category overall (79 per cent of pupils in England were in this category). Compared with the international average, a notably lower proportion of pupils in England were categorised as having *Few Resources* (5 per cent in England compared with 21 per cent on average internationally).

Mathematics

The average mathematics achievement score for the 17 per cent of pupils in the *Many Resources* category was 137 scale points higher than the average achievement score of pupils in the *Few Resources* category. This difference was greater than the difference between the international averages for these categories (115 scale points) and is likely to be significant. The difference in England was also larger than that seen in some of the higher performing countries. However, there were also large differences in Chinese Taipei, Korea and the high performing US states.

Science

In England, the average achievement of Y9 pupils in the *Many Resources* category in the science assessment was 158 scale points higher than that of pupils in the *Few Resources* category. This difference is larger than for Y9 mathematics and also larger than the equivalent difference in the international average (116 scale points). There were achievement differences between these two groups of pupils in the majority of countries. The difference in England was larger than in the majority of the higher performing countries. However, there were also large differences in Chinese Taipei, Singapore and Korea, as well as similar differences in the US states performing in the same achievement band as England.

Table 9.5 Home educational resources in Y9

Mathematics

Reported by Students

Students were scored according to their responses concerning the availability of three home educational resources on the *Home Educational Resources* scale. Students with **Many Resources** had a score of at least 12.5, which is the point on the scale corresponding to students reporting that they had more than 100 books in the home and two home study supports, and that at least one parent had finished university, on average. Students with **Few Resources** had a score no higher than 8.2, which is the scale point corresponding to students reporting that they had 25 or fewer books in the home, neither of the two home study supports, and that neither parent had gone beyond upper-secondary education, on average. All other students were assigned to the **Some Resources** category.

Country	Many Resources		Some Resources		Few Resources		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
England	17 (1.1)	564 (6.7)	79 (1.1)	500 (5.1)	5 (0.5)	427 (14.9)	10.8 (0.05)
International Avg.	12 (0.1)	530 (1.2)	67 (0.2)	470 (0.6)	21 (0.2)	415 (1.0)	

Centre point of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Science

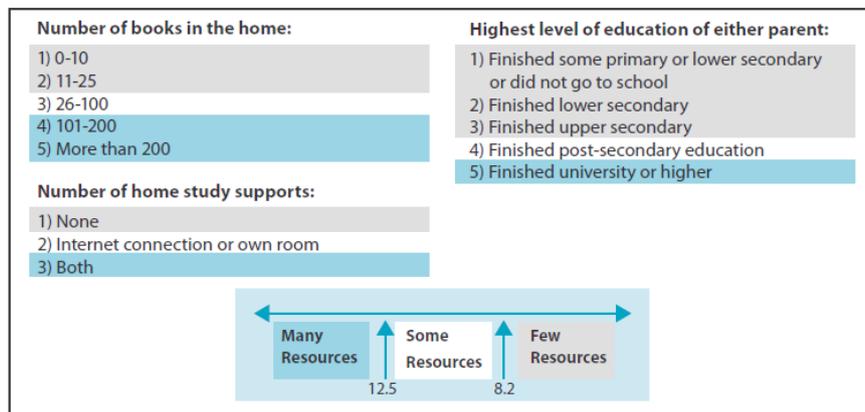
Reported by Students

Students were scored according to their responses concerning the availability of three home educational resources on the *Home Educational Resources* scale. Students with **Many Resources** had a score of at least 12.5, which is the point on the scale corresponding to students reporting that they had more than 100 books in the home and two home study supports, and that at least one parent had finished university, on average. Students with **Few Resources** had a score no higher than 8.2, which is the scale point corresponding to students reporting that they had 25 or fewer books in the home, neither of the two home study supports, and that neither parent had gone beyond upper-secondary education, on average. All other students were assigned to the **Some Resources** category.

Country	Many Resources		Some Resources		Few Resources		Average Scale Score
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	
England	17 (1.1)	597 (5.9)	79 (1.1)	526 (4.5)	5 (0.5)	439 (13.5)	10.8 (0.05)
International Avg.	12 (0.1)	540 (1.1)	67 (0.2)	480 (0.6)	21 (0.2)	424 (1.0)	

Centre point of scale set at 10.

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.



Source: Exhibit 4.3, international mathematics and science reports

Table 9.6 provides supporting detail about the availability of the specific home resources included in the *Home Educational Resources* scale. In England, 31 per cent of Y9 pupils had at least one parent with a university degree, similar to the international average. Percentages of pupils who reported that at least one parent had a university degree were higher in Korea, Japan, and Quebec, and were particularly high in all the US states with average achievement higher than England's in at least one subject. Thirty-three per cent of Y9 pupils in England reported having more than

100 books in their home, compared with a quarter on average internationally. The majority of pupils in England, 89 per cent, reported having both their own room and an internet connection at home, whereas on average internationally this was just over half (53 per cent).¹³⁶

Table 9.6 Components of the *Home Educational Resources* scale

Reported by Students

Country	Per cent of Students with		
	More than 100 Books in Their Home	Own Room and Internet Connection in Home	At Least One Parent with a University Degree or Higher
England	33 (1.5)	89 (0.8)	31 (1.8)
International Avg.	25 (0.2)	53 (0.2)	32 (0.2)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Source: Exhibit 4.4, *international mathematics and science reports*

Table 9.7 shows the results for *their own room* and *internet connection* in the home separately, as well as trends from 2007 for these variables and for *more than 100 books in their home*. It shows that the percentages of Y9 pupils with more than 100 books in their home and with their own room were similar in 2007 and 2011. The percentage of Y9 pupils with an internet connection in the home is higher than in 2007.

Table 9.7 Components of the *Home Educational Resources* scale, with trends

Per cent of Y9 pupils in England with			
	More than 100 books in their home	Their own room	An internet connection in the home
2007	35	86	92
2011	33	89	98

Source: 2007 national report for England (Sturman *et al*, 2008)¹³⁷

9.4 Pupils' use of social networking sites

Y9 pupils in England were asked about the amount of time they spend using social networking sites on a normal school day. The question asked is given in Figure 9.2, and pupils' responses, along with the average achievement associated with each group of responses, are summarised in Table 9.8.

136 Data for these two items is combined in the international reports. Separate percentages are given later in this section.

137 The 2007 'own room' data is taken from the 2007 TIMSS national report (Sturman *et al*, 2008), as it was a national option in 2007 and therefore unavailable in international data. The wording was slightly different ('own bedroom' in 2007) and standard errors are not available. The percentages for 'number of books in the home' and 'internet connection' are also taken from the 2007 national report. Both measures are directly comparable since the question stem and response categories were identical in 2007 and 2011. For 'number of books in the home', the top two response categories were combined to create the category 'more than 100 books', in both 2007 and 2011. Standard errors are available for the individual categories only. Trends for 'at least one parent with a university degree or higher' could not be reported because the question was not administered in the 2007 pupil questionnaire in England.

Figure 9.2 Social networking sites question

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On a normal school day, how much time do you spend (not including for school work) using social networking sites (e.g. Facebook, Bebo, Twitter, etc)?

Tick one box only.

No time ---

Less than 1 hour ---

From 1 hour up to 2 hours ---

From 2 hours up to 4 hours ---

From 4 hours up to 6 hours ---

6 hours or more ---

Source: national option in England's adapted version of the TIMSS 2011 Student Questionnaire¹³⁸

Table 9.8 Y9 pupils' use of social networking sites

Time spent on social networking sites on a normal school day	Per cent of Y9 pupils	Mean score on TIMSS mathematics assessment	Mean score on TIMSS science assessment
No time	16 (0.9)	503 (8.0)	531 (8.4)
Less than 1 hour	25 (0.9)	525 (7.1)	549 (6.5)
From 1 hour up to 2 hours	27 (0.8)	511 (5.8)	537 (4.9)
From 2 hours up to 4 hours	18 (0.8)	504 (6.2)	529 (5.5)
From 4 hours up to 6 hours	7 (0.5)	494 (6.2)	526 (6.4)
6 hours or more	6 (0.5)	452 (8.6)	485 (7.4)

Source: derived from national dataset for TIMSS 2011

Just over half of Y9 pupils reported spending up to two hours on a normal school day using social networking sites, with the highest proportion reporting *from 1 to 2 hours per day*. Sixteen per cent of pupils reported spending *no time* at all on social networking sites, compared with 13 per cent of pupils who reported using social networking sites for four hours or more on a normal school day. It is likely that pupils' use of social networking sites is dependent on a number of contextual factors, for example socio-economic circumstances, access to relevant technology, personal or family choice. Further investigation of the characteristics of pupils in each category would be needed to establish the factors associated with the different levels of attainment observed.

138 <http://timssandpirls.bc.edu/timss2011/index.html>

Average achievement appears to be lower among pupils who reported spending *no time* on a normal school day using social networking sites than among pupils who reported spending *less than 1 hour* using them. This difference may be statistically significant for mathematics achievement, but is unlikely to be significant for science achievement.¹³⁹

For both subjects, average achievement appears to decrease as the reported number of hours using social networking sites increases from *less than 1 hour* up to *from 4 to 6 hours*. However, these apparent differences are unlikely to be statistically significant.

For pupils who reported using social networking sites for more than six hours on a normal school day, there is a decrease in average achievement, compared with pupils who reported using them for less time or no time at all. These differences are likely to be statistically significant for both subjects.

9.5 Pupil-level factors that limit teaching in Y9

As for Y5, teachers of Y9 pupils were asked to report the extent to which a number of pupil-level factors limited their mathematics teaching. The content of the question to which teachers responded is the same as shown in section 9.2.¹⁴⁰ The findings relating to responses to the first three statements of this question are presented in Table 9.9 and Table 9.10. Table 9.9 presents teachers' reports on the extent to which pupils lacking prerequisite knowledge or skills limited teaching and Table 9.10 presents equivalent findings relating to pupils suffering from a lack of basic nutrition and from not enough sleep.

9.5.1 Limitations on teaching due to pupils lacking prerequisite knowledge or skills

Mathematics

Table 9.9 shows that in England, 24 per cent of pupils were taught mathematics by teachers who reported that their teaching was *not at all* limited by pupils' lack of prerequisite knowledge or skills; a higher proportion than on average internationally (15 per cent). A further 60 per cent of Y9 pupils were taught mathematics by teachers who reported that their teaching was limited to some *extent* by pupils' lacking prerequisite knowledge or skills. High performing participants with particularly high percentages of pupils taught by teachers whose teaching was limited *a lot* by pupils lacking prerequisite knowledge or skills included the Russian Federation, Chinese Taipei, Quebec and North Carolina.

In England, average achievement of Y9 pupils whose mathematics teachers reported that their teaching was limited *a lot* by pupils lacking prerequisite knowledge or skills was 124 scale points lower than that of pupils whose teachers reported that their teaching was *not at all* limited. This is likely to be a statistically significant difference, and is higher than in Y5, where the difference was 77 scale points for mathematics.

139 No tests of statistical significance have been carried out in the international analysis. Based on the size of the standard errors, this difference may be significant for mathematics, but further analysis would be needed in order to confirm this.

140 The only difference is that the Y9 mathematic teachers were asked about 'students' rather than 'children'.

Science

Table 9.9 shows that in England, 29 per cent of pupils were taught science by teachers who reported that their teaching was *not at all* limited by pupils' lack of prerequisite knowledge or skills, a higher proportion than on average internationally (20 per cent). A further 62 per cent of Y9 pupils were taught science by teachers who reported that their teaching was limited to *some* extent by pupils lacking prerequisite knowledge or skills. Among high performing participants, Chinese Taipei had a relatively high percentage of pupils who were taught by teachers who reported that their teaching was limited *a lot* by pupils' lacking prerequisite knowledge or skills (21 per cent, compared with 9 per cent in England), although this was not as high as the percentage in Chinese Taipei for mathematics (43 per cent).

In England, average achievement among Y9 pupils whose science teachers reported that their teaching was limited *a lot* by pupils lacking prerequisite knowledge or skills was 80 scale points lower than that of pupils whose teachers reported that their teaching was *not at all* limited by this. This is likely to be a statistically significant difference, but is smaller than the equivalent difference for Y9 mathematics. However, it is larger than the equivalent difference for Y5 science.

Table 9.9 Y9 teaching limited by pupils lacking prerequisite knowledge or skills

Mathematics

Reported by Teachers

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Lacking Prerequisite Knowledge or Skills					
	Not At All		Some		A Lot	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
England	24 (3.3)	552 (9.0)	60 (4.4)	507 (6.3)	15 (3.1)	428 (13.6)
International Avg.	15 (0.4)	490 (1.9)	57 (0.6)	471 (0.8)	28 (0.5)	443 (1.2)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Science

Reported by Teachers

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Lacking Prerequisite Knowledge or Skills					
	Not At All		Some		A Lot	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
England	29 (3.2)	562 (8.0)	62 (3.2)	526 (6.4)	9 (1.7)	482 (18.8)
International Avg.	20 (0.4)	496 (2.0)	61 (0.5)	478 (0.7)	19 (0.4)	455 (1.5)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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

Source: Exhibit 8.20, international mathematics and science reports

9.5.2 Limitations on teaching due to pupils suffering from a lack of basic nutrition

Mathematics

Table 9.10 shows that in England, 14 per cent of Y9 pupils were taught mathematics by teachers who reported that their teaching was limited to *some extent* or *a lot*¹⁴¹ by pupils' suffering from a lack of basic nutrition. This is lower than the equivalent percentage reported by teachers of Y5 pupils in England, and is lower than the international average. Among high performing participants, this percentage was higher in Korea, Quebec and Minnesota, but much lower in Japan, where it was just 1 per cent.

In England, the average achievement of Y9 pupils taught mathematics by teachers whose teaching was limited to *some extent* or *a lot* by pupils suffering from a lack of basic nutrition was 70 scale points lower than that of pupils whose teachers reported that their teaching was *not at all* limited. This is likely to be a statistically significant difference.

Science

Table 9.10 shows that in England, 25 per cent of Y9 pupils were taught science by teachers who reported that their teaching was limited to *some extent* or *a lot* by pupils suffering from a lack of basic nutrition. This is higher than the equivalent percentage for Y9 mathematics, but lower than the international average. It was similar to Korea, but higher than most other high performing and similarly performing participants, apart from Alberta where it was 43 per cent, and the United States where it was 40 per cent (and 35 to 40 per cent within similarly performing individual states).

In England, average achievement among Y9 pupils who were taught science by teachers who reported that their teaching was limited to *some extent* or *a lot* by pupils suffering from a lack of basic nutrition was 25 scale points lower than that of pupils who were taught by teachers who reported that their teaching was *not at all* limited by this. This is likely to be a statistically significant difference, but is a smaller difference than for Y9 mathematics.

9.5.3 Limitations on teaching due to pupils suffering from not enough sleep

Mathematics

Table 9.10 also shows that in England, 56 per cent of Y9 pupils were taught by teachers who reported that their teaching was limited to *some extent* or *a lot* by pupils' suffering from not enough sleep. These results are similar to the international average. However, the equivalent percentage was higher for the high performing participants Chinese Taipei, Hong Kong, Singapore, Minnesota and Quebec, and in similarly performing Finland.

In England, the average achievement of Y9 pupils who were taught mathematics by teachers who reported that their teaching was limited to *some extent* or *a lot* by pupils suffering from a lack of enough sleep was 62 scale points lower than that of pupils whose teachers reported that their teaching was *not at all* limited by this. This is likely to be a statistically significant difference, and is larger than the equivalent difference at Y5 (38 scale points).

141 As for Y5, for this statement and for *Pupils suffering from not enough sleep*, the response categories *some* and *a lot* were combined in the international analysis.

Science

Table 9.10 also shows that in England, 63 per cent of pupils were taught by teachers who reported that their teaching was limited to *some* extent or *a lot* by pupils' suffering from not enough sleep. These results are just above the international average. This percentage was higher in most of the highest performing participants, apart from Japan and was particularly high in Finland (82 per cent), Alberta (84 per cent), Minnesota (85 per cent) and Massachusetts (84 per cent).

In England, average achievement among Y9 pupils whose science teachers reported that their teaching was limited to *some* extent or *a lot* by pupils' suffering from not enough sleep was 27 scale points lower than that of pupils who were taught by teachers who reported that their teaching was *not at all* limited by this. Though notably smaller than for mathematics, this is likely to be a statistically significant difference, and is similar to the equivalent difference at Y5 science.

Table 9.10 Y9 teaching limited by pupils suffering from lack of nutrition or sleep
Mathematics

Reported by Teachers

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Lack of Basic Nutrition				Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Not Enough Sleep			
	Not At All		Some or A Lot		Not At All		Some or A Lot	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
England	86 (2.6)	516 (5.9)	14 (2.6)	446 (10.1)	44 (4.3)	540 (8.0)	56 (4.3)	478 (7.1)
International Avg.	63 (0.5)	477 (0.8)	37 (0.5)	449 (1.2)	43 (0.6)	477 (1.0)	57 (0.6)	461 (0.9)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

Science

Reported by Teachers

Country	Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Lack of Basic Nutrition				Students in Classrooms Where Teachers Report Instruction Is Limited by Students Suffering from Not Enough Sleep			
	Not At All		Some or A Lot		Not At All		Some or A Lot	
	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement	Per cent of Students	Average Achievement
England	r 75 (2.4)	538 (5.4)	25 (2.4)	513 (11.4)	r 37 (3.4)	549 (5.4)	63 (3.4)	522 (7.7)
International Avg.	64 (0.5)	485 (0.8)	36 (0.5)	461 (1.2)	42 (0.5)	484 (1.0)	58 (0.5)	473 (0.8)

() Standard errors appear in parentheses. Because of rounding some results may appear inconsistent.

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

Source: Exhibit 8.22, international mathematics and science reports

