INDICATOR D5

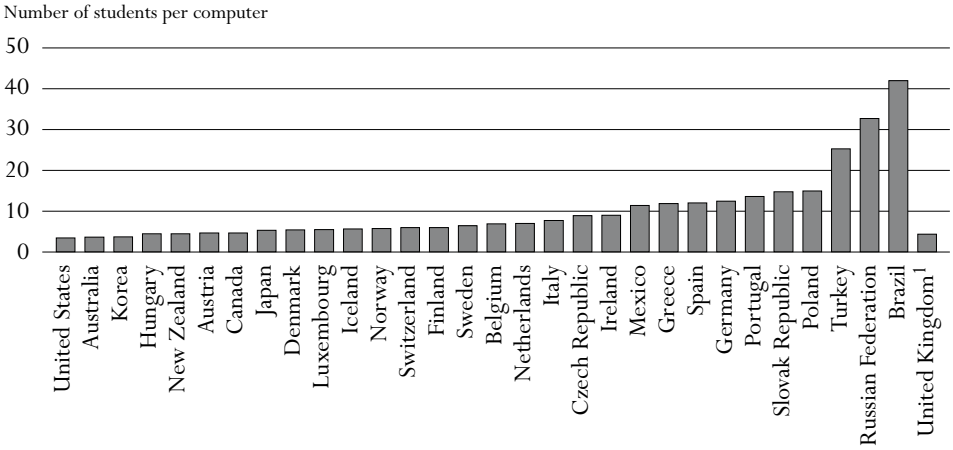
ACCESS TO AND USE OF ICT

This indicator focuses on access to information and communication technology (ICT) in schools across OECD countries, using the PISA 2003 data drawn from the responses of 15-year-old students and their school principals. This data provides information on ICT access for both students and staff within schools. The resulting analysis considers the number of computers in schools per 15-year-old student, the availability of computers to staff, and the perceptions of principals concerning the level of ICT resources in their school.

Key results

Chart D5.1. Number of students per computer (2003)

Virtually all students in OECD countries and partner countries are in schools with at least one computer, but there is substantial variation in the number of computers available to students: around one computer for nearly 3 students in the United States and Australia against one computer for 42 students in the partner country Brazil.



1. Response rate too low to ensure comparability.
Countries are ranked in ascending order of number of students per computer.
Source: OECD PISA 2003 database, Table D5.1.

StatLink: http://dx.doi.org/10.1787/203814216003

Other highlights of this indicator

- On average among OECD countries, the number of computers per student in schools has increased since PISA 2000. This increase has occurred in all but three OECD countries (Denmark, Poland and Portugal).
- There is substantial variation in the level of access students have to computers at schools. Some OECD countries have more than one computer for every five students, while eight OECD countries have, on average, less than one computer per ten students (Germany, Greece, Mexico, Poland, Portugal, the Slovak Republic, Spain and Turkey).
- Even though access to computers is greater at school than at home, 15-year-old students use their computers at home more frequently. Nearly three-quarters of students are using computers at home several times each week.
- Twenty-six per cent of school principals believe that ICT resources are at a level that does not hinder instruction in OECD countries. But there is substantial variation within and between countries. On average across OECD countries, 11% of school principals believe that a lack of ICT resources in their school hinders the instruction of students "a lot".

Policy context

Information technology continues to be an essential element of economic growth in all OECD countries. This is true not just for the growth in the ICT sector, but in the importance of ICT to blue and particularly white-collar employment and across industries as diverse as agriculture, finance, and medicine. For students, ICT skills and abilities will affect employment opportunities as well as how they integrate an increasingly technology-oriented society.

Arguably, students will need a sufficient level of familiarity and mastery of ICT to be successful in their further education and work-life. Following this assumption, schools require sufficient ICT resources for student use and learning, and for teachers and school administrators to operate functionally effective schools and school programmes.

The distribution of resources across and within education systems has long been an important issue for both educational equality and efficiency. Advances in technology in recent years beg the question of whether those without access to ICT resources will be disadvantaged – unable to share the benefits of technological growth. From the perspective of education policy-makers, it is important to consider whether schools in poorer communities provide the ICT resources that are otherwise lacking within the local community.

ICT resources within schools

Computers per student

Across OECD countries, virtually all students attend schools with at least one computer. It is clear that virtually all schools have at least some level of ICT resources. In Australia, Austria, Canada, Hungary, Korea, New Zealand, the United Kingdom and the United States the number of computers per student is more than 0.2, implying five or fewer students per computer. In Germany, Greece, Mexico, Poland, Portugal, the Slovak Republic and Spain, the number of computers per student is less than 0.1, implying 10 or more students per computer. In Turkey and the partner countries Brazil and the Russian Federation there are fewer computers per student, with 25 or more students enrolled at schools per computer (Table D5.1 and Chart D5.1).

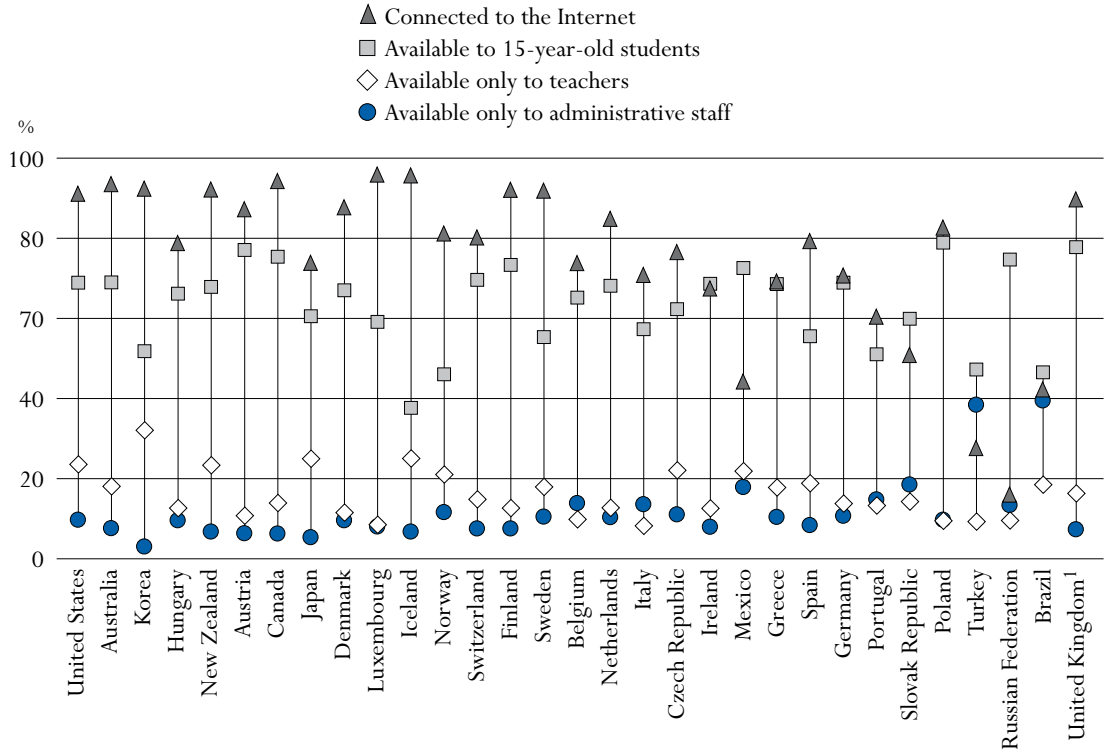
The number of computers per student has increased between 2000 and 2003. In 2000, there were 0.13 computers per student in schools (OECD average). By 2003, this had increased to 0.16 computers per student. This is equivalent to a decrease of nearly 1.5 students per computer in three years so that in 2003 there was 1 computer for every 6.25 students in schools in OECD countries. It is not possible to determine from this data whether this increase in computers is due to policy decisions to increase funding in ICT for schools or because of decreases in the price of computers and other ICT resources between 2000 and 2003.

Growth in the numbers of computers per student has occurred in most OECD countries. However, the number of computers per student has stayed the same in Denmark and has decreased in Norway, Poland and Portugal.

Student, teacher and administrative access to ICT

The number of computers per students illustrates only a portion of the question of the access to ICT. To better comprehend this issue, it is important to analyse who actually has access to the computers. The data used here show the percentage of computers in schools that are available to: 15-year-old students; only to teachers; only to administrative staff (Table D5.1 and Chart D5.2).

Chart D5.2. Percentage of computers available to staff, students and with Internet connection (2003)



1. Response rate too low to ensure comparability.
Countries are ranked in ascending order of number of students per computer.
Source: OECD PISA 2003 database, Table D5.1.

StatLink: http://dx.doi.org/10.1787/203814216003

On average, 64% of computers within schools are available to 15-year-old students across OECD countries. Considering that virtually all schools have at least one computer, most 15-year-old students have access to a computer at their school. However, there are substantial differences between countries. In Iceland, Norway, Turkey and partner country Brazil, less than one-half of computers in schools are available to 15-year-old students compared with Austria, Canada and Poland, and the partner country the Russian Federation, where over three-quarters of the school computers are made available. Importantly, this is not strongly correlated with the number of computers in schools. However, there are some countries that have relatively few computers per student and of those computers, relatively few are available to 15-year-old students. For example, Portugal and Spain have fewer computers per student than the OECD average and, of those computers, have a lower percentage available to 15-year-old students.

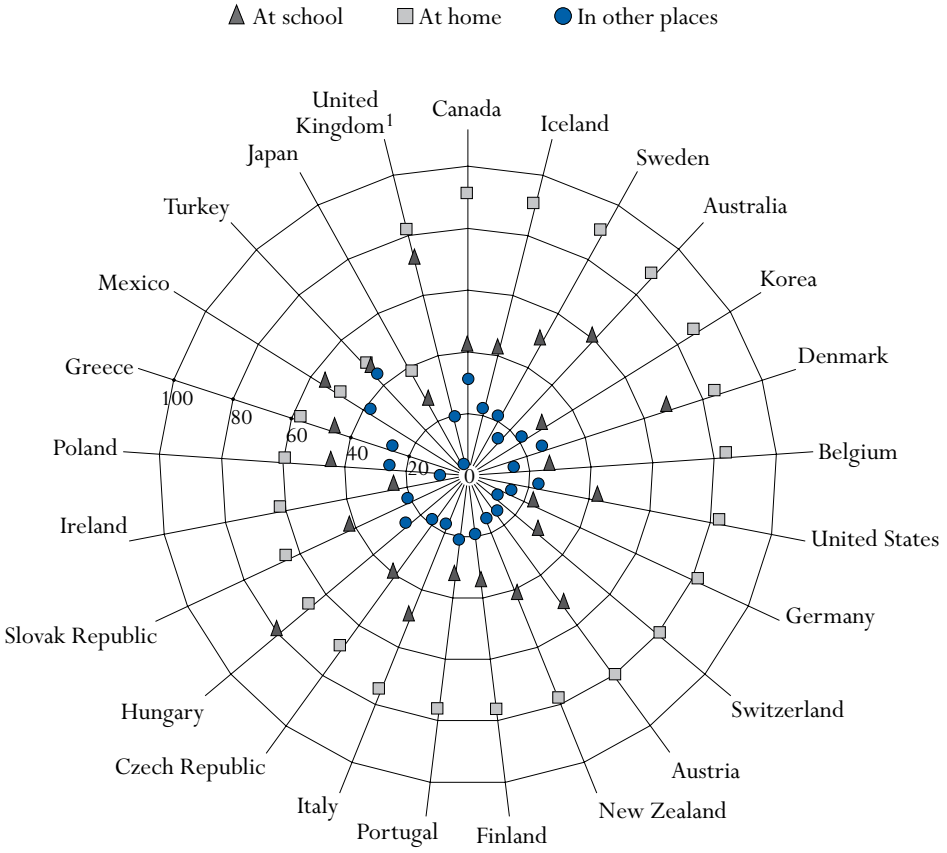
Students' use of ICT

Even though access to computers is more widespread at school than at home, 15-year-old students use their computers at home more frequently. Nearly three-quarters are using computers at home several times each week. PISA 2003 asked students how often they used a computer at home, at school or at other places. If students responded that they used computers almost every

day or a few times each week, they are considered to make frequent use of computers. In all countries except Hungary and Mexico students report that they use computers most frequently at home (rather than at school or in other places) (Chart D5.3).

As students most frequently use computers at their homes, it is important to examine what the level of ICT resources at schools means for students' access to ICT. More comprehensive analysis of this complex issue requires more extensive data and analysis, but there are two important issues that should be considered.

Chart D5.3. Percentage of students frequently using a computer



1. Response rate too low to ensure comparability.
Moving clockwise, countries are ranked in descending order of the percentage of students frequently using computers at home.
Source: OECD PISA 2003 database, Table D5.3.

StatLink: http://dx.doi.org/10.1787/203814216003

First, student access to ICT in schools is of increased importance for those students that have little access at home. On average across OECD countries, 18% of students reported having rare or no use of computers at home (defined as students who reported that they used a computer at their home "less than once a month" or "never"). However, there is considerable variation across countries. In seven OECD countries (Australia, Austria, Belgium, Canada, Denmark, Germany and Switzerland), less than 10% of students reported rare or no use of computers in their homes,

and in a further three OECD countries (Iceland, Korea and Sweden), the figures was less than 5%. Conversely, in five OECD countries (the Czech Republic, Hungary, Ireland, Mexico and the Slovak Republic), around one in five students reported rare or no use of computers in their homes, and in a further four OECD countries (Greece, Japan, Poland and Turkey), this rises to more than one in three students. For these countries, increased importance is placed upon access to ICT within schools to counterbalance a lack of use in homes.

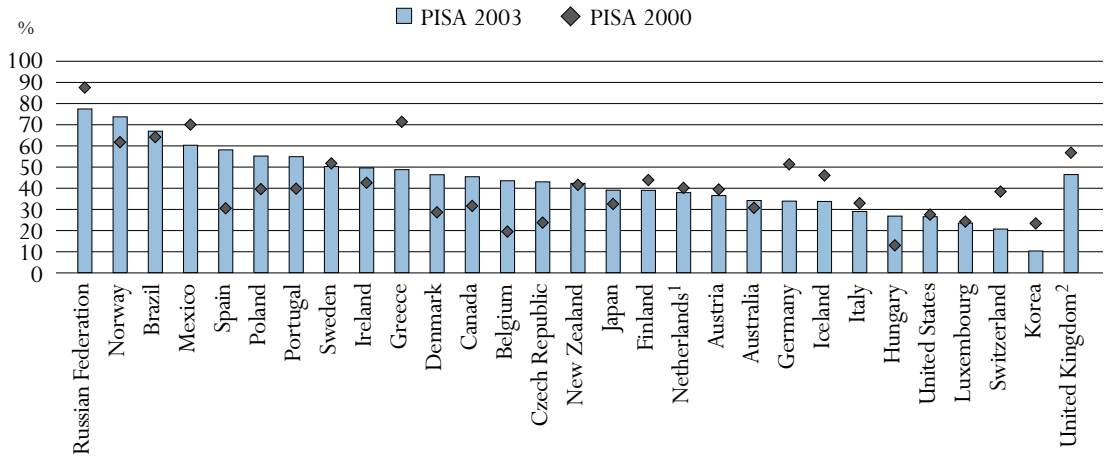
Second, the level of ICT resources in schools is important for the incorporation of ICT into overall student learning and, more specifically, if instruction is hindered by a lack of ICT resources. This is explored in the following sections.

The level of ICT resources and instruction

An important aspect of access to ICT is the issue of the extent to which lack of access hinders instruction, as reported by schools principals. The analysis above looks at the level of ICT within schools and the availability of ICT to students. This is important for issues such as students' familiarity with ICT and students' abilities to utilise ICT in their studies and general life. Analysis of how a lack of ICT resources in schools hinders instruction looks at a combination of two issues: the use of ICT resources in student learning and second, whether those ICT resources are available. The two are linked and have repercussions on the broader issue of student access to ICT.

On average across OECD countries, 26% of principals reported that instruction is not hindered by a lack of ICT resources "at all", 31% reported that it hindered instruction "very little", 33% reported it hindered instruction "to some extent", and 11% said it hindered instruction "a lot" (Table D5.2 and Chart D5.4). Similar findings were evident from the percentage of school principals that reported the extent to which instruction was hindered by a shortage of computer software for instruction.

Chart D5.4. Percentage of students in schools whose principals report that instruction is hindered by a shortage of computers for instruction (2003)



1. Response rate too low to ensure comparability for PISA 2000.
2. Response rate too low to ensure comparability for PISA 2003.

Countries are ranked in descending order of the percentage of students in schools whose principals report that instruction is hindered by a shortage of computers for instruction in PISA 2003.

Source: OECD PISA 2003 database. Table D5.2.

StatLink: http://dx.doi.org/10.1787/203814216003

As stated earlier, principals' perceptions of the extent that instruction is hindered by a shortage of computers for instruction involve two issues: first, the extent of the use of ICT resources in student learning and second, whether those ICT resources are available. This issue can, at least partly, be separated. Analysis of principals' perceptions can be nuanced by comparing these perceptions with the number of computers per student in schools. Across OECD countries, on average, principals who reported that instruction is hindered by a lack of ICT resources had fewer computers per student across their schools (Table D5.2). This would imply that principals believe that fewer computers per student hinders instruction to those students. This magnifies problems in schools where students have poor access to computers and thus less opportunity to gain familiarity and increase their general ICT skills and abilities.

Change has occurred in most countries between 2000 and 2003. In some countries the situation appears to have improved; in others, it seems to have worsened. For most countries, these changes are relatively minor but in others, the percentage of students in schools whose principals report that a shortage of computers hinders instruction to some extent or a lot has changed substantially between 2000 and 2003. In Belgium, Canada, the Czech Republic, Denmark,

Box D5.1. Findings on students' access and use of ICT and their performance in PISA 2003

This indicator includes a comparison of student access to ICT and principals' perceptions of the extent that instruction is hindered by a shortage of ICT resources in their schools. But this does not necessarily translate into an effect upon student performance. A thematic report from PISA 2003 entitled *Are Students Ready for a Technology-Rich World? What PISA Studies Tell Us* (OECD, 2005e) provides a comprehensive analysis of these issues. In regard to the effect upon student performance, the report's main findings were that:

- There is a consistent and significant positive relationship between the years of experience in computer use and mathematics performance, both before and after accounting for socio-economic and systemic variables.
- There is a consistent and significant positive curvilinear relationship between the frequency of computer use at home and mathematics performance, both before and after accounting for socio-economic and systemic variables.
- There is a curvilinear relationship between the frequency of computer use at school and mathematics performance, with moderate users of computers showing the highest mathematics performance while rare and frequent computer users perform at similar levels, once socio-economic and systemic variables have been accounted for.
- With the introduction of a multi-level structure of modelling using selected control variables, the performance gaps between students with access to computers at home and those without are less pronounced than those in the simple linear regression models, but in one-half of OECD countries students with computer access at home perform higher in mathematics than those without. Similarly, there is a performance advantage for students with access to computers at school in at least 10 out of 25 OECD even when the multi-level structure and various background factors are taken into account.

Hungary, Norway, Poland, Portugal and Spain, the hindering of instruction to some extent or a lot due to a shortage of computers has increased. In Belgium, Hungary and Spain, the proportion of students whose principals report this shortage has even doubled between 2000 and 2003. Conversely, the reported effects of shortages have substantially lessened in Germany, Greece, Iceland and Korea, and the partner country the Russian Federation, although not to the same extent.

Definitions and methodologies

The target population studied for this indicator was 15-year-old students. Operationally, this referred to students who were from 15 years and 3 (completed) months to 16 years and 2 (completed) months at the beginning of the testing period and who were enrolled in an educational institution, irrespective of the grade levels or type of institutions in which they were enrolled, and irrespective of whether they participated in school full-time or part-time.

Further references

For further information about PISA 2003, see *Learning for Tomorrow's World – First Results from PISA 2003* (OECD 2004a), *Are Students Ready for a Technology-Rich World? What PISA Studies Tell Us* (OECD, 2005e) and the *PISA 2003 Technical Report* (OECD 2005c) PISA data are also available on the PISA Web site: *www.pisa.oecd.org*.

D5

Table D5.1

Various ICT resources in secondary schools and percentage of various types of computers in schools (2003)

Results based on school principals' reports

		PISA 2003																PISA 2000			
		Percentage of students whose principals report there is at least one computer at school		For students whose principals report there is at least one computer at school:				Out of the number of computers in school, percentage of computers:										For students whose principals report there is at least one computer at school:			
				The number of computers in the school all together		Computers per student		Available to 15-year-old students		Available only to teachers		Available only to administrative staff		Connected to the Internet / WWW		Connected to a local area network		The number of computers in the school all together		Computers per student	
		%	S.E.	Mean	S.E.	Mean	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	Mean	S.E.	Mean	S.E.
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)	(19)	(20)
OECD countries	**Australia**	100	(0.0)	255	(12.9)	0.28	(0.01)	69	(1.1)	18	(0.8)	7	(0.6)	93	(0.9)	93	(1.1)	**184**	(13.5)	**0.22**	(0.01)
	Austria	100	(0.0)	128	(11.3)	0.22	(0.01)	77	(1.4)	11	(0.8)	6	(0.3)	87	(1.9)	71	(3.1)	**85**	(7.2)	**0.15**	(0.01)
	Belgium	100	(0.0)	89	(3.3)	0.15	(0.01)	65	(1.3)	10	(0.9)	14	(0.6)	74	(1.5)	54	(2.3)	**67**	(3.1)	**0.11**	(0.00)
	Canada	100	(0.0)	198	(5.3)	0.22	(0.01)	75	(0.9)	14	(0.5)	6	(0.2)	94	(0.7)	87	(1.6)	**176**	(3.0)	a	a
	Czech Republic	100	(0.0)	47	(2.4)	0.11	(0.01)	62	(1.2)	22	(0.9)	11	(0.6)	77	(1.6)	68	(2.6)	**34**	(2.5)	**0.08**	(0.01)
	Denmark	100	(0.0)	68	(2.8)	0.19	(0.01)	67	(1.4)	11	(0.9)	9	(0.4)	88	(1.4)	77	(2.2)	**53**	(2.2)	0.19	(0.03)
	Finland	100	(0.0)	57	(1.9)	0.17	(0.01)	73	(1.4)	12	(0.7)	7	(0.3)	92	(0.9)	76	(2.9)	**45**	(1.5)	**0.13**	(0.01)
	France	w	w	w	w	w	w	w	w	w	w	w	w	w	w	w	w	119	(9.1)	0.13	(0.01)
	Germany	100	(0.0)	48	(2.1)	0.08	(0.00)	69	(1.3)	14	(1.5)	10	(0.4)	71	(2.0)	45	(2.9)	**31**	(1.3)	**0.06**	(0.00)
	Greece	100	(0.0)	24	(2.7)	0.08	(0.01)	69	(2.2)	18	(1.4)	10	(1.7)	69	(3.7)	56	(4.4)	**15**	(1.5)	**0.05**	(0.00)
	Hungary	100	(0.0)	90	(3.6)	0.23	(0.01)	66	(1.5)	12	(0.6)	9	(0.4)	79	(2.0)	79	(2.2)	**61**	(3.7)	**0.16**	(0.01)
	Iceland	100	(0.0)	73	(0.2)	0.18	(0.00)	38	(0.1)	25	(0.1)	7	(0.0)	96	(0.1)	89	(0.1)	**39**	(0.1)	**0.12**	(0.00)
	Ireland	100	(0.0)	60	(3.4)	0.11	(0.00)	69	(2.1)	12	(1.3)	8	(0.7)	67	(2.6)	36	(3.5)	**41**	(1.7)	**0.08**	(0.00)
	Italy	100	(0.0)	77	(3.6)	0.13	(0.01)	57	(1.6)	8	(0.6)	13	(0.7)	71	(2.1)	50	(2.7)	74	(7.2)	**0.10**	(0.00)
	Japan	100	(0.0)	128	(7.2)	0.19	(0.02)	61	(1.5)	25	(1.2)	5	(0.3)	74	(2.5)	73	(2.3)	**92**	(4.4)	**0.11**	(0.01)
	Korea	100	(0.0)	289	(7.4)	0.27	(0.01)	52	(1.5)	32	(0.6)	3	(0.1)	92	(1.2)	91	(1.4)	**198**	(7.2)	**0.21**	(0.03)
	Luxembourg	100	(0.0)	254	(0.2)	0.18	(0.00)	59	(0.0)	8	(0.0)	8	(0.0)	96	(0.0)	95	(0.0)	**159**	(0.1)	**0.11**	(0.00)
	Mexico	99	(0.6)	59	(3.6)	0.09	(0.01)	73	(1.7)	22	(2.9)	18	(1.1)	44	(4.2)	51	(4.4)	**32**	(2.3)	**0.06**	(0.01)
	Netherlands	100	(0.0)	129	(5.8)	0.14	(0.01)	68	(1.6)	12	(1.1)	10	(0.7)	85	(2.6)	81	(3.0)	**101**	(6.8)	**0.11**	(0.01)
	New Zealand	100	(0.0)	232	(8.0)	0.23	(0.01)	68	(1.0)	23	(0.8)	7	(0.3)	92	(1.3)	92	(1.6)	**169**	(5.8)	**0.18**	(0.01)
	Norway	100	(0.0)	50	(1.8)	0.18	(0.01)	46	(1.5)	21	(0.9)	11	(0.4)	81	(1.7)	48	(3.2)	m	m	m	m
	Poland	100	(0.0)	21	(0.7)	0.07	(0.00)	79	(0.7)	9	(0.6)	10	(0.5)	83	(2.0)	64	(2.8)	**25**	(1.4)	**0.10**	(0.01)
	Portugal	100	(0.0)	69	(2.9)	0.07	(0.00)	51	(1.9)	13	(0.6)	15	(0.7)	60	(2.3)	50	(3.4)	**27**	(1.8)	0.09	(0.03)
	Slovak Republic	100	(0.0)	29	(1.1)	0.07	(0.00)	60	(1.5)	14	(0.9)	18	(1.1)	51	(1.9)	53	(2.2)	a	a	a	a
	Spain	100	(0.0)	52	(2.8)	0.08	(0.00)	56	(1.6)	19	(1.1)	8	(0.5)	79	(1.7)	59	(3.3)	**42**	(2.4)	**0.06**	(0.00)
	Sweden	100	(0.0)	85	(3.8)	0.16	(0.00)	55	(1.5)	18	(0.7)	10	(0.4)	92	(1.1)	80	(2.2)	**64**	(3.6)	0.14	(0.01)
	Switzerland	100	(0.0)	70	(6.3)	0.17	(0.03)	70	(1.7)	15	(0.9)	7	(0.5)	80	(1.8)	70	(2.9)	**47**	(4.2)	0.14	(0.01)
	Turkey	100	(0.0)	25	(3.9)	0.04	(0.00)	47	(4.5)	9	(1.5)	38	(4.2)	28	(3.1)	12	(2.4)	a	a	a	a
	United States	100	(0.0)	377	(15.9)	0.30	(0.01)	69	(1.7)	23	(1.4)	9	(1.4)	91	(1.3)	84	(2.0)	**237**	(21.4)	**0.22**	(0.01)
	OECD average	***100***	***(0.0)***	***115***	***(1.1)***	***0.16***	***(0.00)***	***64***	***(0.3)***	***16***	***(0.2)***	***10***	***(0.2)***	***78***	***(0.4)***	***68***	***(0.5)***	***87***	***(1.2)***	***0.13***	***(0.00)***
	United Kingdom[1]	100	(0.0)	245	(8.2)	0.23	(0.01)	78	(0.9)	16	(1.3)	7	(0.7)	90	(1.3)	88	(1.7)	**140**	(4.8)	**0.14**	(0.00)
Partner countries	**Brazil**	90	(2.6)	23	(4.5)	0.02	(0.00)	47	(2.8)	18	(2.0)	39	(2.5)	42	(3.3)	32	(3.2)	16	(2.7)	0.13	(0.09)
	Russian Federation	99	(0.4)	20	(2.2)	0.03	(0.00)	75	(2.4)	9	(0.7)	13	(2.0)	16	(2.5)	34	(2.9)	**12**	(0.8)	**0.02**	(0.00)

Note: Statistically significant differences are marked in bold.

1. Response rate too low to ensure comparability.

Source: OECD PISA 2003 database. See Annex 3 for notes (*www.oecd.org/edu/eag2006*).

Please refer to the Reader's Guide for information concerning the symbols replacing missing data.

StatLink: http://dx.doi.org/10.1787/203814216003

Table D5.2.

Percentage of students in secondary schools whose principals report that instruction is hindered by a shortage of ICT resources (2003)

Results based on school principals' reports

		Percentage of students in schools whose principals report that instruction is hindered by a shortage of:															
		Computers for instruction								Computer software for instruction							
		Not at all		Very little		To some extent		A lot		Not at all		Very little		To some extent		A lot	
		%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
OECD countries	Australia	30	(3.1)	35	(3.1)	28	(2.7)	6	(1.3)	32	(3.3)	37	(2.9)	28	(3.0)	3	(1.0)
	Austria	40	(3.4)	24	(3.1)	30	(2.9)	7	(2.1)	31	(3.5)	31	(3.4)	31	(3.7)	8	(2.2)
	Belgium	22	(2.7)	35	(3.0)	35	(3.7)	9	(1.8)	25	(3.0)	37	(3.2)	31	(3.0)	7	(1.6)
	Canada	20	(2.1)	34	(2.3)	35	(2.3)	11	(1.7)	18	(2.1)	35	(2.5)	39	(2.3)	8	(1.2)
	Czech Republic	23	(3.2)	34	(3.3)	33	(2.9)	10	(2.2)	15	(2.5)	38	(3.4)	37	(3.0)	9	(1.9)
	Denmark	17	(2.8)	36	(3.7)	39	(3.9)	8	(2.4)	14	(2.5)	45	(3.7)	33	(3.5)	7	(1.8)
	Finland	14	(2.5)	47	(4.1)	34	(4.1)	5	(1.8)	10	(2.2)	44	(4.0)	42	(4.2)	5	(1.7)
	France	w	w	w	w	w	w	w	w	w	w	w	w	w	w	w	w
	Germany	34	(3.5)	33	(3.4)	27	(3.3)	7	(1.7)	26	(3.4)	31	(3.2)	34	(3.3)	9	(2.0)
	Greece	26	(4.2)	25	(5.1)	22	(4.9)	27	(4.6)	12	(3.3)	28	(5.6)	30	(5.1)	30	(4.3)
	Hungary	43	(3.8)	30	(3.5)	23	(3.5)	4	(1.1)	22	(3.5)	33	(3.8)	32	(4.0)	13	(2.8)
	Iceland	36	(0.2)	30	(0.2)	31	(0.2)	2	(0.1)	25	(0.2)	40	(0.2)	32	(0.2)	2	(0.1)
	Ireland	24	(3.8)	27	(3.9)	41	(4.3)	8	(2.5)	18	(3.6)	25	(3.9)	37	(4.4)	20	(3.6)
	Italy	35	(3.5)	36	(3.2)	23	(3.1)	6	(1.3)	30	(3.3)	40	(3.6)	22	(3.5)	9	(2.4)
	Japan	27	(3.9)	34	(4.0)	32	(4.1)	7	(2.1)	20	(3.8)	34	(4.1)	38	(4.3)	9	(2.4)
	Korea	57	(3.9)	33	(3.9)	9	(2.1)	2	(1.1)	41	(4.1)	48	(4.1)	9	(2.2)	2	(1.1)
	Luxembourg	26	(0.1)	50	(0.1)	11	(0.0)	12	(0.0)	38	(0.1)	46	(0.1)	12	(0.0)	3	(0.0)
	Mexico	21	(2.7)	19	(2.6)	38	(3.4)	22	(2.7)	21	(2.7)	21	(2.5)	33	(3.6)	25	(3.1)
	Netherlands	30	(3.9)	32	(4.6)	31	(3.9)	7	(1.8)	26	(3.8)	30	(4.1)	33	(4.2)	11	(2.5)
	New Zealand	24	(2.7)	33	(3.3)	38	(3.3)	4	(1.3)	23	(2.4)	40	(3.3)	33	(3.2)	5	(1.2)
	Norway	6	(1.9)	21	(2.8)	55	(3.7)	18	(3.1)	8	(2.2)	31	(3.6)	48	(3.8)	14	(2.6)
	Poland	19	(3.0)	26	(3.0)	40	(3.6)	15	(2.8)	7	(2.1)	21	(3.5)	53	(4.2)	19	(3.1)
	Portugal	18	(3.6)	27	(4.2)	45	(4.0)	10	(2.6)	14	(2.7)	27	(4.2)	51	(4.2)	8	(2.4)
	Slovak Republic	10	(1.8)	23	(2.5)	49	(3.8)	18	(2.5)	4	(1.3)	21	(3.2)	50	(3.7)	25	(2.7)
	Spain	19	(2.9)	23	(3.2)	44	(3.3)	14	(2.4)	15	(2.9)	25	(3.2)	45	(3.9)	16	(2.6)
	Sweden	17	(2.7)	33	(3.8)	42	(3.9)	8	(2.2)	16	(2.8)	37	(3.8)	41	(3.7)	7	(2.0)
	Switzerland	44	(3.7)	35	(3.3)	17	(2.6)	4	(1.3)	27	(3.4)	48	(4.2)	18	(2.9)	7	(1.9)
	Turkey	6	(2.1)	13	(2.9)	37	(4.2)	45	(4.8)	6	(2.0)	16	(3.7)	33	(4.3)	45	(4.4)
	United States	38	(3.7)	35	(2.8)	20	(2.8)	7	(1.7)	36	(3.6)	37	(2.9)	23	(2.8)	4	(1.3)
	OECD average	*26*	*(0.6)*	*31*	*(0.6)*	*33*	*(0.6)*	*11*	*(0.4)*	*21*	*(0.5)*	*34*	*(0.7)*	*34*	*(0.7)*	*12*	*(0.4)*
	United Kingdom[1]	19	(2.5)	34	(3.3)	36	(3.3)	11	(2.2)	17	(2.4)	35	(3.6)	40	(3.2)	7	(1.7)
Partner countries	Brazil	22	(3.1)	11	(2.3)	20	(2.7)	47	(3.5)	16	(2.8)	14	(2.9)	17	(2.5)	52	(3.4)
	Russian Federation	13	(2.7)	10	(2.8)	32	(3.7)	46	(3.9)	9	(2.0)	11	(3.0)	35	(3.7)	46	(3.9)

Note: Statistically significant changes are marked in bold.

1. Response rate too low to ensure comparability for 2003 data.

Source: OECD PISA 2003 database, Table 2.5. See Annex 3 for notes (*www.oecd.org/edu/eag2006*).

Please refer to the Reader's Guide for information concerning the symbols replacing missing data.

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Table D5.2. *(continued)*

Percentage of students in secondary schools whose principals report that instruction is hindered by a shortage of ICT resources (2003)

Results based on school principals' reports

		Percentage of students in schools whose principals report that a shortage of computers hinders instruction to some extent or a lot				Number of computers per student in schools whose principals report that a shortage of computers hinders instruction							
		PISA 2000		PISA 2003		Not at all		Very little		To some extent		A lot	
		%	S.E.	%	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.	Mean	S.E.
		(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)	(26)	(27)	(28)
OECD countries	Australia	30	(3.9)	34	(2.8)	0.36	(0.02)	0.26	(0.01)	0.24	(0.01)	0.18	(0.02)
	Austria	38	(4.3)	36	(3.4)	0.26	(0.02)	0.22	(0.02)	0.17	(0.02)	0.19	(0.04)
	Belgium	**18**	(2.4)	**43**	(3.3)	0.18	(0.01)	0.15	(0.01)	0.13	(0.01)	0.13	(0.06)
	Canada	**30**	(1.7)	**45**	(2.6)	0.27	(0.03)	0.22	(0.01)	0.19	(0.01)	0.21	(0.02)
	Czech Republic	22	(3.5)	43	(3.2)	0.14	(0.02)	0.13	(0.01)	0.09	(0.01)	0.07	(0.01)
	Denmark	**27**	(3.5)	**46**	(4.4)	0.27	(0.06)	0.21	(0.01)	0.14	(0.01)	0.11	(0.02)
	Finland	43	(3.9)	39	(4.2)	0.22	(0.02)	0.18	(0.01)	0.14	(0.01)	0.12	(0.02)
	France	28	(3.3)	w	w	w	w	w	w	w	w	w	w
	Germany	**50**	(3.8)	**34**	(3.3)	0.10	(0.01)	0.07	(0.00)	0.08	(0.01)	0.05	(0.01)
	Greece	**70**	(4.4)	**49**	(5.8)	0.12	(0.02)	0.08	(0.01)	0.07	(0.01)	0.07	(0.01)
	Hungary	**12**	(2.7)	**27**	(3.5)	0.28	(0.02)	0.23	(0.03)	0.15	(0.01)	0.14	(0.05)
	Iceland	**45**	(0.1)	**34**	(0.2)	0.20	(0.00)	0.18	(0.00)	0.15	(0.00)	0.14	(0.01)
	Ireland	41	(4.5)	50	(4.1)	0.16	(0.01)	0.11	(0.01)	0.09	(0.01)	0.06	(0.01)
	Italy	32	(3.9)	29	(3.1)	0.15	(0.01)	0.13	(0.01)	0.10	(0.01)	0.10	(0.02)
	Japan	31	(4.3)	39	(4.2)	0.22	(0.03)	0.14	(0.01)	0.22	(0.06)	0.21	(0.04)
	Korea	**22**	(3.7)	**10**	(2.4)	0.26	(0.01)	0.29	(0.02)	0.29	(0.03)	0.12	(0.00)
	Luxembourg	**23**	(0.2)	**23**	(0.1)	0.24	(0.00)	0.16	(0.00)	0.17	(0.00)	0.17	(0.00)
	Mexico	69	(3.7)	60	(3.1)	0.13	(0.02)	0.07	(0.01)	0.07	(0.01)	0.08	(0.01)
	Netherlands	39	(6.0)	38	(4.0)	0.15	(0.01)	0.15	(0.01)	0.13	(0.01)	0.15	(0.02)
	New Zealand	40	(3.4)	42	(3.5)	0.26	(0.02)	0.23	(0.01)	0.20	(0.01)	0.22	(0.03)
	Norway	**61**	(4.1)	**74**	(3.1)	0.30	(0.06)	0.22	(0.02)	0.16	(0.01)	0.13	(0.01)
	Poland	**38**	(4.8)	**55**	(3.6)	0.07	(0.01)	0.08	(0.01)	0.06	(0.01)	0.06	(0.01)
	Portugal	**39**	(3.8)	**55**	(4.1)	0.08	(0.00)	0.08	(0.01)	0.07	(0.00)	0.06	(0.00)
	Slovak Republic	a	a	a	a	0.10	(0.01)	0.09	(0.01)	0.07	(0.00)	0.03	(0.00)
	Spain	**29**	(3.8)	**58**	(3.4)	0.10	(0.01)	0.09	(0.01)	0.08	(0.01)	0.07	(0.01)
	Sweden	51	(4.1)	50	(4.1)	0.21	(0.01)	0.16	(0.01)	0.14	(0.01)	0.12	(0.01)
	Switzerland	37	(4.0)	21	(2.9)	0.21	(0.06)	0.15	(0.01)	0.11	(0.01)	0.20	(0.05)
	Turkey	a	a	a	a	0.12	(0.06)	0.03	(0.01)	0.03	(0.00)	0.03	(0.00)
	United States	26	(4.7)	26	(3.0)	0.32	(0.02)	0.30	(0.02)	0.24	(0.01)	0.21	(0.02)
	OECD average	***37***	***(0.7)***	***41***	***(0.7)***	***0.20***	***(0.01)***	***0.16***	***(0.00)***	***0.14***	***(0.00)***	***0.13***	***(0.00)***
	United Kingdom[1]	56	(3.4)	46	(3.3)	0.30	(0.02)	0.23	(0.01)	0.20	(0.01)	0.20	(0.02)
Partner countries	Brazil	63	(3.8)	67	(3.4)	0.06	(0.02)	0.02	(0.01)	0.02	(0.00)	0.01	(0.00)
	Russian Federation	**86**	(2.7)	**77**	(3.7)	0.04	(0.01)	0.05	(0.01)	0.03	(0.00)	0.02	(0.00)

Note: Statistically significant changes are marked in bold.

1. Response rate too low to ensure comparability for 2003 data.

Source: OECD PISA 2003 database, Table 2.5. See Annex 3 for notes (*www.oecd.org/edu/eag2006*).

Please refer to the Reader's Guide for information concerning the symbols replacing missing data.

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Table D5.3.

Percentage of 15-year-old students using computers at home, school or other places, by frequency of use (2003)

Results based on students' self-reports

		Percentage of students using computers at school						Percentage of students using computers at home						Percentage of students using computers in other places					
		Frequent use		Moderate use		Rare or no use		Frequent use		Moderate use		Rare or no use		Frequent use		Moderate use		Rare or no use	
		%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.	%	S.E.
		(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
OECD countries	Australia	59	(1.0)	27	(0.7)	14	(0.7)	87	(0.5)	7	(0.3)	6	(0.3)	14	(0.6)	27	(0.7)	59	(0.6)
	Austria	53	(2.0)	31	(1.5)	16	(1.3)	81	(0.8)	12	(0.6)	6	(0.4)	16	(0.7)	25	(0.8)	59	(1.0)
	Belgium	27	(0.9)	35	(0.9)	39	(1.2)	84	(0.5)	8	(0.4)	9	(0.4)	15	(0.5)	22	(0.6)	63	(0.7)
	Canada	40	(0.9)	31	(0.7)	29	(0.8)	90	(0.3)	4	(0.2)	6	(0.3)	30	(0.5)	34	(0.5)	37	(0.5)
	Czech Republic	41	(1.6)	44	(1.6)	15	(1.4)	70	(0.9)	11	(0.5)	19	(0.7)	19	(0.6)	29	(0.7)	52	(0.9)
	Denmark	68	(1.6)	25	(1.1)	7	(0.7)	84	(0.7)	10	(0.6)	6	(0.4)	25	(0.8)	25	(0.9)	49	(1.1)
	Finland	36	(1.5)	41	(1.0)	23	(1.3)	78	(0.6)	11	(0.4)	11	(0.5)	21	(0.7)	28	(0.7)	52	(0.8)
	Germany	23	(1.2)	28	(1.4)	48	(1.7)	82	(0.6)	10	(0.5)	7	(0.4)	16	(0.7)	19	(0.7)	65	(0.9)
	Greece	45	(2.4)	27	(1.7)	28	(1.9)	57	(1.2)	6	(0.3)	37	(1.3)	26	(0.8)	20	(0.6)	54	(0.8)
	Hungary	80	(1.2)	10	(0.8)	9	(1.0)	67	(1.0)	6	(0.5)	27	(0.9)	26	(0.6)	28	(0.8)	46	(0.9)
	Iceland	41	(0.8)	40	(0.8)	19	(0.7)	89	(0.6)	7	(0.5)	4	(0.4)	21	(0.7)	30	(0.7)	50	(0.9)
	Ireland	24	(1.4)	27	(1.8)	49	(2.3)	61	(0.9)	19	(0.7)	20	(0.8)	9	(0.5)	18	(0.8)	73	(0.9)
	Italy	51	(2.0)	20	(0.9)	30	(1.9)	76	(0.8)	8	(0.4)	16	(0.7)	19	(0.7)	18	(0.5)	64	(0.8)
	Japan	26	(2.3)	33	(2.7)	41	(3.1)	37	(1.2)	22	(0.8)	41	(1.1)	2	(0.3)	5	(0.4)	93	(0.5)
	Korea	28	(1.9)	29	(1.8)	43	(2.6)	86	(0.6)	11	(0.6)	3	(0.3)	21	(0.9)	33	(1.0)	47	(1.2)
	Mexico	54	(1.9)	16	(0.9)	30	(1.7)	48	(1.8)	44	(0.3)	28	(0.3)	37	(1.1)	23	(0.8)	40	(1.2)
	New Zealand	43	(1.2)	26	(0.8)	31	(1.2)	79	(0.7)	8	(0.5)	12	(0.6)	17	(0.7)	26	(0.6)	57	(0.8)
	Poland	44	(1.8)	34	(1.4)	22	(2.4)	59	(1.1)	4	(0.3)	38	(1.1)	25	(0.7)	22	(0.7)	53	(0.9)
	Portugal	34	(1.5)	25	(0.9)	41	(1.6)	78	(0.9)	5	(0.4)	18	(0.8)	23	(0.8)	22	(0.8)	55	(1.1)
	Slovak Republic	42	(1.5)	30	(1.5)	27	(2.0)	65	(1.0)	9	(0.5)	26	(0.9)	21	(0.8)	31	(0.9)	48	(1.2)
	Sweden	48	(1.5)	30	(0.8)	22	(1.2)	89	(0.5)	7	(0.4)	4	(0.3)	20	(0.7)	28	(0.6)	52	(0.8)
	Switzerland	30	(1.4)	36	(1.1)	34	(1.7)	81	(0.6)	12	(0.5)	7	(0.5)	13	(0.7)	17	(0.6)	70	(0.8)
	Turkey	46	(3.5)	8	(0.9)	46	(3.7)	48	(2.1)	3	(0.5)	49	(2.2)	43	(1.2)	21	(0.9)	36	(1.3)
	United States	43	(1.4)	28	(0.9)	29	(1.2)	83	(0.7)	6	(0.4)	11	(0.5)	23	(0.7)	26	(0.8)	51	(1.0)
	OECD average	*44*	*(0.3)*	*28*	*(0.3)*	*28*	*(0.4)*	*74*	*(0.2)*	*9*	*(0.1)*	*18*	*(0.2)*	*21*	*(0.2)*	*24*	*(0.1)*	*55*	*(0.2)*
	United Kingdom[1]	71	(1.4)	15	(0.8)	14	(1.0)	81	(1.0)	9	(0.6)	11	(0.7)	18	(1.0)	27	(0.9)	55	(1.3)
Partner country	Russian Federation	43	(2.1)	38	(1.3)	19	(1.7)	43	(2.0)	2	(0.2)	55	(2.0)	36	(1.2)	23	(0.9)	41	(1.1)

1. Response rate too low to ensure comparability.

Source: OECD. See Annex 3 for notes (*www.oecd.org/edu/eag2006*).

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