CHAPTER 5:

Students' Use of and Engagement with ICT at Home and School

Introduction

As part of the ICILS 2013 survey, Grade 8 students in the 21 participating ICILS countries completed a questionnaire concerning their use of information and communication technology (ICT) at home and at school, their experience of using ICT, and their access to ICT resources. Students answered this computer-based questionnaire after completing the ICILS assessment of computer and information literacy (CIL).

More specifically, the ICILS student questionnaire included questions relating to students' background characteristics, their experience and use of computers and ICT to complete a range of different tasks in school and out of school, and their attitudes toward the use of computers and ICT. The introduction to the questionnaire advised students that a computer could refer to a desktop computer, a notebook or laptop computer, a netbook computer, or a tablet device such as an iPad. The responses from this questionnaire thus provided information about aspects of Grade 8 students' familiarity with ICT[1] and their perceptions of using ICT at school and at home.

Our focus in this chapter is mainly on Research Question 3: *What characteristics of students' levels of access to, familiarity with, and self-reported proficiency in using computers are related to student achievement in computer and information literacy?* When reporting the information presented in this chapter, we provide detailed results for each country (typically percentages) pertaining to particular questionnaire items. We use scale scores based on sets of items to provide a more parsimonious picture of differences across countries as well as differences between subgroups such as females and males.

Following the engagement taxonomy proposed by Fredericks, Blumenfeld, and Paris (2004), we use the term "engagement" to encompass behavioral engagement (i.e., how students use ICT and how often they use it) and emotional engagement (students' perceptions of, attitudes toward, and feelings about ICT).

ICT at home and school

The last 30 or so years have seen rapid growth in the availability and use of ICT. Use of this technology has thus become ubiquitous in a relatively short period of time. Today, ICT permeates many occupations and homes throughout the world. Computer and internet access varies across countries, however, and also within countries. At the level of the home, this variation is typically associated with household income. Meta-analyses (Li & Ma, 2010; Tamin, Bernard, Borokhovski, Abrami, & Schmid, 2011) suggest positive associations between ICT use and student achievement in different subject areas.

The Trends in International Mathematics and Science Study (TIMSS), conducted by the International Association for the Evaluation of Educational Achievement (IEA) in 2011, reported that, on average, more than half (53%) of the Grade 8 students participating

1 In Norway, Grade 9 students completed the questionnaire.

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in the study had their own room and an internet connection at home (Mullis, Martin, Foy, & Arora, 2012, p. 184).[2] In some countries, this figure was higher than 80 percent (Australia, England, Finland, New Zealand, Norway, Slovenia, and Sweden as well as the Canadian provinces of Alberta, Ontario, and Quebec).

The survey of ICT familiarity conducted in 2012 as part of the OECD's Programme for International Student Assessment (PISA) showed that across the 34 participating OECD countries 93 percent of 15-year-old students had a computer at home that they could use for school work (OECD, 2013, p. 184). In 2000, the corresponding figure was 77 percent. Other PISA 2012 data showed that, on average across the participating countries, 93 percent of 15-year-old students had access to the internet at home (OECD, 2013, p. 184).

Evidence of widespread and growing use of digital technologies in schools for teaching and learning also exists. One example is a report from the United States Department of Education that documented the policies and practices 22 countries had adopted in order to encourage educational application of ICT (Bakia, Murphy, Anderson, & Trinidad, 2011).

TIMSS 2011 likewise reported high levels of access to computers for teaching and learning in schools (Mullis et al., 2012, p. 244). Forty percent of the Grade 8 students (one of the two TIMSS target grades) were in schools that had, on average, one computer for every one to two students, 28 percent were in schools with one computer for every three to five students, and 28 percent were in schools with one computer for six or more students. Only four percent of the Grade 8 students were attending schools with no provision for computers for instruction. The countries with the highest levels of computer availability (70% of students in schools with one computer for every one or two students) included Australia, England, Georgia, Hungary, Macedonia, New Zealand, Norway, and Slovenia.

Growth in student use of ICT at home and school has been accompanied by a growing interest in how these technologies are being used. IEA's Second International Technology in Education Study (SITES, Module 2), a major qualitative study of innovative pedagogical practices involving ICT use, conducted between 2000 and 2002, considered 174 case studies from across 28 countries (Kozma, 2003b). The case studies focused primarily on innovative ICT use, covered primary (one third of the cases) and secondary schooling (two thirds of the cases), and encompassed a range of subjects and crosscurricular topics.

SITES 2006 explored the use of ICT by Grade 8 science and mathematics teachers in 22 countries (Law, Pelgrum, & Plomp, 2008). The report of that study highlighted the importance of system and school factors in supporting teachers' pedagogical use of ICT. The report also documented the more extensive use of ICT by science teachers than mathematics teachers and the wide variation in the pedagogical use of ICT across education systems.

A survey of ICT in school education commissioned by the European Commission and reported on in 2013 included a survey of students at ISCED 2 (Grade 8) and ISCED 3 (Grade 11). Eighty percent of the Grade 8 students and 90 percent of the Grade 11 students said they had been using computers for more than four years. Students

2 These two items (own room and internet connection) cannot be separated in the reported data.

reported undertaking ICT-based activities more frequently at home than at school. However, considerable crossnational differences existed in the frequency with which students participated in ICT-based activities.

Students in the European Commission study rarely reported using, during lessons, applications (e.g., data-logging tools and computer simulations) that the commission research team considered particularly well suited to ICT use. One third of the students said they used digital textbooks and multimedia resources on at least a weekly basis. Students furthermore considered teacher-centered activities to be more extensive than student-centered activities. The report provided evidence of a positive association between amount of student-centered learning and frequency of ICT use for classroom activities.

The European Commission survey also identified three groups of ICT-based activities at home that the report authors termed "fun" (e.g., streaming or downloading multimedia, music, movies, videos), "learning" (e.g., online news, information searching, and learning programs), and "games." Apparently missing from the classification, however, were activities involving the use of computer utilities (software applications) for school-related document preparation.

The report's authors indicated that students were more confident in their "digital competences when they [had] high access to/use of ICT at home and at school" (European Commission, 2013, p. 15). Confident students also tended to be positive about the impact of ICT on their work and leisure. The authors furthermore reported evidence showing that pedagogical use of ICT is not simply associated with more abundant ICT resourcing. They observed that despite enhanced resourcing in the several years before the study, school use of ICT had not increased since 2006. This context enabled the study's authors to draw attention to the lack of ICT policies in schools.

In this chapter, we extend the body of information about student engagement with ICT by referencing data from the representative samples of Grade 8 students across 21 countries who participated in the study. We examine the extent to which, and the ways in which, these students were using ICT at home and at school. We also look at their perceptions of using ICT in these two environments.

Familiarity with computers

Our focus with regard to familiarity with computers is on students' ICT experience (in terms of the number of years students said they had been using computers) and the frequency with which (according to the students) they were using computers at home, school, and other places.

Experience with using computers

Table 5.1 records the length of time that students had been using computers. It also sets out the association between computer experience and students' CIL. Students reported their experience via five question response categories ("less than one year," "at least one year but less than three years," "at least three years but less than five years," "at least five years but less than seven years," and "seven or more years"). We transformed these categories into values reflecting approximate years of experience (0, 2, 4, 6, and 8) to obtain estimates of average years of experience. We then used these in a regression analysis so that we could review the association between this variable and CIL.

As is evident in Table 5.1, on average across the ICILS countries, more than one third (36%) of Grade 8 students reported having used computers for seven or more years. A further 29 percent had been using computers for between five and seven years. Fourteen percent said they had been using computers for under three years. Only five percent (or one in 20) of the surveyed students said they had been using computers for less than one year. Crossnationally, the estimated average length of time that students had been using computers was about six years.

Grade 8 students' experience with computers varied across the ICILS countries. If we take the percentage of students with five years or more experience of using computers as an indication of an "experienced computer user," we can see from Table 5.1 that many of the countries that met IEA sampling requirements had 69 percent or more of their students in this group. These countries included Poland (85%), the Canadian provinces of Ontario and Newfoundland and Labrador (both 83%), Norway (79%), Australia (78%), Slovenia (76%), Croatia (76%), the Czech Republic (75%), the Slovak Republic (71%), Lithuania (70%), and Korea (69%). In the next, much smaller group of countries, where about half the students had five or more years' experience of using computers, we find the Russian Federation (60% of students in this category) and Germany (49% of students). In the remaining two countries, Turkey and Thailand, the respective percentages of students reporting five or more years' experience of using computers were 38 and 34 percent.

We used a bivariate regression to investigate the relationship between students' computer experience (in approximate years) and CIL achievement. The results of this regression appear in the final two columns of Table 5.1. Statistically significant positive associations between computer experience and test performance emerged in all but one country (Germany). On average across countries, one year of computer experience was associated with an increase of nine CIL score points, and the model explained six percent of the variation in CIL. In Thailand and Turkey, computer experience accounted for 10 percent or more of the variance in student CIL achievement. Between one quarter and one fifth of the students in these two countries said they had been using computers for less than one year, an outcome perhaps of limited ICT resources. However, the relationship between experience of computer use and CIL achievement appeared to be similar in most countries.

Frequency of computer use

Students can use computers at home, school, and other places (such as a library or internet cafe). Table 5.2 records the percentages of Grade 8 students who reported using computers at least once a week at each of these places.[3] We chose to adopt the category of "at least once per week" as a summary indicator, not only because we could apply it uniformly to the various out-of-school computer-based activities reported in this chapter but also because it allowed us to generate reasonable distributions across those varied activities. We also used "at least once per month" as a summary indicator for school-based computer activities.[4]

3 The full range of response categories was "never," "less than once a month," "at least once a month but not every week," "at least once a week but not every day," and "every day." Because the relationship between frequency of use and CIL was weaker than the relationship between computer experience and CIL, Table 5.2 does not show it.

4 The full range of response categories for school-based computer activities was "never," "less than once a month," "at least once a month but not every week," and "at least once a week."

Table 5.1: National percentages of students' experience with computers

Country	Length of Time Using Computers					Average Length of Time Using Computers (Years)	Effect of Computer Experience on CIL Score	
	Less than one year	At least one year but fewer than three years	At least three years but fewer than five years	At least five years but fewer than seven years	Seven or more years		Difference in score points per year of experience	Variance explained
Australia	1 (0.2)	5 (0.4)	15 (0.6)	28 (0.8)	50 (1.1)	6 (0.0)	**10** (0.7)	6 (0.9)
Chile	8 (0.8)	14 (0.7)	25 (1.0)	25 (0.9)	28 (1.1)	5 (0.1)	**9** (0.9)	7 (1.5)
Croatia	2 (0.3)	4 (0.3)	19 (0.7)	33 (0.7)	43 (0.9)	6 (0.0)	**11** (0.8)	7 (1.0)
Czech Republic	1 (0.2)	4 (0.4)	20 (0.8)	37 (1.1)	38 (1.1)	6 (0.0)	**4** (0.7)	2 (0.5)
Germany†	2 (0.3)	14 (1.0)	35 (1.3)	30 (1.2)	19 (1.1)	5 (0.1)	2 (1.3)	0 (0.3)
Korea, Republic of	5 (0.4)	11 (0.7)	15 (0.8)	25 (0.9)	44 (1.1)	6 (0.1)	**10** (0.7)	7 (1.0)
Lithuania	3 (0.4)	7 (0.6)	20 (1.0)	29 (1.0)	41 (1.2)	6 (0.1)	**11** (1.0)	9 (1.3)
Norway (Grade 9)[1]	0 (0.1)	3 (0.3)	17 (0.8)	35 (0.9)	44 (1.0)	6 (0.0)	**6** (0.9)	2 (0.6)
Poland	1 (0.2)	3 (0.4)	11 (0.7)	31 (1.0)	53 (1.0)	7 (0.0)	**12** (1.2)	7 (1.4)
Russian Federation[2]	4 (0.4)	11 (0.6)	25 (0.7)	28 (0.8)	32 (0.9)	6 (0.1)	**9** (1.0)	7 (1.5)
Slovak Republic	3 (0.4)	7 (0.7)	20 (0.9)	34 (1.1)	37 (1.2)	6 (0.1)	**12** (1.7)	7 (1.9)
Slovenia	1 (0.2)	4 (0.5)	19 (0.9)	37 (0.8)	39 (1.2)	6 (0.1)	**2** (0.7)	0 (0.2)
Thailand[2]	23 (1.3)	24 (1.1)	19 (1.0)	16 (1.1)	18 (0.8)	4 (0.1)	**12** (1.1)	12 (1.9)
Turkey	22 (1.2)	19 (1.0)	22 (0.8)	18 (0.8)	20 (1.0)	4 (0.1)	**15** (1.0)	18 (1.9)
ICILS 2013 average	5 (0.2)	9 (0.2)	20 (0.2)	29 (0.3)	36 (0.3)	6 (0.0)	**9** (0.3)	6 (0.3)
Countries not meeting sample requirements								
Denmark	1 (0.2)	4 (0.5)	17 (1.1)	29 (1.2)	49 (1.6)	6 (0.1)	**4** (1.0)	1 (0.5)
Hong Kong SAR	2 (0.4)	7 (0.7)	19 (0.9)	27 (1.0)	45 (1.4)	6 (0.1)	**6** (1.2)	2 (0.8)
Netherlands	1 (0.2)	3 (0.4)	14 (0.7)	31 (1.1)	52 (1.3)	7 (0.0)	**6** (1.5)	1 (0.7)
Switzerland	1 (0.4)	13 (1.2)	31 (1.4)	36 (1.6)	20 (1.6)	5 (0.1)	**4** (1.4)	1 (0.8)
Benchmarking participants								
Newfoundland and Labrador, Canada	1 (0.4)	3 (0.6)	12 (1.2)	27 (1.3)	56 (1.4)	7 (0.1)	**9** (1.8)	4 (1.7)
Ontario, Canada	1 (0.2)	3 (0.4)	12 (0.7)	25 (1.0)	58 (1.1)	7 (0.0)	**7** (1.1)	3 (0.8)
Benchmarking participant not meeting sample requirements								
City of Buenos Aires, Argentina	5 (1.0)	11 (1.2)	19 (1.4)	27 (2.1)	37 (1.7)	6 (0.1)	**12** (1.8)	10 (2.5)

Notes:
* Statistically significant (p<.05) coefficients in **bold**.
() Standard errors appear in parentheses. Because some results are rounded to the nearest whole number, some totals may appear inconsistent.
† Met guidelines for sampling participation rates only after replacement schools were included.
[1] National Desired Population does not correspond to International Desired Population.
[2] Country surveyed the same cohort of students but at the beginning of the next school year.

The data showed that, on average across countries, the percentages of frequent computer usage were higher for home use (87%) than school use (54%) and considerably higher than for use at other places (13%). In Croatia, the Czech Republic, Lithuania, Norway, Poland, the Russian Federation, the Slovak Republic, and Slovenia, the percentages of students who reported using their computers at home at least once a week were significantly higher than the ICILS 2013 average.[5] Notably high percentages of students were also using computers at home at least once a week in the Canadian provinces of Newfoundland and Labrador and Ontario. The percentages of weekly home users of computers were significantly below the ICILS 2013 average in Chile, Korea, Thailand, and Turkey. The percentages of weekly home users in Germany and Australia were the same as the ICILS 2013 average.[6]

Although more than half of the ICILS students reported using a computer at school at least once a week (the ICILS 2013 average was 54%), there were notable differences among countries. The use of computers at school at least once each week was more than 10 percentage points higher than the ICILS 2013 average in Australia, Poland, the Slovak Republic, the Russian Federation, and Thailand. The percentage of students using school computers at least once a week was also significantly higher than average (but by no more than 10 percentage points) in Croatia and the Czech Republic. The percentage of students reporting at least weekly use of computers at school was more than 10 percentage points lower than the ICILS average in Chile, Germany, Korea, Slovenia, and Turkey.[7]

The data in Table 5.2 also indicate the relative extent of weekly home and school use of computers. Slovenia stands out as a country where the extent of weekly home use was far greater than school use (96% compared to 26%). In Germany, Korea, and Switzerland, the extent of weekly home computer use was substantially greater (with a difference of more than 50 percentage points) than the extent of weekly school use. In Chile, Norway, Lithuania, the Czech Republic, and Croatia, the extent of weekly home computer use was greater than the extent of weekly school computer use by between 31 and 46 percentage points. The Canadian provinces of Newfoundland and Labrador and Ontario were also in this group. In Turkey, the Russian Federation, Denmark, the Slovak Republic, and Poland, the difference between home and school use ranged from only 17 to 27 percentage points. In Australia, the proportions of students using computers at home and at school were almost similar (87% and 81%). Thailand was the only country where more students reported using computers at least weekly at school (66%) than at home (59%).

In most countries, the frequency with which students were using computers at places other than the home or school was small. Fewer than 10 percent of students in most countries reported using computers beyond the home or school on a weekly basis. In Thailand (31%), Korea (30%), Turkey (23%), and the Russian Federation (18%), students' computer use in places other than at home or at school was significantly above the ICILS 2013 average.

5 The ICILS 2013 average is the average across those participating countries that met the sampling requirements, with each country given an equal weight.

6 More than half of the Grade 8 students said they used a computer every day (the ICILS 2013 average was 54%).

7 Only six percent of students across the participating countries said they used a computer at school every day. In Australia, one third of students (33%) reported this frequency, as did one tenth (11%) of the students in the Canadian province of Ontario. Denmark (33%) and the Netherlands (13%) also had a similar apparently high level of daily school-based computer use.

Table 5.2: National percentages of students' computer use at home, school, and other places at least once a week

Country	Percent of Students Using a Computer at Least Once a Week								
	At home			At school			At other places (e.g., local library, internet cafe)		
Australia	87	(0.7)		81	(1.3)	▲	9	(0.5)	▽
Chile	81	(1.0)	▽	35	(2.1)	▼	8	(0.5)	▽
Croatia	95	(0.5)	△	61	(1.6)	△	7	(0.6)	▽
Czech Republic	96	(0.4)	△	60	(2.2)	△	7	(0.5)	▽
Germany†	88	(0.8)		31	(2.5)	▼	5	(0.5)	▽
Korea, Republic of	71	(1.2)	▼	18	(2.1)	▼	30	(1.3)	▲
Lithuania	95	(0.5)	△	55	(2.5)		9	(0.6)	▽
Norway (Grade 9)[1]	96	(0.4)	△	52	(2.4)		7	(0.5)	▽
Poland	96	(0.4)	△	79	(2.1)	▲	5	(0.5)	▽
Russian Federation[2]	94	(0.6)	△	73	(1.3)	▲	18	(0.9)	△
Slovak Republic	95	(0.5)	△	77	(2.1)	▲	12	(0.7)	
Slovenia	96	(0.5)	△	26	(1.2)	▼	7	(0.5)	▽
Thailand[2]	59	(1.5)	▼	66	(1.8)	▲	31	(1.5)	▲
Turkey	62	(1.6)	▼	35	(2.7)	▼	23	(1.0)	▲
ICILS 2013 average	87	(0.2)		54	(0.5)		13	(0.2)	
Countries not meeting sample requirements									
Denmark	95	(0.4)		76	(2.1)		8	(0.7)	
Hong Kong SAR	88	(1.0)		57	(2.0)		8	(0.7)	
Netherlands	95	(0.6)		63	(2.6)		5	(0.7)	
Switzerland	86	(1.2)		34	(3.1)		6	(0.8)	
Benchmarking participants									
Newfoundland and Labrador, Canada	91	(1.1)		54	(1.7)		11	(1.1)	
Ontario, Canada	91	(0.7)		60	(2.2)		11	(0.7)	
Benchmarking participant not meeting sample requirements									
City of Buenos Aires, Argentina	89	(1.1)		57	(3.3)		13	(1.2)	

▲ More than 10 percentage points above ICILS 2013 average
△ Significantly above ICILS 2013 average
▽ Significantly below ICILS 2013 average
▼ More than 10 percentage points below ICILS 2013 average

Notes:

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

† Met guidelines for sampling participation rates only after replacement schools were included.

1 National Desired Population does not correspond to International Desired Population.

2 Country surveyed the same cohort of students but at the beginning of the next school year.

Student use of computers outside school

The preceding section of this chapter indicated that in most of the ICILS countries a larger percentage of students reported using computers at least once per week outside school than at school. In this section, we take a closer look at aspects of students' ICT use outside school. We consider the frequency of computer use outside of school for specified applications and the frequency of internet use for specified purposes.

Computer-based applications used outside school

We asked students about the frequency with which they used computer-based work-oriented applications (computer utilities) outside school. The response categories were "never," "less than once a month," "at least once a month but not every week," "at least once a week but not every day," and "every day." Students were asked to indicate the frequency with which they used work-oriented computer applications for the following purposes:

- Creating or editing documents;
- Using a spreadsheet to do calculations, store data, or plot graphs;
- Creating a simple "slideshow" presentation;
- Creating a multimedia presentation;
- Using education software designed to help with school study;
- Writing computer programs, macros, or scripts; and
- Using drawing, painting, or graphics software.

Table 5.3 records the percentages of students who said they used work-oriented computer applications for these seven purposes at least once a week. On average across the ICILS countries, 28 percent of students reported using computer technology to "create or edit documents" at least once a week. Of the seven activities, this was the one most extensively done on a weekly basis across the countries.

In Australia (48%), the Russian Federation (44%), and Thailand (39%), the percentages were significantly above the international average, by more than 10 percentage points.[8] In Chile (33%), Thailand (32%), Norway (31%), and Poland (31%), the percentages for creating and editing documents at least weekly were significantly higher than the ICILS 2013 average but by fewer than 10 percentage points. The percentages were significantly below the ICILS 2013 average for the Czech Republic (25%), the Slovak Republic (25%), Croatia (20%), and Slovenia (19%). In Lithuania (16%), Germany (15%), and Korea (13%), the percentages were significantly below the ICILS 2013 average by more than 10 percentage points.

On average, 18 percent of students across the participating countries reported using "education software designed to help with school study (e.g., mathematics or reading software)" at least once a week. The largest percentages of students who were weekly users of this type of software were recorded for the Russian Federation (42%) and Turkey (29%). These percentages were significantly above the ICILS 2013 average by more than 10 percentage points. The percentages in Australia (28%), Lithuania (28%), and Poland (22%) were also above the ICILS 2013 average. The percentages in Germany

8 When describing the extent of participation on a weekly basis, we identify those countries that differed significantly from the ICILS 2013 average and those that differed by an amount that was significant and greater than 10 percentage points. We sometimes use the term "notable" to characterize this latter group.

Table 5.3: National percentages of students using computers outside of school for specific ICT applications at least once a week

Country	Creating or Editing Documents (e.g., to Write Stories or Assignments)	Using a Spreadsheet to Do Calculations, Store Data, or Plot Graphs (e.g., Using [Microsoft EXCEL ®])	Creating a Simple "Slideshow" Presentation (e.g., Using [Microsoft PowerPoint ®])	Creating a Multimedia Presentation (With Sound, Pictures, Video)	Using Education Software Designed to Help With School Study (e.g., Mathematics or Reading Software)	Writing Computer Programs, Macros, or Scripts (e.g., Using [Logo, Basic, or HTML])	Using Drawing, Painting, or Graphics Software
Australia	48 (1.3) ▲	9 (0.5) ▽	20 (1.0) △	15 (0.6)	28 (1.2) △	14 (0.7) △	19 (0.7)
Chile	33 (1.3) △	11 (0.6)	27 (1.3) ▲	22 (0.9) △	11 (0.8) ▽	9 (0.7)	15 (0.8) ▽
Croatia	20 (0.9) ▽	7 (0.5) ▽	14 (0.8) ▽	12 (0.8) ▽	9 (0.6) ▽	7 (0.6) ▽	13 (0.7) ▽
Czech Republic	25 (1.4) ▽	8 (0.7) ▽	14 (1.0) ▽	13 (0.6) ▽	8 (0.7) ▼	6 (0.5) ▽	20 (0.8) △
Germany†	15 (1.0) ▼	7 (0.6) ▽	6 (0.8) ▼	8 (0.6) ▽	7 (0.7) ▼	7 (0.6) ▽	11 (0.8) ▽
Korea, Republic of	13 (0.8) ▼	5 (0.4) ▽	5 (0.5) ▼	7 (0.5) ▽	11 (0.6) ▽	5 (0.5) ▽	8 (0.5) ▼
Lithuania	16 (0.9) ▼	20 (1.2) △	19 (1.1)	27 (1.0) ▲	28 (1.1) △	11 (0.6)	19 (1.0)
Norway (Grade 9)¹	31 (1.6) △	4 (0.5) ▽	11 (1.1) ▽	9 (0.7) ▽	12 (0.7) ▽	7 (0.5) ▽	12 (0.7) ▽
Poland	31 (1.0) △	10 (0.8)	9 (0.7) ▽	12 (0.7) ▽	22 (1.0) △	9 (0.7)	23 (1.0) △
Russian Federation²	44 (1.4) ▲	18 (1.0) △	29 (1.5) ▲	19 (0.9) △	42 (1.0) ▲	15 (0.6) △	31 (1.0) ▲
Slovak Republic	25 (0.9) ▽	14 (0.9) △	22 (1.2) △	18 (0.8) △	14 (0.8) ▽	11 (0.6)	18 (0.9)
Slovenia	19 (0.9) ▽	11 (0.7)	14 (1.0) ▽	15 (0.9)	15 (0.8) ▽	10 (0.7)	16 (0.8) ▽
Thailand²	32 (1.2) △	15 (1.0) △	19 (1.2)	20 (1.1) △	20 (1.1)	12 (0.9) △	27 (1.0) △
Turkey	39 (1.0) ▲	19 (0.9) △	25 (1.2) △	21 (0.9) △	29 (1.3) ▲	17 (0.9) △	25 (1.1) △
ICILS 2013 average	28 (0.3)	11 (0.2)	17 (0.3)	15 (0.2)	18 (0.2)	10 (0.2)	18 (0.2)
Countries not meeting sample requirements							
Denmark	52 (1.8)	18 (1.4)	11 (1.2)	12 (0.8)	17 (1.0)	9 (0.7)	13 (0.9)
Hong Kong SAR	26 (1.6)	11 (0.7)	10 (0.8)	13 (0.8)	15 (1.0)	8 (0.5)	12 (0.7)
Netherlands	32 (1.6)	7 (0.7)	9 (0.9)	10 (0.9)	24 (1.4)	9 (0.7)	11 (0.9)
Switzerland	17 (1.2)	6 (0.9)	5 (0.8)	7 (0.9)	11 (1.0)	6 (1.0)	10 (1.0)
Benchmarking participants							
Newfoundland and Labrador, Canada	18 (1.2)	5 (0.6)	8 (1.1)	9 (0.9)	14 (1.1)	8 (0.9)	16 (1.0)
Ontario, Canada	35 (1.7)	7 (0.6)	10 (0.9)	11 (0.7)	17 (0.8)	12 (0.8)	17 (1.1)
Benchmarking participant not meeting sample requirements							
City of Buenos Aires, Argentina	31 (2.3)	13 (1.2)	14 (1.4)	23 (1.3)	17 (1.5)	9 (1.1)	22 (1.5)

Notes:

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

† Met guidelines for sampling participation rates only after replacement schools were included.

¹ National Desired Population does not correspond to International Desired Population.

² Country surveyed the same cohort of students but at the beginning of the next school year.

▲ More than 10 percentage points above ICILS 2013 average

△ Significantly above ICILS 2013 average

▽ Significantly below ICILS 2013 average

▼ More than 10 percentage points below ICILS 2013 average

(7%) and the Czech Republic (7%) were significantly, and by more than 10 percentage points, below the ICILS 2013 average. The percentages in Croatia (9%), Chile (11%), Korea (11%), Norway (12%), the Slovak Republic (14%), and Slovenia (15%) were also significantly below the ICILS 2013 average.

On average across ICILS countries, 18 percent of students reported using "drawing, painting, or graphics software" at least once a week outside of school. The proportion of Russian Federation students reporting this usage was, at 31 percent, more than 10 percentage points above the ICILS 2013 average. Other countries that were also significantly above the ICILS 2013 average were Thailand (27%), Turkey (25%), Poland (23%), and the Czech Republic (20%). The eight percent of Korean students reporting use of this application were below the ICILS 2013 average by more than 10 percentage points. Other countries that were also significantly below the ICILS 2013 average were Germany (11%), Norway (12%), Croatia (13%), Chile (15%), and Slovenia (16%).

On average across the ICILS countries, 17 percent of students said they "created a simple 'slideshow' presentation" at least weekly outside of school. The percentages in the Russian Federation (29%) and Chile (27%) were more than 10 percentage points above the ICILS 2013 average. In Turkey (25%), the Slovak Republic (22%), and Australia (20%), the percentages were also significantly higher than the ICILS 2013 average. For Korea (5%) and Germany (6%), the percentages were 10 percentage points or more below the ICILS 2013 average. In addition, the percentages in Poland (9%), Norway (11%), Croatia (14%), the Czech Republic (14%), and Slovenia (14%) were also significantly lower than the ICILS 2013 average.

An application similar to but more complex than developing a slideshow was "creating a multimedia presentation (with sound, pictures, video)." On average across the ICILS countries, 15 percent of students reported carrying out this activity at least once a week. In Lithuania, 27 percent of students said they used this application at least once a week. This figure was more than 10 percentage points above the ICILS 2013 average. The percentages in Chile (22%), Turkey (21%), Thailand (20%), the Russian Federation (19%), and the Slovak Republic (18%) were also significantly higher than the ICILS 2013 average. Countries where the percentages were significantly below the ICILS 2013 average were the Czech Republic (13%), Croatia (12%), and Poland (12%).

Crossnationally, 11 percent of students (the ICILS 2013 average) reported "using a spreadsheet to do calculations, store data, or plot graphs" at least once a week. The percentages were significantly higher than the average across ICILS countries in Lithuania (20%), Turkey (19%), the Russian Federation (18%), Thailand (15%), and the Slovak Republic (14%). In Norway (4%), Korea (5%), Germany (7%), Croatia (7%), the Czech Republic (8%), and Australia (9%), these percentages were significantly lower than the ICILS 2013 average.

Only 10 percent of students (on average across ICILS countries) reported engaging at least once a week in "writing computer programs, macros, or scripts (e.g., using Logo, Basic, or HTML)." National percentages ranged from five percent in Korea to 17 percent in Turkey.

The scale derived from the seven items reflecting use of different applications had an average reliability of 0.80 (Cronbach's alpha) across the ICILS countries. We used the Rasch partial credit model to construct this scale and standardized its item response theory (IRT) scores to have an ICILS 2013 average score of 50 points and a standard deviation of 10 points.[9] The higher scores on the scale indicate higher frequencies of using these applications.

Table 5.4 shows the national average scores on the *students' use of computer applications scale* overall and within gender groups. We recorded significantly more frequent use of these applications in the Russian Federation, Australia, Lithuania, Chile, Poland, the Slovak Republic, Slovenia, Thailand, and Turkey. They were less extensively used in Korea, Germany, Croatia, the Czech Republic, Norway, and the Canadian province of Newfoundland and Labrador.

On average across ICILS countries, no statistically significant differences could be discerned between females and males in out-of-school use of the seven applications. In some countries, small but statistically significant differences were apparent. In Turkey, the Czech Republic, Poland, and the Slovak Republic, male students were slightly more likely than female students to use these applications on a frequent basis. However, in Australia, Chile, Korea, and the Russian Federation, female students were more likely than males to report using these applications on a frequent basis.

Internet use for communication and exchange of information

Several publications have not only documented students' extensive use of ICT for communication and accessing information but also looked at the implications of this use for education (see, for example, Ainley, Enger, & Searle, 2009). The ICILS student questionnaire asked students to identify the frequency with which they were using the internet for a variety of communication and information-exchange activities outside of school. The response categories were "never," "less than once a month," "at least once a month but not every week," "at least once a week but not every day," and "every day."

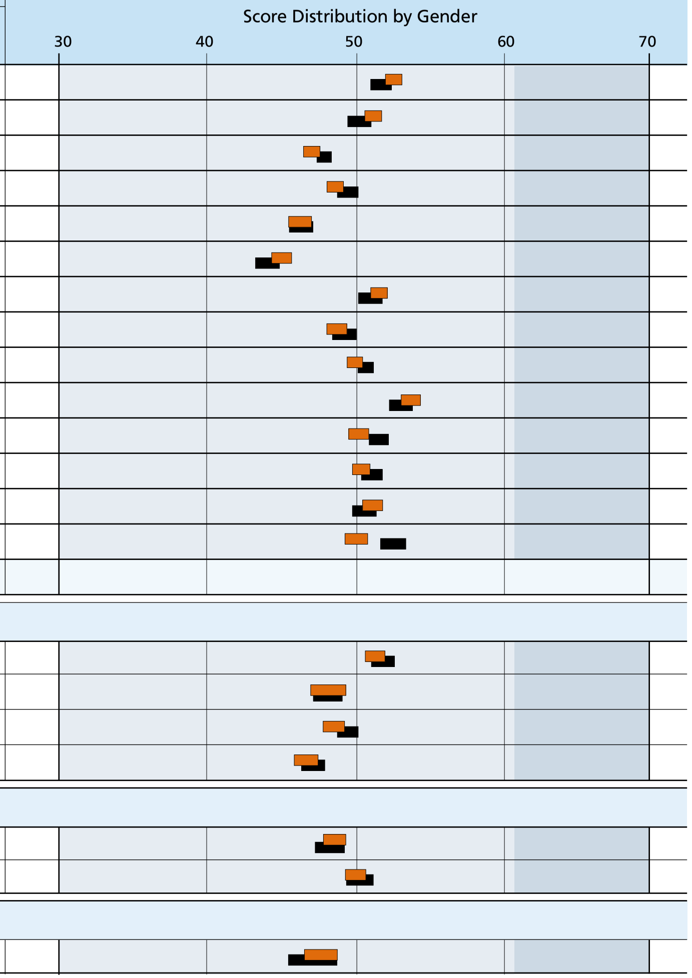
The 10 activities that the questionnaire required the students to respond to were the following:

- Searching for information for study or school work;
- Accessing wikis or online encyclopedias for study or school work;
- Communicating with others using messaging or social networks (e.g., instant messaging or [status updates]);
- Posting comments to online profiles or blogs;
- Asking questions on forums or [question and answer] websites;
- Answering other people's questions on forums or websites;
- Writing posts for your [the student's] own blog;
- Uploading images or video to an [online profile] or [online community] (e.g., Facebook or YouTube);
- Using voice chat (e.g., Skype) to chat with friends or family online; and
- Building or editing a webpage.

9 This metric was used for most questionnaire-based scales in ICILS. Setting the international standard deviation to 10 points was deemed appropriate given the limited numbers of items used for deriving questionnaire scales. (The achievement scale was based on many more items, so an international metric with a standard deviation of 100 was chosen.)

Table 5.4: National averages for students' use of computers for specific ICT applications overall and by gender

Country	Students' Use of Computers for Specific ICT Applications: All students			Females		Males		Differences (males - females)*	
Australia	52	(0.2)	△	53	(0.2)	52	(0.3)	**-1**	(0.4)
Chile	51	(0.2)	△	51	(0.2)	50	(0.4)	**-1**	(0.4)
Croatia	47	(0.2)	▽	47	(0.3)	48	(0.3)	1	(0.4)
Czech Republic	49	(0.2)	▽	49	(0.3)	50	(0.3)	**1**	(0.3)
Germany†	46	(0.3)	▼	46	(0.4)	46	(0.4)	0	(0.4)
Korea, Republic of	45	(0.3)	▼	45	(0.3)	44	(0.4)	**-1**	(0.5)
Lithuania	52	(0.3)	△	52	(0.3)	51	(0.4)	-1	(0.4)
Norway (Grade 9)[1]	49	(0.2)	▽	49	(0.3)	49	(0.3)	0	(0.4)
Poland	51	(0.2)	△	50	(0.3)	51	(0.3)	**1**	(0.4)
Russian Federation[2]	54	(0.3)	▲	54	(0.3)	53	(0.4)	**-1**	(0.3)
Slovak Republic	51	(0.2)	△	50	(0.3)	52	(0.3)	**1**	(0.4)
Slovenia	51	(0.2)	△	51	(0.3)	51	(0.4)	1	(0.5)
Thailand[2]	51	(0.3)	△	51	(0.3)	51	(0.4)	-1	(0.4)
Turkey	51	(0.3)	△	50	(0.4)	53	(0.4)	**3**	(0.5)
ICILS 2013 average	50	(0.1)		50	(0.1)	50	(0.1)	0	(0.1)
Countries not meeting sample requirements									
Denmark	52	(0.3)		52	(0.3)	52	(0.3)	1	(0.4)
Hong Kong SAR	48	(0.4)		48	(0.6)	48	(0.5)	0	(0.6)
Netherlands	49	(0.3)		49	(0.3)	50	(0.4)	**1**	(0.4)
Switzerland	47	(0.3)		47	(0.3)	47	(0.5)	1	(0.5)
Benchmarking participants									
Newfoundland and Labrador, Canada	48	(0.3)		48	(0.4)	48	(0.5)	-1	(0.6)
Ontario, Canada	50	(0.3)		50	(0.3)	50	(0.4)	0	(0.5)
Benchmarking participant not meeting sample requirements									
City of Buenos Aires, Argentina	48	(0.5)		48	(0.5)	47	(0.8)	-1	(0.9)



Notes:
* Statistically significant (p<.05) coefficients in **bold.**
() Standard errors appear in parentheses. Because some results are rounded to the nearest whole number, some totals may appear inconsistent.
† Met guidelines for sampling participation rates only after replacement schools were included.
[1] National Desired Population does not correspond to International Desired Population.
[2] Country surveyed the same cohort of students but at the beginning of the next school year.

▲ More than three score points above ICILS 2013 average
△ Significantly above ICILS 2013 average
▽ Significantly below ICILS 2013 average
▼ More than three score points below ICILS 2013 average

Female average score +/— confidence interval
Male average score +/— confidence interval

On average, students with a score in the range indicated by this color have more than a 50% probability of reporting use of computers for specific ICT applications:

Less than once a week
Once a week or more frequently

Table 5.5 records the national percentages of students who reported doing each of these activities at least once a week. Across the ICILS countries, one activity stood out from the others in terms of weekly use, namely "communicating with others using messaging or social networks." The crossnational average for this activity was 75 percent. Student percentages in several countries exceeded the ICILS 2013 average by more than 10 such points. They were Norway (89%), Poland (88%), the Slovak Republic (87%), and the Czech Republic (86%). Those countries where the respective percentage was more than 10 percentage points below the ICILS 2013 average were Korea (42%), Thailand (49%), and Turkey (56%).

On average across the ICILS countries, just over half of the students (52%) said they used internet for "searching for information for study or school work" at least once a week. The countries where the average percentages exceeded the ICILS 2013 average by 10 or more percentage points included Poland (74%), the Russian Federation (72%), Australia (65%), and Turkey (63%). The countries with percentages 10 or more points below the ICILS 2013 average included Korea (30%), Slovenia (38%), Germany (38%), and the Slovak Republic (42%).

Crossnationally, about half of the students (49%), on average, indicated that they engaged in "posting comments to online profiles or blogs" at least once a week. This percentage was 10 points or more above the ICILS 2013 average in the Russian Federation (69%) and Poland (63%), and was 10 percentage points or more below this average in Thailand (30%), Korea (35%), and Turkey (38%).

Across all ICILS countries, an average of 48 percent of students indicated that they used internet for "voice chat in order to chat with friends or family online." The highest percentages of students reporting they did this at least once a week were recorded in Lithuania (64%), Slovenia (62%), the Czech Republic (61%), the Slovak Republic (60%), and the Russian Federation (58%). The lowest national percentages were found in Korea (26%), Turkey (31%), Thailand (35%), and Australia (36%).

On average across ICILS countries, 43 percent of students indicated using internet at least once a week for "accessing wikis or online encyclopedias for study or school work." The highest national percentages of students reporting at least weekly use of this activity were in the Russian Federation (63%) and Poland (63%); the lowest percentages were in Korea (23%), Newfoundland and Labrador (25%), and Germany (30%).

Thirty-eight percent of students on average across all countries said they "uploaded images or video to an online profile or community" such as Facebook or YouTube at least once a week. The highest national percentages were found in the Russian Federation (54%) and Croatia (49%), while the lowest percentages were observed in Norway (22%) and Korea (23%).

On average across the ICILS countries, only small percentages of students reported using the four remaining activities at least once a week. These activities were:

- Answering other people's questions on forums or websites (ICILS 2013 average: 24%);
- Asking questions on forums or [question and answer] websites (ICILS 2013 average: 22%);
- Writing posts for your own blog (ICILS 2013 average: 21%); and
- Building or editing a webpage (ICILS 2013 average: 11%).

Table 5.5: National percentages of students using the internet outside of school for communication and exchange of information at least once a week

Country	Searching for Information for Study or School Work	Accessing Wikis or Online Encyclopedia for Study or School Work	Communicating With Others Using Messaging or Social Networks (e.g., Instant Messaging or [Status Updates])	Posting Comments to Online Profiles or Blogs	Asking Questions on Forums or [Question and Answer] Websites	Answering Other People's Questions on Forums or Websites	Writing Posts for Your Own Blog	Uploading Images or Video to an [Online Profile] or [Online Community] (e.g., Facebook or YouTube)	Using Voice Chat (e.g., Skype) to Chat with Friends or Family Online	Building or Editing a Webpage
Australia	65 (1.4) ▲	50 (1.3) △	80 (0.8) △	48 (0.8)	17 (0.8) ▽	13 (0.5) ▼	22 (0.7)	36 (0.9) ▽	36 (1.0) ▼	8 (0.5) ▽
Chile	49 (1.4) ▽	40 (1.4)	72 (1.1) ▽	48 (1.3)	24 (1.2)	20 (0.9) ▽	24 (1.0) △	47 (1.1) △	42 (1.3) ▽	10 (0.7)
Croatia	44 (1.2) ▽	39 (1.0) ▽	85 (0.8) △	56 (1.0) △	18 (0.7) ▽	19 (0.9) ▽	17 (0.9) ▽	49 (1.1) ▲	49 (1.2)	8 (0.6) ▽
Czech Republic	48 (1.3) ▽	50 (1.3) △	86 (0.8) ▲	47 (1.1)	14 (0.7) ▽	23 (0.9)	16 (0.8) ▽	39 (1.0)	61 (1.3) ▲	10 (0.7)
Germany†	38 (1.1) ▼	30 (1.1) ▼	80 (0.9) △	46 (1.1) ▽	13 (0.8) ▽	11 (0.8) ▼	12 (0.7) ▽	30 (1.3) ▽	48 (1.6)	6 (0.6) ▽
Korea, Republic of	30 (1.1) ▼	23 (0.9) ▼	42 (1.1) ▼	35 (1.1) ▼	18 (0.8) ▽	16 (0.7) ▽	11 (0.6) ▼	23 (0.9) ▼	26 (0.9) ▼	5 (0.4) ▽
Lithuania	62 (1.2) △	45 (1.1)	85 (0.9) △	54 (1.0) △	32 (1.1) △	37 (1.0) ▲	24 (0.9) △	32 (1.1) ▽	64 (1.2) ▲	13 (0.9)
Norway (Grade 9)[1]	55 (1.6)	47 (1.6) △	89 (0.7) ▲	46 (1.1) ▽	11 (0.7) ▼	11 (0.7) ▼	7 (0.6) ▼	22 (0.9) ▼	48 (1.1)	7 (0.6) ▽
Poland	74 (1.0) ▲	63 (1.0) ▲	88 (0.7) ▲	63 (0.9) ▲	30 (1.1) △	33 (1.2) △	11 (0.8) ▽	37 (0.9)	52 (1.2) △	10 (0.7) ▽
Russian Federation[2]	72 (1.1) ▲	63 (1.0) ▲	85 (0.7) △	69 (0.9) ▲	34 (1.0) ▲	36 (1.0) ▲	34 (0.9) ▲	54 (1.2) ▲	58 (1.2) ▲	22 (0.9) ▲
Slovak Republic	42 (1.2) ▼	39 (1.1) ▽	87 (0.9) ▲	53 (1.0) △	21 (0.9)	29 (0.9) △	24 (1.0) △	47 (1.2) △	60 (1.1) ▲	14 (0.7) △
Slovenia	38 (1.0) ▼	37 (0.9) ▽	73 (0.9) ▽	49 (1.2)	21 (1.0)	24 (1.1)	32 (1.4) ▲	30 (1.2) ▽	62 (1.2) ▲	14 (0.8) △
Thailand[2]	51 (1.4)	33 (1.3) ▽	49 (1.5) ▼	30 (1.5) ▼	34 (1.4) ▲	36 (1.6) ▲	34 (1.3) ▲	43 (1.2) △	35 (1.4) ▼	15 (1.0) △
Turkey	63 (1.3) ▲	40 (1.3) ▽	56 (1.6) ▼	38 (1.4) ▼	27 (1.0) △	26 (1.0)	27 (1.1) △	45 (1.4) △	31 (1.1) ▼	18 (0.8) △
ICILS 2013 average	52 (0.3)	43 (0.3)	75 (0.3)	49 (0.3)	22 (0.3)	24 (0.3)	21 (0.2)	38 (0.3)	48 (0.3)	11 (0.2)
Countries not meeting sample requirements										
Denmark	65 (1.8)	48 (1.6)	90 (0.8)	42 (1.8)	12 (1.0)	11 (1.0)	8 (0.7)	28 (1.2)	50 (1.6)	5 (0.5)
Hong Kong SAR	37 (2.1)	33 (1.7)	60 (1.6)	36 (1.3)	23 (1.0)	30 (0.9)	13 (0.8)	33 (1.1)	39 (1.3)	9 (0.8)
Netherlands	50 (1.6)	30 (1.5)	80 (1.2)	36 (1.1)	9 (0.7)	11 (0.8)	17 (1.0)	42 (1.2)	54 (1.2)	9 (0.7)
Switzerland	33 (1.8)	31 (1.5)	77 (1.3)	45 (1.7)	12 (1.2)	8 (0.8)	16 (1.3)	31 (1.8)	50 (2.0)	7 (0.8)
Benchmarking participants										
Newfoundland and Labrador, Canada	39 (1.4)	25 (1.4)	75 (2.0)	54 (1.5)	13 (0.9)	10 (1.1)	29 (1.4)	41 (1.3)	41 (2.0)	10 (1.0)
Ontario, Canada	56 (1.7)	41 (1.8)	79 (0.9)	55 (1.2)	19 (1.1)	13 (1.0)	25 (1.3)	40 (1.1)	41 (1.2)	10 (0.8)
Benchmarking participant not meeting sample requirements										
City of Buenos Aires, Argentina	58 (1.9)	48 (2.2)	74 (1.7)	51 (2.0)	24 (1.5)	22 (1.7)	30 (2.2)	54 (2.0)	45 (1.8)	13 (1.3)

Notes:
() Standard errors appear in parentheses. Because some results are rounded to the nearest whole number, some totals may appear inconsistent.
† Met guidelines for sampling participation rates only after replacement schools were included.
[1] National Desired Population does not correspond to International Desired Population.
[2] Country surveyed the same cohort of students but at the beginning of the next school year.

▲ More than 10 percentage points above ICILS 2013 average
△ Significantly above ICILS 2013 average
▽ Significantly below ICILS 2013 average
▼ More than 10 percentage points below ICILS 2013 average

Four items reflecting internet use for social communication[10] provided the basis for deriving a scale that had a satisfactory reliability (i.e., a Cronbach's alpha of 0.74 on average across the participating countries). We used the Rasch partial credit model to construct the scale and standardized the IRT scores to have an ICILS 2013 average score of 50 points and a standard deviation of 10 points. The higher scores on the scale indicate higher frequencies of engaging in ICT use for social communication.

Table 5.6 shows the national average scores on the *students' ICT use for social communication scale* overall and within gender groups. The students who made the most use of internet as a means of social communication were those in the Russian Federation. They, along with students in the Slovak Republic, Poland, Lithuania, the Czech Republic, and Croatia, were significantly more likely than their peers internationally to use internet for social communication. This usage was lowest in Korea, Turkey, and Thailand (more than three score points below the ICILS 2013 average), and significantly so. Usage was also significantly lower than the international average in Germany and Australia. In Chile, Norway, and Slovenia, using internet for social communication was not significantly different from the ICILS 2013 average. The average scores for the Canadian provinces of Ontario and Newfoundland and Labrador also appeared to be similar to the ICILS 2013 average.

The data presented evidence that females were using the internet for social communication slightly more often (on average) than males. We recorded statistically significant gender differences in favor of female students in Chile, Australia, Korea, and Lithuania as well as in the two Canadian provinces of Newfoundland and Labrador and Ontario. On average, females scored two or more scale score points higher than males in these countries. The only country where male students' scores on the social communication scale were significantly higher than the females' was Turkey.

Four items reflecting *internet use for exchanging information*[11] provided the basis for deriving a scale that had a satisfactory reliability of 0.75 (Cronbach's alpha) on average across the ICILS countries. The Rasch partial credit model was again used to construct the scale, and we standardized the IRT scores to have an ICILS 2013 average score of 50 points and a standard deviation of 10 points. The higher scale scores indicate higher frequencies of using ICT for exchanging information.

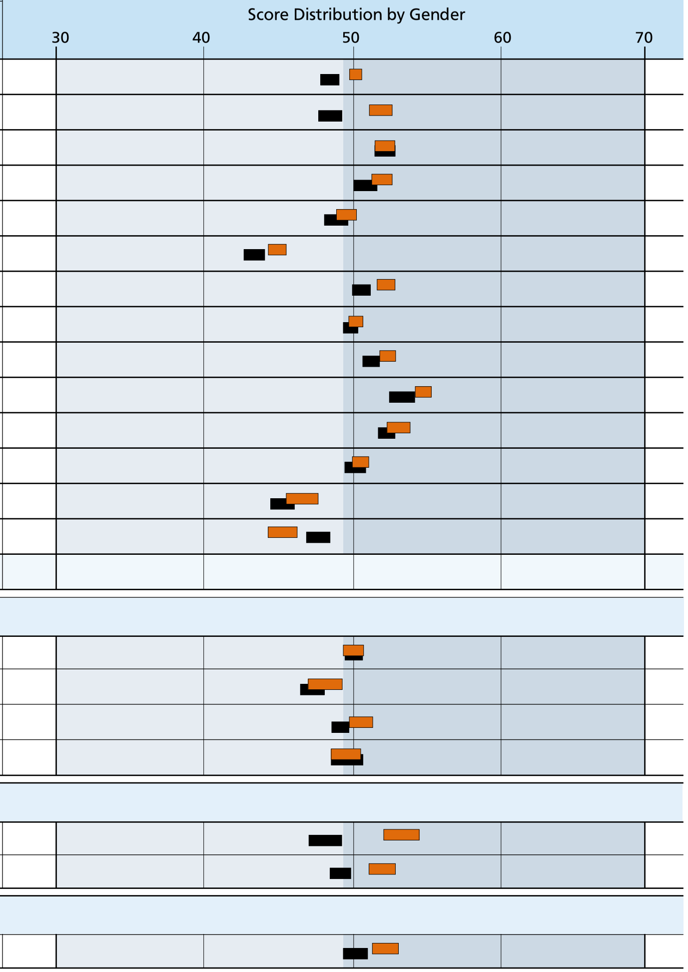
Table 5.7 records the national average scale score overall and within gender groups. The results indicate that using internet for information exchange was highest in the Russian Federation and Thailand (three or more points above the ICILS 2013 average) and also significantly higher than the ICILS 2013 average in Lithuania, Slovenia, the Slovak Republic, and Turkey. National averages were lowest in Germany and Norway and also significantly lower than the ICILS 2013 average in Australia, Croatia, the Czech Republic, and Korea. In Chile and Poland, the national averages did not differ significantly from the ICILS 2013 average. The Canadian provinces of Ontario and Newfoundland and Labrador both recorded national average scale scores of 49.

10 The four items were "communicating with others using messaging or social networks (e.g., instant messaging or [status updates])," "posting comments to online profiles or blogs," "uploading images or video to an [online profile] or [online community] (e.g., Facebook or YouTube)," and "using voice chat (e.g., Skype) to chat with friends or family online."

11 The four items were "asking questions on forums or [question and answer] websites," "answering other people's questions on forums or websites," "writing posts for your own blog," and "building or editing a webpage."

Table 5.6: National averages for students' use of ICT for social communication overall and by gender

Country	Students' Use of the Internet for Social Communication: All students			Females		Males		Differences (males - females)*	
Australia	49	(0.2)	▽	50	(0.2)	49	(0.3)	**-2**	(0.4)
Chile	50	(0.3)		52	(0.4)	49	(0.3)	**-3**	(0.4)
Croatia	52	(0.3)	△	52	(0.3)	52	(0.3)	0	(0.4)
Czech Republic	52	(0.2)	△	52	(0.3)	51	(0.3)	**-1**	(0.4)
Germany†	49	(0.2)	▽	50	(0.3)	49	(0.3)	-1	(0.4)
Korea, Republic of	44	(0.2)	▼	45	(0.3)	43	(0.3)	**-2**	(0.4)
Lithuania	52	(0.2)	△	52	(0.3)	51	(0.3)	**-2**	(0.4)
Norway (Grade 9)¹	50	(0.2)		50	(0.2)	50	(0.2)	0	(0.3)
Poland	52	(0.2)	△	52	(0.2)	51	(0.3)	**-1**	(0.4)
Russian Federation²	54	(0.3)	▲	55	(0.3)	53	(0.4)	**-1**	(0.4)
Slovak Republic	53	(0.2)	△	53	(0.3)	52	(0.3)	-1	(0.5)
Slovenia	50	(0.2)		51	(0.3)	50	(0.3)	0	(0.4)
Thailand²	46	(0.4)	▼	47	(0.5)	45	(0.4)	**-1**	(0.5)
Turkey	46	(0.4)	▼	45	(0.5)	48	(0.4)	**2**	(0.5)
ICILS 2013 average	50	(0.1)		50	(0.1)	50	(0.1)	**-1**	(0.1)
Countries not meeting sample requirements									
Denmark	50	(0.2)		50	(0.3)	50	(0.3)	0	(0.3)
Hong Kong SAR	48	(0.3)		48	(0.5)	47	(0.3)	-1	(0.7)
Netherlands	50	(0.3)		51	(0.4)	49	(0.3)	**-2**	(0.4)
Switzerland	49	(0.4)		50	(0.5)	49	(0.5)	0	(0.6)
Benchmarking participants									
Newfoundland and Labrador, Canada	51	(0.3)		53	(0.5)	48	(0.5)	**-5**	(0.8)
Ontario, Canada	50	(0.3)		52	(0.4)	49	(0.3)	**-3**	(0.5)
Benchmarking participant not meeting sample requirements									
City of Buenos Aires, Argentina	51	(0.3)		52	(0.4)	50	(0.5)	**-2**	(0.7)



Notes:
* Statistically significant (*p*<.05) coefficients in **bold.**
() Standard errors appear in parentheses. Because some results are rounded to the nearest whole number, some totals may appear inconsistent.
† Met guidelines for sampling participation rates only after replacement schools were included.
¹ National Desired Population does not correspond to International Desired Population.
² Country surveyed the same cohort of students but at the beginning of the next school year.

▲ More than three score points above ICILS 2013 average
△ Significantly above ICILS 2013 average
▽ Significantly below ICILS 2013 average
▼ More than three score points below ICILS 2013 average

Female average score +/– confidence interval
Male average score +/– confidence interval

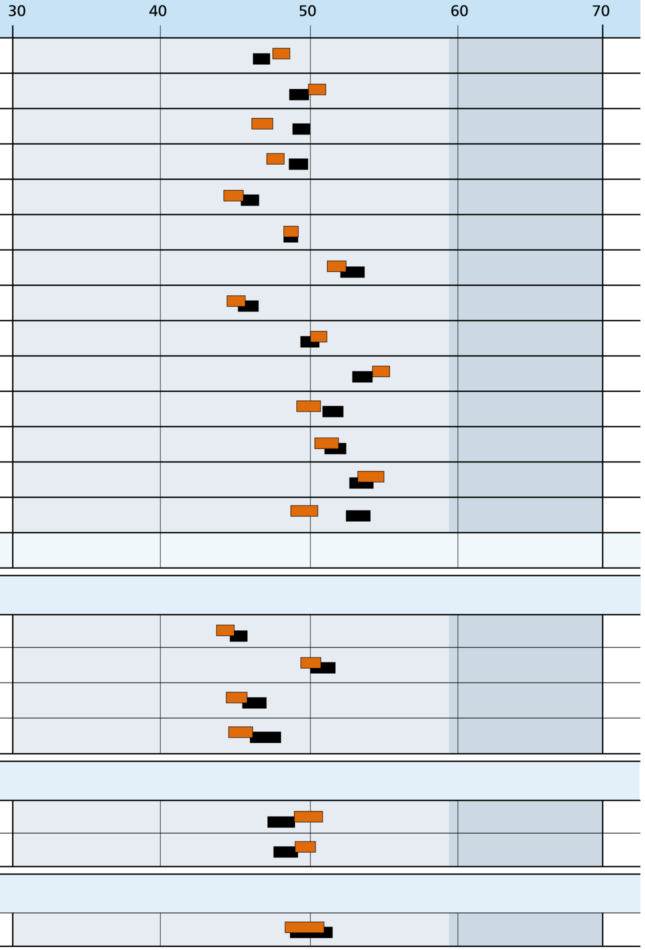
On average, students with a score in the range indicated by this color have more than a 50% probability of reporting use of ICT for social communication:

Less than once a week
Once a week or more frequently

Table 5.7: National averages for students' use of ICT for exchanging information overall and by gender

Country	Students' Use of the Internet for Exchanging Information: All students			Females		Males		Differences (males - females)*	
Australia	48	(0.2)	▽	48	(0.2)	47	(0.2)	**-1**	(0.3)
Chile	50	(0.3)		51	(0.3)	49	(0.3)	**-1**	(0.4)
Croatia	48	(0.2)	▽	47	(0.3)	50	(0.3)	**3**	(0.4)
Czech Republic	49	(0.2)	▽	48	(0.3)	49	(0.3)	**2**	(0.4)
Germany†	46	(0.2)	▼	45	(0.3)	46	(0.3)	**1**	(0.4)
Korea, Republic of	49	(0.1)	▽	49	(0.2)	49	(0.2)	0	(0.3)
Lithuania	53	(0.2)	△	52	(0.3)	53	(0.4)	**1**	(0.5)
Norway (Grade 9)[1]	46	(0.2)	▼	45	(0.2)	46	(0.3)	**1**	(0.3)
Poland	50	(0.2)		51	(0.3)	50	(0.3)	-1	(0.4)
Russian Federation[2]	54	(0.2)	▲	55	(0.3)	54	(0.3)	**-1**	(0.3)
Slovak Republic	51	(0.2)	△	50	(0.3)	52	(0.3)	**1**	(0.5)
Slovenia	52	(0.3)	△	51	(0.3)	52	(0.3)	1	(0.4)
Thailand[2]	54	(0.3)	▲	54	(0.4)	54	(0.4)	-1	(0.5)
Turkey	52	(0.3)	△	50	(0.4)	53	(0.4)	**4**	(0.5)
ICILS 2013 average	50	(0.1)		50	(0.1)	50	(0.1)	**1**	(0.1)
Countries not meeting sample requirements									
Denmark	45	(0.2)		44	(0.3)	45	(0.3)	**1**	(0.4)
Hong Kong SAR	50	(0.2)		50	(0.3)	51	(0.4)	1	(0.6)
Netherlands	46	(0.3)		45	(0.4)	46	(0.4)	1	(0.5)
Switzerland	46	(0.4)		46	(0.5)	47	(0.5)	**1**	(0.6)
Benchmarking participants									
Newfoundland and Labrador, Canada	49	(0.3)		50	(0.4)	48	(0.4)	**-2**	(0.6)
Ontario, Canada	49	(0.3)		49	(0.4)	48	(0.4)	**-1**	(0.4)
Benchmarking participant not meeting sample requirements									
City of Buenos Aires, Argentina	50	(0.5)		50	(0.6)	50	(0.7)	1	(0.7)

Score Distribution by Gender



Notes:

* Statistically significant (p<.05) coefficients in **bold.**

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

† Met guidelines for sampling participation rates only after replacement schools were included.

[1] National Desired Population does not correspond to International Desired Population.

[2] Country surveyed the same cohort of students but at the beginning of the next school year.

▲ More than three score points above ICILS 2013 average

△ Significantly above ICILS 2013 average

▽ Significantly below ICILS 2013 average

▼ More than three score points below ICILS 2013 average

Female average score +/– confidence interval

Male average score +/– confidence interval

On average, students with a score in the range indicated by this color have more than a 50% probability of reporting use of ICT for exchanging information:

Less than once a week

Once a week or more frequently

On average internationally, males seemed to be using the internet for information exchange slightly more frequently than females were. In Turkey, Croatia, and the Czech Republic, male students' scores were two or more score points higher than females'. However, in the Russian Federation, Australia, and Chile, females scored significantly higher than males.

Computer use for recreation

Students frequently use ICT for recreation, with these leisuretime pursuits including playing games (Tobias, Fletcher, Yun Dai, & Wind, 2011) and listening to music. The ICILS student questionnaire asked students to use the following response options to indicate how often they used computers for specified recreational purposes: "never," "less than once a month," "at least once a month but not every week," "at least once a week but not every day," and "every day." The recreational activities listed for this question were:

- Accessing the internet to find out about places to go or activities to do;
- Reading reviews on the internet of things you might want to buy;
- Playing games;
- Listening to music;
- Watching downloaded or streamed video (e.g., movies, TV shows or clips); and
- Using the internet to get news about things of interest.

Table 5.8 records the national percentages of students who reported doing each of these activities at least once a week.

Across the ICILS countries, "listening to music" stood out as a very common activity. On average, 82 percent of students reported using ICT at least once a week to listen to music. Percentages exceeded the ICILS 2013 average by a statistically significant amount in Norway (91%), Croatia (90%), the Czech Republic (90%), Poland (90%), the Russian Federation (89%), the Slovak Republic (88%), and Slovenia (86%). These percentages were lowest in Korea (63%) and Turkey (67%). The percentages were significantly lower than the ICILS 2013 average not only in these two countries but also in Thailand (74%), Germany (78%), and Australia (80%).

Using computers to "watch downloaded or streamed video (e.g., movies, TV shows or clips)" was also a common activity. On average across the ICILS countries, about two thirds of students engaged in this activity on a weekly basis (68%). In two countries, the respective percentages were significantly greater than the ICILS 2013 average by more than 10 percentage points. They were the Russian Federation (83%) and the Czech Republic (78%). Other countries where the percentages were significantly greater than the ICILS 2013 average were Poland (78%), Norway (75%), the Slovak Republic (74%), Chile (73%), and Slovenia (73%). We recorded significantly less extensive engagement in this activity in a number of other countries, however. In Turkey (52%), Germany (54%), Korea (54%), and Thailand (56%), participation was more than 10 percentage points lower than the ICILS 2013 average. The percentage was also significantly lower than the ICILS 2013 average in Australia (65%).

Crossnationally, 62 percent of students, on average, said they used the internet on a weekly basis to "get news about things of interest." In the Russian Federation (79%) and Poland (75%), the national percentages of students engaging in this activity on at least a weekly basis were more than 10 percentage points higher than the ICILS 2013

Table 5.8: National percentages of students using computers for recreation at least once a week

Country	Accessing the Internet to Find Out About Places to Go or Activities to Do	Reading Reviews on the Internet of Things You Might Want to Buy	Playing Games	Listening to Music	Watching Downloaded or Streamed Video (e.g., Movies, TV Shows, or Clips)	Using the Internet to Get News About Things I Am Interested In
Australia	31 (0.8) △	34 (1.1) △	55 (1.2)	80 (0.7) ▽	65 (1.1) ▽	51 (1.1) ▼
Chile	25 (1.0) ▽	24 (1.0) ▽	51 (1.2) ▽	80 (1.0)	73 (1.1) △	47 (1.3) ▼
Croatia	30 (0.9) △	34 (1.0) △	63 (1.1) △	90 (0.7) △	68 (0.9)	70 (1.0) △
Czech Republic	29 (1.0)	33 (1.0)	65 (1.0) △	90 (0.5) △	78 (0.8) ▲	64 (0.9) △
Germany†	11 (0.9) ▼	18 (0.9) ▼	48 (1.2) ▽	78 (1.0) ▽	54 (1.2) ▼	62 (1.2)
Korea, Republic of	25 (0.9) ▽	30 (1.0)	56 (1.3)	63 (1.0) ▼	54 (1.1) ▼	57 (1.1) ▽
Lithuania	21 (0.9) ▽	28 (1.0) ▽	56 (1.0)	81 (0.9)	66 (1.0)	66 (1.1) △
Norway (Grade 9)[1]	18 (0.9) ▼	37 (1.1) △	47 (1.0) ▽	91 (0.7) △	75 (0.9) △	67 (1.1) △
Poland	33 (1.1) △	43 (1.1) ▲	56 (1.2)	90 (0.7) △	78 (0.9) △	75 (0.8) ▲
Russian Federation[2]	44 (0.9) ▲	43 (0.9) ▲	60 (0.9) △	89 (0.6) △	83 (0.8) ▲	79 (0.8) ▲
Slovak Republic	35 (1.0) △	38 (1.0) △	61 (1.0) △	88 (1.0) △	74 (1.1) △	69 (1.1) △
Slovenia	26 (0.9) ▽	21 (0.8) ▼	54 (1.3)	86 (0.7) △	73 (0.9) △	60 (1.0)
Thailand[2]	32 (1.2) △	21 (1.1) ▽	61 (1.5) △	74 (1.1) ▽	56 (1.4) ▼	45 (1.2) ▼
Turkey	36 (1.2) △	32 (1.1)	52 (1.4) ▽	67 (1.4) ▼	52 (1.4) ▼	52 (1.3) ▽
ICILS 2013 average	28 (0.3)	31 (0.3)	56 (0.3)	82 (0.2)	68 (0.3)	62 (0.3)
Countries not meeting sample requirements						
Denmark	18 (0.9)	32 (1.4)	54 (1.3)	92 (0.8)	68 (1.3)	68 (1.2)
Hong Kong SAR	29 (1.0)	30 (1.0)	58 (1.3)	72 (1.0)	64 (1.1)	68 (1.4)
Netherlands	11 (0.7)	21 (0.8)	52 (1.0)	84 (1.0)	65 (1.2)	49 (1.5)
Switzerland	13 (1.0)	14 (1.0)	41 (1.7)	76 (1.9)	58 (1.5)	56 (1.7)
Benchmarking participants						
Newfoundland and Labrador, Canada	25 (1.3)	33 (1.8)	55 (1.9)	80 (1.7)	66 (1.5)	53 (1.7)
Ontario, Canada	30 (1.2)	33 (1.4)	57 (1.4)	80 (1.2)	67 (1.1)	54 (1.4)
Benchmarking participant not meeting sample requirements						
City of Buenos Aires, Argentina	32 (1.6)	30 (2.0)	59 (2.0)	84 (1.1)	73 (1.7)	51 (1.7)

Notes:
() Standard errors appear in parentheses. Because some results are rounded to the nearest whole number, some totals may appear inconsistent.
† Met guidelines for sampling participation rates only after replacement schools were included.
[1] National Desired Population does not correspond to International Desired Population.
[2] Country surveyed the same cohort of students but at the beginning of the next school year.

▲ More than 10 percentage points above ICILS 2013 average
△ Significantly above ICILS 2013 average
▽ Significantly below ICILS 2013 average
▼ More than 10 percentage points below ICILS 2013 average

average. In the Slovak Republic (69%), Croatia (70%), Norway (67%), Lithuania (66%), and the Czech Republic (64%), the percentages of students participating at least once a week were also significantly greater than the ICILS 2013 average. In Thailand (45%), Chile (47%), and Australia (51%), the percentages of weekly student participation in this activity were more than 10 percentage points lower than the ICILS 2013 average. Percentages were also significantly lower than the international average in Turkey (52%) and Korea (57%). Percentages were likewise low in Newfoundland and Labrador (53%) and Ontario (54%).

A little over half of the ICILS students said they used computers to “play games” on at least a weekly basis (ICILS 2013 average: 56%). The national percentages of students using computers in this way and with this degree of frequency were significantly higher than the ICILS 2013 average in the Czech Republic (65%), Croatia (63%), the Slovak Republic (61%), Thailand (61%), and the Russian Federation (60%). The percentages were significantly lower than the ICILS average in Norway (47%), Germany (48%), Chile (51%), and Turkey (52%).

According to the relevant data, relatively few students were participating frequently (on a weekly basis) in the remaining two activities: “reading reviews on the internet of things to buy” and “accessing internet to find out about places to go or activities to do.” The ICILS 2013 average for the first of these two activities was 31 percent. Prevalence was notably higher in Poland and the Russian Federation (43%) and notably lower in Germany (18%) and Slovenia (21%). The ICILS average for the second activity (28%) was exceeded to a considerable extent in the Russian Federation (44%). However, it was well above the national averages in Germany (11%) and Norway (18%).

Five of six items reflecting *use of computer technology for recreational purposes*[12] provided the basis for deriving a scale that had a satisfactory reliability of 0.76 (Cronbach’s alpha) on average across the ICILS countries. The scale was constructed using the Rasch partial credit model, and its IRT scores were standardized to an ICILS 2013 average score of 50 points and a standard deviation of 10 points. The higher scores on the scale indicate higher frequencies of using computer technology for recreational purposes.

Table 5.9 shows the national average scale scores overall and within gender groups. As evident in the table, the students most frequently using computer technology for recreational purposes were those in the Russian Federation and Poland (by more than three score points above the ICILS 2013 average). The national average scores of the students in the Slovak Republic, Croatia, the Czech Republic, and Norway were also all significantly higher than the ICILS 2013 average. Compared to their peers in all other ICILS countries, German students were the most infrequent users of computers for recreational purposes. The national averages for these students and for the students in Thailand, Turkey, Chile, Korea, and Lithuania were significantly below the ICILS 2013 average.

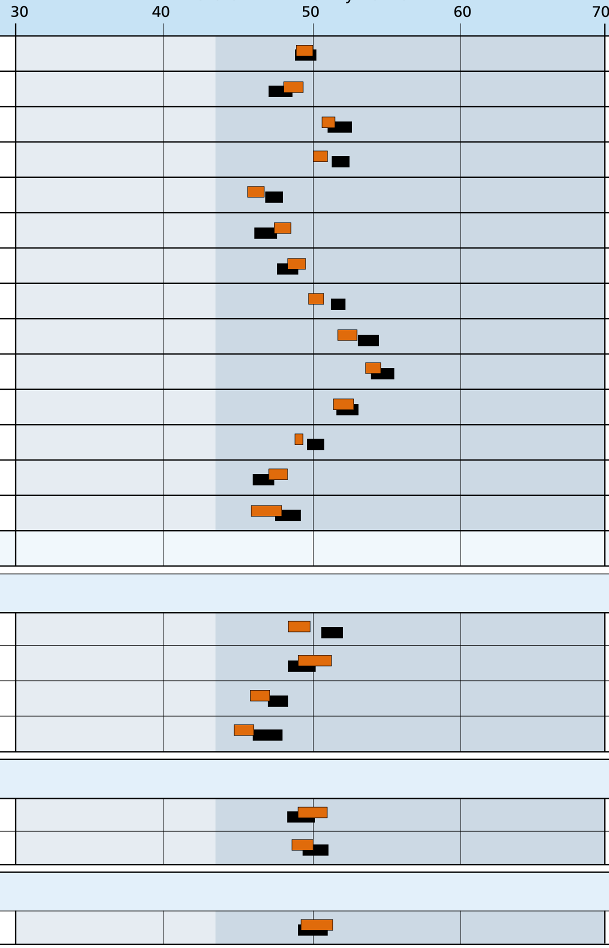
Overall, there was only a small, albeit statistically significant, gender difference in the extent of recreational use of computers. The difference, which favored males, was less than half of a scale point (equal to one 20th of an international standard deviation).

12 The five items were “accessing the internet to find out about places to go or activities to do,” “reading reviews on the internet of things you [the student] might want to buy,” “listening to music,” “watching downloaded or streamed video (e.g., movies, TV shows or clips),” and “using the internet to get news about things I am interested in.”

Table 5.9: National averages for students' use of computers for recreation overall and by gender

Country	Students' Use of the Internet for Recreation: All students		Females	Males	Differences (males - females)*
Australia	50 (0.2)		50 (0.2)	50 (0.3)	0 (0.4)
Chile	48 (0.2)	▽	49 (0.3)	48 (0.4)	**-1** (0.4)
Croatia	52 (0.2)	△	51 (0.2)	52 (0.4)	1 (0.4)
Czech Republic	51 (0.2)	△	51 (0.2)	52 (0.3)	**1** (0.3)
Germany†	47 (0.2)	▼	46 (0.2)	47 (0.2)	**1** (0.3)
Korea, Republic of	48 (0.2)	▽	48 (0.3)	47 (0.3)	**-1** (0.4)
Lithuania	49 (0.2)	▽	49 (0.3)	48 (0.3)	-1 (0.4)
Norway (Grade 9)[1]	51 (0.2)	△	50 (0.3)	52 (0.2)	**1** (0.3)
Poland	53 (0.2)	▲	52 (0.3)	54 (0.3)	**1** (0.5)
Russian Federation[2]	55 (0.3)	▲	54 (0.3)	55 (0.4)	1 (0.4)
Slovak Republic	52 (0.2)	△	52 (0.3)	52 (0.3)	0 (0.4)
Slovenia	50 (0.2)		49 (0.1)	50 (0.3)	**1** (0.3)
Thailand[2]	47 (0.3)	▽	48 (0.4)	47 (0.3)	**-1** (0.4)
Turkey	48 (0.4)	▽	47 (0.5)	48 (0.4)	**1** (0.5)
ICILS 2013 average	50 (0.1)		50 (0.1)	50 (0.1)	0 (0.1)
Countries not meeting sample requirements					
Denmark	50 (0.2)		49 (0.3)	51 (0.3)	**2** (0.4)
Hong Kong SAR	50 (0.3)		50 (0.5)	49 (0.4)	-1 (0.7)
Netherlands	47 (0.2)		47 (0.3)	48 (0.3)	**1** (0.4)
Switzerland	46 (0.3)		46 (0.3)	47 (0.4)	**1** (0.4)
Benchmarking participants					
Newfoundland and Labrador, Canada	50 (0.4)		50 (0.5)	49 (0.5)	-1 (0.7)
Ontario, Canada	50 (0.3)		49 (0.4)	50 (0.4)	**1** (0.5)
Benchmarking participant not meeting sample requirements					
City of Buenos Aires, Argentina	50 (0.3)		50 (0.5)	50 (0.5)	-1 (0.7)

Score Distribution by Gender



Notes:

* Statistically significant (p<.05) coefficients in **bold**.

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

† Met guidelines for sampling participation rates only after replacement schools were included.

[1] National Desired Population does not correspond to International Desired Population.

[2] Country surveyed the same cohort of students but at the beginning of the next school year.

▲ More than three score points above ICILS 2013 average

△ Significantly above ICILS 2013 average

▽ Significantly below ICILS 2013 average

▼ More than three score points below ICILS 2013 average

Female average score +/– confidence interval

Male average score +/– confidence interval

On average, students with a score in the range indicated by this color have more than a 50% probability of responding to the statements about students' use for recreation with:

Disagreement to positive, agreement to negative statements

Agreement to positive, disagreement to negative items

In Turkey, Slovenia, Germany, Poland, and the Czech Republic, the differences in favor of males were statistically significant. We also observed smaller but still statistically significant differences in Chile, Korea, and Thailand. However, in these countries, it was the female students who reported somewhat more frequent recreational use of computers.

Computer use for and at school

The ICILS student questionnaire asked students about a number of aspects of computer use for school work and in their schools. Specifically, it asked them about school-related purposes of computer use, the subject areas in which they used computers, and aspects of learning how to use computers and the internet.

School-related use of computers

The relevant question in this regard asked students to report how often they used computers for specified school-related purposes (listed below). The response categories were "never," "less than once a month," "at least once a month but not every week," and "at least once a week."[13]

- Preparing reports or essays;
- Preparing presentations;
- Working with other students from your [the student's] own school;
- Working with other students from other schools;
- Completing worksheets or exercises;
- Organizing your time and work;
- Writing about your learning; and
- Completing tests.

Extent of use for particular school-related purposes

Table 5.10 records the national percentages of students who reported doing each of these activities at least once a month. For four of the activities, the crossnational average percentages of students doing them at least weekly were 39 percent or higher. These activities included preparing reports or essays, preparing presentations, working with other students from the student's own school, and completing worksheets or exercises.

Just under half of all students across the ICILS countries reported using computers for "preparing reports or essays" at least once a month; the ICILS 2013 average percentage was 45 percent. Frequency of use was highest in Australia (70%), the Russian Federation (68%), Ontario (67%), Norway (61%), and Thailand (60%). The two other countries where this level of use was also significantly higher than the ICILS 2013 average were Chile (54%) and the Slovak Republic (52%). In Newfoundland and Labrador, 55 percent of students said they used computers for preparing reports or essays at least once per month. This frequency of use was lowest in Korea (21%), Croatia (24%), Slovenia (26%), and Lithuania (28%). Other countries where this level of use was also significantly lower than the ICILS 2013 average were Turkey (40%), the Czech Republic (41%), and Germany (42%). The percentage for Poland did not differ significantly from the ICILS 2013 average.

13 The range of response categories differed from the range used for out-of-school uses, and the summary category was at least once per month rather than at least once per week. These differences reflect the lower frequency of in-school use than out-of-school use.

Table 5.10: National percentages of students using computers for study purposes at least once a month

Country	Preparing Reports or Essays	Preparing Presentations	Working with Other Students from Your Own School	Working with Other Students from Other Schools	Completing [Worksheets] or Exercises	Organizing Your Time and Work	Writing about Your Learning	Completing Tests
Australia	70 (1.0) ▲	68 (1.1) ▲	56 (1.2) ▲	11 (0.6) ▽	64 (1.3) ▲	45 (1.2) ▲	22 (0.9) △	44 (1.1) ▲
Chile	54 (1.5) △	61 (1.4) ▲	55 (1.3) ▲	12 (0.8)	54 (1.2) ▲	31 (1.0)	21 (1.0)	30 (1.1) ▽
Croatia	24 (1.0) ▼	41 (1.4) ▽	33 (0.8) ▽	7 (0.6) ▽	20 (0.9) ▼	20 (0.8) ▽	10 (0.5) ▽	22 (0.9) ▼
Czech Republic	41 (1.4) ▽	37 (1.6) ▽	35 (1.1) ▽	11 (0.7) ▽	36 (1.3) ▽	25 (0.9) ▽	17 (1.0)	26 (1.0) ▽
Germany†	42 (1.3) ▽	32 (1.2) ▼	29 (1.2) ▼	9 (0.7) ▽	23 (1.0) ▼	12 (0.9) ▼	5 (0.6) ▼	12 (0.9) ▼
Korea, Republic of	21 (1.0) ▼	23 (1.1) ▼	16 (0.8) ▼	11 (0.7) ▽	20 (0.8) ▼	17 (0.8) ▼	16 (0.7) ▽	17 (0.8) ▼
Lithuania	28 (1.4) ▼	30 (1.3) ▼	33 (1.2) ▽	14 (0.9)	19 (1.1) ▼	25 (1.2) ▽	14 (0.9) ▽	29 (1.3) ▽
Norway (Grade 9)[1]	61 (1.4) ▲	64 (1.6) ▲	58 (1.6) ▲	13 (0.8)	53 (1.3) ▲	30 (1.0)	9 (0.7) ▼	34 (1.6)
Poland	43 (1.1)	31 (1.2) ▼	32 (1.1) ▽	9 (0.6) ▽	28 (0.9) ▼	44 (1.0) ▲	16 (0.8) ▽	24 (0.9) ▽
Russian Federation[2]	68 (1.5) ▲	50 (1.7) △	40 (1.2)	15 (0.7) △	62 (1.0) ▲	40 (1.0) △	29 (0.7) ▲	52 (1.2) ▲
Slovak Republic	52 (1.5) △	51 (1.3) △	41 (1.2)	14 (0.7)	35 (1.2) ▽	27 (0.9) ▽	13 (0.7) ▽	30 (1.4)
Slovenia	26 (1.0) ▼	40 (1.3) ▽	32 (1.2) ▽	15 (0.9) △	30 (1.0) ▽	23 (0.9) ▽	11 (0.6) ▽	27 (1.0) ▽
Thailand[2]	60 (1.4) ▲	51 (1.4) △	61 (1.4) ▲	23 (1.1) ▲	59 (1.5) ▲	38 (1.2) △	36 (1.2) ▲	55 (1.3) ▲
Turkey	40 (1.2) ▽	44 (1.4)	42 (1.3)	19 (0.9) △	45 (1.4) △	48 (1.2) ▲	50 (1.1) ▲	60 (1.3) ▲
ICILS 2013 average	45 (0.3)	44 (0.4)	40 (0.3)	13 (0.2)	39 (0.3)	30 (0.3)	19 (0.2)	33 (0.3)
Countries not meeting sample requirements								
Denmark	84 (1.3)	69 (1.6)	69 (1.5)	9 (0.8)	56 (1.6)	36 (1.6)	28 (1.5)	44 (1.9)
Hong Kong SAR	43 (1.7)	36 (1.4)	44 (1.8)	19 (1.2)	51 (1.3)	25 (1.4)	17 (1.1)	27 (1.3)
Netherlands	48 (1.8)	36 (1.8)	52 (2.1)	9 (0.9)	54 (1.9)	26 (1.5)	12 (1.1)	33 (1.6)
Switzerland	30 (1.8)	30 (2.2)	29 (1.5)	8 (0.8)	24 (1.3)	14 (1.2)	6 (0.9)	15 (1.4)
Benchmarking participants								
Newfoundland and Labrador, Canada	55 (2.2)	50 (2.3)	41 (1.4)	10 (1.1)	37 (1.9)	25 (1.3)	19 (1.2)	19 (1.6)
Ontario, Canada	67 (1.6)	59 (1.6)	53 (1.5)	12 (0.7)	42 (1.4)	35 (1.2)	20 (1.0)	24 (1.2)
Benchmarking participant not meeting sample requirements								
City of Buenos Aires, Argentina	44 (2.3)	40 (2.5)	49 (2.2)	15 (1.5)	56 (2.7)	27 (2.1)	21 (1.7)	33 (2.2)

Notes:

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

† Met guidelines for sampling participation rates only after replacement schools were included.

[1] National Desired Population does not correspond to International Desired Population.

[2] Country surveyed the same cohort of students but at the beginning of the next school year.

▲ More than 10 percentage points above ICILS 2013 average
△ Significantly above ICILS 2013 average
▽ Significantly below ICILS 2013 average
▼ More than 10 percentage points below ICILS 2013 average

A similar extent of use (i.e., on a monthly or more frequent basis) was evident for "preparing presentations." The ICILS 2013 average percentage of students reporting at least monthly participation in this activity was 44 percent. The extent of at least monthly involvement in this activity was highest in Australia (68%), Norway (64%), Chile (61%), and Ontario (59%). Other countries where the extent of use was also significantly greater than the ICILS 2013 average were the Slovak Republic (51%), Thailand (51%), and the Russian Federation (50%). In Newfoundland and Labrador, 50 percent of students said they used computers to prepare presentations at least once a month. The national percentages were lowest in Korea (23%), Lithuania (30%), Poland (31%), and Germany (32%). The other countries with national averages significantly lower than the ICILS 2013 average were the Czech Republic (37%), Slovenia (40%), and Croatia (41%). The figure for Turkey (44%) did not differ significantly from the ICILS 2013 average.

For students, using computers when working with other students from their own school is a different type of school-related use of ICT. The ICILS 2013 average for undertaking this activity at least monthly was 40 percent. National percentages were highest in Thailand (61%), Norway (58%), Australia (56%), Chile (55%), and Ontario (53%). They were lowest in Korea (16%) and Germany (29%). National percentages were also significantly lower than the ICILS 2013 average in Poland (32%), Slovenia (32%), Croatia (33%), Lithuania (33%), and the Czech Republic (35%). There was no discernible difference between the national percentages and the international average in the Russian Federation, Slovak Republic, and Turkey. In Newfoundland and Labrador, 41 percent of students were using computers to work with other students from their school at least once a month.

Table 5.10 shows how often the ICILS students were using computers to complete computer-based worksheets or exercises. The ICILS 2013 average for monthly use of the practice was 39 percent. The countries with the highest national percentages were Australia (64%), the Russian Federation (62%), Chile (54%), and Norway (53%). The average national percentage was also significantly higher than the ICILS 2013 average in Turkey (45%). Use of computer-based worksheets and exercises was lowest (and significantly so) in Lithuania (19%), Croatia (20%), Germany (23%), Korea (20%), and Poland (28%). Percentages were also significantly lower than the international average in Slovenia (30%) and the Slovak Republic (35%). In the Canadian provinces of Ontario and Newfoundland and Labrador, 42 and 37 percent of students respectively reported using computers for completing worksheets on a monthly basis. Both percentages were close to the ICILS 2013 average.

On average across the ICILS countries, about one third of students reported using computers to complete tests at least once each month. The highest percentages were found in Turkey (60%), Thailand (55%), the Russian Federation (52%), and Australia (44%); the lowest were evident in Germany (12%), Korea (17%), and Croatia (22%). We also recorded relatively low percentages for Ontario (24%) and Newfoundland and Labrador (19%). These percentages and those for Poland (24%), the Czech Republic (26%), Slovenia (27%), Lithuania (29%), and Chile (30%) were all significantly lower than the ICILS 2013 average. The percentages in Norway and the Slovak Republic did not differ significantly from the international average.

Another question for the students focused on how often they used computers for organizing their time and work. The intent behind this question was to obtain information about computer applications such as "moodles" and the explicit use of learning management systems. The highest national percentages for using computers for this purpose on an at least monthly basis were observed in Turkey (48%), Australia (45%), and Poland (44%). These percentages and the national percentages for the Russian Federation (40%) and Thailand (38%) were all significantly higher than the ICILS 2013 average of 30 percent. The countries with the lowest national percentages were Germany (12%) and Korea (17%). A further group of countries where frequency of use was significantly lower than the ICILS 2013 average included Croatia (20%), Slovenia (23%), the Czech Republic (25%), Lithuania (25%), and the Slovak Republic (27%). The national percentages for Chile and Norway did not differ significantly from the ICILS 2013 average. In Ontario and Newfoundland and Labrador, 35 and 25 percent of students respectively were using computers on at least a monthly basis to organize their time and work.

No more than one fifth of students on average across the ICILS countries said they used school computers for the two remaining activities on the "school-related purposes" list. The first of these two activities, "writing about one's own learning," referred to using a learning log. The ICILS 2013 average percentage for this activity was 19 percent. The crossnational average for the second activity, "working with other students from other schools," was 13 percent, a figure that corresponds to about one student in eight doing this activity on a monthly basis.

We constructed a scale (derived from the eight activities considered in this section of the chapter) that measured the extent of using *computers for school-related purposes*. The Rasch partial credit model was again used to construct the scale, and we standardized the IRT scores to have an ICILS 2013 average score of 50 points and a standard deviation of 10 points. The scale reliability (Cronbach's alpha) was 0.83 on average across the ICILS countries. The higher scores on this scale indicate higher frequencies of using computers for school-related purposes.

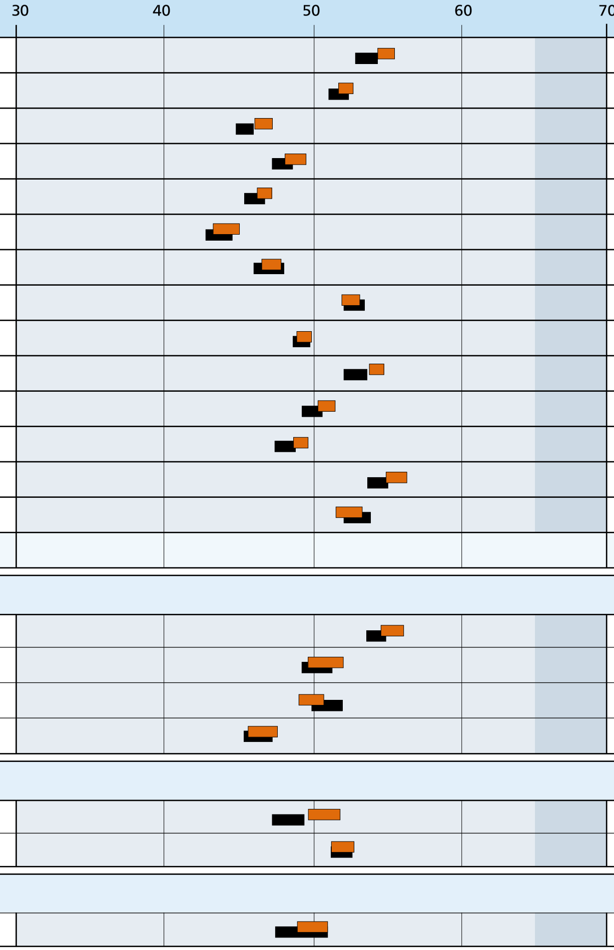
Table 5.11 presents the national scale score averages. The extent to which computers were being used for school-related purposes was highest in Thailand, Australia, and the Russian Federation. The national averages for these countries were three or more scale score points higher than the ICILS 2013 average. The use of computers for school-related purposes was also significantly higher than the international average in Turkey, Norway, and Chile. Computer use for school-related purposes was lowest, by three or more points below the average, in Croatia, Germany, and Korea. These three countries, along with the Czech Republic, Lithuania, Poland, and Slovenia, all had national averages significantly lower than the international one. The average scale score for Ontario was 52 points. For Newfoundland and Labrador, it was 49 points.

In about half of the participating countries, female students were more likely than males to be using computers for school-related purposes. This difference was significant in the Russian Federation by two scale score points. We also recorded small but still statistically significant differences in Australia, Croatia, the Czech Republic, Germany, the Slovak Republic, Slovenia, Thailand, and Newfoundland and Labrador. None of the countries recorded a significant difference in favor of males.

Table 5.11: National averages for students' use of computers for study purposes overall and by gender

Country	Students' Use of Computers for Study Purposes: All students			Females		Males		Differences (males - females)*	
Australia	54	(0.3)	▲	55	(0.3)	54	(0.4)	**-1**	(0.4)
Chile	52	(0.2)	△	52	(0.2)	52	(0.3)	-1	(0.3)
Croatia	46	(0.2)	▼	47	(0.2)	45	(0.2)	**-1**	(0.3)
Czech Republic	48	(0.3)	▽	49	(0.3)	48	(0.3)	**-1**	(0.3)
Germany†	46	(0.2)	▼	47	(0.2)	46	(0.3)	**-1**	(0.4)
Korea, Republic of	44	(0.3)	▼	44	(0.4)	44	(0.4)	-1	(0.5)
Lithuania	47	(0.3)	▽	47	(0.3)	47	(0.5)	0	(0.4)
Norway (Grade 9)¹	53	(0.2)	△	53	(0.3)	53	(0.3)	0	(0.2)
Poland	49	(0.2)	▽	49	(0.2)	49	(0.3)	0	(0.3)
Russian Federation²	54	(0.3)	▲	54	(0.2)	53	(0.4)	**-2**	(0.3)
Slovak Republic	50	(0.2)		51	(0.3)	50	(0.3)	**-1**	(0.3)
Slovenia	49	(0.2)	▽	49	(0.2)	48	(0.3)	**-1**	(0.3)
Thailand²	55	(0.2)	▲	56	(0.3)	54	(0.3)	**-1**	(0.4)
Turkey	53	(0.3)	△	53	(0.4)	53	(0.4)	0	(0.5)
ICILS 2013 average	50	(0.1)		50	(0.1)	50	(0.1)	**-1**	(0.1)
Countries not meeting sample requirements									
Denmark	55	(0.3)		55	(0.3)	54	(0.3)	**-1**	(0.3)
Hong Kong SAR	50	(0.4)		51	(0.6)	50	(0.5)	-1	(0.5)
Netherlands	50	(0.4)		50	(0.4)	51	(0.5)	**1**	(0.5)
Switzerland	46	(0.4)		46	(0.5)	46	(0.5)	0	(0.6)
Benchmarking participants									
Newfoundland and Labrador, Canada	49	(0.3)		51	(0.5)	48	(0.5)	**-2**	(0.7)
Ontario, Canada	52	(0.3)		52	(0.3)	52	(0.3)	0	(0.4)
Benchmarking participant not meeting sample requirements									
City of Buenos Aires, Argentina	50	(0.6)		50	(0.5)	50	(0.9)	-1	(0.7)

Score Distribution by Gender



Notes:

* Statistically significant (p<.05) coefficients in **bold.**

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

† Met guidelines for sampling participation rates only after replacement schools were included.

¹ National Desired Population does not correspond to International Desired Population.

² Country surveyed the same cohort of students but at the beginning of the next school year.

▲ More than three score points above ICILS 2013 average
△ Significantly above ICILS 2013 average
▽ Significantly below ICILS 2013 average
▼ More than three score points below ICILS 2013 average

Female average score +/– confidence interval
Male average score +/– confidence interval

On average, students with a score in the range indicated by this color have more than a 50% probability of responding to the statements about students' ICT use for study purposes with:

Disagreement to positive, agreement to negative statements
Agreement to positive, disagreement to negative items

Use of computers in subject areas

When answering the question on how often they used computers during lessons in designated subjects or subject areas, students had at hand five response options: "never," "in some lessons," "in most lessons," "in every or almost every lesson," and "I don't study this subject/these subjects." Student responses in the last category were treated as missing responses. The list of subjects or subject areas that students had to consider was based on a list developed for the OECD Teaching and Learning International Study (TALIS) (OECD, 2014b).

- Language arts: test language;
- Language arts: foreign or other national languages;
- Mathematics;
- Sciences (general science and/or physics, chemistry, biology, geology, Earth sciences);
- Human sciences or humanities (history, geography, civics, law, economics, etc.);
- Creative arts (visual arts, music, dance, drama, etc.);
- Information technology, computer studies, or similar; and
- Other (practical or vocational subjects, morals/ethics, physical education, home economics, personal and social development).

Table 5.12 records the national percentages of students who indicated that they used computers in "most lessons" or in "every or almost every" lesson. The ICILS 2013 average percentages recorded for each subject area provide an overall indication of the extent to which students were using computers in the specified subject areas. The figures for each country also provide profiles of computer use in classrooms across the participating ICILS countries.

The subject area in which computers were being most frequently used was information technology or computer studies (56% on average). National percentages were highest in the Slovak Republic (82%), Poland (81%), and Croatia (70%) and lowest in Chile (22%), Korea (33%), Turkey (34%), and Germany (44%). The national percentage in Australia did not differ significantly from the ICILS 2013 average.

On average, internationally, in both the (natural) sciences and human sciences or humanities, about one fifth of students said that they used computers in most or all lessons. The ICILS 2013 averages were 21 percent and 20 percent respectively. The countries where we recorded the highest percentages for computer use in science classes were Thailand (45%), Turkey (34%), and Australia (34%). Our lowest recordings were for Germany (7%) and Norway (9%). The national percentages for computer use in humanities or human sciences classes were highest in Australia (42%) and Thailand (37%) and lowest in Germany (8%) and Poland (8%).

In language arts (the test language) and language arts (foreign languages), the ICILS 2013 averages were 16 percent and 17 percent respectively. These averages correspond to about one in six students using computers in most lessons for these subject areas. Computer use for language arts in the test language was highest in Thailand (36%), Australia (34%), and Turkey (32%) and lowest in Germany (4%) and Croatia (5%). For language arts (foreign languages), computer usage was highest in Thailand (39%) and Korea (37%) and lowest in Germany (3%) and Croatia (5%).

Table 5.12: National percentages of students with frequent computer use during lessons in different learning areas

Country	[Language Arts: Test Language]	[Language Arts: Foreign or Other National Languages]	Mathematics	Sciences (General Science and/or Physics, Chemistry, Biology, Geology, Earth Sciences)	Human Sciences/ Humanities (History, Geography, Civics, Law, Economics, etc.)	Creative Arts (Visual Arts, Music, Dance, Drama, etc.)	[Information Technology, Computer Studies, or Similar]	Other (Practical or Vocational Subjects, Moral/Ethics, Physical Education, Home Economics, Personal and Social Development)
Australia	34 (1.8) ▲	24 (1.9) △	23 (1.8) △	34 (1.8) ▲	42 (1.7) ▲	14 (0.9) △	58 (1.8)	14 (0.8) △
Chile	9 (0.9) ▽	9 (0.7) ▽	11 (1.2) ▽	13 (1.1) ▽	12 (1.1) ▽	11 (1.3)	22 (2.0) ▼	8 (0.7) ▽
Croatia	5 (0.5) ▼	5 (0.5) ▼	6 (0.7) ▽	11 (0.8) ▼	12 (0.9) ▽	5 (0.4) ▽	70 (1.6) ▲	4 (0.4) ▽
Czech Republic	6 (0.7) ▽	10 (0.7) ▽	7 (0.7) ▽	13 (1.0) ▽	13 (1.0) ▽	5 (0.7) ▽	52 (1.8) ▽	6 (0.6) ▽
Germany†	4 (0.4) ▼	3 (0.4) ▼	4 (0.4) ▼	7 (0.7) ▼	8 (0.8) ▼	3 (0.4) ▽	44 (3.1) ▼	4 (0.5) ▽
Korea, Republic of	25 (1.2) △	37 (1.2) ▲	15 (1.0)	30 (1.2) △	22 (1.2)	18 (0.8) △	33 (1.7) ▼	19 (0.9) △
Lithuania	11 (0.7) ▽	14 (0.9) ▽	13 (0.9)	21 (1.0)	21 (1.3)	8 (0.9) ▽	65 (1.5) △	9 (0.7) ▽
Norway (Grade 9)¹	16 (1.4)	12 (0.9) ▽	3 (0.5) ▼	9 (1.0) ▼	14 (1.1) ▽	7 (0.9) ▽		6 (0.7) ▽
Poland	6 (0.7) ▽	8 (0.8) ▽	9 (0.8) ▽	11 (1.0) ▽	8 (0.6) ▼	7 (0.8) ▽	81 (1.3) ▲	7 (0.7) ▽
Russian Federation²	15 (1.1)	20 (1.1) △	16 (0.9) △	21 (0.9)	22 (1.0)	14 (1.0) △	62 (1.1) △	9 (0.5) ▽
Slovak Republic	10 (0.8) ▽	16 (1.4)	11 (1.0) ▽	17 (1.3) ▽	18 (1.2)	10 (1.1)	82 (1.7) ▲	11 (1.0)
Slovenia	11 (0.9) ▽	18 (1.0)	13 (1.0)	27 (1.5) △	29 (1.2) △	12 (1.0)	73 (1.4) ▲	9 (0.7) ▽
Thailand²	36 (1.3) ▲	39 (1.3) ▲	37 (1.2) ▲	45 (1.3) ▲	37 (1.1) ▲	23 (1.1) ▲	51 (1.4) ▽	29 (1.1) ▲
Turkey	32 (1.4) ▲	23 (1.1) △	29 (1.4) ▲	34 (1.4) ▲	29 (1.4) △	15 (0.8) △	34 (1.7) ▼	20 (1.0) △
ICILS 2013 average	16 (0.3)	17 (0.3)	14 (0.3)	21 (0.3)	20 (0.3)	11 (0.2)	56 (0.4)	11 (0.2)
Countries not meeting sample requirements								
Denmark	44 (2.5)	34 (2.4)	30 (2.6)	33 (2.5)	44 (2.3)	4 (0.6)	29 (2.3)	8 (1.0)
Hong Kong SAR	12 (1.1)	13 (1.2)	9 (1.2)	15 (1.1)	15 (1.4)	11 (1.1)	81 (1.6)	8 (1.0)
Netherlands	13 (1.8)	13 (1.5)	3 (0.7)	10 (1.6)	14 (1.7)	10 (1.4)	9 (1.0)	26 (3.3)
Switzerland	6 (0.9)	9 (1.8)	6 (1.1)	7 (1.0)	7 (1.1)	6 (1.1)	40 (2.7)	6 (0.9)
Benchmarking participants								
Newfoundland and Labrador, Canada	21 (1.5)	15 (1.2)	13 (1.1)	19 (1.3)	23 (1.5)	9 (1.0)	58 (1.5)	9 (1.1)
Ontario, Canada	31 (1.5)	15 (1.2)	16 (1.1)	28 (1.6)	28 (1.7)	11 (0.8)	38 (1.7)	10 (0.9)
Benchmarking participant not meeting sample requirements								
City of Buenos Aires, Argentina	11 (1.5)	12 (1.9)	12 (2.1)	13 (2.7)	12 (2.6)	6 (0.9)	49 (2.9)	10 (1.1)

Notes:

* Percentages reflect students who selected "in most lessons" or "in every or almost every lesson"

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

† Met guidelines for sampling participation rates only after replacement schools were included.

¹ National Desired Population does not correspond to International Desired Population.

² Country surveyed the same cohort of students but at the beginning of the next school year.

▲ More than 10 percentage points above ICILS 2013 average

△ Significantly above ICILS 2013 average

▽ Significantly below ICILS 2013 average

▼ More than 10 percentage points below ICILS 2013 average

In mathematics, the ICILS 2013 average was 14 percent, which corresponds to about one in seven students reporting computer use in most lessons or almost every lesson in this subject area. National percentages were highest in Thailand (37%) and Turkey (29%) and lowest in Norway (3%) and Germany (4%).

The ICILS 2013 average for creative arts was 11 percent, which corresponds to just a little more than one student in 10 reporting computer use in most lessons or almost every lesson. Thailand recorded the highest national percentage of computer use in class for this subject area (23%).

Learning about computer and information literacy at school

The student questionnaire asked students to indicate whether they had learned ("yes" or "no") how to do various ICT tasks at school. The tasks were:

- Providing references to internet sources;
- Accessing information with a computer;
- Presenting information for a given audience or purpose with a computer;
- Working out whether to trust information from the internet;
- Deciding what information is relevant to include in school work;
- Organizing information obtained from internet sources;
- Deciding where to look for information about an unfamiliar topic; and
- Looking for different types of digital information on a topic.

Results based on the percentages recording a response of "yes" are shown in Table 5.13. While an answer of "no" signals students who said they did not learn that skill at school, we acknowledge that students may have learned it at other places (e.g., at home or from peers). The data indicate some smaller variations across the various tasks, ranging from 33 percent for "looking for different types of digital information on a topic" and 30 percent for "working out whether to trust information from the internet" to 15 percent for "accessing information with a computer." The remaining ICILS 2013 average percentages ranged from 24 to 28 percent. Overall, the results suggest that students learn about ICT through school, and that school is more important for learning the "information literacy" aspects of ICT than for learning the operational aspects of ICT.

In order to explore differences among countries relating to students' reported learning of ICT tasks, we derived a scale based on student responses to the eight aspects of ICT learning shown above. The scale, which we constructed using the Rasch partial credit model, measured the extent to which students attributed their *learning about ICT to schools*. We standardized the scale's IRT scores to have an ICILS 2013 average of 50 points and a standard deviation of 10 points. We found the scale to have a reliability of 0.81 (Cronbach's alpha) on average across ICILS countries. The higher scores on the scale indicate greater attribution to school-based ICT learning. Table 5.14 presents the results of our analysis based on this scale.

As evident from Table 5.14, the differences between females and males in the extent to which they attributed their ICT learning to school instruction were very small, no more than half a scale point in favor of females. However, in Chile and the Czech Republic, female students scored significantly higher (by two scale score points) than males. Germany was the only country where the gender difference favored males.

Table 5.13: National percentages of students reporting having learned ICT tasks at school

Country	Providing References to Internet Sources	Accessing Information with a Computer	Using a Computer to Present Information for a Given Audience or Purpose	Working out Whether to Trust Information from the Internet	Deciding What Information is Relevant to Include in School Work	Organizing Information Obtained from Internet Sources	Deciding Where to Look for Information About an Unfamiliar Topic	Looking for Different Types of Digital Information on a Topic
Australia	87 (0.9) ▲	96 (0.4) ▲	92 (0.6) ▲	82 (0.8) ▲	91 (0.5) ▲	83 (0.8) ▲	77 (0.9) △	74 (1.0) △
Chile	73 (1.3)	86 (1.0)	76 (1.0)	68 (1.0) ▽	79 (1.0) △	80 (1.1) △	75 (1.1) △	78 (1.1) ▲
Croatia	45 (1.2) ▼	85 (0.8)	70 (1.1) ▽	78 (0.8) △	77 (0.9) △	74 (0.9)	78 (0.9) △	68 (1.1)
Czech Republic	70 (1.3) ▽	78 (1.2) ▽	80 (1.1) △	59 (1.3) ▼	76 (1.0)	67 (1.1) ▽	73 (1.1)	66 (1.1)
Germany†	78 (1.2) △	83 (1.0) ▽	75 (1.5)	45 (1.5) ▼	54 (1.3) ▼	71 (1.3)	60 (1.1) ▼	52 (1.4) ▼
Korea, Republic of	70 (1.0) ▽	74 (1.0) ▼	60 (1.1) ▼	60 (1.0) ▽	60 (1.1) ▼	67 (1.1) ▽	59 (1.0) ▼	54 (1.1) ▼
Lithuania	75 (1.2)	89 (0.7) △	78 (1.0)	71 (1.5)	75 (1.1)	77 (1.1) △	73 (1.1)	70 (1.2) △
Norway (Grade 9)[1]	85 (0.9) ▲	86 (0.8)	88 (0.9) ▲	79 (1.2) △	82 (0.9) △	71 (1.0)	72 (0.9)	71 (1.0) △
Poland	72 (1.0)	80 (0.8) ▽	76 (1.1)	70 (1.1)	70 (1.1) ▽	72 (1.0)	69 (1.1) ▽	75 (1.0) △
Russian Federation[2]	72 (1.3)	90 (0.7) △	73 (1.0) ▽	70 (1.4)	75 (1.0)	69 (1.0) ▽	74 (0.9) △	74 (1.1) △
Slovak Republic	67 (1.6) ▽	84 (0.9)	76 (1.1)	59 (1.8) ▼	71 (1.1) ▽	63 (1.5) ▽	71 (1.2)	68 (1.2)
Slovenia	81 (1.2) △	83 (1.1) ▽	71 (1.0) ▽	73 (1.0) △	75 (1.0)	68 (1.1) ▽	73 (1.0)	58 (1.1) ▽
Thailand[2]	91 (0.7) ▲	94 (0.7) △	84 (1.1) △	84 (1.0) ▲	81 (1.1) △	83 (1.0) ▲	75 (1.2) △	71 (1.3) △
Turkey	60 (1.2) ▼	88 (0.9) △	69 (1.2) ▽	79 (1.2) △	80 (1.0) △	74 (1.3)	73 (1.2)	64 (1.2) ▽
ICILS 2013 average	73 (0.3)	85 (0.2)	76 (0.3)	70 (0.3)	75 (0.3)	73 (0.3)	72 (0.3)	67 (0.3)
Countries not meeting sample requirements								
Denmark	86 (1.1)	90 (0.8)	86 (0.9)	77 (1.4)	86 (0.7)	67 (1.1)	75 (1.0)	79 (1.1)
Hong Kong SAR	72 (1.4)	81 (1.4)	66 (1.9)	53 (1.4)	70 (1.7)	74 (1.4)	71 (1.8)	64 (1.8)
Netherlands	65 (1.4)	76 (1.3)	79 (1.2)	58 (1.7)	59 (1.4)	53 (1.4)	61 (1.1)	65 (1.2)
Switzerland	72 (1.7)	84 (1.9)	71 (2.1)	49 (1.9)	59 (1.7)	63 (1.5)	67 (1.5)	66 (1.8)
Benchmarking participants								
Newfoundland and Labrador, Canada	83 (0.9)	91 (0.8)	87 (0.9)	73 (1.6)	81 (1.2)	80 (1.2)	77 (1.6)	71 (1.8)
Ontario, Canada	84 (1.1)	94 (0.7)	89 (0.9)	80 (1.2)	87 (0.7)	82 (0.9)	78 (1.1)	71 (1.3)
Benchmarking participant not meeting sample requirements								
City of Buenos Aires, Argentina	69 (2.1)	81 (1.9)	64 (1.8)	62 (2.4)	72 (2.2)	72 (2.0)	66 (1.8)	67 (1.8)

Notes:

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

† Met guidelines for sampling participation rates only after replacement schools were included.

[1] National Desired Population does not correspond to International Desired Population.

[2] Country surveyed the same cohort of students but at the beginning of the next school year.

▲ More than 10 percentage points above ICILS 2013 average

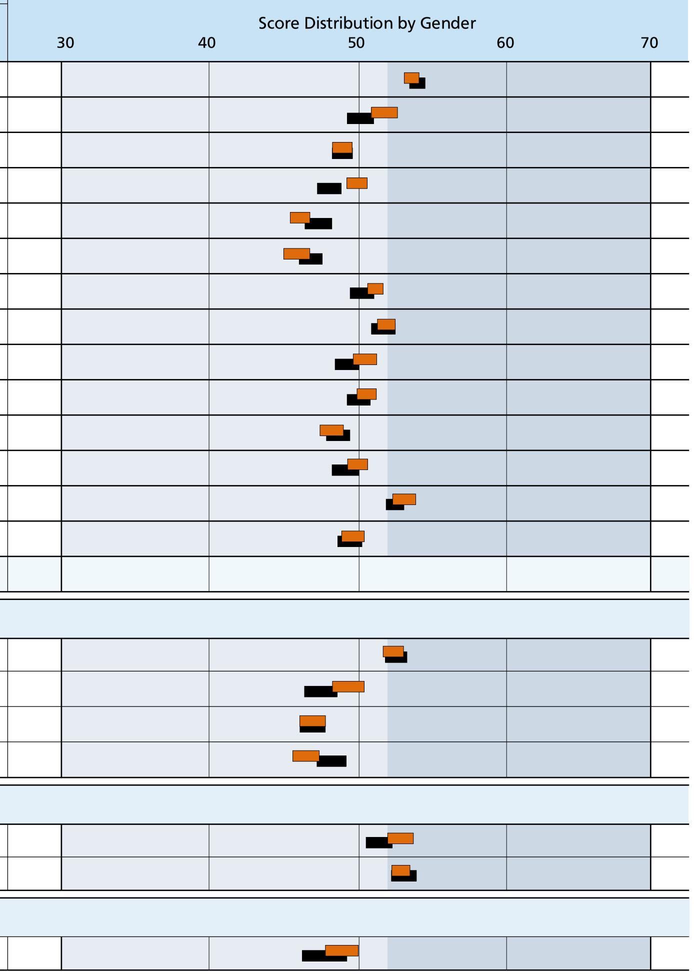
△ Significantly above ICILS 2013 average

▽ Significantly below ICILS 2013 average

▼ More than 10 percentage points below ICILS 2013 average

Table 5.14: National averages for students' learning of ICT tasks at school overall and by gender

Country	Students' Learning of ICT Tasks at School								
	All students			Females		Males		Differences (males - females)*	
Australia	54	(0.2)	▲	54	(0.2)	54	(0.2)	**0**	(0.2)
Chile	51	(0.3)	△	52	(0.4)	50	(0.4)	**-2**	(0.5)
Croatia	49	(0.2)	▽	49	(0.3)	49	(0.3)	0	(0.4)
Czech Republic	49	(0.3)	▽	50	(0.4)	48	(0.4)	**-2**	(0.4)
Germany†	47	(0.3)	▼	46	(0.3)	47	(0.4)	**1**	(0.4)
Korea, Republic of	46	(0.3)	▼	46	(0.4)	47	(0.4)	1	(0.5)
Lithuania	51	(0.3)	△	51	(0.3)	50	(0.4)	**-1**	(0.4)
Norway (Grade 9)[1]	52	(0.3)	△	52	(0.3)	52	(0.4)	0	(0.4)
Poland	50	(0.3)		50	(0.4)	49	(0.3)	**-1**	(0.5)
Russian Federation[2]	50	(0.3)		51	(0.3)	50	(0.3)	-1	(0.4)
Slovak Republic	49	(0.3)	▽	48	(0.4)	49	(0.4)	0	(0.4)
Slovenia	50	(0.3)		50	(0.3)	49	(0.4)	**-1**	(0.4)
Thailand[2]	53	(0.3)	△	53	(0.3)	53	(0.3)	-1	(0.3)
Turkey	50	(0.3)		50	(0.4)	50	(0.4)	0	(0.4)
ICILS 2013 average	50	(0.1)		50	(0.1)	50	(0.1)	**0**	(0.1)
Countries not meeting sample requirements									
Denmark	52	(0.2)		52	(0.3)	52	(0.3)	0	(0.4)
Hong Kong SAR	48	(0.5)		49	(0.5)	47	(0.5)	**-2**	(0.5)
Netherlands	47	(0.3)		47	(0.4)	47	(0.4)	0	(0.5)
Switzerland	47	(0.4)		46	(0.4)	48	(0.5)	**2**	(0.4)
Benchmarking participants									
Newfoundland and Labrador, Canada	52	(0.2)		53	(0.4)	52	(0.4)	-1	(0.8)
Ontario, Canada	53	(0.3)		53	(0.3)	53	(0.4)	0	(0.3)
Benchmarking participant not meeting sample requirements									
City of Buenos Aires, Argentina	48	(0.5)		49	(0.5)	48	(0.7)	-1	(0.6)



Notes:
* Statistically significant (p<.05) coefficients in **bold.**
() Standard errors appear in parentheses. Because some results are rounded to the nearest whole number, some totals may appear inconsistent.
† Met guidelines for sampling participation rates only after replacement schools were included.
[1] National Desired Population does not correspond to International Desired Population.
[2] Country surveyed the same cohort of students but at the beginning of the next school year.

▲ More than three score points above ICILS 2013 average
△ Significantly above ICILS 2013 average
▽ Significantly below ICILS 2013 average
▼ More than three score points below ICILS 2013 average

Female average score +/— confidence interval
Male average score +/— confidence interval

On average, students with a score in the range indicated by this color have more than a 50% probability of responding to having learned ICT tasks at school with:

No
Yes

We can also see from Table 5.14 some crossnational differences in regard to the extent to which students attributed their ICT learning to schools. In Australia, this attribution was notably stronger, by four scale score points, than the ICILS 2013 average. Significantly stronger attribution to schools can also be observed in Thailand, Norway, Chile, and Lithuania. In Germany and Korea, the attributions were notably weaker than the ICILS 2013 average (by three and four scale score points respectively). Attributions were also significantly weaker than the international average attribution in Croatia, the Czech Republic, and the Slovak Republic. In four countries—Poland, the Russian Federation, Slovenia, and Turkey—the measure of attribution did not differ significantly from the ICILS average. In the two Canadian provinces, Ontario and Newfoundland and Labrador, attribution to school-based learning about ICT was relatively strong.

Student perceptions of ICT

The ICILS student questionnaire also gathered information about two student perceptions of ICT. The first concerned students' confidence in using computers (ICT self-efficacy). The other related to students' interest and enjoyment in using ICT.

ICT self-efficacy

When responding to the ICILS student questionnaire, students indicated how well they thought they could do each of 13 computer-based tasks. The response categories were "I know how to do this," "I could work out how to do this," and "I do not think I could do this." For the purposes of analyses at the item level, we collapsed the second and third categories and gave the first category a score of one and the second a score of zero.

The tasks that the questionnaire listed were (in order of increasing difficulty):

- Search for and find information you need on the internet;
- Search for and find a file on your computer;
- Create or edit documents (e.g., assignments for school);
- Upload text, images, or video to an online profile;
- Edit digital photographs or other graphic images;
- Create a multimedia presentation (with sound, pictures, or video);
- Change the settings on your computer to improve the way it operates or to fix problems;
- Use a spreadsheet to do calculations, store data, or plot a graph;
- Use software to find and get rid of viruses;
- Build or edit a webpage;
- Set up a computer network;
- Create a database; and
- Create a computer program or macro.

Table 5.15 records the percentages, both as ICILS 2013 averages and for each country, of students who indicated that they knew how to do each task. The percentages, which reflect how difficult students perceived each task to be, ranged from 21 percent ("create a computer program or macro") to 89 percent ("search for and find information you need on the internet").

Table 5.15: National percentages of student confidence in using computers

Country	Search for and Find a File on Your Computer	Use Software to Find and Get Rid of Viruses	Edit Digital Photographs or Other Graphic Images	Create a Database (e.g., Using [Microsoft Access ®])	Create or Edit Documents (e.g., Assignments for School)	Search For and Find Information You Need on the Internet	Build or Edit a Webpage	Change the Settings on Your Computer to Improve the Way It Operates or to Fix Problems	Use a Spreadsheet to Do Calculations, Store Data, or Plot a Graph	Create a Computer Program or Macro (e.g., in [Basic, Visual Basic])	Set up a Computer Network	Create a Multimedia Presentation (with Sound, Pictures, or Video)	Upload Text, Images, or Video to an Online Profile
Australia	91 (0.6) △	32 (0.9) ▼	69 (0.7) ▽	24 (0.9) ▽	90 (0.6) △	94 (0.5) △	31 (1.0) ▽	59 (0.8)	50 (1.1) ▽	17 (0.7) ▽	27 (0.8) ▽	73 (0.8) △	83 (0.7) △
Chile	94 (0.6) △	50 (1.3) △	84 (0.8) ▲	37 (1.2) △	88 (0.8) △	94 (0.6) △	42 (1.1) △	59 (1.2)	56 (1.3)	27 (1.0) △	46 (1.4) ▲	75 (1.1) ▲	84 (1.0) △
Croatia	93 (0.6) △	45 (1.0) ▽	83 (1.0) ▲	48 (1.4) ▲	82 (0.8)	93 (0.7) △	47 (1.3) △	70 (1.0) ▲	54 (1.1)	27 (1.2) △	44 (1.1) △	77 (1.0) ▲	84 (1.0) △
Czech Republic	93 (0.5) △	43 (1.0) ▽	76 (0.8) △	19 (0.9) ▼	87 (0.7) △	95 (0.5) △	41 (1.0) △	59 (1.2)	47 (1.6) ▽	15 (1.0) ▽	20 (1.0) ▼	66 (1.2)	79 (0.8)
Germany†	86 (0.8)	45 (1.2) ▽	77 (1.2) △	18 (1.1) ▼	84 (0.9) △	91 (0.7) △	29 (1.0) ▽	55 (1.4)	49 (1.4) ▽	17 (1.1) ▽	30 (1.0) ▽	59 (1.4) ▽	80 (1.1) △
Korea, Republic of	87 (0.7)	55 (1.0) △	61 (1.1) ▼	25 (0.9) ▽	80 (0.8)	87 (0.7) ▽	37 (0.8)	38 (1.0) ▼	35 (1.0) ▼	16 (0.8) ▽	56 (1.0) ▲	52 (1.1) ▼	73 (1.0) ▽
Lithuania	91 (0.7) △	60 (1.1) ▲	79 (1.0) △	30 (1.1)	75 (1.0) ▽	90 (0.8)	36 (1.0) ▽	56 (1.0)	76 (1.0) ▲	23 (1.2)	23 (1.0) ▼	53 (1.2) ▼	77 (1.1)
Norway (Grade 9)¹	92 (0.6) △	44 (0.9) ▽	75 (1.0)	17 (0.8) ▼	91 (0.6) ▲	95 (0.4) △	37 (1.2)	64 (1.1) △	62 (1.2) △	16 (0.9) ▽	30 (1.0) ▽	66 (1.1)	79 (1.0) △
Poland	95 (0.4) △	51 (1.0) △	83 (0.9) △	33 (1.5) △	90 (0.8) △	96 (0.4) △	39 (1.2)	58 (0.9)	67 (1.3) ▲	15 (0.7) ▽	21 (1.0) ▼	81 (1.0) ▲	86 (0.9) △
Russian Federation²	90 (0.6) △	66 (0.8) ▲	78 (0.9) △	29 (1.2)	80 (0.9)	91 (0.6) △	44 (0.9) △	66 (0.9) △	46 (1.4) ▽	21 (0.9)	45 (1.2) △	70 (1.1) △	86 (0.6) △
Slovak Republic	95 (0.6) △	54 (1.1) △	79 (0.9) △	16 (0.9) ▼	79 (1.0)	92 (0.8) △	46 (1.2) △	67 (1.2) ▲	62 (1.2) △	21 (1.0)	48 (1.2) ▲	70 (1.1) △	82 (1.0) △
Slovenia	95 (0.4) △	45 (1.1) ▽	85 (0.7) ▲	44 (1.3) ▲	91 (0.7) ▲	95 (0.4) △	39 (1.1)	61 (1.1) △	67 (1.2) ▲	28 (1.2) △	46 (1.1) ▲	73 (0.8) △	85 (0.7) △
Thailand²	52 (1.2) ▼	31 (1.3) ▼	37 (1.2) ▼	32 (1.2)	50 (1.1) ▼	56 (1.4) ▼	27 (1.0) ▼	34 (1.1) ▼	34 (1.1) ▼	22 (0.9)	23 (0.9) ▼	33 (1.1) ▼	45 (1.5) ▼
Turkey	69 (1.2) ▼	43 (1.3) ▽	61 (1.2) ▼	42 (1.2) ▲	62 (1.3) ▼	71 (1.0) ▼	41 (1.1) △	54 (1.4) ▽	52 (1.3)	33 (1.1) ▲	38 (1.1) △	51 (1.2) ▼	60 (1.3) ▼
ICILS 2013 average	87 (0.2)	47 (0.3)	73 (0.3)	30 (0.3)	81 (0.2)	89 (0.2)	38 (0.3)	57 (0.3)	54 (0.3)	21 (0.3)	35 (0.3)	64 (0.3)	77 (0.3)
Countries not meeting sample requirements													
Denmark	92 (0.6)	40 (1.0)	68 (1.0)	16 (1.0)	93 (0.7)	96 (0.5)	32 (1.2)	65 (1.1)	69 (1.9)	14 (1.0)	42 (1.3)	71 (1.3)	84 (0.9)
Hong Kong SAR	79 (1.4)	53 (1.2)	65 (1.3)	37 (1.4)	75 (1.5)	79 (1.5)	42 (1.2)	59 (1.4)	64 (1.5)	28 (1.3)	29 (1.3)	66 (1.5)	72 (1.5)
Netherlands	94 (0.7)	45 (1.2)	82 (1.1)	29 (1.4)	90 (1.0)	93 (0.8)	45 (1.2)	59 (1.2)	38 (1.2)	22 (1.3)	32 (1.3)	70 (1.3)	82 (1.1)
Switzerland	87 (1.2)	36 (1.1)	73 (1.8)	21 (1.3)	84 (1.3)	90 (1.2)	25 (1.5)	56 (1.4)	48 (1.6)	20 (1.6)	25 (1.3)	58 (1.8)	74 (1.7)
Benchmarking participants													
Newfoundland and Labrador, Canada	88 (1.2)	41 (1.4)	71 (2.1)	30 (1.4)	84 (1.4)	91 (0.9)	41 (2.0)	65 (1.4)	35 (1.4)	26 (1.4)	39 (1.4)	70 (1.7)	84 (1.2)
Ontario, Canada	88 (0.8)	36 (1.2)	70 (1.2)	29 (1.1)	86 (0.9)	93 (0.6)	34 (1.2)	63 (1.1)	45 (1.2)	21 (0.9)	35 (1.1)	74 (1.2)	85 (0.8)
Benchmarking participant not meeting sample requirements													
City of Buenos Aires, Argentina	91 (0.9)	44 (1.7)	77 (1.8)	24 (1.5)	82 (1.9)	90 (1.7)	35 (1.9)	55 (1.9)	48 (2.2)	23 (2.2)	37 (2.2)	71 (2.1)	83 (1.7)

Notes:

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

† Met guidelines for sampling participation rates only after replacement schools were included.

¹ National Desired Population does not correspond to International Desired Population.

² Country surveyed the same cohort of students but at the beginning of the next school year.

▲ More than 10 percentage points above ICILS 2013 average

△ Significantly above ICILS 2013 average

▽ Significantly below ICILS 2013 average

▼ More than 10 percentage points below ICILS 2013 average

We formed two scales based on these items in order to explore across-country differences in students' ICT self-efficacy. One of those scales (based on six items) focused on basic ICT skills.[14] It had a reliability (coefficient alpha) of 0.76. The other (based on seven items) was concerned with advanced ICT skills.[15] It had a reliability (coefficient alpha) of 0.80. We used the Rasch partial credit model to construct the scales and standardized the IRT scores to have an ICILS 2013 average score of 50 points and a standard deviation of 10 points. The higher scores on the scales indicate higher levels of self-efficacy.

Table 5.16 presents the national average scores on the *basic ICT skills self-efficacy scale*. These data show differences across countries and gender. In both Poland and Slovenia, the level of self-efficacy was notably higher than the ICILS 2013 average (by four and three scale points respectively in the two countries). The average scale scores for Australia, Chile, Croatia, the Czech Republic, Norway, the Russian Federation, Ontario, Newfoundland and Labrador, and the Slovak Republic were also significantly higher than the ICILS 2013 average (typically by one or two scale score points). Scores in Thailand and Turkey were notably lower than the ICILS 2013 average (by 11 and six points respectively), while those in Korea and Lithuania were significantly lower than the ICILS 2013 average (by about one point).

Statistically significant gender differences in basic ICT self-efficacy favoring females emerged in Chile, Korea, and Newfoundland and Labrador. On average, the females' scores were two scale points higher than the males'. The only country (among the ICILS countries that met sampling requirements) where males scored higher was Norway.

Table 5.17 records the average scale scores on the *advanced ICT self-efficacy scale*. These data show larger gender differences than the gender differences observed on the basic scale. On average, males' scores on the advanced scale were higher than the females' average scores, with the difference as much as five scale points in some countries. Differences between males and females within countries were as large as six or seven scale points. There was no country where females scored higher than males; the smallest difference (of two scale score points) was recorded in Thailand.

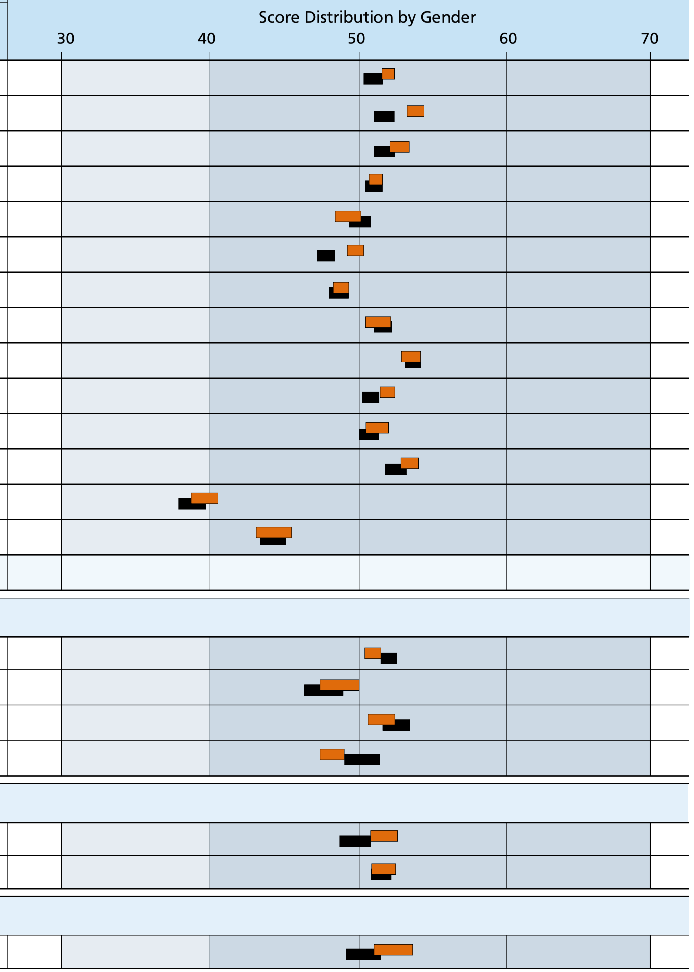
Crossnational differences were also apparent on the advanced ICT self-efficacy scale. In Chile, Croatia, Korea, Lithuania, the Russian Federation, and Slovenia, the national average scale scores were significantly higher than the ICILS 2013 average. In Australia, the Czech Republic, Germany, Norway, Poland, Ontario, and Newfoundland and Labrador, the mean scores were significantly lower than the ICILS 2013 average. The average national score for Thailand was notably lower than the ICILS 2013 average.

14 The following items were used to derive this scale: "search for and find a file on your computer," "edit digital photographs or other graphic images," "create or edit documents (e.g., assignments for school)," "search for and find information you need on the internet," "create a multimedia presentation (with sound, pictures, or video)," and "upload text, images, or video to an online profile."

15 The following items were used to derive this scale: "use software to find and get rid of viruses," "create a database (e.g., using [Microsoft access ®])," "build or edit a webpage," "change the settings on your computer to improve the way it operates or to fix problems," "use a spreadsheet to do calculations, store data, or plot a graph," "create a computer program or macro (e.g., in [Basic, Visual Basic])," and "set up a computer network."

Table 5.16: National averages for students' self-efficacy in basic ICT skills overall and by gender

Country	Students' Self-Efficacy in Basic ICT Skills: All students			Females		Males		Differences (males - females)*	
Australia	52	(0.2)	△	52	(0.2)	51	(0.2)	**-1**	(0.3)
Chile	53	(0.2)	△	54	(0.3)	52	(0.3)	**-2**	(0.3)
Croatia	52	(0.3)	△	53	(0.3)	52	(0.3)	**-1**	(0.3)
Czech Republic	51	(0.2)	△	51	(0.2)	51	(0.2)	0	(0.3)
Germany†	50	(0.3)		49	(0.4)	50	(0.3)	1	(0.5)
Korea, Republic of	49	(0.2)	▽	50	(0.3)	48	(0.3)	**-2**	(0.3)
Lithuania	49	(0.2)	▽	49	(0.3)	49	(0.3)	0	(0.4)
Norway (Grade 9)[1]	51	(0.2)	△	51	(0.2)	52	(0.3)	1	(0.3)
Poland	54	(0.2)	▲	54	(0.3)	54	(0.2)	0	(0.3)
Russian Federation[2]	51	(0.2)	△	52	(0.2)	51	(0.3)	**-1**	(0.3)
Slovak Republic	51	(0.3)	△	51	(0.4)	51	(0.3)	-1	(0.5)
Slovenia	53	(0.2)	▲	54	(0.3)	53	(0.3)	-1	(0.4)
Thailand[2]	39	(0.3)	▼	40	(0.4)	39	(0.4)	**-1**	(0.4)
Turkey	44	(0.4)	▼	44	(0.5)	44	(0.4)	0	(0.6)
ICILS 2013 average	50	(0.1)		50	(0.1)	50	(0.1)	**-1**	(0.1)
Countries not meeting sample requirements									
Denmark	52	(0.2)		51	(0.3)	52	(0.3)	**1**	(0.3)
Hong Kong SAR	48	(0.5)		49	(0.5)	48	(0.6)	-1	(0.7)
Netherlands	52	(0.3)		52	(0.4)	52	(0.4)	**1**	(0.4)
Switzerland	49	(0.4)		48	(0.4)	50	(0.6)	**2**	(0.7)
Benchmarking participants									
Newfoundland and Labrador, Canada	51	(0.3)		52	(0.5)	50	(0.5)	**-2**	(0.6)
Ontario, Canada	52	(0.2)		52	(0.3)	51	(0.3)	0	(0.4)
Benchmarking participant not meeting sample requirements									
City of Buenos Aires, Argentina	51	(0.5)		52	(0.6)	50	(0.6)	**-2**	(0.6)



Notes:
* Statistically significant (*p*<.05) coefficients in **bold**.
() Standard errors appear in parentheses. Because some results are rounded to the nearest whole number, some totals may appear inconsistent.
† Met guidelines for sampling participation rates only after replacement schools were included.
[1] National Desired Population does not correspond to International Desired Population.
[2] Country surveyed the same cohort of students but at the beginning of the next school year.

▲ More than three score points above ICILS 2013 average
△ Significantly above ICILS 2013 average
▽ Significantly below ICILS 2013 average
▼ More than three score points below ICILS 2013 average

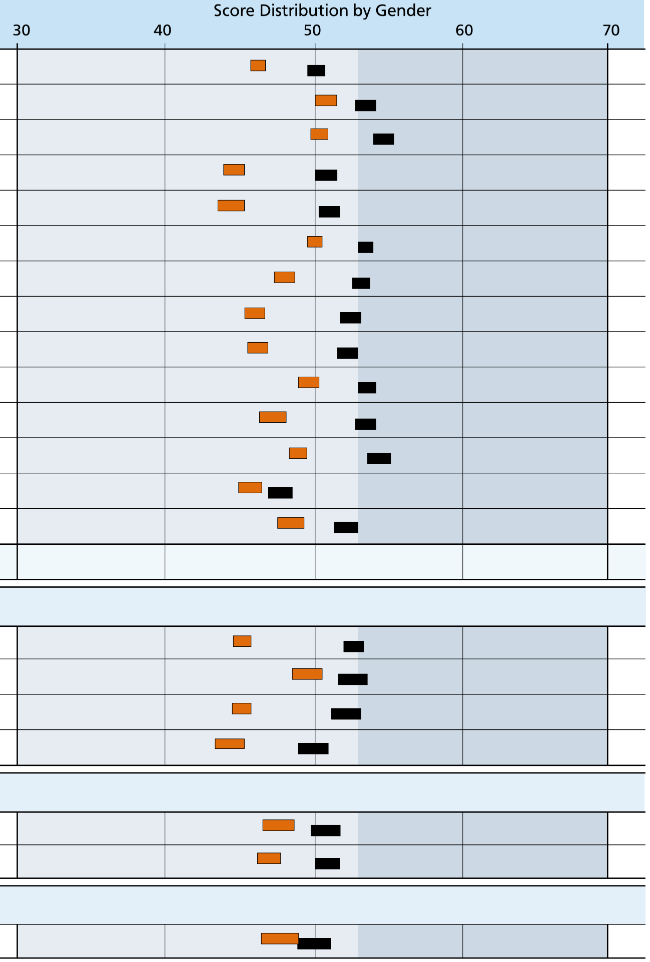
Female average score +/— confidence interval
Male average score +/— confidence interval

On average, students with a score in the range indicated by this color have more than a 50% probability of responding to the statements about students' self-efficacy in basic ICT skills with:

Disagreement to positive, agreement to negative statements
Agreement to positive, disagreement to negative items

Table 5.17: National averages for students' self-efficacy in advanced ICT skills overall and by gender

Country	Students' Self-Efficacy in Advanced ICT Skills: All students			Females		Males		Differences (males - females)*	
Australia	48	(0.2)	▽	46	(0.2)	50	(0.3)	**4**	(0.3)
Chile	52	(0.3)	△	51	(0.4)	53	(0.3)	**3**	(0.4)
Croatia	53	(0.2)	△	50	(0.3)	55	(0.3)	**4**	(0.4)
Czech Republic	48	(0.2)	▽	45	(0.3)	51	(0.3)	**6**	(0.4)
Germany†	48	(0.3)	▽	44	(0.4)	51	(0.3)	**7**	(0.5)
Korea, Republic of	52	(0.2)	△	50	(0.2)	53	(0.2)	**3**	(0.3)
Lithuania	51	(0.2)	△	48	(0.3)	53	(0.3)	**5**	(0.4)
Norway (Grade 9)[1]	49	(0.2)	▽	46	(0.3)	52	(0.3)	**6**	(0.4)
Poland	49	(0.2)	▽	46	(0.3)	52	(0.3)	**6**	(0.4)
Russian Federation[2]	52	(0.2)	△	50	(0.3)	54	(0.3)	**4**	(0.3)
Slovak Republic	50	(0.3)		47	(0.4)	54	(0.3)	**6**	(0.5)
Slovenia	52	(0.3)	△	49	(0.3)	54	(0.4)	**5**	(0.4)
Thailand[2]	47	(0.3)	▼	46	(0.4)	48	(0.4)	**2**	(0.4)
Turkey	50	(0.4)		48	(0.4)	52	(0.4)	**4**	(0.5)
ICILS 2013 average	50	(0.1)		48	(0.1)	52	(0.1)	**5**	(0.1)
Countries not meeting sample requirements									
Denmark	49	(0.2)		45	(0.3)	53	(0.3)	**7**	(0.4)
Hong Kong SAR	51	(0.3)		50	(0.4)	52	(0.5)	**3**	(0.6)
Netherlands	49	(0.3)		45	(0.3)	52	(0.4)	**7**	(0.5)
Switzerland	47	(0.4)		44	(0.5)	50	(0.5)	**5**	(0.5)
Benchmarking participants									
Newfoundland and Labrador, Canada	49	(0.3)		48	(0.5)	51	(0.5)	**3**	(0.8)
Ontario, Canada	49	(0.3)		47	(0.3)	51	(0.4)	**4**	(0.5)
Benchmarking participant not meeting sample requirements									
City of Buenos Aires, Argentina	49	(0.4)		48	(0.6)	50	(0.6)	**2**	(0.8)



Notes:
- * Statistically significant (p<.05) coefficients in **bold**.
- () Standard errors appear in parentheses. Because some results are rounded to the nearest whole number, some totals may appear inconsistent.
- † Met guidelines for sampling participation rates only after replacement schools were included.
- [1] National Desired Population does not correspond to International Desired Population.
- [2] Country surveyed the same cohort of students but at the beginning of the next school year.

▲ More than three score points above ICILS 2013 average
△ Significantly above ICILS 2013 average
▽ Significantly below ICILS 2013 average
▼ More than three score points below ICILS 2013 average

Female average score +/– confidence interval
Male average score +/– confidence interval

On average, students with a score in the range indicated by this color have more than a 50% probability of responding to the statements about students' self-efficacy in advanced ICT skills with:

Disagreement to positive, agreement to negative statements
Agreement to positive, disagreement to negative items

Student interest and enjoyment in using computers and computing

Students were asked to record their level of agreement with the following statements (each denoting interest and enjoyment[16] in using computers and doing computing) on a four-point Likert scale ("strongly agree," "agree," "disagree," and "strongly disagree"):

- It is very important to me to work with a computer;
- I think using a computer is fun;
- It is more fun to do my work using a computer than without a computer;
- I use a computer because I am very interested in the technology;
- I like learning how to do new things using a computer;
- I often look for new ways to do things using a computer;
- I enjoy using the internet to find out information.

Table 5.18 records the percentages of agreement (a combination of the categories "strongly agree" and "agree") with each item. The table shows the generally high level of agreement with these statements. These "high-level" percentages ranged from 63 percent ("I use a computer because I am very interested in the technology") to 92 percent ("I enjoy using the internet to find out information").

Table 5.19 records the scale scores for the *interest and enjoyment in computing scale*. This seven-item scale, constructed using the Rasch partial credit model and with IRT scores standardized to an ICILS 2013 average score of 50 points and a standard deviation of 10 points, had reliabilities (coefficient alpha) that ranged across countries from 0.74 to 0.87.

In all countries, males expressed greater interest and enjoyment in computing than females did. The difference between gender groups was, on average, four scale points. In some countries (Germany and the Czech Republic[17]), the difference was as large as six scale points. The difference was statistically significant in all countries.

There were some notable crossnational differences with respect to interest and enjoyment in computing. In Chile and Croatia, attitudes were notably more favorable than the ICILS 2013 average, by five and three scale score points respectively. In Poland and Turkey, attitudes were significantly more favorable than the international average, by one and two scale points respectively. In Korea, the scale score was notably lower than the ICILS 2013 average (by four points). In Australia, the Czech Republic, Germany, Norway, the Russian Federation, and the Slovak Republic, the respective national averages were significantly lower than the ICILS 2013 average (by one or two scale points). The average scale scores for Ontario (51 points) and Newfoundland and Labrador (53 points) also suggested relatively high levels of interest and enjoyment among students in those education systems.

16 When analyzing these data, we were unable to identify the separate dimensions of "interest" and "enjoyment." The questionnaire also included four ICT self-concept items not analyzed in this report: "learning how to use a new computer program is very easy for me," "I have always been good at working with computers," "I know more about computers than most people of my age," and "I am able to give advice to others when they have problems with computers."

17 There were also large gender differences in Denmark (eight points) and Switzerland (seven points).

Table 5.18: National percentages of students' agreement with statements about computers

Country	It is Very Important to Me to Work With a Computer	I Think Using a Computer is Fun	It Is More Fun to Do My Work Using a Computer than without a Computer	I Use a Computer Because I Am Very Interested in the Technology	I Like Learning How to Do New Things Using a Computer	I Often Look for New Ways to Do Things Using a Computer	I Enjoy Using the Internet to Find out Information
Australia	88 (0.6)	93 (0.5) △	85 (0.6) △	65 (0.9) △	91 (0.5)	75 (0.8) ▽	93 (0.5)
Chile	95 (0.6) △	97 (0.4) △	92 (0.6) △	85 (1.0) ▲	98 (0.3) △	87 (0.8) △	93 (0.6)
Croatia	95 (0.5) △	97 (0.3) △	85 (0.7) △	73 (0.9) △	92 (0.6)	82 (0.8) △	95 (0.5) △
Czech Republic	93 (0.5) △	94 (0.4) △	81 (0.9)	57 (1.1) ▽	92 (0.5)	81 (0.7) △	94 (0.4) △
Germany†	89 (0.7)	96 (0.4) △	80 (1.0) ▽	51 (1.2) ▼	89 (0.8) ▽	63 (1.1) ▼	89 (0.7) ▽
Korea, Republic of	79 (0.9) ▼	88 (0.6) ▽	76 (0.9) ▽	42 (1.3) ▼	86 (0.8) ▽	67 (0.9) ▼	88 (0.7) ▽
Lithuania	89 (0.6)	90 (0.6)	81 (0.9)	57 (1.2) ▽	90 (0.6)	77 (1.0)	90 (0.7) ▽
Norway (Grade 9)¹	84 (0.9) ▽	96 (0.4) △	89 (0.7) △	52 (1.1) ▼	90 (0.6) ▽	76 (0.9)	96 (0.4) △
Poland	92 (0.6) △	97 (0.4) △	86 (0.9) △	62 (1.1)	88 (0.8) ▽	77 (1.0)	96 (0.4) △
Russian Federation²	86 (0.6) ▽	58 (1.1) ▼	79 (0.9) ▽	52 (0.9) ▼	93 (0.4) △	77 (0.8)	96 (0.3) △
Slovak Republic	90 (0.8)	92 (0.7)	80 (0.9) ▽	52 (1.2) ▼	90 (0.9)	76 (0.9) ▽	91 (0.8)
Slovenia	90 (0.7)	96 (0.5) △	83 (1.0)	66 (1.0) △	91 (0.5)	78 (0.9)	84 (1.0) ▽
Thailand²	94 (0.6) △	88 (0.9) ▽	82 (1.2)	86 (0.8) ▲	96 (0.5) △	87 (0.9) △	94 (0.7) △
Turkey	87 (0.8) ▽	90 (0.7)	76 (1.0) ▽	79 (1.1) ▲	94 (0.6) △	83 (0.9) △	90 (0.8) ▽
ICILS 2013 average	89 (0.2)	91 (0.2)	83 (0.2)	63 (0.3)	91 (0.2)	78 (0.2)	92 (0.2)
Countries not meeting sample requirements							
Denmark	93 (0.6)	97 (0.4)	89 (0.8)	48 (1.2)	91 (0.7)	63 (1.3)	98 (0.4)
Hong Kong SAR	92 (0.7)	92 (1.0)	77 (1.0)	69 (1.3)	86 (1.1)	80 (1.1)	93 (0.8)
Netherlands	92 (0.8)	95 (0.6)	82 (1.0)	41 (1.5)	86 (1.0)	57 (1.3)	71 (1.2)
Switzerland	85 (1.4)	91 (1.0)	76 (1.4)	49 (1.8)	83 (0.8)	65 (2.0)	89 (1.1)
Benchmarking participants							
Newfoundland and Labrador, Canada	91 (1.0)	95 (0.6)	88 (1.0)	76 (1.5)	93 (0.8)	79 (1.6)	93 (0.9)
Ontario, Canada	90 (0.8)	96 (0.4)	85 (0.8)	72 (1.3)	93 (0.7)	77 (1.1)	93 (0.6)
Benchmarking participant not meeting sample requirements							
City of Buenos Aires, Argentina	95 (0.8)	95 (0.7)	82 (1.6)	76 (1.9)	95 (0.9)	77 (1.4)	86 (1.1)

Notes:

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

† Met guidelines for sampling participation rates only after replacement schools were included.

¹ National Desired Population does not correspond to International Desired Population.

² Country surveyed the same cohort of students but at the beginning of the next school year.

▲ More than 10 percentage points above ICILS 2013 average

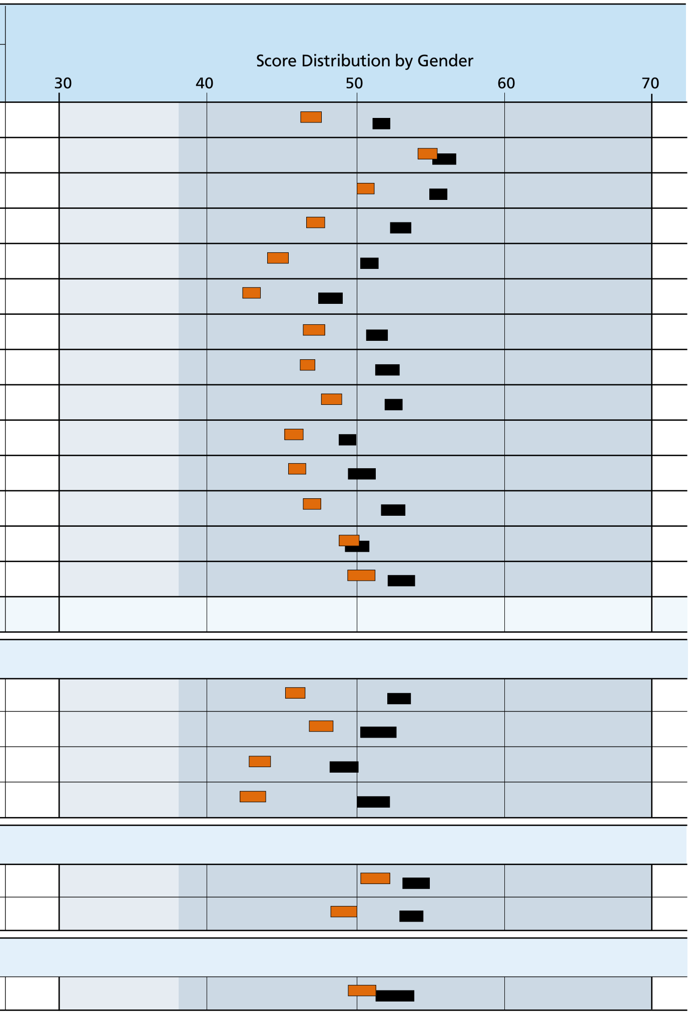
△ Significantly above ICILS 2013 average

▽ Significantly below ICILS 2013 average

▼ More than 10 percentage points below ICILS 2013 average

Table 5.19: National averages for students' interest and enjoyment in using computers overall and by gender

Country	Students' Interest and Enjoyment in Using Computers								
	All students			Females		Males		Differences (males - females)*	
Australia	49	(0.2)	▽	47	(0.3)	52	(0.3)	**5**	(0.4)
Chile	56	(0.3)	▲	55	(0.3)	56	(0.4)	**1**	(0.4)
Croatia	53	(0.2)	▲	51	(0.2)	56	(0.3)	**5**	(0.3)
Czech Republic	50	(0.2)		47	(0.3)	53	(0.3)	**6**	(0.4)
Germany†	48	(0.2)	▽	45	(0.3)	51	(0.3)	**6**	(0.4)
Korea, Republic of	46	(0.3)	▼	43	(0.3)	48	(0.3)	**5**	(0.4)
Lithuania	49	(0.2)	▽	47	(0.3)	51	(0.3)	**4**	(0.4)
Norway (Grade 9)[1]	50	(0.2)		47	(0.2)	52	(0.3)	**5**	(0.3)
Poland	51	(0.2)	△	49	(0.3)	53	(0.3)	**4**	(0.4)
Russian Federation[2]	48	(0.2)	▽	46	(0.2)	49	(0.2)	**3**	(0.3)
Slovak Republic	48	(0.3)	▽	46	(0.3)	50	(0.4)	**4**	(0.5)
Slovenia	50	(0.2)		47	(0.2)	53	(0.4)	**5**	(0.4)
Thailand[2]	50	(0.3)		50	(0.3)	50	(0.4)	0	(0.4)
Turkey	52	(0.3)	△	51	(0.4)	53	(0.4)	**2**	(0.5)
ICILS 2013 average	50	(0.1)		48	(0.1)	52	(0.1)	**4**	(0.1)
Countries not meeting sample requirements									
Denmark	50	(0.3)		46	(0.3)	53	(0.4)	**7**	(0.4)
Hong Kong SAR	50	(0.4)		48	(0.3)	52	(0.6)	**4**	(0.6)
Netherlands	46	(0.3)		44	(0.3)	49	(0.4)	**5**	(0.5)
Switzerland	47	(0.4)		43	(0.4)	51	(0.5)	**8**	(0.6)
Benchmarking participants									
Newfoundland and Labrador, Canada	53	(0.3)		51	(0.4)	54	(0.4)	**3**	(0.6)
Ontario, Canada	51	(0.3)		49	(0.4)	54	(0.4)	**5**	(0.5)
Benchmarking participant not meeting sample requirements									
City of Buenos Aires, Argentina	51	(0.4)		50	(0.4)	52	(0.6)	**2**	(0.8)



Notes:

* Statistically significant (p<.05) coefficients in **bold.**

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

† Met guidelines for sampling participation rates only after replacement schools were included.

[1] National Desired Population does not correspond to International Desired Population.

[2] Country surveyed the same cohort of students but at the beginning of the next school year.

▲ More than three score points above ICILS 2013 average

△ Significantly above ICILS 2013 average

▽ Significantly below ICILS 2013 average

▼ More than three score points below ICILS 2013 average

Female average score +/— confidence interval

Male average score +/— confidence interval

On average, students with a score in the range indicated by this color have more than a 50% probability of responding to the statements about students' interest and enjoyment in using ICT with:

Disagreement to positive, agreement to negative items

Agreement to positive, disagreement to negative items

Associations between perceptions and achievement

In order to review the association of students' CIL with ICT self-efficacy beliefs and with ICT interest and enjoyment, we computed correlation coefficients for each ICILS country. These coefficients are shown in Table 5.20, with the statistically significant ones presented in bold. We recorded positive and statistically significant correlations between basic ICT self-efficacy and CIL scores at both the international level and in every country. The ICILS 2013 average correlation coefficient was 0.32, and the values for countries that met sampling requirements ranged from 0.20 in Germany to 0.42 in Korea. In Ontario, the correlation coefficient was 0.31; in Newfoundland and Labrador, it was 0.25.

The association between advanced ICT self-efficacy and CIL was much weaker. The ICILS 2013 average for the correlation coefficient was 0.04, while the coefficients for the participating countries were statistically significant only in Turkey (0.20), Korea (0.13), Croatia (0.12), Lithuania (0.07), the Russian Federation (0.05), and the Slovak Republic (0.06). A small but statistically significant positive association was evident in Ontario (0.07), and statistically significant but small negative correlation coefficients were evident in Norway (-0.07) and in Newfoundland and Labrador (-0.10).

The patterns for the two scales suggest that while basic ICT self-efficacy is quite strongly associated with CIL, the same cannot be said of the relationship between advanced ICT self-efficacy and CIL. In fact, the associations with respect to the latter were weak to the point of being almost nonexistent. When interpreting this difference, we need to remember that the CIL achievement construct combines two sets of skills: fundamental technical skills and the skills associated with information literacy and communication. As such, we need not expect students with higher levels of advanced ICT self-efficacy (encompassing advanced ICT tasks) to have higher levels of CIL proficiency. In contrast, however, it is reasonable to expect that students with higher levels of basic ICT self-efficacy will have higher CIL achievement scores because the skills described in the basic self-efficacy questions are similar to those required for demonstration of CIL proficiency.

Interest and enjoyment was also weakly and inconsistently associated with CIL. The ICILS 2013 average for this coefficient was 0.07. The coefficient was statistically significant in 10 of the 14 countries that met sampling requirements: Turkey (0.25), Thailand (0.23), Australia (0.11), the Slovak Republic (0.11), Korea (0.11), Lithuania (0.08), Chile (0.06), Norway (0.06), Croatia (0.05), and Poland (0.05). We recorded a statistically significant negative correlation coefficient in the Russian Federation (-0.07). The coefficient for Ontario was 0.09.

Conclusion

The ICILS 2013 data considered in this chapter show that in most of the participating countries Grade 8 students had been using computers and other forms of ICT for a considerable period of time, typically for five years or more. The ICILS students also presented as frequent users of ICT, with that use occurring more often at home than at school. They reported using ICT for study, communication, information exchange, and recreation. Many of the ICILS students were clearly managing to learn and live in this digital age.

Table 5.20: National values of correlation coefficients for CIL with basic ICT self-efficacy, advanced ICT self-efficacy, and interest/enjoyment in computing

Country	Basic ICT Self-Efficacy*		Advanced ICT Self-Efficacy*		Interest - Enjoyment in ICT*	
Australia	**0.36**	(0.02)	0.04	(0.02)	**0.11**	(0.02)
Chile	**0.36**	(0.02)	0.00	(0.02)	**0.06**	(0.03)
Croatia	**0.34**	(0.02)	**0.12**	(0.02)	**0.05**	(0.02)
Czech Republic	**0.22**	(0.02)	0.01	(0.02)	-0.02	(0.03)
Germany†	**0.20**	(0.02)	-0.03	(0.02)	0.00	(0.03)
Korea, Republic of	**0.42**	(0.02)	**0.13**	(0.02)	**0.11**	(0.02)
Lithuania	**0.38**	(0.02)	**0.07**	(0.02)	**0.08**	(0.03)
Norway (Grade 9)[1]	**0.24**	(0.02)	**-0.07**	(0.03)	**0.06**	(0.03)
Poland	**0.33**	(0.02)	**0.05**	(0.02)	**0.05**	(0.02)
Russian Federation[2]	**0.28**	(0.02)	0.01	(0.02)	**-0.07**	(0.02)
Slovak Republic	**0.37**	(0.02)	**0.06**	(0.03)	**0.11**	(0.03)
Slovenia	**0.28**	(0.02)	-0.03	(0.03)	0.05	(0.03)
Thailand[2]	**0.29**	(0.02)	0.00	(0.03)	**0.23**	(0.03)
Turkey	**0.37**	(0.03)	**0.21**	(0.03)	**0.25**	(0.03)
ICILS 2013 average	**0.32**	(0.01)	**0.04**	(0.01)	**0.08**	(0.01)
Countries not meeting sample requirements						
Denmark	**0.20**	(0.03)	**-0.12**	(0.02)	-0.01	(0.03)
Hong Kong SAR	**0.40**	(0.03)	**0.09**	(0.03)	**0.12**	(0.05)
Netherlands	**0.28**	(0.03)	**-0.08**	(0.03)	0.01	(0.03)
Switzerland	**0.20**	(0.03)	-0.02	(0.04)	0.05	(0.04)
Benchmarking participants						
Newfoundland and Labrador, Canada	**0.25**	(0.04)	-0.08	(0.04)	**0.07**	(0.02)
Ontario, Canada	**0.31**	(0.03)	**-0.10**	(0.03)	0.09	(0.06)
Benchmarking participant not meeting sample requirements						
City of Buenos Aires, Argentina	**0.26**	(0.04)	0.07	(0.04)	-0.03	(0.04)

Notes:
* Statistically significant ($p < 0.05$) coefficients in **bold**.
() Standard errors appear in parentheses. Because some results are rounded to the nearest whole number, some totals may appear inconsistent.
† Met guidelines for sampling participation rates only after replacement schools were included.
1 National Desired Population does not correspond to International Desired Population.
2 Country surveyed the same cohort of students but at the beginning of the next school year.

The difference between the percentages of females and males using computers at home at least once a week was small (78% compared to 82%), and almost nonexistent with respect to using computers at school at least once a month. On average across ICILS countries, we found no statistically significant differences between females and males in terms of out-of-school use of common computer applications. However, females were making greater use than males of computers for school-related purposes, albeit by a small but significant amount. Females were also slightly more likely than males to attribute their ICT learning to school instruction.

We also found evidence that females were making slightly more frequent use than males of the internet for social communication. However, males were slightly more likely than females to frequently use the internet for information exchange. Similarly, there was greater prevalence of recreational use of computers among males than females. Our conclusion is that although there are differences between males and females in the way they use information and communication technology, these differences are small.

At school, students were using computer technology across most subject areas as well as in the specialist subject area of information technology or computer studies. Beyond this specialist subject area, the most frequent use of computer technology was in the (natural) sciences and in the human sciences and humanities. Use was least frequent in the creative arts.

The Grade 8 ICILS students also indicated that they were confident in their capacity to use basic ICT applications but a little less confident about using more advanced ICT functions. Females recorded slightly higher scores than males (the difference was about one tenth of a standard deviation) on the basic ICT self-efficacy scale (encompassing common ICT applications). However, much larger differences (of about half of a standard deviation) in favor of males were evident with regard to the advanced ICT self-efficacy scale (encompassing multimedia and technical aspects).

Students generally expressed high levels of interest and enjoyment in using computer technology. Males expressed relatively higher levels of interest and enjoyment than females (the difference was about two fifths of a standard deviation). There were also notable differences across countries in average levels of interest and enjoyment in computing.

Student confidence in their basic ICT skills was moderately highly associated with measured computer and information literacy (CIL) achievement. Confidence in using advanced ICT skills was not associated to any appreciable extent with CIL achievement. Interest and enjoyment in using ICT was only weakly associated with CIL achievement, overall, and the association was inconsistent across countries. This finding is consistent with findings from cross-sectional surveys in other areas of learning.