

Chapter 5

Teacher Gender and ICT



Abstract The beliefs and attitudes of teachers towards information and communications technologies (ICT) in teaching and learning are central to the successful implementation of new technologies. While teachers are encouraged to integrate ICT into their teaching, there is evidence that the effectiveness of this integration depends to a large extent on teachers' preparedness to do so, which is directly related to their confidence and knowledge in using ICT, as well as their beliefs about the value of ICT in education. Female teachers using technology effectively provide a role model for young women at school, however previous studies have shown that female teachers are less likely to be using computers personally than their male counterparts. The International Computer and Information Literacy Study (ICILS) 2013 teacher questionnaire provides a rich resource of data on teacher characteristics in relation to computer and information literacy and technology by gender. Analyses of female and male teachers' experiences, dispositions, and uses of ICT indicate that any differences are small and inconsistent across countries. Female and male teachers in secondary school do not appear to differ greatly in the extent of their pedagogical use of ICT.

Keywords Computer and information literacy (CIL) · Gender differences · Information and communications technologies (ICT) · International Computer and Information Literacy Study (ICILS) · International large-scale assessments · Teachers

5.1 Introduction

Ertmer (1999) proposed two types of barriers to using ICT in teaching. First-order barriers include factors such as resources (both hardware and software), and second-order barriers include factors relating to teachers' expertise and interest, such as self-efficacy in using ICT, beliefs about student learning, and perceptions about the value of ICT in education. Teachers' responses to items addressing these issues in ICILS provide evidence to answer research question RQ4 (Sect. 1.4): To what extent do female and male teachers differ in computer self-efficacy overall and in relation to particular aspects of computing?

Research question RQ5 (Sect.1.4) asked: To what extent do female and male teachers differ in their attitudes towards the use of computer technologies in school education? While teachers are encouraged to integrate ICT into teaching, there is evidence that their preparedness to do so determines the effectiveness of the integration rather than simply the existence of technology in the classroom (Buabeng-Andoh 2012). Anxiety and lack of confidence or competence often means that teachers revert to conventional learning techniques (Russell and Bradley 1997), and a number of studies cite female teachers' lower levels of computer use on a personal level and link this with lower levels of integration of ICT into their teaching practice (see, for example, Jamieson-Proctor et al. 2006; Wozney et al. 2006).

The ICILS teacher population was defined as any teacher teaching regular school subjects to students in grade eight in each sampled school and up to 15 teachers were selected at random from this population. The data for this chapter are derived from the teachers' responses to these surveys. Germany and Norway are not included in this chapter, as their data did not meet the sample requirements.

5.2 Teacher Gender

Cross-nationally, on average, more than two-thirds of the responding teachers were female, and female teachers were the majority in every country that participated in ICILS 2013 (Table 5.1). This was particularly evident in Lithuania (where 84% of teachers surveyed were female), the Russian Federation (83% female), the Slovak Republic (79% female), and Slovenia (78% female). Female teachers who are

Table 5.1 Percentage of teachers surveyed in ICILS 2013 that were female

Country	Percentage of teacher questionnaire respondents that were female (%)
Australia	63 (1.4)
Chile	61 (1.8)
Croatia	59 (1.6)
Czech Republic	75 (1.1)
Republic of Korea	65 (1.7)
Lithuania	84 (0.6)
Poland	75 (1.0)
Russian Federation	83 (1.0)
Slovak Republic	79 (1.1)
Slovenia	78 (0.9)
Thailand	62 (2.3)
Turkey	54 (1.7)
Average of countries	71 (1.1)

Note Standard errors in parentheses

confident about using computer and information technologies in their teaching may provide strong role models for the young women in their classes.

5.3 Experience in Using Computers

The ICILS 2013 teacher questionnaire asked teachers to describe how much experience they had in using computers for teaching purposes. Responses were in three categories: never, less than two years, and two years or more. The vast majority of teachers in all countries indicated that they had more than two years of experience in using computers (Table 5.2).

On average across countries, 81% of male teachers and 85% of female teachers reported having at least two years of experience in using computers. The largest difference in favor of female teachers was in the Russian Federation (17 percentage points) and there were also significant differences in favor of female teachers in Poland and Thailand (nine percentage points) and Croatia (six percentage points). The Czech Republic was the only country where there was a greater proportion

Table 5.2 National percentages of teachers’ computer experience, by gender

Country	Percentage of teachers using computers for two years or more (%)		
	Males	Females	Difference (males – females)
Russian Federation	73 (3.2)	90 (0.9)	17* (2.9)
Poland	79 (1.9)	88 (1.1)	9* (2.2)
Thailand	72 (4.4)	81 (2.3)	9* (4.3)
Croatia	67 (1.8)	73 (1.4)	6* (2.4)
Republic of Korea	84 (2.3)	89 (1.2)	5 (3.2)
Lithuania	88 (2.1)	91 (1.1)	4 (2.4)
Slovak Republic	75 (2.2)	79 (1.4)	4 (2.6)
Australia	91 (1.1)	93 (0.7)	1 (1.2)
Chile	85 (2.0)	86 (1.6)	1 (2.6)
Turkey	82 (2.0)	82 (1.9)	0 (2.0)
Slovenia	81 (2.2)	80 (1.2)	–1 (1.8)
Czech Republic	90 (1.6)	84 (1.1)	–6* (1.9)
Average of countries	81 (0.7)	85 (0.4)	4* (0.7)

Notes Standard errors in parentheses. Because some results are rounded to the nearest whole number, some totals may appear inconsistent. *Differences were significant ($p < 0.05$)

of male teachers than female teachers that reported having more than two years of experience in using computers.

The ICILS 2013 international report (Fraillon et al. 2014) indicated that there were associations of a moderate size between teacher experience in using computers and frequency of use ($r = 0.34$, $d = 0.7$).

ICILS 2013 also disclosed the proportion of teachers in each country who reported using computers at least once a week at school when teaching, at school for other work-related purposes, and outside school for any purpose (Table 5.3). On average, around 60% of teachers used a computer at school when teaching, but this varied widely across countries. Australian teachers reported the highest levels of weekly computer use, and a significantly higher proportion of Australian female teachers than male teachers used a computer when teaching. The lowest level of computer use was in Poland, where fewer than half of either male or female teachers reported using computers on a weekly basis.

The largest gender differences could be seen in Croatia and in the Czech Republic; in both countries a substantially higher proportion of female than male teachers reported regularly using computers in the classroom. In Slovenia and Lithuania, the gender differences were similarly in favor of female teachers but smaller than in Croatia and the Czech Republic, and, in the Republic of Korea and the Russian Federation, more male teachers than female teachers used computers regularly in the classroom.

The use of computers at school for other work-related purposes was much higher than the use for teaching, reaching almost saturation point in Australia. On average across countries, just over 80% of teachers used computers at school for work-related purposes other than teaching. In the Russian Federation and Thailand, substantially more female than male teachers were weekly users of computers for other work-related purposes in school, while, in Turkey, the reverse was reported.

Similarly, the proportions of both male and female teachers using computers outside school for any purpose were high and there were few gender differences. Notably, the only significant differences were in Chile and the Russian Federation; in both countries, it was female teachers who reported a higher level of use of computers.

5.4 Confidence in Using ICT

As studies have shown (for example, SITES 2006; see IEA 2019; Law et al. 2008) confident teachers are more likely than less confident teachers to adopt ICT as part of their teaching repertoire. Confident female teachers are therefore more likely to use ICT than less confident female teachers, and confident female teachers may be important in ensuring that students of both sexes perceive ICT in the classroom as tools that are equally used by both male and female teachers. The ICILS teacher questionnaire asked teachers to rate their confidence in their ability to complete various tasks on a computer by themselves according to the following categories:

Table 5.3 Percentage of teachers reporting using a computer at least once a week, by gender

Country	At school when teaching			At school for other work-related purposes			Outside school for any purpose		
	Male	Female	Difference (males–females)	Male	Female	Difference (males–females)	Male	Female	Difference (males–females)
Australia	87 (1.3)	91 (0.8)	4* (1.5)	99 (0.3)	98 (0.6)	-1 (0.7)	97 (0.6)	98 (0.4)	0 (0.7)
Chile	59 (2.8)	64 (2.5)	4 (3.7)	82 (2.1)	83 (2.0)	1 (1.9)	89 (2.2)	95 (1.0)	6* (2.2)
Croatia	53 (2.1)	37 (1.9)	-17* (2.8)	71 (1.8)	72 (1.4)	1 (2.0)	92 (1.3)	90 (1.2)	-1 (1.6)
Czech Republic	75 (2.2)	62 (2.0)	-13* (2.6)	94 (1.2)	92 (0.9)	-2 (1.4)	95 (1.4)	96 (0.6)	1 (1.6)
Republic of Korea	65 (3.3)	81 (1.4)	17* (3.2)	91 (2.4)	95 (0.5)	4 (2.6)	81 (4.6)	84 (1.4)	3 (5.5)
Lithuania	61 (3.7)	67 (1.7)	7 (3.4)	85 (3.7)	90 (1.0)	5 (3.6)	94 (1.7)	93 (0.8)	-1 (2.0)
Poland	45 (2.9)	40 (1.9)	-4 (3.7)	79 (2.1)	76 (2.0)	-2 (2.5)	98 (0.5)	98 (0.5)	0 (0.7)
Russian Federation	62 (4.7)	79 (1.7)	17* (5.0)	69 (3.3)	90 (1.0)	20* (3.1)	78 (3.7)	85 (1.4)	8* (3.2)
Slovak Republic	62 (2.9)	57 (2.0)	-5 (3.5)	84 (2.0)	85 (1.2)	0 (2.3)	92 (1.6)	93 (0.8)	2 (1.8)
Slovenia	60 (2.6)	68 (1.5)	8* (2.8)	92 (1.5)	93 (0.7)	2 (1.4)	96 (1.0)	95 (0.5)	0 (1.0)
Thailand	51 (4.7)	49 (2.1)	-2 (4.6)	67 (4.5)	78 (2.8)	11* (4.5)	67 (4.4)	73 (3.5)	7 (5.4)
Turkey	51 (3.8)	44 (3.6)	-7* (3.1)	70 (2.7)	60 (2.2)	-11* (3.0)	90 (1.5)	92 (1.4)	2 (1.7)
Average of countries	61 (0.9)	62 (0.6)	1 (1.0)	82 (0.7)	84 (0.4)	2* (0.8)	89 (0.7)	91 (0.4)	2* (0.8)

Notes: Standard errors in parentheses. Because some results are rounded to the nearest whole number, some totals may appear inconsistent. *Differences were significant ($p < 0.05$)

I know how to do this, I could work out how to do this, or I do not think I could do this. These tasks were:

- Producing a letter using a word processing program;
- Emailing a file as an attachment;
- Using the internet for online purchases and payments;
- Monitoring students' progress;
- Using a spreadsheet program (for example, [Lotus 1 2 3[®], Microsoft Excel[®]]) for keeping records or analyzing data;
- Preparing lessons that involve the use of ICT by students;
- Finding useful teaching resources on the internet;
- Collaborating with others using shared resources such as [Google Docs[®]]; and
- Installing software.

The 14 items in this group of questions were used to derive a teachers' ICT self-efficacy scale. The scale was set to have an average of 50 and a standard deviation of 10. Higher values on the scale reflect greater levels of confidence (Table 5.4).

On average across the participating countries, there was a significant gender difference in favor of male teachers, although the magnitude of the difference was small. This was also true of the gender differences in Chile, the Slovak Republic, Australia, and Turkey. However, in the Czech Republic and Slovenia, and to a lesser

Table 5.4 National averages for the ICILS 2013 teacher ICT self-efficacy scale, by gender

Country	Teachers' reports on their ICT self-efficacy		
	Males	Females	Difference (males – females)
Czech Republic	54 (0.5)	48 (0.3)	6* (0.6)
Slovenia	54 (0.6)	49 (0.3)	5* (0.6)
Croatia	50 (0.6)	47 (0.4)	3* (0.7)
Poland	54 (0.6)	51 (0.3)	3* (0.6)
Chile	53 (0.6)	51 (0.4)	2* (0.7)
Slovak Republic	52 (0.6)	49 (0.2)	2* (0.7)
Australia	55 (0.3)	54 (0.3)	1* (0.4)
Turkey	49 (0.5)	48 (0.6)	1* (0.5)
Lithuania	51 (0.8)	50 (0.3)	1 (0.9)
Republic of Korea	53 (0.6)	53 (0.2)	0 (0.5)
Thailand	44 (0.9)	45 (0.7)	-1 (1.1)
Russian Federation	46 (0.9)	50 (0.4)	-3* (0.9)
Average of countries	51 (0.5)	50 (0.3)	2* (0.6)

Notes Standard errors in parentheses. Because some results are rounded to the nearest whole number, some totals may appear inconsistent. *Differences were significant ($p < 0.05$)

extent, in Croatia and Poland, gender differences were moderate to large (being three to six questionnaire scale score points), with male teachers expressing a higher level of self-efficacy than female teachers. Conversely, in the Russian Federation, the reverse was true; female teachers in the Russian Federation reported significantly higher levels of self-efficacy than their male colleagues.

5.5 Using ICT in the Classroom

Research question RQ6 (Sect. 1.4) asked: To what extent do female and male teachers differ in the ways in which they use computer technologies in their teaching? In ICILS 2013, teachers were asked whether or not they used ICT in their teaching of the reference class¹ during the current year (Table 5.5). As the teachers were a random sample, there was a variety of subjects being taught in those reference classes (for example, languages, mathematics, human sciences, physical sciences, creative

Table 5.5 National percentages of teachers using ICT with the reference class, by gender

Country	Teachers' reports of using ICT in their class (%)		
	Male	Females	Difference (males – females)
Thailand	71 (4.0)	66 (2.4)	4 (4.5)
Czech Republic	75 (2.1)	75 (1.6)	0 (2.3)
Turkey	57 (2.7)	59 (2.4)	–2 (2.6)
Australia	92 (0.9)	95 (0.7)	–3* (1.1)
Chile	80 (2.4)	85 (1.4)	–5* (2.1)
Croatia	60 (2.4)	65 (1.8)	–5 (3.1)
Slovak Republic	64 (2.9)	73 (1.8)	–9* (3.2)
Republic of Korea	73 (1.3)	85 (1.4)	–12* (1.7)
Poland	62 (3.2)	74 (1.4)	–12* (3.3)
Slovenia	72 (2.3)	84 (1.1)	–12* (2.3)
Lithuania	67 (3.0)	82 (1.1)	–15* (3.0)
Russian Federation	70 (2.2)	85 (1.0)	–15* (2.4)
Average of countries	70 (0.7)	77 (0.5)	–7* (0.8)

Notes Standard errors in parentheses. Because some results are rounded to the nearest whole number, some totals may appear inconsistent. *Differences were significant ($p < 0.05$)

¹Teachers were asked to focus their responses to a series of questions about their teaching practices on only one class they taught, referred to as “the reference class.” Teachers were instructed that this class was to be the one they taught on a particular day at a particular time.

arts, information technology, or vocational subjects), but, on average across the 12 countries, 70% of male teachers and 77% of female teachers said that they used ICT in the classroom. The difference between these percentages was significant.

Gender differences were significant in eight of the 12 countries, and were large in Lithuania and the Russian Federation (15 percentage points), in the Republic of Korea, Poland, Slovenia (12 percentage points), and the Slovak Republic (nine percentage points). In every country, a greater percentage of female teachers than male teachers reported using ICT in the classroom.

5.6 Developing ICT Skills in Students

Teachers who said they used ICT in their teaching were asked to indicate the extent of the emphasis they placed on developing their students' computer and information literacy (CIL). The 12 items formed an ICILS scale called developing students' CIL. As with other scales developed for ICILS, the mean of the scale is 50 and the standard deviation 10. Higher scores on the scale reflect stronger levels of emphasis on teaching these skills.

Teachers were asked to assess how much emphasis (according to the categories: strong emphasis, some emphasis, little emphasis, or no emphasis) they gave to developing ICT-based capabilities in:

- Accessing information efficiently;
- Evaluating the relevance of digital information;
- Displaying information for a given audience;
- Evaluating the credibility of digital information;
- Validating the accuracy of digital information;
- Sharing digital information with others;
- Using computer software to construct digital work products;
- Self-evaluating their approach to information searches;
- Providing digital feedback on the work of others;
- Exploring a range of digital resources when searching for information;
- Providing references for digital information; and
- Understanding the consequences of making information publicly available online.

Differences between male and female teachers tended to be small, but reached statistical significance in Australia, Chile, Lithuania, Slovenia, the Republic of Korea, the Slovak Republic, and the Russian Federation, resulting in a significant cross-national gender difference (Table 5.6). All differences indicated female teachers placed stronger emphasis on teaching these ICT-based capabilities.

Table 5.6 National average scale scores for emphasis on ICT skills scale, by gender

Country	Teachers' reports of their emphasis on ICT skills		
	Males	Females	Difference (males – females)
Thailand	51 (0.9)	49 (0.4)	2 (1.0)
Czech Republic	50 (0.5)	49 (0.4)	0 (0.6)
Turkey	50 (0.8)	50 (0.7)	0 (0.8)
Croatia	50 (0.6)	50 (0.4)	–1 (0.8)
Australia	52 (0.3)	53 (0.2)	–1* (0.3)
Chile	52 (0.7)	53 (0.5)	–1* (0.7)
Lithuania	46 (0.5)	47 (0.2)	–1* (0.5)
Slovenia	48 (0.5)	49 (0.3)	–1* (0.5)
Poland	48 (0.9)	50 (0.3)	–2 (1.0)
Republic of Korea	49 (0.4)	51 (0.3)	–2* (0.4)
Slovak Republic	48 (0.6)	50 (0.4)	–2* (0.7)
Russian Federation	48 (0.5)	51 (0.3)	–3* (0.5)
Average of countries	49 (0.2)	50 (0.1)	–1* (0.5)

Notes Standard errors in parentheses. Because some results are rounded to the nearest whole number, some totals may appear inconsistent. *Differences were significant ($p < 0.05$)

5.7 Teachers' Views About ICT

We also looked at what ICILS 2013 revealed about teachers' perceptions on the advantages and disadvantages of using ICT in schools, by gender. The ICILS teacher questionnaire asked teachers to rate their level of agreement (using the categories: strongly agree, agree, disagree, and strongly disagree) with a series of statements that represented both positive and negative aspects of using ICT for teaching and learning. Two scales were constructed (see Fraillon et al. 2014): the negative views on using ICT in teaching and learning scale and the positive views on using ICT in teaching and learning scale. Both these scales were standardized to have a mean of 50 points and a standard deviation of 10 points. Higher scores on the scales therefore reflect more negative or more positive views.

There were very few gender differences in the responses to statements related to negative views of using ICT in teaching and learning (Table 5.7). The only significant differences were in Croatia and Poland, and, while they were both small, they indicated that female teachers held slightly more negative views about ICT than male teachers.

While again there were only small gender differences in the national averages on the positive views scale in a number of countries, interestingly all indicated

Table 5.7 National averages for teachers with negative views on using ICT in teaching and learning, by gender

Country	Teachers' negative views on using ICT in teaching and learning		
	Males	Females	Difference (males – females)
Australia	49 (0.5)	48 (0.4)	1 (0.6)
Republic of Korea	53 (0.9)	52 (0.3)	0 (1.2)
Lithuania	51 (0.8)	51 (0.3)	0 (0.8)
Russian Federation	50 (0.8)	50 (0.4)	0 (0.8)
Slovenia	51 (0.5)	51 (0.3)	0 (0.5)
Thailand	51 (1.3)	51 (1.2)	0 (1.0)
Turkey	51 (0.5)	51 (0.5)	0 (0.6)
Chile	45 (0.6)	46 (0.7)	–1 (0.8)
Czech Republic	50 (0.5)	51 (0.4)	–1 (0.6)
Slovak Republic	49 (0.5)	50 (0.3)	–1 (0.5)
Croatia	50 (0.5)	51 (0.3)	–1* (0.5)
Poland	47 (0.5)	49 (0.3)	–2* (0.5)
Average of countries	50 (0.6)	50 (0.4)	0 (0.6)

Notes Standard errors in parentheses. Because some results are rounded to the nearest whole number, some totals may appear inconsistent. *Differences were significant ($p < 0.05$)

that male teachers held more positive views of ICT in teaching and learning than female teachers (Table 5.8). Interestingly, in Croatia and Poland, female teachers held significantly more negative views and in addition male teachers held significantly more positive views.

5.8 Explaining Variation in Teachers' Emphasis on Developing ICT Skills in Students

We also undertook in-depth investigation of the ICILS 2013 data in an attempt to explain differences in teachers' emphasis on developing students' ICT skills. We looked at male and female teachers separately, analyzing the combined effect of years of experience, teacher self-efficacy, and teachers' negative and positive views about using ICT in teaching and learning (Tables 5.9 and 5.10).

The variable for years of ICT experience for teaching was recoded into two dummy variables, with the reference category being two or more years of experience (as this was the most commonly recorded category). The first dummy category compared no experience with two or more years of experience, and the second dummy variable

Table 5.8 National averages for teachers with positive views on using ICT in teaching and learning, by gender

Country	Teachers' positive views on using ICT in teaching and learning		
	Males	Females	Difference (males – females)
Republic of Korea	50 (0.8)	47 (0.3)	2* (0.9)
Croatia	49 (0.4)	47 (0.3)	2* (0.6)
Poland	51 (0.5)	49 (0.3)	2* (0.5)
Turkey	55 (0.5)	54 (0.6)	1 (0.8)
Lithuania	50 (0.5)	49 (0.2)	1* (0.5)
Slovak Republic	48 (0.5)	47 (0.3)	1* (0.5)
Slovenia	48 (0.4)	47 (0.3)	1* (0.5)
Czech Republic	48 (0.5)	47 (0.3)	1 (0.6)
Thailand	57 (0.8)	56 (0.9)	1 (0.9)
Chile	56 (0.6)	55 (0.6)	0 (0.8)
Russian Federation	50 (0.9)	50 (0.3)	0 (0.8)
Australia	48 (0.4)	48 (0.4)	-1 (0.6)
Average of countries	51 (0.5)	50 (0.4)	1 (0.5)

Notes Standard errors in parentheses. Because some results are rounded to the nearest whole number, some totals may appear inconsistent. *Differences were significant ($p < 0.05$)

compared less than two years of experience with two or more years of experience. The other independent variables were scaled indices, centered around a mean of zero within each country.

Both male teachers (Table 5.9) and female teachers (Table 5.10) without experience in using ICT for teaching placed less emphasis on developing ICT skills in students than teachers with more than two years of experience in all countries. The effect of (lack of) experience on emphasis on ICT skills appeared to be stronger among female teachers than among male teachers.

The difference between the emphases placed on developing students' ICT skills by teachers with less than two years of experience against that of teachers with two or more years of experience in using ICT for teaching was statistically significant in all but one country (Turkey) for female teachers; conversely, for male teachers, this difference was non-significant in all but four countries (Croatia, the Republic of Korea, Lithuania, and the Slovak Republic). Together, these results suggest that the number of years of teacher experience in using ICT for teaching may be more influential on the extent to which female teachers emphasize developing ICT skills among their students than it is for male teachers.

Self-efficacy was an important predictor of the amount of emphasis placed on developing their students' ICT skills for teachers of both genders. Male and female

Table 5.9 Explaining the variation in male teachers' emphasis on developing ICT skills in students

Country	Intercept	Years of experience (none)	Years of experience (less than two years)	Self-efficacy	Negative views	Positive views	R ²
Australia	52 (0.3)	-11.6* (0.5)	-1.1 (1.5)	0.2* (0.0)	0.0 (0.0)	0.2* (0.1)	0.17* (0.04)
Chile	52 (0.5)	-10.8* (1.9)	-1.3 (1.3)	0.3* (0.1)	-0.1 (0.0)	0.1* (0.0)	0.23* (0.04)
Croatia	51 (0.7)	-11.8* (1.2)	-4.0* (1.6)	0.3* (0.0)	0.0 (0.1)	0.1* (0.0)	0.43* (0.03)
Czech Republic	49 (0.6)	-9.5* (1.6)	-1.6 (1.6)	0.3* (0.0)	0.0 (0.0)	0.1 (0.1)	0.18* (0.03)
Republic of Korea	49 (0.3)	-9.4* (0.9)	-4.8* (1.4)	0.3* (0.0)	0.1* (0.0)	0.3* (0.0)	0.35* (0.07)
Lithuania	46 (0.6)	-4.8* (2.0)	-4.4* (1.2)	0.3* (0.1)	0.0 (0.0)	0.1 (0.1)	0.29* (0.04)
Poland	48 (0.8)	-9.3* (1.0)	-0.7 (2.3)	0.4* (0.0)	0.0 (0.1)	0.1 (0.1)	0.27* (0.04)
Russian Federation	49 (0.4)	-6.3* (2.7)	-2.3 (1.3)	0.3* (0.1)	0.0 (0.1)	0.2* (0.0)	0.34* (0.04)
Slovak Republic	49 (0.5)	-9.5* (1.1)	-3.2* (1.5)	0.2* (0.0)	0.0 (0.1)	0.3* (0.1)	0.36* (0.04)
Slovenia	48 (0.5)	-9.9* (0.8)	-1.5 (1.7)	0.2* (0.0)	-0.2* (0.1)	0.1* (0.1)	0.32* (0.04)
Thailand	52 (0.9)	-7.0* (2.5)	-3.3 (2.5)	0.3* (0.1)	0.1 (0.0)	0.3* (0.1)	0.33* (0.05)
Turkey	51 (0.8)	-12.1* (1.3)	-2.5 (1.4)	0.4* (0.1)	-0.1 (0.1)	0.2* (0.0)	0.22* (0.04)

Notes: Standard errors in parentheses. *Differences were significant ($p < 0.05$)

Table 5.10 Explaining variation in female teachers' emphasis on developing ICT skills in students

Country	Intercept	Years of experience (none)	Years of experience (less than two years)	Self-efficacy	Negative views	Positive views	R ²
Australia	53 (0.2)	-14.6* (2.0)	-2.5* (0.8)	0.2* (0.0)	0.0 (0.0)	0.2* (0.0)	0.18* (0.02)
Chile	54 (0.4)	-14.4* (1.5)	-2.7* (1.3)	0.3* (0.0)	0.0 (0.0)	0.2* (0.0)	0.24* (0.03)
Croatia	53 (0.4)	-12.3* (1.2)	-4.4* (0.8)	0.3* (0.0)	0.0 (0.0)	0.2* (0.0)	0.32* (0.02)
Czech Republic	51 (0.3)	-10.8* (1.1)	-4.1* (0.8)	0.3* (0.0)	0.0 (0.0)	0.2* (0.0)	0.22* (0.02)
Republic of Korea	52 (0.2)	-10.3* (2.3)	-4.7* (1.0)	0.3* (0.0)	0.1 (0.1)	0.4* (0.0)	0.28* (0.03)
Lithuania	48 (0.2)	-9.7* (1.9)	-2.8* (0.7)	0.3* (0.0)	0.0 (0.0)	0.1* (0.0)	0.23* (0.03)
Poland	51 (0.3)	-10.8* (0.7)	-2.1* (0.9)	0.3* (0.0)	0.0 (0.0)	0.2* (0.0)	0.23* (0.02)
Russian Federation	51 (0.2)	-7.5* (1.3)	-3.8* (0.7)	0.3* (0.0)	0.0 (0.0)	0.1* (0.0)	0.27* (0.02)
Slovak Republic	52 (0.3)	-11.2* (1.0)	-4.0* (1.0)	0.3* (0.0)	0.0 (0.0)	0.1* (0.1)	0.23* (0.02)
Slovenia	51 (0.2)	-11.6* (0.6)	-2.3* (0.7)	0.3* (0.0)	0.1 (0.0)	0.2* (0.0)	0.34* (0.02)
Thailand	50 (0.6)	-8.6* (1.3)	-6.1* (1.5)	0.3* (0.0)	0.1 (0.1)	0.2* (0.0)	0.25* (0.04)
Turkey	52 (0.8)	-11.6* (1.5)	-1.0 (1.8)	0.3* (0.1)	0.1 (0.0)	0.2* (0.1)	0.12* (0.02)

Note Standard errors in parentheses. *Differences were significant ($p < 0.05$)

teachers with higher levels of confidence placed more emphasis on teaching ICT skills to their students. On average, the regression coefficient was 0.3 scale points, meaning that an increase of one score point in self-efficacy was associated with an increase of 0.3 points in the scale of teacher emphasis on developing ICT skills among their students. Consequently, an increase of one standard deviation in self-efficacy (10 score points) was associated with three score points on the emphasis scale. This is a moderate effect. The effect was similar in size for both male and female teachers.

Negative views about using ICT in learning and teaching were generally not associated with teacher emphasis on teaching ICT skills, apart from male teachers in the Republic of Korea, where the association was positive, and Slovenia, where the association was negative. In both countries, the association between negative views of ICT and teacher emphasis on teaching ICT skills was small.

Positive views about using ICT in learning and teaching were positively related to teacher emphasis on teaching ICT skills to students in nine out of 12 countries for male teachers, and in all countries for female teachers. Significant effects were small to moderate.

Collectively, the independent variables explained between 12% (female teachers in Slovenia) and 43% (male teachers in Croatia) of the variance in teacher emphasis (see Fig. 5.1). In the majority of the countries, the collective contribution was larger for male teachers than it was for female teachers.

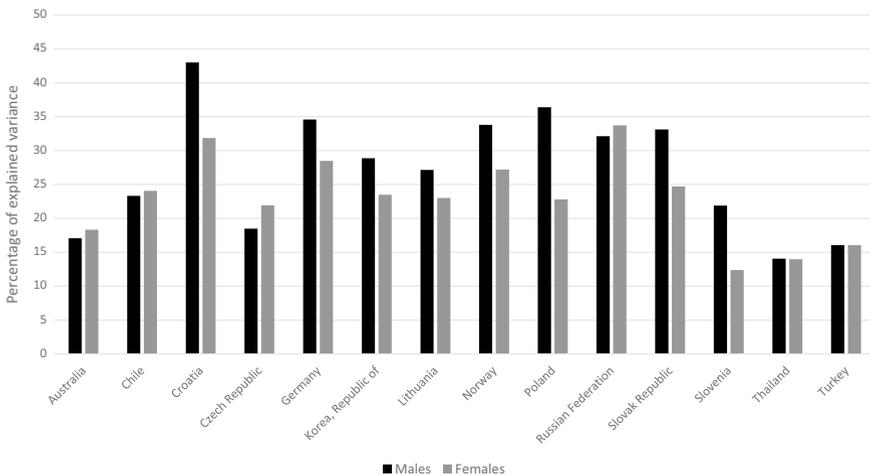


Fig. 5.1 Proportion of explained variance in providing emphasis on developing ICT skills in students by years of experience, teacher self-efficacy, and teachers’ negative and positive views on using ICT in teaching and learning

5.9 Conclusions

The most pervasive conclusion from these analyses of female and male teachers' experience, dispositions toward, and use of ICT is that any differences are small and/or inconsistent across countries. These results should go some way towards dispelling any beliefs that female and male teachers in secondary schools differ in the extent of their pedagogical use of ICT.

On average, seven out of 10 lower secondary school teachers in the ICILS study were female. Female teachers, on average, reported slightly more experience than male teachers in using computers for teaching. Female and male teachers did not differ overall in either their positive or negative views regarding the use of ICT in education, but there were several countries in which male teachers expressed slightly more positive views than their female colleagues. There were differences between female and male teachers in their confidence in using computer technology. On average, male teachers reported higher ICT self-efficacy scores than those reported by female teachers, with a magnitude of a little less than one-fifth of a standard deviation. However, there were variations among countries in the magnitude of these differences and, in the Russian Federation, the female teachers reported higher self-efficacy than male teachers.

Teachers indicated whether they used ICT in their teaching of a randomly-selected reference class. On average, across the 12 countries, 70% of male teachers and 77% of female teachers said they used ICT in the classroom. There were only small differences in a few countries regarding the emphasis placed on teaching ICT-based capabilities, but where a difference was observed this was greater among female teachers than among male teachers.

The differing emphases that male and female teachers placed on developing ICT skills in students were positively associated with a teacher's years of experience in using ICT in the classroom, teacher self-efficacy, and positive views on using ICT in learning and teaching. Teachers' years of experience in using ICT in the classroom also appears to have a stronger relationship with female teachers' emphasis on such skill development than this factor does for male teachers. Other factors showed similar effects for both male and female teachers.

References

- Buabeng-Andoh, C. (2012). Factors influencing teachers' adoption and integration of information and communication technology into teaching: A review of the literature. *International Journal of Education and Development using Information and Communication Technology*, 8, 136–155. Retrieved from <https://files.eric.ed.gov/fulltext/EJ1084227.pdf>.
- Ertmer, P. A. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration. *Educational Technology Research and Development*, 47(4), 47–61. Retrieved from <https://doi.org/10.1007/BF02299597>.

- Frailon, J., Ainley, J., Schulz, W., Friedman, T., & Gebhardt, E. (2014). *Preparing for life in a digital age: the IEA International Computer and Information Literacy Study international report*. Cham, Switzerland: Springer. Retrieved from <https://www.springer.com/gp/book/9783319142210>.
- IEA. (2019). SITES. Second Information Technology in Education Study [webpage]. Retrieved from <https://www.iea.nl/studies/iea/sites>.
- Jamieson-Proctor, R. M., Burnett, P., Finger, G., & Watson, G. (2006). ICT integration and teachers' confidence in using ICT for teaching and learning in Queensland state schools. *Australasian Journal of Educational Technology*, 22(4), 511–530. Retrieved from <https://ajet.org.au/index.php/AJET/article/view/1283>.
- Law, N., Pelgrum, W., & Plomp, T. (2008). *Pedagogy and ICT use in schools around the world: Findings from the IEA SITES 2006 study*. CERC Studies in Comparative Education, Volume 23. Cham, Switzerland: Springer. Retrieved from <https://www.springer.com/gp/book/9781402089275>.
- Russell, G., & Bradley, G. (1997). Teachers' computer anxiety: Implications for professional development. *Education and Information Technologies*, 2(1), 17–30. Retrieved from <https://link.springer.com/article/10.1023/A:1018680322904>.
- Wozney, L., Venkatesh, V., & Abrami, P. (2006). Implementing computer technologies: Teachers' perceptions and practices. *Journal of Technology and Teacher Education*, 14(1), 173–207. Retrieved from <https://www.learntechlib.org/primary/p/5437>.

Open Access This chapter is licensed under the terms of the Creative Commons Attribution-NonCommercial 4.0 International License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits any noncommercial use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license and indicate if changes were made.

The images or other third party material in this chapter are included in the chapter's Creative Commons license, unless indicated otherwise in a credit line to the material. If material is not included in the chapter's Creative Commons license and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder.

