European Commission

2nd Survey of Schools: ICT in Education

Objective 1: Benchmark progress in ICT in schools

FINAL REPORT

A study prepared for the European Commission

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Glossary

Country codes

AT	Austria	IT	Italy
BE	Belgium	LT	Lithuania
BG	Bulgaria	LU	Luxembourg
CZ	Czech Republic	LV	Latvia
CY	Cyprus	MT	Malta
DE	Germany	NL	Netherlands
DK	Denmark	NO	Norway
EE	Estonia	PL	Poland
EL	Greece	PT	Portugal
ES	Spain	RO	Romania
FI	Finland	SE	Sweden
FR	France	SI	Slovenia
HR	Croatia	SK	Slovakia
HU	Hungary	TR	Turkey
IE	Ireland	UK	United Kingdom
IS	Iceland		

Abbreviations used

BYOD	Bring Your Own Device
CEF	Connecting Europe Facility
CPD	Continuing professional development
DG CONNECT	Directorate General for Communications Networks, Content & Technology
DG EAC	Directorate General for Education, Youth, Sport and Culture
DigComp	Digital competence framework
HECC	Highly equipped and connected classrooms
HT	Head teachers
ICT	Information and communications technology
PA	Parents
SELFIE	Self-reflection tool for digitally capable schools
SITES	Second Information Technology in Education Study
ST	Students
TC	Teachers

ABSTRACT

This survey follows the **Digital Education Action** Plan Communication's call to provide more evidence regarding digitisation in education. By surveying head teachers, teachers, students and parents from **EU28**, **Norway**, **Iceland** and **Turkey**, this survey provides detailed information related to access, use and attitudes towards the use of technology in education.

Amongst other results, the study shows that **less than 1 out of 5 of students** attend schools which have **access to high-speed Internet**. The results of the survey clearly support the future Connected Europe Facility Programme's aim to support high-speed internet access for schools. Further, the study found that students overall, and female students in particular, rarely engage in **coding/programming activities**. Activities to strengthen students' coding skills and getting girls more interested in digital therefore need further attention. Furthermore, results show that most teachers engage in ICT training in their **own time** whereas participation in **compulsory ICT trainings** is less common. Further findings reveal that only **1 out of 2 students attending secondary schools have parents that feel they know enough** about their child's online behaviour. These results support the Commission's Strategy for a Better Internet for Children, which also aims at raising awareness and foster digital literacy among parents.

RÉSUMÉ

Cette étude fait suite à l'appel lancé dans le cadre du **Plan d'Action pour l'Education Numérique** pour fournir plus d'informations sur la numérisation dans l'éducation. En interrogeant des proviseurs, des enseignants, des élèves et des parents dans les **28 pays de l'UE, en Norvège, en Islande** et en **Turquie**, l'étude fournit des informations détaillées concernant l'accès, l'utilisation et les attitudes relatives aux technologies numériques dans le secteur de l'éducation.

L'étude démontre entre-autres **que moins d'un élève sur cinq** fréquente une école qui a accès à une **connexion Internet à haut débit**. Les résultats du sondage soutiennent l'objectif du futur programme « *Connected Europe Facility* » qui vise à renforcer l'accès à Internet à haut débit dans les écoles. De plus, l'étude démontre que les élèves en général et les filles en particulier, participent rarement à des activités de **codage/programmation**. Les activités visant à renforcer les compétences en matière de codage des élèves ou visant à accroître l'intérêt des filles pour le numérique doivent faire l'objet d'une attention accrue. De surcroît, les résultats montrent que la plupart des enseignants participent à des formations sur les TIC pendant leur temps libre, tandis que la **participation dans des programmes obligatoires** de formation sur les TIC est moins courante. D'autres résultats révèlent que **seul un élève sur deux en école secondaire** a des parents qui ont le **sentiment d'en savoir suffisamment sur le comportement de leur enfant sur Internet**. Ces résultats soutiennent la stratégie de la Commission européenne visant à rendre l'Internet plus sûr pour les enfants, et qui a aussi pour but de sensibiliser davantage les parents et à améliorer leur littératie numérique.

SUMMARY OF RESULTS AND POLICY RECOMMENDATIONS

Summary of results and policy recommendations

The **2nd Survey of Schools: ICT in Education** has two objectives:

- **Objective 1: Benchmark progress in ICT in schools -** to provide detailed and up-to-date information related to access, use and attitudes towards the use of technology in education by surveying head teachers, teachers, students and parents covering the EU-28, Norway, Iceland and Turkey;

- **Objective 2: Model for a 'highly equipped and connected classroom' -** to define a conceptual model for a 'highly equipped and connected classroom' (HECC), presenting three scenarios to describe different levels of a HECC and to estimate the overall costs to equip and connect an average EU classroom with advanced components of the HECC model.

Two separate reports are published concurrently, focusing on each of the two study objectives of the '2nd Survey of Schools: ICT in Education'. The current publication refers to the **first objective** of the study, **benchmarking progress in ICT in schools**. The findings on the **second study objective** ('Model for a 'highly equipped and connected classroom') are reported in the separate publication[1].

The results of this survey contribute towards the development of updated, relevant and efficient **indicators** as well as to the establishment of a long-term and **continuous monitoring system** in the field of digital education at school. The survey was conducted in a partnership between Deloitte and IPSOS and builds upon the European Commission's 1st Survey of Schools: ICT in Education which provided data for the school year 2011/2012[2].

An online survey was carried out in **31 countries** (EU28, Iceland, Norway and Turkey), covering **four different target groups** at **three different ISCED levels** (ISCED level 1: primary schools: ISCED level 2: lower secondary schools; ISCED level 3: upper secondary schools). In each school, interviews were conducted with head teachers, class teachers (one teacher at ISCED level 1, three teachers at ISCED levels 2 and 3), students (all students from one randomly selected class per level in each school, except ISCED level 1), and parents.

Key findings

1. Access to and use of digital technologies

- The share of students who are in schools with **high-speed Internet** (above 100 mbps) differs widely across Europe with the Nordic countries leading. Availability of high-speed Internet is lowest at ISCED 1 level (11%) in relation to ISCED levels 2 and 3 (17% respectively 18%).

[1] European Commission (2019). 2nd Survey of Schools: ICT in Education – Objective 2: Model for a 'highly equipped and connected classroom'. Luxembourg: European Commission. doi: 10.2759/831325.

[2] More information on the 1st Survey of Schools: ICT in Education can be found at https://ec.europa.eu/digital-single-market/en/news/survey-schools-ict-education. The survey was conducted in 2013 by the European Schoolnet in collaboration with the University of Liège.

- Only 8% of students across all ISCED levels attend schools located in a **village** or a **small city**, which have access to a high-speed Internet above 100 mbps.
- The share of students who are in schools with access to a **Wireless LAN** differs widely across Europe and ranges from 46% (ISCED 1) to 52% (ISCED 2) to 67% (ISCED 3).
- There is an average number of 18 **students per computer** at ISCED level 1 at European level. The average number of students per computer at European level amounts to 7 at ISCED level 2 and 8 at ISCED level 3.
- The share of students attending **highly digitally equipped and connected schools** differs widely across Europe, is highest in Nordic countries, and ranges from 35% (ISCED 1) to 52% (ISCED 2) to 72% (ISCED 3).
- The share of students **that use the Internet at least once a week** ranges from 68% (ISCED 2) to 73% (ISCED 3).
- The share of students who **use a computer at school** at least once a week for learning purposes ranges between 52% at ISCED level 2 and 59% in ISCED level 3.
- Still 1 out of 5 ISCED level 2 students and 1 out of 4 ISCED level 3 students never or almost **never use a computer** at school.
- The share of students who use **own digital equipment for learning purposes** remains relatively stable compared to 2011/2012 data. The own equipment most used for learning purposes is a smartphone where use ranges from 30% (ISCED 2) to 53% (ISCED 3). In terms of own equipment use, the use of laptops owned by students is quite low across Europe, except in Nordic countries.
- The share of students taught by teachers that use **ICT in 25% or more of their lessons** ranges from 71% (ISCED 1) to 58% (ISCED 2) to 65% (ISCED 3) and is highest in Nordic countries.
- Teachers perceive the **insufficient number of tablets, laptops and notebooks** as the most important obstacle to the use of digital technologies at schools.

2. Digital activities and confidence of teachers and students in their digital competence

- Across all ISCED levels, more than 90% of students have teachers using ICT to prepare lessons.
- 60% of students in all ISCED levels have teachers who use **digital technologies to communicate with parents**.
- There is a higher frequency of **communication via emails and apps** between teachers and students at higher ISCED levels.
- Teachers are most confident in their own **digital competence** in the areas of **safety**, **communication**, **collaboration** as well as **information and data literacy**.
- In terms of **digital content creation**, teachers feel most confident with basic activities (e.g. producing texts) while they feel least confident in more complex tasks (e.g. coding).
- **Male teachers** feel more confident in coding/programming across all ISCED levels compared to female teachers.
- Only 3% of ISCED level 2 students and 6% of ISCED level 3 students engage in **coding activities** on a highly frequent basis (e.g. every day or almost every day). Between 76% and 79% of students in ISCED levels 3 and 2, respectively, never or almost never undertake coding activities during lessons.
- **Male students** engage more frequently in coding/programming during lessons than female students.
- Students seem to be **most confident in the digital competence areas** communication and collaboration and least confident in the digital competence areas related to problem solving and digital content creation.
- Compared to teachers, students seem to be somewhat less confident in performing fairly basic tasks such as producing a text file. **Students** seem to be **more confident** than teachers regarding **coding and programming apps, programs or robots**.
- **Male students** feel **more confident in coding/programming** across all ISCED levels compared to female students.

3. ICT related teacher professional development

- More than 6 out of 10 students across all ISCED levels are taught by teachers who engage in **personal learning about ICT in their own time**.
- Between 29% (ISCED 2) and 41% (ISCED 1) of students are taught by teachers who participate in **online communities** for professional discussions with other teachers.
- In contrast, only between 12% (ISCED 3) and 27% (ISCED 1) of European students are taught by teachers who **participated in a compulsory ICT training**.
- Between 43% (ISCED 1) and 50% (ISCED 3) of students are taught by teachers who have undertaken **pedagogical courses** on the use of ICT.
- **Introductory courses on** Internet use and general applications are more common among teachers than more advanced courses: between 27% (ISCED 2) and 31% (ISCED 2 and 3) of students are taught by teachers who undertook such introductory courses.
- Between 45% (ISCED 1) and 55% (ISCED 2) of students have teachers who invested **more than 6 days in professional development in ICT** during the past two years.
- Only between 2% (ISCED 1) and 4% (ISCED 2 and 3) of European students have teachers who report having spent **no time at all on ICT related professional development activities** over the past two years.

4. Digital home environment of students

- Across all ISCED levels, most students have **access to computers** (e.g. desktop computers, laptops or notebooks) at home. While **tablet access** is lower for students in higher ISCED levels (81 % at ISCED level 1 and 59% at ISCED level 3), **smartphone access** seems to increase with the age of students (80% at ISCED level 1 and 91% at ISCED level 3).
- Students often chat online, participate in social networks and watch video clips or download music, games or software from the Internet at home. Activities like coding or other learning activities using educational software, games, apps or quizzes are less common.
- A large share of students at ISCED levels 2 and 3 never or almost never discuss the risks of the Internet with their parents (42% ISCED 2, 51% ISCED 3).
- On average, 79% of ISCED 1 students, 59% of ISCED 2 students and only 39% of ISCED 3 students have parents that indicate that they **know enough about their child's online activities.**
- **The younger the child, the more frequently parents engage in ICT-related activities** with them.
- More than 3 out of 5 students at ISCED levels 1 and 2, but only half of ISCED 3 students, have parents who are highly confident in teaching their children how to use the Internet safely and responsibly.
- Still, **1 out of 5 students** at ISCED levels 1 and 2 have parents who declare having only **low (or no) confidence in teaching their children how to use the Internet safely** and responsibly. This figure is higher at ISCED level 3 with 30%.
- Students at ISCED level 1 are more likely to have parents that use **parental control** tools than students at ISCED levels 2 and 3, while 1 out of 3 ISCED level 1 students have parents who do not implement any parental control tool.
- The most used parental control tools over all ISCED levels are **online content filters** (e.g. filtering out adult-related sites, illegal activity and social networking sites) and program blockers to stop children from running certain programs.

5. Schools' digital policies, strategies and opinions

- In order to support its use in teaching and learning, most schools organise **regular discussions with teaching staff about ICT use for pedagogical purposes**. Over all ISCED levels, on average 50% (ISCED 1) to 56% (ISCED 2) of students are in schools which organise such regular discussions.
- Between 33% (ISCED level 3) and 38% (ISCED level 2) of students attend schools that implement **written statements about the use of ICT**.
- Only slightly more than 30% of students over all ISCED levels are in schools that have **policies and/or actions to assess the outcomes of using ICT for teaching and learning**.
- About 1 out of 2 European students across all ISCED levels attend schools where time or space for teachers to meet is scheduled in order to support ICT use through collaboration among peers.
- 64% of European students at ISCED level 1, 73% of European students at ISCED level 2 and 66% European of students at ISCED level 3 attend schools having a specific policy or programme in place to prepare students for **responsible behaviour on the Internet.**
- Over all ISCED levels, most applied methods by schools in order to **reward teachers** for ICT use in teaching and learning are: providing additional training hours and additional ICT equipment for the classroom.
- Between 56% (ISCED 1) and 71% (ISCED 3) of students across all ISCED levels attend a school having **initiatives in place to encourage innovation**.
- Between 62% (ISCED 1) and 81% (ISCED 2) of students are in schools with an **ICT coordinator**.
- Both teachers and head teachers over all ISCED levels have a very **positive attitude** towards using ICT for learning and teaching. In this respect, the positive opinions of head teachers are even more pronounced.
- Both teachers and head teachers clearly agree that ICT use in teaching and learning is essential to prepare students to **live and work in the 21st century**.
- The majority of **students** at ISCED levels 2 and 3 'strongly agree' or 'agree' that it is worth using a computer because it will help them in the future.
- The majority of students have **parents** who believe that digital technologies have a positive impact on their children to study more efficiently (e.g. the use of digital technologies lead to a better understanding, a higher motivation, etc.).
- About 70% of the students have **parents** believe 'a lot' or 'somewhat' that the use of ICT will help their child to find a job in the labour market.

Policy recommendations

Investing in **high-quality education** pays long-term dividends for the European economy and for the overall prosperity of European societies. Innovation in education systems have a great potential to significantly improve learning outcomes, enhance equity and improve efficiency. Thus, there is a clear need to **harness technological change for the benefit of all learners** in order not to further exacerbate existing divides in society. For instance, if broadband availability and adoption of digital equipment are not diffusing in rural and urban areas or between different European countries at the same speed, already existing divides between schools which can benefit from fast Internet access and latest technological developments, and those which are left behind will further increase. Therefore, it will be a key challenge to make sure that **no one is left behind in the digital revolution** in the education sector. This is particularly relevant as the results of this survey clearly show **wide differences** between European countries and between schools located in and outside of big cities with regard to having access to and the use of digital technologies. Whereas several countries are clear frontrunners regarding mainstreaming the access to digital technologies in schools, other countries are lagging behind regarding the level of connectivity and equipment provision in their schools.

To address this situation, the European Union, Member States, regions and municipalities as well as industry and civil society organisations must make a concerted and coordinated effort to allow the **European education sector to stay ahead of technological change**. Building upon efforts achieved at different levels will be crucial to bring about the necessary change.

The responsibility for education lies with Member States, which makes **policies and action at national and local level indespensible**, particularly in countries lagging far behind others. However, the European Union also has an important role to play in scaling up innovation in all EU Member States' education systems, particularly through exchange of best practices, peer learning or evidence sharing. In fact, there are several EU funding programs available for digital education projects in the current multiannual financial framework running from 2014 to 2020 which complement national efforts (such as Erasmus+, European Social Funds, European Regional Development Fund, Horizon 2020, Wifi4EU through the Connecting Europe Facility (CEF), etc.). Education and training is one of the eleven priorities of the EU's 2014-2020 cohesion policy ("thematic objective 10").

There is a **clear need for digital education to be further supported by the new Multiannual Financial Framework** (2021-2027) in addition to national and regional investments as well as cooperation between private and public stakeholders. The large gaps between surveyed countries reported in the study provide a clear signal to funding programmes such as the European Social Fund (ESF) and the European Regional Development Fund (ERDF) to continue supporting activities to modernise education and training systems, including investments in educational infrastructure. The proposed new Research and Innovation programme (Horizon Europe) will play a crucial role in spurring innovation in education and also scaling up innovation activities to facilitate market entry and diffusion of innovations through large-scale piloting.

Continuous professional development is key for teachers to integrate digital technologies into their teaching practices[3]. If digital competence of teachers is to be boosted, it is of high importance that policies and actions support all types of participation and engagement in professional development and other forms of professional learning, such as personal learning in their own time. Member States have the **important role to promote all forms of professional development**, including incorporating digital skills in the initial teacher training curriculum. Their role also includes guiding schools in incorporating the goals on digital technologies in school policies, strategies and overall vision. That way, schools can support teachers to use digital technologies and also promote their use for on-the-job learning, pear learning and other knowledge sharing activities within the school. To **facilitate teachers' professional development and further integration of ICT in education**, Erasmus+ offers many successfully established tools for exchanging best practices, peer learning and professional development of teachers (e.g. through tools as eTwinning, School Education Gateway, Teacher Academy). However, more efforts will be needed to further recognise and reward the use of these tools, and promote them among schools, teachers and policy-makers. Furthermore, the recognition by Member States of these existing tools (e.g. by integrating eTwinning in the curriculum) and rewarding their use will be key.

Furthermore, given the many benefits of a high-speed Internet access to schools, the vision of the European Commission is that **by 2025, all schools should have access to Internet connections with download and upload speeds of 1 Gigabit of data per second**. In this context, a wide range of measures have already been undertaken and/or are foreseen by Member States, regional and/or local administrations to finance **connectivity investments**. Further action in this area is particularly urgent in countries lagging far behind others. As part of the next long-term EU budget, the European Commission proposed to renew the **Connecting Europe Facility** (CEF). The results of

[3] Organisation for Economic Co-operation and Development (2014). TALIS 2013 results: An international perspective on teaching and learning. OECD.

this survey show that this Gigabit connectivity goal is very much out of sight at the moment and clearly support the future **Connected Europe Facility Programme's** aim – next to investment efforts at national and regional level - to support high-speed Internet access for socio-economic drivers, including schools, to maximise their positive spill-over effects on the wider economy and society. The European Commission is also advised to further promote its established network of the **European Broadband Competence Offices** (BCOs) which provide legal, technical and financial guidance, including to schools, to support stakeholders in their country or region in accelerating broadband roll-out.

Moreover, the proposed **Digital Europe Programme** has been designed to support the digital transformation of the public sector and of areas of public interest by improving their digital capacities. For Digital Education, this **opens up opportunities for supporting the deployment of digital capacities in schools** (i.e. equipment, technologies, digital content) as well as innovative and effective teaching and learning practices at European level that have already been proven successful in smaller scale pilots. In addition, policy makers are advised to **exchange information and best practices** on the different existing models of providing schools with access to devices (including **Bring-Your-Own-Device policies**) to better understand specific benefits and disadvantages. In this respect, the **digital home environment requires particular attention** by policy-makers as the resources for home-based digital learning must be equally available to all in order to not to increase any digital divide, e.g. between children from low and high socio-economic backgrounds. While the results of this survey revealed that access to equipment is widespread, there are still children without good access to digital equipment at home.

Moreover, digital skills including **coding skills** are essential so that everyone can take part in society and contribute to economic and social progress in the digital era. Coding helps practice 21st century skills such as problem solving or analytical thinking. The results of this survey however show that students rarely regularly engage in coding/programming activities at European level. In light of these figures, activities to strengthen students' coding skills at EU, Member States and local level need to be further scaled up. In fact, the goal of the European Commission is to encourage 50% of schools in Europe to participate in the EU Code Week by 2020, which is a grassroots movement promoting programming and computational thinking in a fun and engaging way. Moreover, the results of this survey show that **female students** less frequently engage in coding than their **male counterparts**. These figures support the European Commissions' strategy to get more women interested in digital by tackling three areas: the image of women in the media, digital skills for girls and women and increasing the number of female tech entrepreneurs.

Furthermore, in terms of strengthening students' competences, national and regional efforts alongside EU initiatives such as the work done through the **Safer Internet Centres** should be further expanded. In this respect, raising parents' awareness on a safe and responsible use of digital technologies is key, as parents can play an important role in helping their children face the challenges digital technologies may bring, including online threats, such as harmful content and behaviour. The results of this survey support the activities aimed at **parents supported by the European Commission's Strategy for a Better Internet for Children**. Among other things, the Commission co-funds Safer Internet Centres in Member States whose main task is to **raise awareness and foster digital literacy among minors, teachers and parents**. The Commission's Safer Internet Day, celebrated each February, is now a worldwide event in over 140 countries to raise awareness of **online safety** among all citizens. In line with the **Digital Education Action Plan**, in 2018 the Commission also launched the EU-wide #SaferInternet4EU Campaign on online safety, media literacy and cyber-hygiene, which helps children, young people, parents, teachers, and other EU citizens to become aware of online risks and challenges.

Moreover, given that the **digital transformation affects schools** in so many ways, it is important to develop a **better understanding** of schools' access to digital technologies as well as where they stand with the use of digital technologies for teaching and learning. In this case, **providing tools for schools** to reflect on their usage of digital technologies for pedagogical goals is crucial, an example of which is **SELFIE**, among many tools provided by Member States themselves. It is also vital to **further strengthen the research base** and **align European-wide and national initiatives** thus allowing to optimise data collection. Both scholars and policy makers consider the availability of reliable data sources as fundamental in order to get a full understanding of the needs in this area. Schools are overloaded with questionnaires from different instances, both at the national and supra-national level. In addition, many of these questionnaires are, to a large extent, overlapping. Instead of scattered European and national initiatives resulting in over-surveying education institutes on a non-permanent basis, data collection initiatives should be consolidated as far as possible.

Last but not least, European policy makers are well placed to elaborate a general framework to support the smooth implementation of digital technologies in education. Such a framework should be an extension of the existing **Digital Education Action Plan,** and should not only serve as a **general guideline** for the individual countries, but also as an advisory document to inform Member States on ways to **implement digital technologies in education, financing possibilities and existing initiatives and support measures**. To sum up, this general EU framework should encourage and support the exchange of best practices among countries and enable capacity building at national, regional and school level.

INTRODUCTION

The objectives of the '**2nd Survey of Schools: ICT in Education'** are twofold:

- **Objective 1: Benchmark progress in ICT in Schools -** to provide detailed and up-to-date information related to access, use and attitudes towards the use of technology in education by surveying head teachers, teachers, students and parents covering the EU28, Norway, Iceland and Turkey;

- **Objective 2: Model for a 'highly equipped and connected classroom' -** to define a conceptual model for a 'highly equipped and connected classroom' (HECC), presenting three scenarios to describe the different levels of a HECC and to estimate the overall costs to equip and connect an average EU classroom with advanced components of the HECC model.

Two separate reports have been published concurrently, focusing on each of the two study objectives. The current publication refers to the first objective of the study, **benchmarking progress in ICT in schools**. The findings on the second study objective ('**Model for a 'highly equipped and connected classroom'**) are reported in the separate publication 2nd Survey of Schools: ICT in Education – Objective 2: Model for a 'highly equipped and connected classroom'[4] (European Commission, 2019a). In addition, 31 individual country reports have been published (see bibliography European Commission, 2019c-2019ag).

The first objective of the 2nd Survey of Schools: ICT in Education therefore benchmarks the progress of Information and Communication Technologies (ICT) in schools. The survey was carried out in **31 countries** (EU28, Norway, Iceland and Turkey), by conducting interviews with head teachers, teachers, students and parents. A range of different topics were covered, including (a) **access to and use of digital technologies**, (b) **digital activities and confidence by teachers and students in their digital competence**, (c) **ICT related professional development of teachers**, (d) **digital home environment of students** and (e) **schools' digital policies**, **strategies and opinions**. The current study builds upon the European Commission Survey of Schools: ICT in Education 2013, which provided data for the school year 2011/2012.[5]

The current report follows the **Digital Education Action Plan**'s call to provide more data and evidence regarding the digitalisation in education and digital technologies in learning. The Digital Education Action Plan was adopted in January 2018, describing how education and training systems can make better use of innovation and digital technology and support the development of relevant digital competences needed for life and work in an age of rapid digital change (European Commission, 2018a). The Action Plan followed the Communication **'Strengthening European Identity through Education and Culture'**, the Commission's contribution to the **EU Leader's Agenda** discussion on education and culture at the Gothenburg Summit, which set out a vision for a **European Education Area** (European Commission, 2017a). The Action Plan also followed the October 2017 European Council's call for training and education systems to be 'fit for the digital age'. (European Council, 2017) as well as the Rome Declaration of March 2017 to provide young people with the 'best education and training' (Council of the EU, 2017). Moreover, the **G20 Digital Economy Ministerial Declaration** in 2017 also shows a global recognition that

[4] European Commission (2019). 2nd Survey of Schools: ICT in Education – Objective 2: Model for a 'highly equipped and connected classroom'. Luxembourg: European Commission.

[5] More information on the 1st Survey of Schools : ICT in Education can be found at http://ec.europa.eu/information_society/newsroom/image/document/2016-20/surveyofschoolsictineducation_15585.pdf.

'all forms of education and lifelong learning may need to be adjusted to take advantage of new digital technologies' (Federal Ministry for Economic Affairs and Energy, 2017).

Even though digital technology cannot replace the human element in education, it can certainly enrich it. Technology can be a powerful tool for transforming students' learning experience by making it much more appealing to younger generations who have already grown up as so-called **'digital natives'**. Digital technologies have, for example, the power to open up classrooms, by inviting external speakers/experts to a specific class who would otherwise not be available, or by linking students from different communities, backgrounds and cultures. Digital technologies can combine traditionally separated educational sources, such as books, audio and video recordings. Digital technology enables pupils to create value themselves, e.g. by creating and sharing blogs, videos, etc. In addition, as diversity in society calls for tailor-made approaches to learning and education, technology provides educators with the means to adapt the learning experience to the individual learner, thus increasing autonomy. Digital technologies can **open the learning experience** to an unprecedented **wealth of information**, **resources and tools**. In addition, digital technologies can support new pedagogies focusing on learners as active participants such as inquiry-based teaching concepts (e.g. making use of serious games or virtual labs). To conclude, research shows that digital technology can lead to **improved learning outcomes**, particularly if educators are trained to use the technologies properly and approach those tools from a critical pedagogical perspective (European Commission, 2018b).

In addition, **schools play a crucial role** in enabling students to integrate themselves into the 21st century job market and acquire the necessary skills needed in order to keep pace with the digital transformation of our societies. However, it is acknowledged that there is an **increasing mismatch** between the different skills students acquire at school and the skills that are required in the labour market, thus contributing to unemployment and limiting growth. In general, policy-makers and other educational stakeholders recognise the need to **integrate digital competence as a main component in the skill-set of students**.

Chapter overview

The objective 1 report was structured along five sections covering the different areas which were investigated, namely:

- Section 1: Access to and use of digital technologies
- Section 2: Digital activities and confidence of teachers and students in their digital competence
- Section 3: ICT related teacher professional development
- Section 4: Digital home environment of students
- Section 5: Schools' digital policies, strategies and opinions

To take full advantage of the benefits of digital learning, there are a number of conditions that must be met in order for **learning outcomes to be enhanced**, including the **availability of a reliable and fast Internet connection** as well as access to **digital technology equipment** such as computers or interactive whiteboards. Therefore, Section 1 of this report provides an overview of the key figures related to access to the Internet and digital equipment. Section 1 continues by providing information related to the **use of digital technologies** as well as some of the **perceived obstacles** to the use of digital technologies.

Section 2 looks into more detail at various **ICT-based activities performed by teachers and students for teaching and learning**. In addition to that, Section 2 will also look into the **confidence** of teachers and students in their own **digital competence**. For this, the **Digital Competence Framework for Citizens** (DigComp), created by the European

Commission, Joint Research Centre in Seville on behalf of DG EAC and EMPL, is used in order to match several questions on teachers' and students' confidence from the survey with the five categories of the DigComp framework.[6]

Given the importance of professional development of teachers, section 3 of this report provides key insights from the survey on this topic. Section 3 looks into the different ways in which teachers can learn. Next to **obligatory training**, teachers can also learn on their **own initiative** or via peers for example. Section 3 also gives some insights into the **different types of trainings** in which teachers engage. Finally, this section provides insights into the **intensity of involvement** in professional development activities.

Section 4 discusses the **infrastructure provision at home** and the **digital activities** students are involved in at home. Next to a focus on access and use, section 4 also elaborates upon parents' awareness of their children's use of digital technologies. In addition, this section gives some insights into the extent to which parents **supervise** their children when using ICT, or control their children's use by means of digital technologies.

Last but not least, section 5 presents key findings on some of the different **digital policies and strategies of schools**. In addition to European-wide strategies and country-level policies, it is important that schools implement policies and strategies supporting digital technologies themselves. This allows a **tailor-made implementation of ICT in schools** and enables a shared vision among all stakeholders at the school-level, namely head teachers, teachers and students. In line with this, section 5 also provides an **overview of the opinions on digital technologies** in teaching and learning of head teachers, teachers, students and parents.

Technical notes

The technical details of the survey process can be found in the technical report accompanying this report (European Commission, 2019b). This section will nevertheless briefly summarise some of the points from the technical report that are important in order to understand the results presented in the current report.

Four types of questionnaires were created and conducted in the EU28 countries, plus Iceland, Norway and Turkey. Different **education stakeholders** were surveyed: head teachers (school level), classroom teachers (teacher level), students (student level) and the parents of those students (parent level). While the questionnaires at the school, teacher and parent level were conducted for **3 ISCED levels** (ISCED level 1, 2 and 3), students only participated at ISCED levels 2 and 3. Teachers, students and parents of those students of classes in the **last grade of each ISCED level** were invited. This approach was used throughout the **31 countries** in order to ensure consistency in the ages and academic levels of the students surveyed. A more detailed understanding of ISCED classifications can be found below:

- ISCED 1 (Primary education): Programs at this level are typically designed to provide students with fundamental skills in reading, writing and mathematics (i.e. literacy and numeracy) and establish a solid foundation for learning and understanding core areas of knowledge, personal and social development, in preparation for lower secondary education. Age is typically the only entry requirement at this level. The customary or legal age of entry is usually not below 5 years old, nor above 7 years old. The level typically lasts six years, although its duration ranges between four and seven years in the different countries surveyed.

- ISCED 2 (Lower secondary education): Programs at this level are typically designed to build on the learning outcomes from ISCED level 1. Students enter ISCED level

[6] For more information on the Digital Competence Framework for Citizens, see https://ec.europa.eu/jrc/en/digcomp/digital-competence-framework.

2 typically between ages 10 and 13 (age 12 being the most common in most surveyed countries).

- ISCED 3 (Upper secondary education): Programs at this level are typically designed to complete secondary education in preparation for tertiary education or provide skills relevant to employment, or both. Pupils enter this level typically between ages 14 and 16. Within ISCED level 3, programs can be split between ISCED 3A (general) and ISCED 3B (vocational).

Elimination of data at a country level:

For certain ISCED levels within countries, the number of achieved interviews was too low to allow us the use of the data for analytical purposes. Findings from sample sizes too small would be meaningless, and as such, these results had to be eliminated from the final dataset. Specific criteria for elimination of data was discussed between Ipsos, Deloitte, and the European Commission and it was agreed that the minimum threshold to process data from each target group (head teachers, teachers, students, and parents) was 30 participating schools per country per ISCED level. However, in some small countries, this threshold was too high in comparison with the total number of schools in the country. In these cases, the minimum threshold necessary to process the data was established at 10% of the ISCED's school universe. The elimination rule was also applied for the calculation of the European average[7].

Elimination of data at the question level:

Certain questions within each survey had routing or allowed for the answer "don't know", meaning they were only asked to those respondents for whom the question was applicable.

As such, there the base size of respondents having given an informative answer to a question could be smaller than the initial base size indicated above (minimum of 30 schools per ISCED level per country or for smaller countries 10% of the universe). In this case, the result for that specific country was not included as a separate country indicator within a chart but only included in the calculation of the average across countries. Therefore, it may appear for certain graphs that, while the country should appear according to the "country-level" requirement, it is excluded because of a low number of respondents at the question level.

Moreover, if a country outlier was identified to have a significant impact on the average, the average was recalculated without inclusion of the high-weight outlier(s). This procedure ensures comparability within the survey of the European averages across questions and comparability with the 1st Survey of Schools: ICT in education (European Commission, 2013a). Furthermore, across the report, some graphs also show the values for the European averages collected through the first 'Survey of Schools: ICT in Education' and are labelled 'ISCED 1 2011-12' and 'EU 2011-12'.

Table 2 below indicates the minimum base size used to present country information, below which the results from a country were not presented as a separate element in a chart. These "minimum base sizes" are in line with the process which was used to determine which data to exclude, as explained above.

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[7] The European average is calculated taking into account the specific weighting procedure (either student or school weighting) as described further below in the technical notes. In this European average each non-eliminated country is represented according to its size (number of schools or number of students depending the weighting).

The weighting approach was based on the approach used in the 1st Survey of Schools: ICT in Education, to promote comparability by applying school weighting and student weighting[8] of the data set (European Commission, 2013a). Comparability with this first study was also the reason why graphs typically indicate values in terms of "% of students in…". Therefore, most of the graphs are based on the more appropriate student weighting, i.e. student weights summed to the total numbers of students in each of the represented target grades. Only a minority of graphs (figures 1.6.a-1.6.c and figures 1.7.a-1.7.c) related to the availability of hardware in schools are based on school weighting (schools weights summed to the total number of schools in each ISCED level) which is more appropriate to represent the specific school setting.

Next to mentioning some of the key technical points, it is important to emphasise some warnings when interpreting the presented results in the current report. It is important to be careful in drawing conclusions from the presented data since the presented numbers are average figures (mean). They do not imply causality at any point, but can show, at best, a trend at the European level or for some of the presented countries.

For some of the figures, the presented data is compared to the corresponding numbers from the '1st Survey of Schools: ICT in Education' (European Commission, 2013a). It has to be noted that a comparison between surveys is an exercise that should to be done very carefully. Several potential comparability issues could emerge, stretching from the sampling framework, over survey design and survey methods to data processing afterwards. In general, as described in the technical report, the data for the current report were collected in a way to enable comparability to the best extent possible.[9]

In the current report, data is shown for ISCED levels 1, 2 and 3. In the '1st Survey of Schools: ICT in Education' (European Commission, 2013a), a differentiation was made between ISCED level 3, general and vocational training. The same approach has not been followed for the current survey, as, when looking into the data, the amount of available data was too low at this finer grained level.

The following table 2 provides information on final achieved fieldwork results. In particular, details can be found on the number of invitations sent, total completed interviews with headteachers, teachers, parents and students by ISCED level and country.

[8] Within each country and across countries, one should use the school weighting if generalisation to the universe of schools is needed (school weighting only included for the head teacher dataset) and student weighting if generalisation to the universe of students is needed.

[9] European Commission (2019). 2nd Survey of Schools: ICT in Education – Technical report. 10.2759/035445.

Table 1: Country exclusions

excluded = x	Austria	Belgium	Bulgaria	Croatia	Cyprus	Czech Republic	Denmark	Estonia
HT Isced 1	30	30	30	30	30	30	30	30
HT Isced 2	30	30	30	30	6	30	30	30
HT Isced 3	30	30	30	30	5	30	30	21
TC Isced 1	30	30	30	30	x	30	30	30
TC Isced 2	30	30	30	30	6	30	30	30
TC Isced 3	30	30	30	30	x	30	x	21
ST Isced 2	30	30	30	30	6	30	30	30
ST Isced 3	30	30	30	30	5	30	30	21
PA Isced 1	30	30	30	30	x	30	30	30
PA Isced 2	30	30	30	30	x	30	30	30
PA Isced 3	x	30	30	30	x	30	x	21

excluded = x	Finland	France	Germany	Greece	Hungary	Iceland	Ireland	Italy
HT Isced 1	30	30	30	30	30	15	30	30
HT Isced 2	30	30	30	30	30	14	x	30
HT Isced 3	30	30	30	30	30	5	x	30
TC Isced 1	30	x	x	x	30	15	30	30
TC Isced 2	30	x	x	x	30	14	x	30
TC Isced 3	30	x	x	x	30	5	x	30
ST Isced 2	30	x	x	x	30	14	x	30
ST Isced 3	30	x	x	x	30	5	x	30
PA Isced 1	30	x	x	x	30	15	30	30
PA Isced 2	30	x	x	x	30	14	x	30
PA Isced 3	30	x	x	x	30	x	x	30

excluded = x	Latvia	Lithuania	Luxem-bourg	Malta	Norway	Nether-lands	Poland	Portugal
HT Isced 1	30	30	15	10	30	30	30	30
HT Isced 2	30	30	x	5	x	30	30	30
HT Isced 3	30	30	x	5	18	30	30	30
TC Isced 1	30	30	x	10	x	x	x	30
TC Isced 2	30	30	x	5	x	x	x	30
TC Isced 3	30	30	x	5	18	x	x	30
ST Isced 2	30	30	x	5	x	x	x	30
ST Isced 3	30	30	x	5	18	x	x	30
PA Isced 1	30	30	x	10	x	x	x	30
PA Isced 2	30	30	x	x	x	x	x	30
PA Isced 3	30	30	x	x	x	x	x	30

excluded = x	Romania	Slovakia	Slovenia	Spain	Sweden	Turkey	UK
HT Isced 1	30	30	30	30	30	30	30
HT Isced 2	30	30	30	30	30	x	x
HT Isced 3	30	30	18	30	30	x	x
TC Isced 1	30	30	30	30	30	x	30
TC Isced 2	30	30	30	30	30	x	x
TC Isced 3	30	30	18	30	x	x	x
ST Isced 2	30	30	30	30	30	x	x
ST Isced 3	30	30	18	30	x	x	x
PA Isced 1	30	30	30	30	x	x	30
PA Isced 2	30	30	30	30	x	x	x
PA Isced 3	30	30	18	30	x	x	x

Note: The above values indicate the minimum base size in terms of participating schools used to present country information, below which the results from a country were not presented as a separate element in a chart.

Explanation:
HT: Head teachers
TC: Teachers
ST: Students
PA: Parents

Table 2: Final fieldwork statistics

	Total	Austria	Belgium	Bulgaria	Croatia	Cyprus	Czech Republic
Total 'unique' invitations	141968	5530	5586	2305	1277	449	5815
Total completed headteachers interviews	7162	336	267	325	489	75	482
Total completed ISCED 1 teachers interviews	1901	65	71	81	172	24	129
Total completed ISCED 2 teachers interviews	4846	87	92	272	569	16	419
Total completed ISCED 3 teachers interviews	3171	82	166	217	279	8	216
Total completed parent interviews	19040	277	379	1653	1839	53	1042
Total completed student interviews	48799	1063	1253	2583	4289	120	4287

	Den-mark	Estonia	Finland	France	Germany	Greece	Hungary
Total 'unique' invitations	3163	554	2672	4535	4936	7850	5837
Total completed headteachers interviews	265	192	311	201	150	146	496
Total completed ISCED 1 teachers interviews	48	97	98	4	6	19	211
Total completed ISCED 2 teachers interviews	182	258	152	42	33	24	573
Total completed ISCED 3 teachers interviews	31	124	148	24	34	13	257
Total completed parent interviews	547	1119	670	73	68	37	2092
Total completed student interviews	1441	2473	1478	519	398	189	5188

	Iceland	Ireland	Italy	Latvia	Lithuania	Luxem-bourg	Malta
Total 'unique' invitations	184	3407	24263	812	1228	191	142
Total completed headteachers interviews	42	184	460	230	347	18	51
Total completed ISCED 1 teachers interviews	12	54	66	95	176	3	15
Total completed ISCED 2 teachers interviews	31	4	106	276	483	0	14
Total completed ISCED 3 teachers interviews	13	7	120	205	275	0	14
Total completed parent interviews	80	156	464	1184	2652	0	64
Total completed student interviews	161	140	1248	2619	4456	0	117

	Norway	Nether-lands	Poland	Portugal	Romania	Slovakia	Slovenia
Total 'unique' invitations	2133	11168	5369	2885	5293	2903	598
Total completed headteachers interviews	93	156	123	194	337	450	119
Total completed ISCED 1 teachers interviews	14	19	16	69	79	76	42
Total completed ISCED 2 teachers interviews	23	9	42	173	226	351	130
Total completed ISCED 3 teachers interviews	37	5	44	155	143	192	46
Total completed parent interviews	54	56	268	463	1489	822	410
Total completed student interviews	455	224	728	1883	2931	3292	1143

	Spain	Sweden	Turkey	UK
Total 'unique' invitations	3443	3511	2434	21495
Total completed headteachers interviews	309	142	44	128
Total completed ISCED 1 teachers interviews	58	34	3	45
Total completed ISCED 2 teachers interviews	187	59	6	7
Total completed ISCED 3 teachers interviews	271	37	2	6
Total completed parent interviews	700	217	35	77
Total completed student interviews	3032	897	24	168

1. ACCESS TO AND USE OF DIGITAL TECHNOLOGIES

In order to be able to fully exploit the benefits of digital learning and to enhance learning outcomes, there are a number of conditions that must be met, including the availability of a reliable and fast Internet connection as well as access to digital technology equipment like computers or interactive whiteboards. Given that digital transformation affects schools in a large number of ways, it is important to develop a better understanding of schools' access to digital technologies, as well as to know the level of the use of digital technologies for teaching and learning.

Section 1 of this report therefore starts with an overview of the key figures related to access to the Internet and digital equipment (chapter 1). This section continues by providing information related to the use of digital technologies and outlines some of the obstacles perceived by teachers to the use of digital technologies for teaching and learning (chapter 1.2).

Summary of Key Findings

- The share of students who are in schools with **high-speed Internet** (above 100 mbps) differs widely across Europe with the Nordic countries leading. Availability of high-speed Internet is lowest at ISCED 1 level (11%) in relation to ISCED levels 2 and 3 (17% resp. 18%).
- Only 8% of students across all ISCED levels attend schools located in a **village** or a **small city**, which have access to a high-speed Internet above 100 mbps.
- The share of students who are in schools with access to a **Wireless LAN** differs widely across Europe and ranges from 46% (ISCED 1) to 52% (ISCED 2) to 67% (ISCED 3).
- There is an average number of 18 **students per computer** at ISCED level 1 at European level. The average number of students per computer at European level amounts to 7 at ISCED level 2 and 8 at ISCED level 3.
- The share of students attending **highly digitally equipped and connected schools** differs widely across Europe, is highest in Nordic countries, and ranges from 35% (ISCED 1) to 52% (ISCED 2) to 72% (ISCED 3).
- The share of students **that use the Internet at least** once a week ranges from 68% (ISCED 2) to 73% (ISCED 3).
- The share of students who **use a computer at school** at least once a week for learning purposes ranges between 52% at ISCED level 2 and 59% in ISCED level 3.
- Still 1 out of 5 ISCED level 2 students and 1 out of 4 ISCED level 3 students never or almost **never use a computer** at school.
- The share of students who use **own digital equipment for learning purposes** remains relatively stable compared to 2011/2012 data. The own equipment most used for learning purposes is a smartphone where use ranges from 30% (ISCED 2) to 53% (ISCED 3). In terms of own equipment use, the use of laptops owned by students is quite low across Europe, except in Nordic countries.
- The share of students taught by teachers that use **ICT in 25% or more of their lessons** ranges from 71% (ISCED 1) to 58% (ISCED 2) to 65% (ISCED 3) and is highest in Nordic countries.
- Teachers perceive the **insufficient number of tablets, laptops and notebooks** as the most important obstacle to the use of digital technologies at schools.

1.1. Access to the Internet and access to equipment

This section focuses in more detail on the topics of access to the Internet and access to equipment. The availability of a stable and fast Internet connection as well as digital equipment is not only considered as enabling the implementation of ICT in different aspects of learning, but also as a key enabler of innovation in learning in general (Brecko, Kampylis, & Punie, 2014). That way, the provision of Internet access and equipment enables extending the boundaries of learning. Not only can more innovative teaching methods be applied, but learning can also happen in a much more interactive way. In addition, the boundaries of learning can be extended since learning resources and content can be accessed at any time and at any place.

Recognising the importance of connectivity and digital equipment and its potential effect on teaching and learning, this section looks into the access to the Internet, access to equipment, availability of a virtual learning environment and the provision of technical support in order to maintain any digital equipment at school. The final subsection shows the findings of a cluster analysis, which defines different types of digitally equipped and connected schools and looks at the distribution of these types of schools over the different European countries.

1.1.1. Access to the Internet

The European broadband targets foresee that by 2025 all schools have access to Gigabit Internet Connectivity[10]. In fact, being connected to the Internet is a prerequisite for schools to, for example, access up-to-date resources or access online learning platforms. In addition, schools are increasingly requesting bandwidth-demanding applications such as video streaming or video conferencing, which can create great opportunities for both teachers and pupils, e.g. by inviting outside speakers and experts for a specific class who would otherwise not be available, or by linking students with others from different communities, backgrounds and cultures. In addition, so-called "next-generation" applications for innovative learning and teaching like virtual reality (VR) or augmented reality (AR) do require extremely fast Internet access speed. Such "immersive learning" enabled by virtual environments may offer a powerful catalyst to increase students' learning experiences.

Therefore, this chapter looks into what type of Internet connection (e.g. ADSL, cable, fibre optic, etc.) schools have, the share of schools that have access to a wireless LAN and the Internet speed reported by schools.

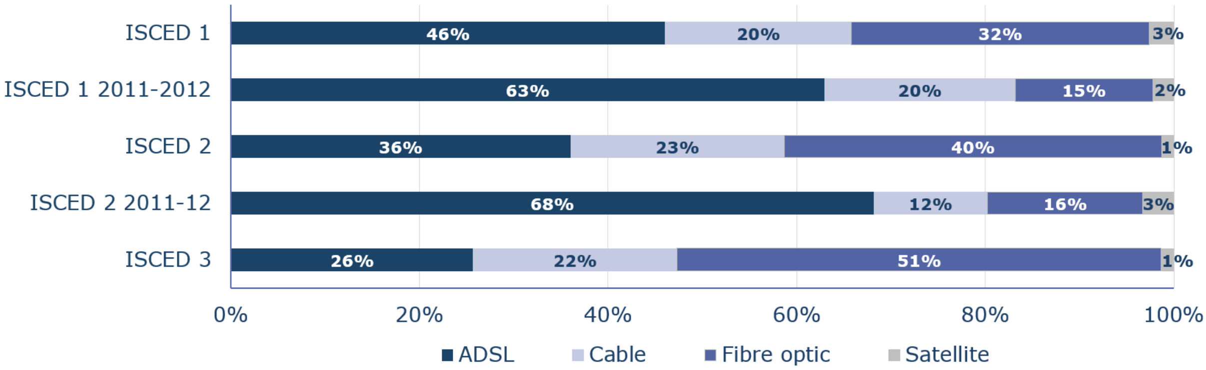
1.1.1.1. Type of Internet connection

In general, it is acknowledged that high-speed Internet can have a noticeable impact on education and improve teaching and learning (McCoy, Lyons, B, & Darmody, 2016). In this context, fibre is often recognised as being the technology for meeting these high-speed Internet requirements of the future (European Commission, 2017b). When looking at the distribution of the different types of Internet access in Figure 1.1, the results reveal that, at European level, most students are in schools that are connected to the Internet via ADSL and fibre optic. More precisely, on average, most ISCED level 1 students at European level (i.e. 46%) are in schools that are connected via ADSL, whereas most ISCED levels 2 and 3 students attend schools that connect to the Internet via fibre optic (40% and 51%, respectively). In contrast, a smaller share of students (ranging between 20% at ISCED level 1 to 23% at ISCED level 2) are in schools that use cable to access the Internet. Access via satellite is rare, given that only between 1% (ISCED 2 and 3) to 3% (ISCED 1) of students are in schools, which are connected to the Internet via satellite. Compared to the ‘1st Survey of Schools: ICT in Education’, the current data suggest an

[10] For more information, see: https://ec.europa.eu/digital-single-market/en/news/communication-connectivity-competitive-digital-single-market-towards-european-gigabit-society.

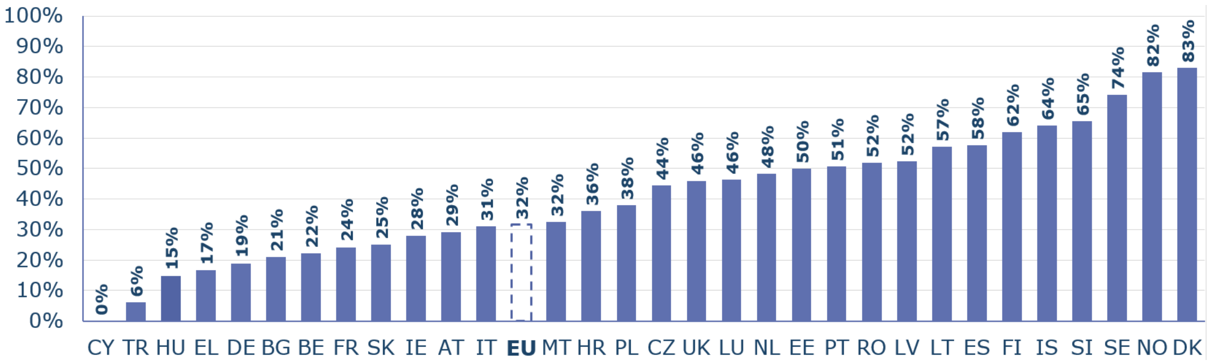
overall decrease in the use of ADSL and a clear increase in the use of fibre optic in schools (European Commission, 2013a). Furthermore, the results of the survey, which show that the Gigabit connectivity goal is very much out of sight at the moment, clearly support the future Connected Europe Facility Programme's aim to support access to Gigabit connectivity for socio-economic drivers including schools[11].

Fig. 1.1: Type of Internet connection at schools
All ISCED levels, in % of students, EU average, 2017-18



Figures 1.2.a to 1.2.c present access to the Internet via fibre optic at the country level. In general, the figures show that, on average, between 32% (ISCED 1) to 40% (ISCED 2) and 51% (ISCED 3) of European students are in schools with Internet access via fibre optic. When looking at the different country figures, we see that large differences between the different countries prevail.

Fig. 1.2.a: Fibre optic
(ISCED 1, in % of students, country and EU average, 2017-18)



[11] European Commission (2018): Proposal for a Regulation of the European Parliament and of the Council establishing the Connecting Europe Facility and repealing Regulations (EU) No 1316/2013 and (EU) No 283/2014 (COM(2018) 438 final): https://ec.europa.eu/commission/sites/beta-political/files/budget-may2018-cef-regulation_en.pdf.

Fig. 1.2.b: Fibre optic
(ISCED 2, in % of students, country and EU average, 2017-18)

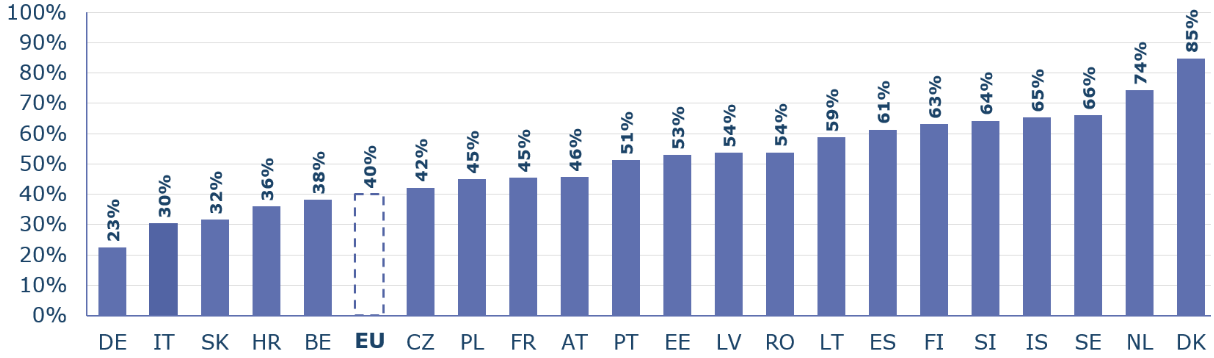
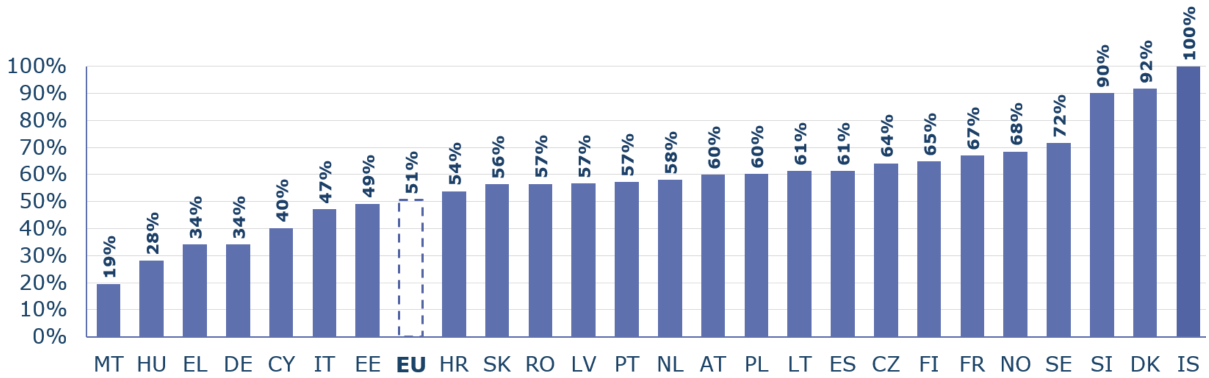


Fig. 1.2.c: Fibre optic
(ISCED 3, in % of students, country and EU average, 2017-18)



1.1.1.2. Internet speed

The European broadband targets foresee that by 2025, all schools should have access to Gigabit Internet connectivity[12]. Figures 1.3.a to 1.3.c give insight into the Internet speed reported for the different countries. The results show that there is a large variation in the range of Internet speeds at schools across Europe. The European average suggests that the older the students, the higher the likelihood that they attend a school with a fast Internet connection. Figures 1.3.a to 1.3.c show that on average in Europe, 11%, 17% and 18% of students are in schools that have an Internet speed above 100 mbps at ISCED levels 1, 2 and 3, respectively. While the data suggests that there are still 12% of students in schools with an Internet speed below 2 mbps at ISCED level 1, this falls down to 4% and 1% at ISCED levels 2 and 3, respectively. The European average should not be taken as a reference for all countries due to the strong variation across countries. While the Nordic countries seem to have a higher Internet speed on average, other countries have levels of Internet speed that are well below the European average.

[12] For more information see: https://ec.europa.eu/digital-single-market/en/policies/improving-connectivity-and-access.

Fig. 1.3.a: Internet speed
(ISCED 1, in % of students, country and EU level, 2017-18)

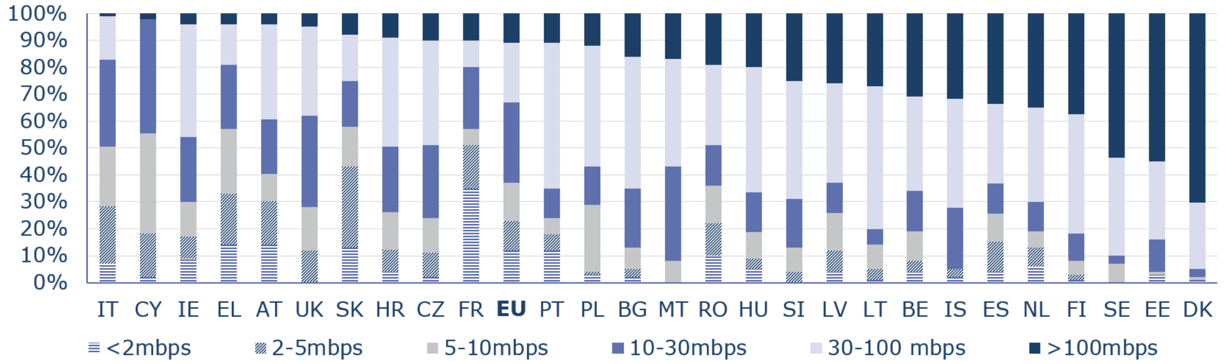


Fig. 1.3.b: Internet speed
(ISCED 2, in % of students, country and EU level, 2017-18)

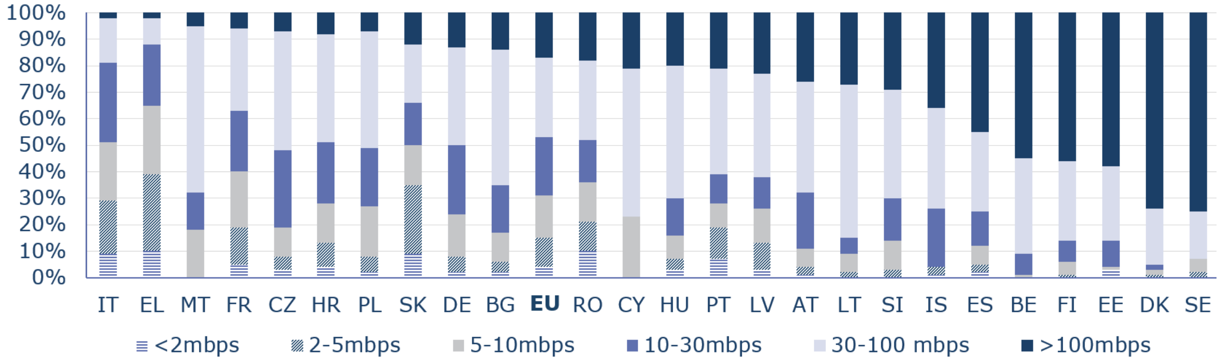
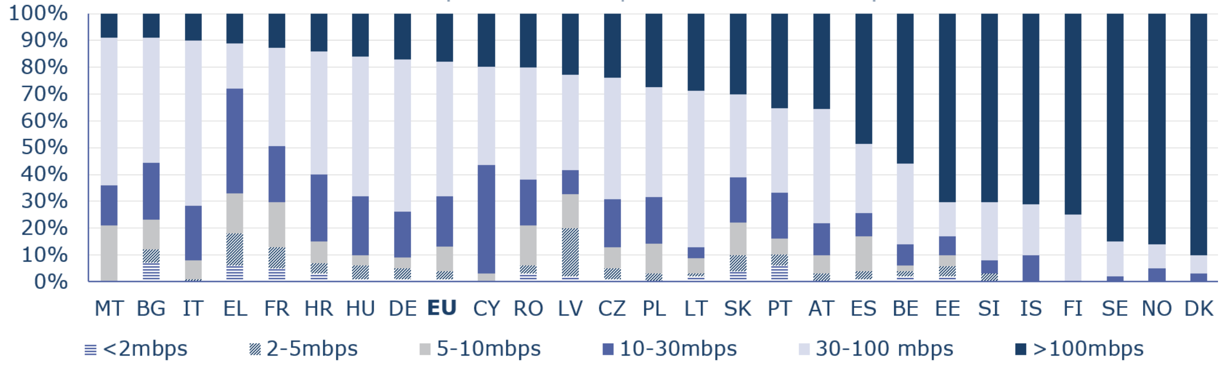


Fig. 1.3.c: Internet speed
(ISCED 3, in % of students, country and EU level, 2017-18)



1.1.1.3. Wireless connection

Figures 1.4.a to 1.4.c give insight into the average share of students attending schools with wireless LAN. On average, 46% of European students at ISCED level 1 attend schools that have access to a wireless LAN. This figure increases to 52% at ISCED level 2 and 67% at ISCED level 3.

Fig.1.4.a: Wireless Lan
(ISCED 1, in % of students, country and EU level, 2017-18)

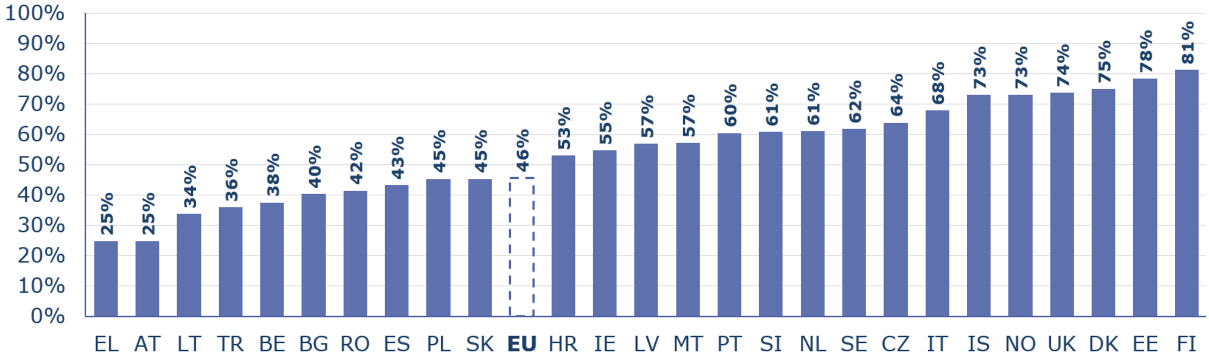


Fig.1.4.b: Wireless Lan
(ISCED 2, in % of students, country and EU level, 2017-18)

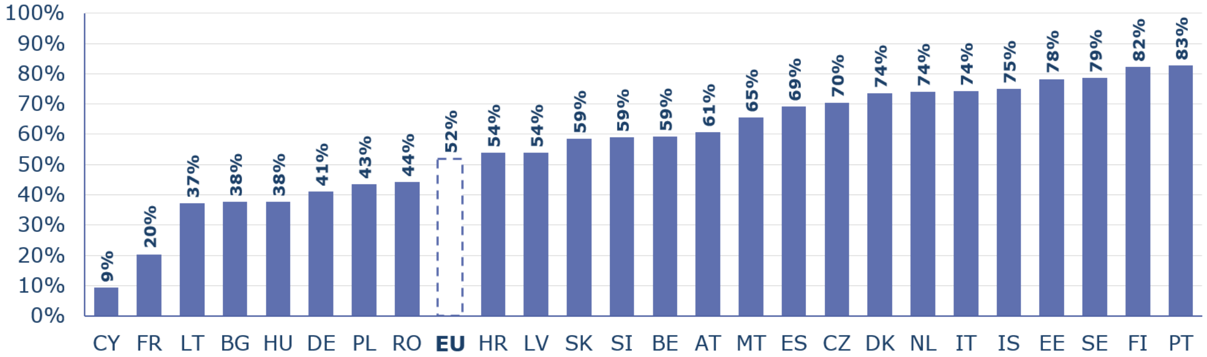
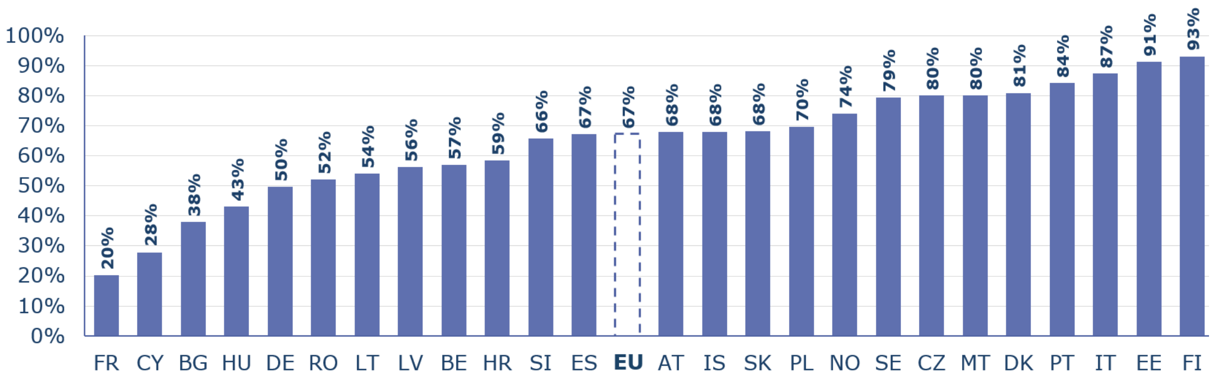


Fig.1.4.c: Wireless Lan
(ISCED 3, in % of students, country and EU level, 2017-18)



1.1.1.4. Access to the Internet according to school location

Figures 1.5.a to 1.5.c show the European average for the different statistics of connectivity shown in chapters 1.1.1.2 and 1.1.1.3, split by school location. The survey allowed differentiating between schools located in villages and small towns with less than 15,000 inhabitants on the one hand and larger towns and cities with more than 15,000 inhabitants on the other hand. The results reveal that schools which are located in larger towns and cities seem to have faster Internet speed over all ISCED levels compared to schools located in villages or small cities. More precisely, only 8% of students across all ISCED levels attend schools located in a village or small city which have access to a high-speed Internet speed above 100 mbps. In contrast, the share of students attending schools that are located in bigger cities and having access to high-speed Internet is significantly higher with 13% (ISCED 1), 22% (ISCED 2), 21% (ISCED 3), respectively. In addition, for all ISCED levels, schools that are located in larger towns and cities are, on average, more likely to connect to the Internet via fibre optic (see Figure 1.5.b). Figure 1.5.c shows the percentage of students attending schools that have access to a wireless LAN, according to the location of schools and per ISCED level. In general, students attending schools in larger towns or cities seem to be more likely to attend schools that have access to the Internet via Wireless LAN.

Fig. 1.5.a: Internet speed according to location of schools
(All ISCED levels, in % of students, EU level, 2017-18)

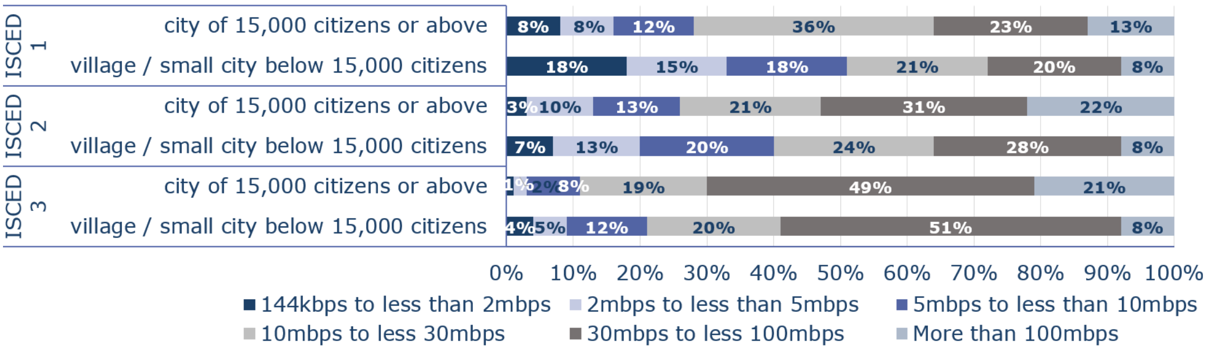


Fig. 1.5.b: Type of Internet connection according to location of schools
(All ISCED levels, in % of students, EU level, 2017-18)

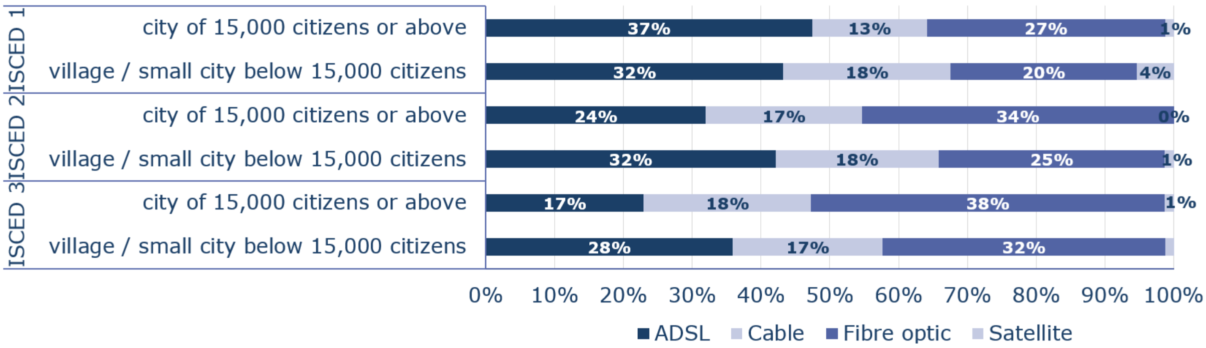
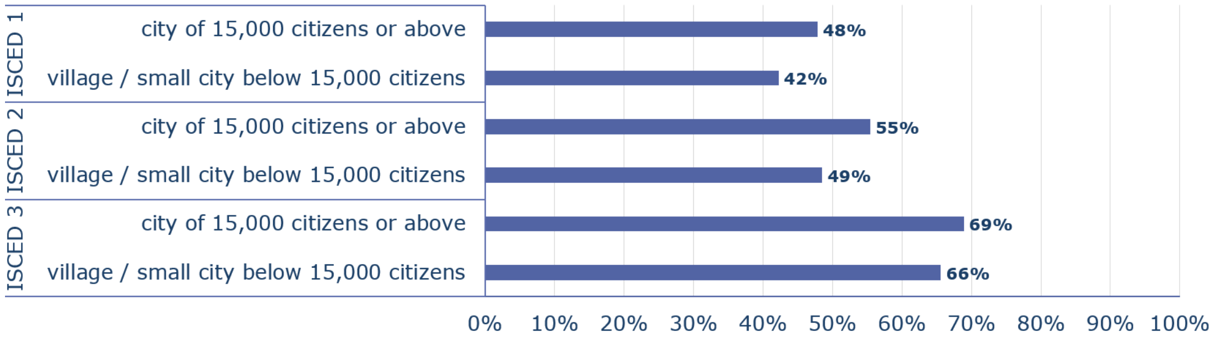


Fig. 1.5.c: Wireless LAN access according to location of schools
(All ISCED levels, in % of students, EU level, 2017-18)



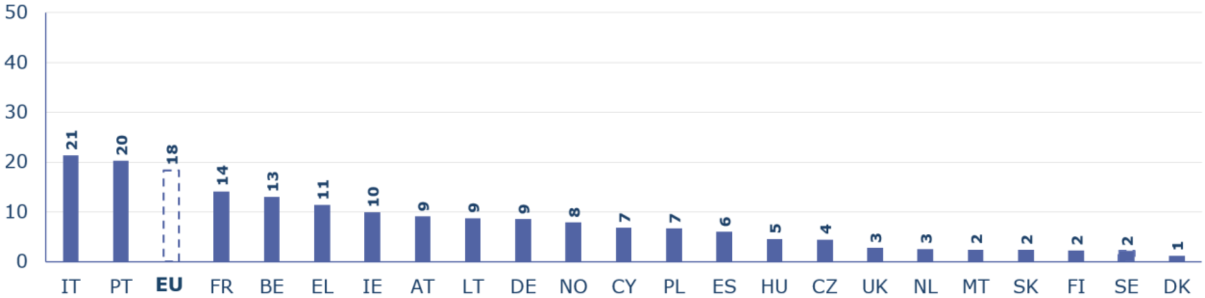
1.1.2. Access to equipment

This sub-section looks closely at the number of students per computer (desktop computers, laptops, notebooks and tablets included) as well as the number of students per interactive whiteboards. The devices listed below only take into account devices provided by schools themselves[13]. This implies that any figure reported does not take into account any device brought to school by students. Furthermore, this section provides data regarding the location where desktop computers are accessible to students (e.g. in classrooms, in the library, etc.) and reports on the share of students in schools where more than 90% of the equipment is operational.

1.1.2.2. Computers (desktop computers, laptops, notebooks and tablets)

Figures 1.6.a to 1.6.c below give insight into the number of students per computer, which includes desktop computers, laptops, notebooks and tablets. The figures clearly show that there are large country differences. Furthermore, while there seem to be 18 students on average at European level per computer at ISCED 1, this number drops to 7 and 8 students per computer at ISCED levels 2 and 3, respectively.

Fig.1.6.a: Number of students per computer (desktop computers, laptops, notebooks, tablets)
(ISCED 1, country and EU level, 2017-18)



[13] However, the reported averages for computers still need to be interpreted with care given the head teachers' possible different understanding when completing the survey, of the definition in which equipment falls under the school's responsibility (e.g. due to different school policies including BYOD).

Fig.1.6.b: Number of students per computer (desktop computers, laptops, notebooks, tablets)
(ISCED 2, country and EU level, 2017-18)

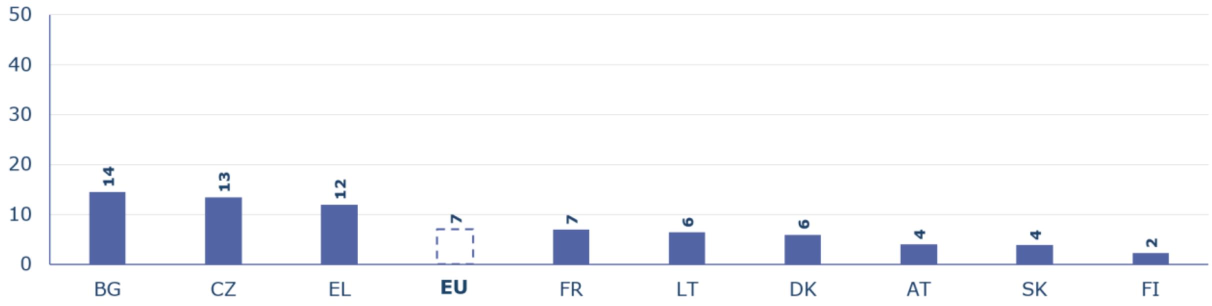
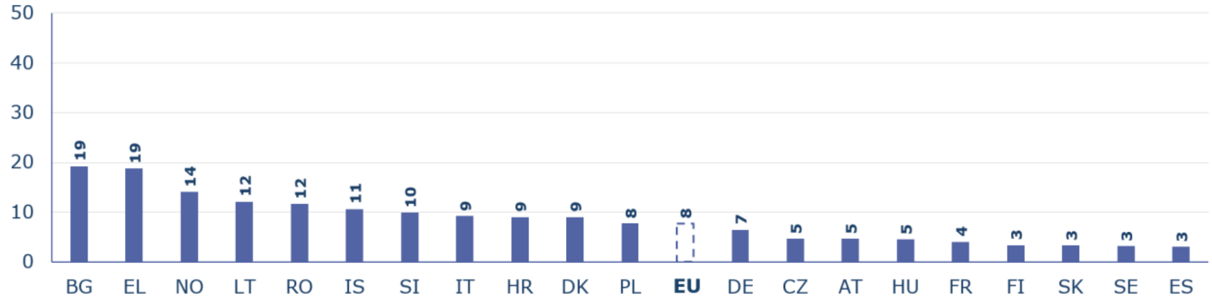


Fig.1.6.c: Number of students per computer (desktop computers, laptops, notebooks, tablets)
(ISCED 3, country and EU level, 2017-18)



1.1.2.3. Interactive whiteboards

Figures 1.7.a to 1.7.c show that, on average, there are 56 ISCED level 1 students per interactive whiteboard in Europe. Further data shows that the availability of interactive whiteboards to ISCED level 1 students has increased in comparison to the '1st survey of schools: ICT in education' (European Commission, 2013a). Whereas at ISCED level 1, 56 students in Europe share one interactive whiteboard, the figure increases to 109 students per one interactive whiteboard at ISCED level 2. Furthermore, the results reveal that at ISCED level 3, about 166 students in Europe share one interactive whiteboard.

Fig.1.7.a: Number of students per interactive whiteboard
(ISCED 1, country and EU level, 2011-12 and 2017-18)

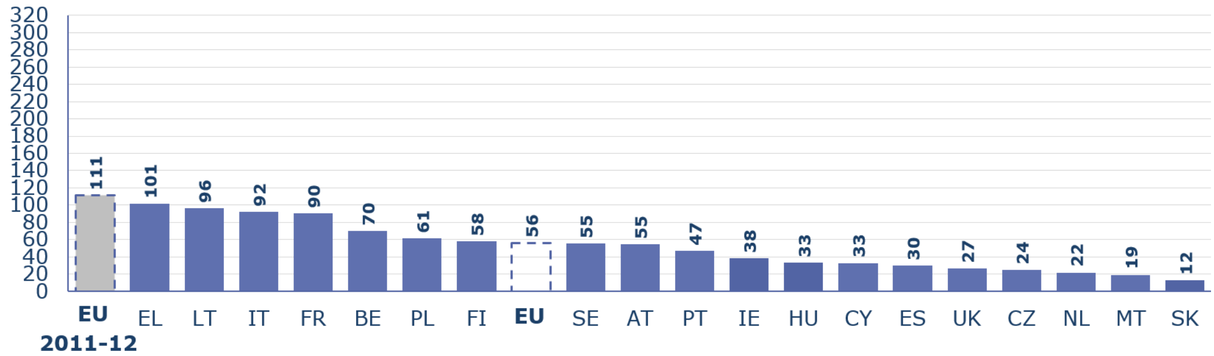


Fig.1.7.b: Number of students per interactive whiteboard
(ISCED 2, country and EU level, 2011-12 2017-18)

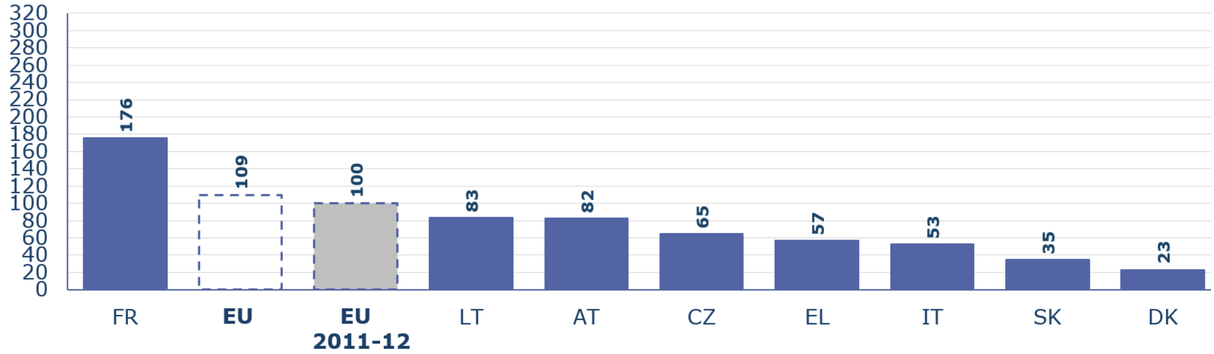
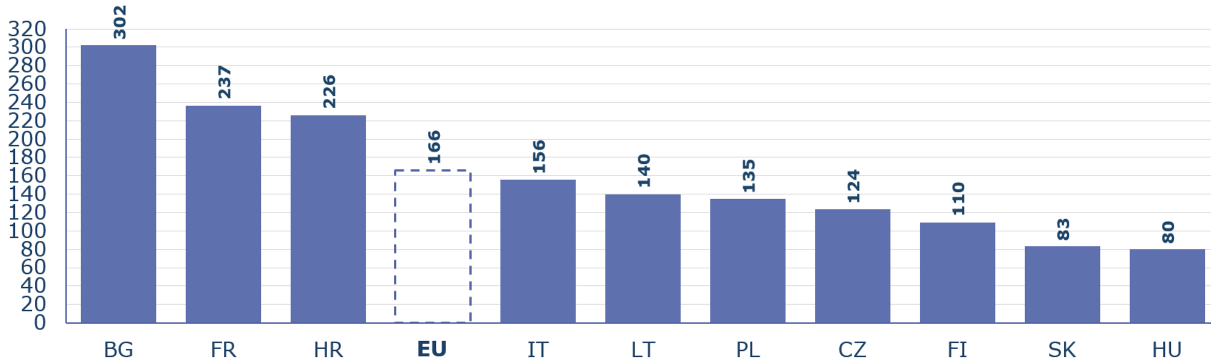


Fig.1.7.c: Number of students per interactive whiteboard
(ISCED 3, country and EU level, 2011-12 and 2017-18)



1.1.2.4. Location of desktop computers

This chapter provides information regarding the location in which students can access desktop computers. Schools could, for example install desktop computers in a dedicated computer lab, in a library, in classrooms or in other locations inside the school, which are accessible to students. Figures 1.8.a to 1.8.c show that the average student in Europe seems to have access to desktop computers mostly in computer labs.

Figure 1.8.a to 1.8.c show that there is a large variation over the different countries in terms of where desktop computers are mainly located. On average in Europe, 33%, 24%, 28% of students are in schools where desktop computers are located in classrooms at ISCED levels 1, 2 and 3 respectively. While the data suggests that on average in Europe at ISCED level 1, 48% of students are in schools where desktop computers are located in computer labs, this increases to 58% and 57% at ISCED levels 2 and 3. While for some countries more than 70% of ISCED 1 students are in schools where desktop computers are located in computer labs (e.g. Romania, Italy and Bulgaria), in Sweden for example, ISCED level 1 students mainly have access to desktop computers in the library and in classrooms. In other countries such as e.g. Austria and the Netherlands, ISCED level 1 students can mainly access desktop computers from the classroom. It has to be noted that this does not take into account the actual number of desktop computers available, but only shows the availability of desktop computers in schools for the different access locations.

Fig. 1.8.a: Location of desktop computers
(ISCED 1, in % of students, country and EU level, 2017-18)

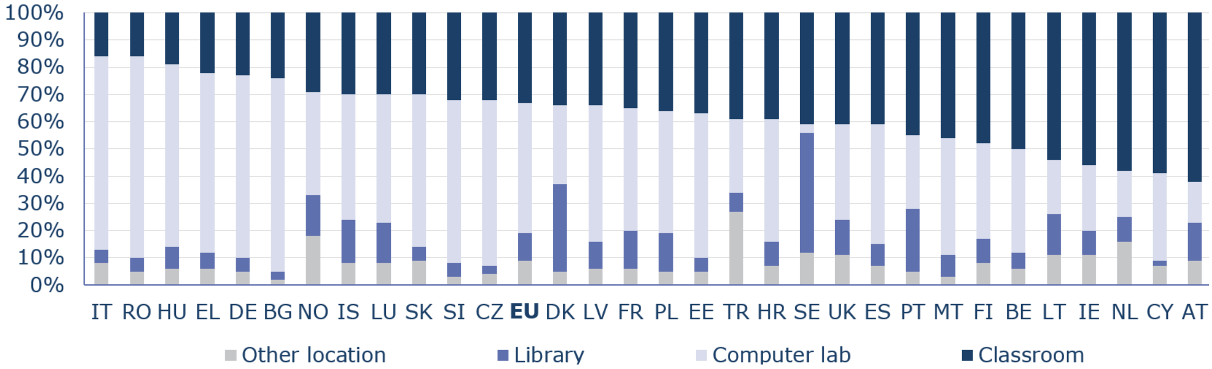


Fig. 1.8.b: Location of desktop computers
(ISCED 2, in % of students, country and EU level, 2017-18)

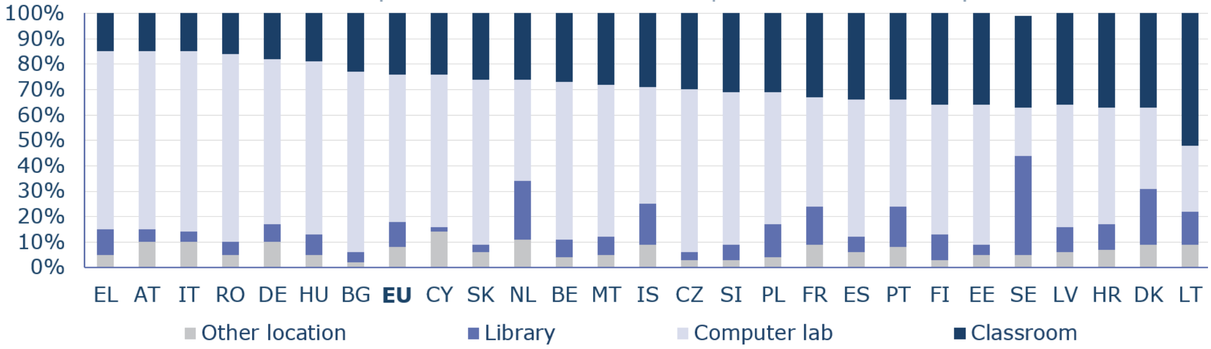
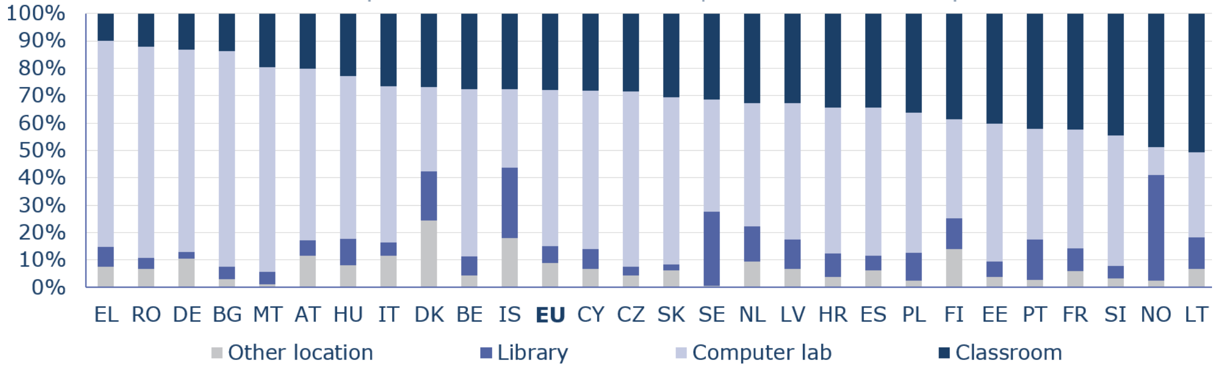


Fig. 1.8.c: Location of desktop computers
(ISCED 3, in % of students, country and EU level, 2017-18)



1.1.2.5. Operational equipment

Figures 1.9.a to 1.9.c display the percentage of the operational equipment available in schools. More precisely, the data shows to what extent equipment (including desktop computers, interactive whiteboards, laptops/notebooks and mobile devices) is operational. In Europe as a whole, between 61% (ISCED level 1) and 73% (ISCED level 3) of students are in schools where more than 90% of equipment (computers, interactive whiteboards, laptops, mobile devices) is operational. However, there is again a large difference between the different countries. At ISCED level 2, 90% or more students in schools for example in Malta, Austria, Estonia and Denmark have, on average, more than 90% of their equipment that is operational. For Croatia, Romania and Italy, survey results suggest that less than 50% of the students are in schools with more than 90% of operational equipment, at ISCED levels 1 and 2, respectively.

Fig. 1.9.a: Students in schools where more than 90% of equipment is operational
(ISCED 1, in % of students, country and EU level, 2017-18)

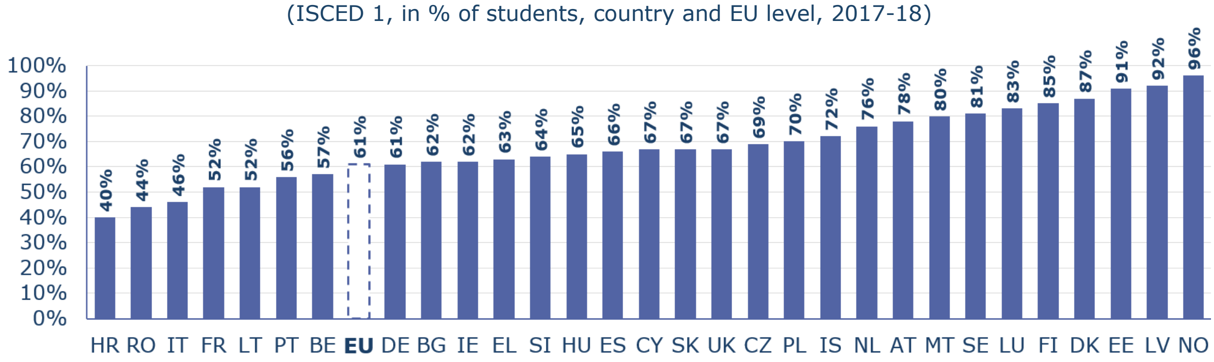


Fig. 1.9.b: Students in schools where more than 90% of equipment is operational
(ISCED 2, in % of students, country and EU level, 2017-18)

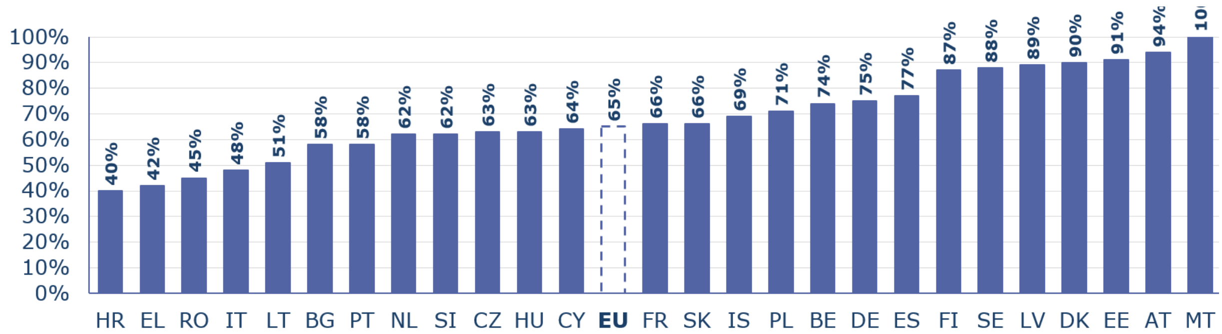
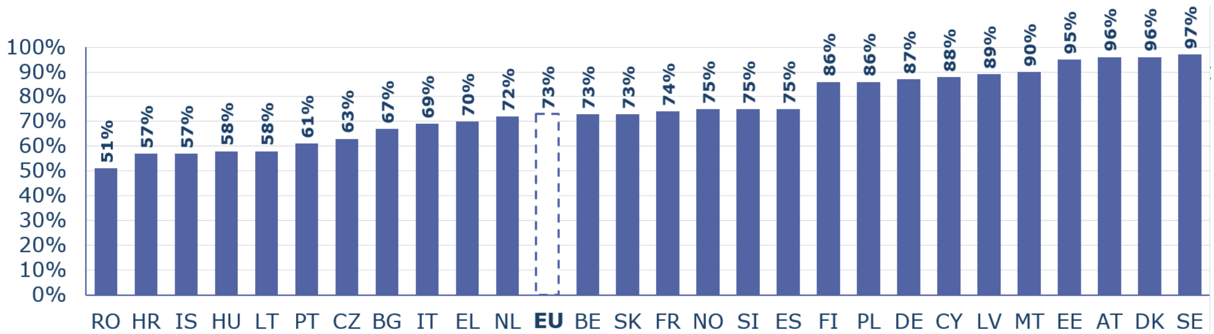


Fig. 1.9.c: Percentage of students in schools where more than 90% of equipment is operational
(ISCED 3, in % of students, country and EU level, 2017-18)



1.1.3. Access to digital content

1.1.3.2. Availability of external email addresses for students and teachers

Having an external email address for students and teachers is an indicator of the extent to which schools adopt digital technologies. Figures 1.10.a to 1.10.c show that in general, the large majority of European students seem to attend schools where more than 50% of teachers have e-mail addresses. At European level, 75%, 83% and 85% of students attend schools where more than 50% of teachers have school email addresses, at ISCED levels 1, 2 and 3 respectively. This, however, varies largely across countries. Furthermore, an average of 29%, 43% and 56% of European students attend schools where more than 50% of European students have school email addresses, at ISCED levels 1, 2 and 3 respectively.

Fig. 1.10.a: Schools where more than 50% of students and teachers have school email addresses
(ISCED 1, in % of students, country and EU level, 2017-18)

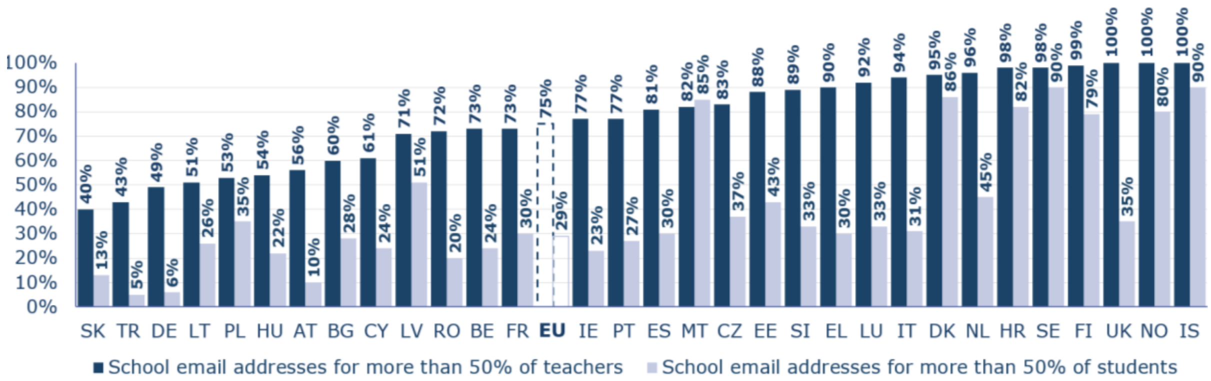


Fig. 1.10.b: Schools where more than 50% of students and teachers have school email addresses
(ISCED 2, in % of students, country and EU level, 2017-18)

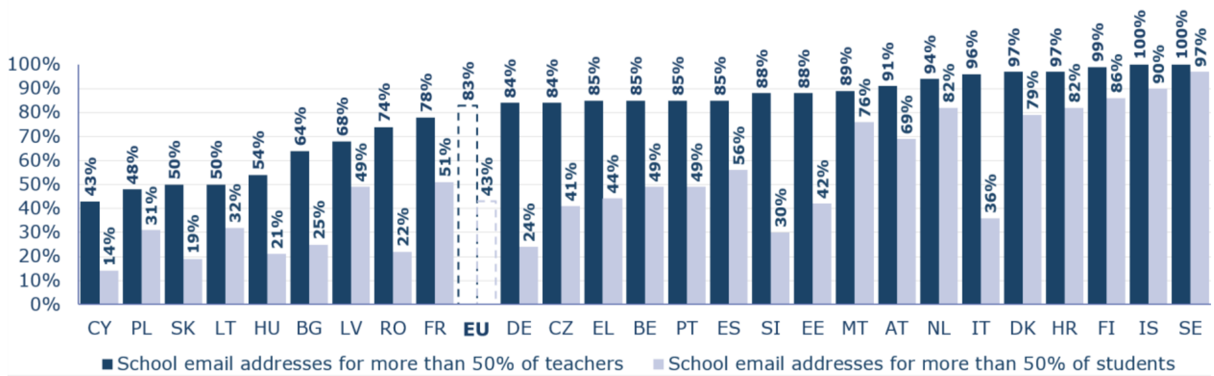
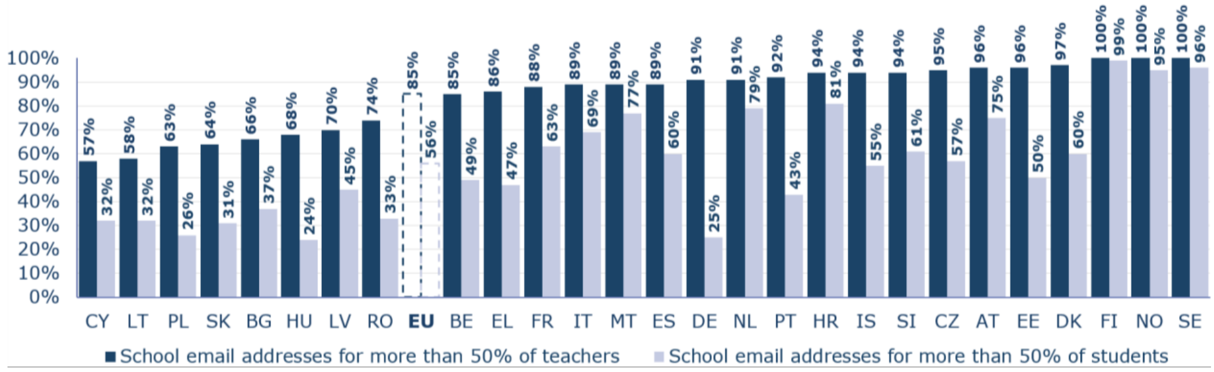


Fig. 1.10.c: Schools where more than 50% of students and teachers have school email addresses
(ISCED 3, in % of students, country and EU level, 2017-18)



1.1.3.3. Access to a virtual learning environment

Figure 1.11.a to 1.11.c provide information regarding the availability of a virtual learning environment (VLE) at school. On average in Europe, there are 32% of students in schools with a VLE at ISCED level 1. The figure increases to an average of 65% of students at ISCED level 3. The data show that the European average remained relatively stable in comparison to the results reported in the '1st Survey of Schools: ICT in Education' (European Commission, 2013a). In line with previous figures, the country figures vary widely for all three ISCED levels.

Fig. 1.11.a: Schools with a virtual learning environment
(ISCED 1, in % of students, country and EU level, 2017-18)

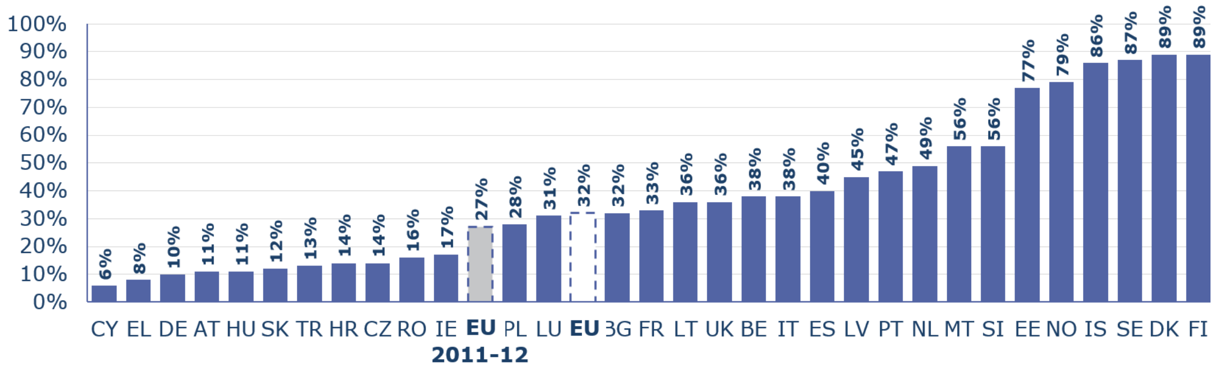


Fig. 1.11.b: Schools with a virtual learning environment
(ISCED 2, in % of students, country and EU level, 2017-18)

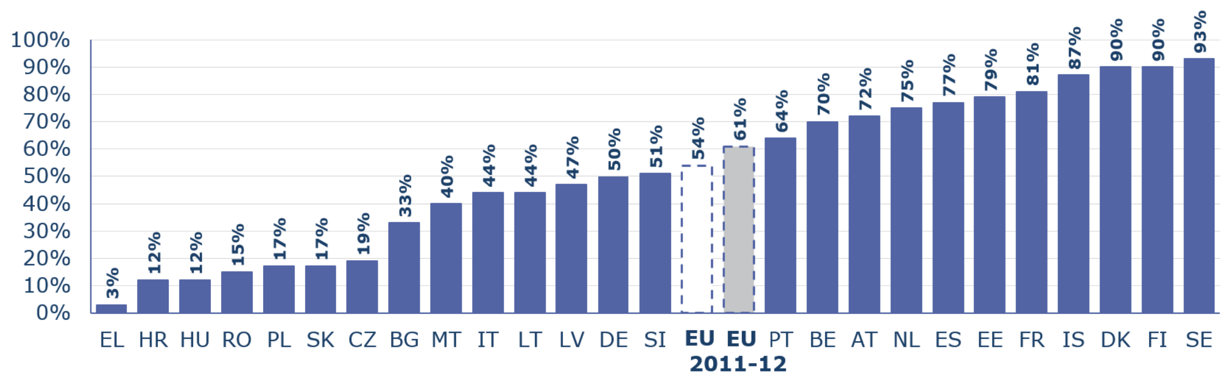
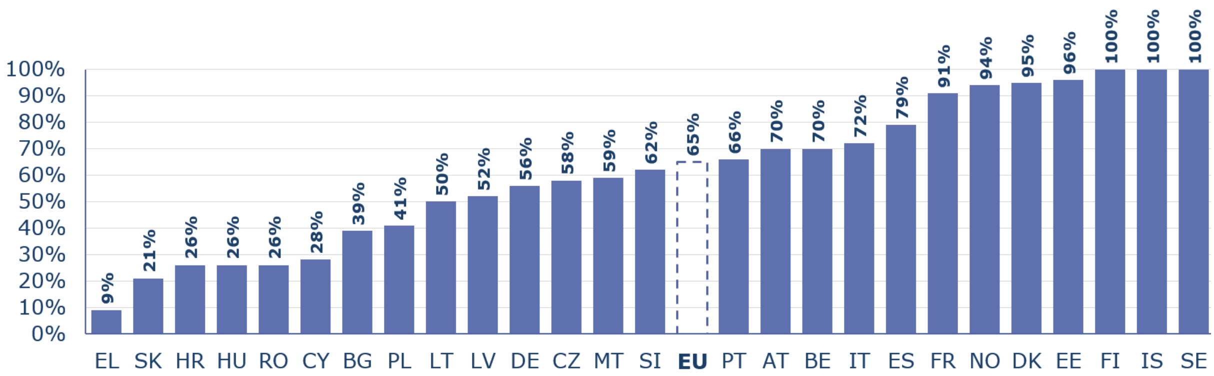


Fig. 1.11.c: Schools with a virtual learning environment
(ISCED 3, in % of students, country and EU level, 2017-18)



Figures 1.12.a to 1.12.c give more insight into the percentage of students who have a VLE available at school and can access this VLE outside school hours or outside the school premises. Provided the schools possess a VLE, the average percentage of students having access to a VLE outside of school hours is relatively high across all surveyed countries and ISCED levels. At European level, this percentage ranges from 85% at ISCED level 1 to 95% at ISCED level 3.

The percentage of European students who can access their VLE outside the school premises is slightly lower than the percentage of European students who can access this VLE outside school hours. For the percentage of European students with a VLE at school who can access it outside the school premises, the figure ranges from 81% at ISCED level 1, 88% at ISCED level 3 to 89% at ISCED level 2.

Fig. 1.12.a: Students with a VLE at school who can access it outside school hours / outside school premises
(ISCED 1, in % of students, country and EU level, 2017-18)

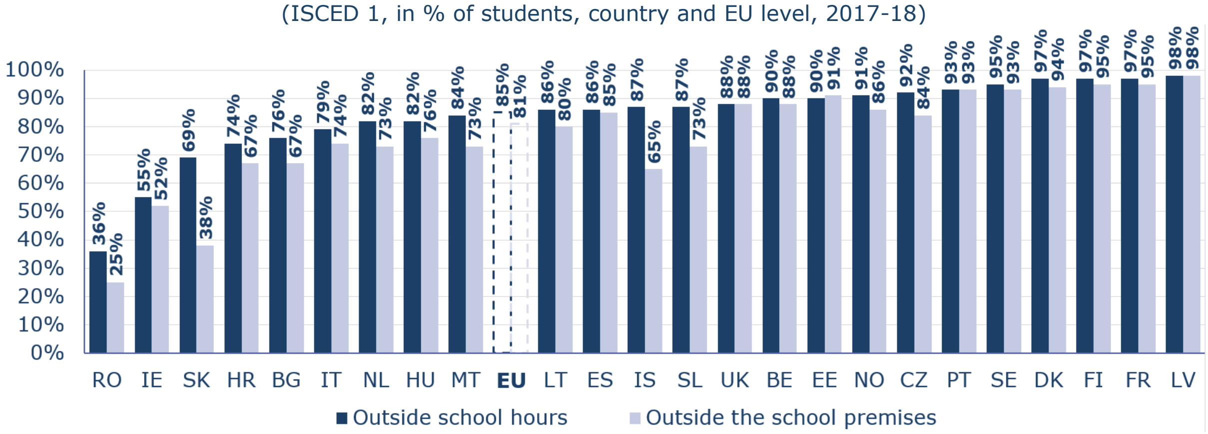


Fig. 1.12.b: Students with a VLE at school who can access it outside school hours / outside school premises
(ISCED 2, in % of students, country and EU level, 2017-18)

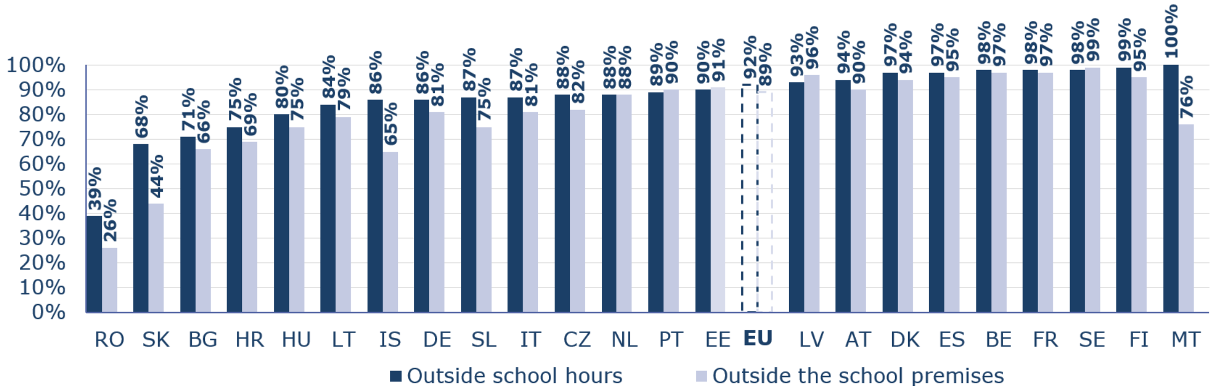
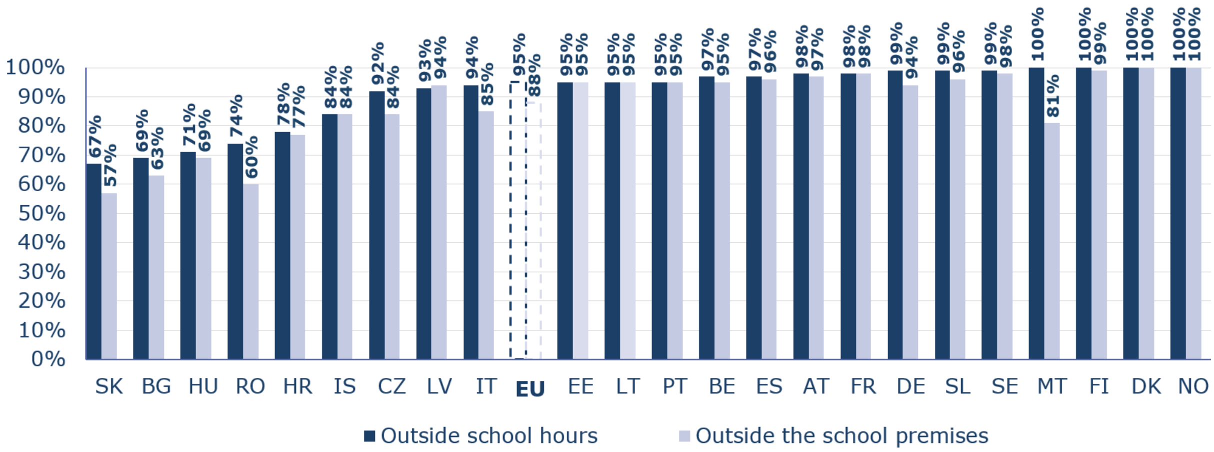


Fig. 1.12.c: Students with a VLE at school who can access it outside school hours / outside school premises
(ISCED 3, in % of students, country and EU level, 2017-18)



1.1.4. Technical support

Digital equipment has to be maintained. This can be done in-house and/or outsourced to an external unit. The external unit could either be a company contracted by the school or an external agency arranged by educational authorities (at the local, regional level, etc.). Evidently, maintenance can also be a combination of all the above-mentioned categories or can even include another supplier of maintenance services that cannot be attributed to one of these categories.

Most European students are in schools where school staff maintain a school's digital equipment (see figures 1.13.a to 1.13.c). At a European scale, 71%, 86% and 94% of students are in schools where school staff maintain a school's digital equipment at ISCED levels 1, 2 and 3 respectively.

Fig. 1.13.a: Maintenance of equipment by school staff
(ISCED 1, in % of students, country and EU level, 2017-18)

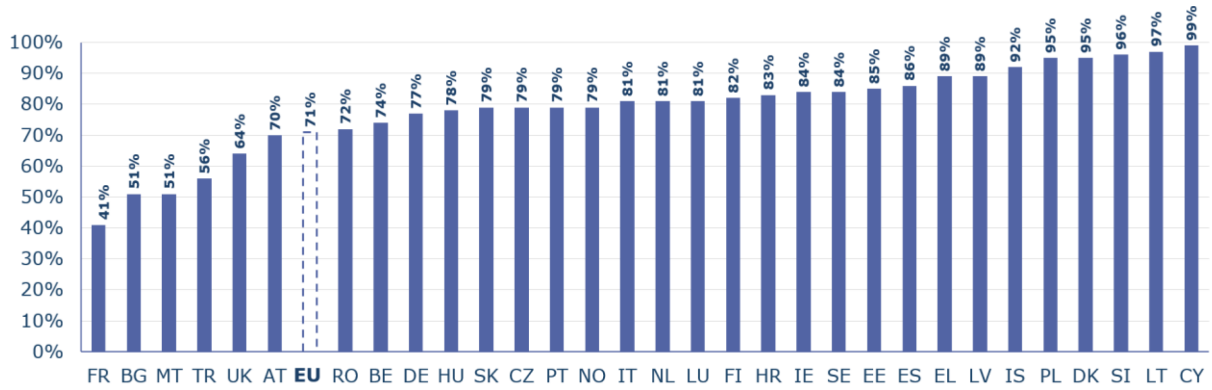


Fig. 1.13.b: Maintenance of equipment by school staff
(ISCED 2, in % of students, country and EU level, 2017-18)

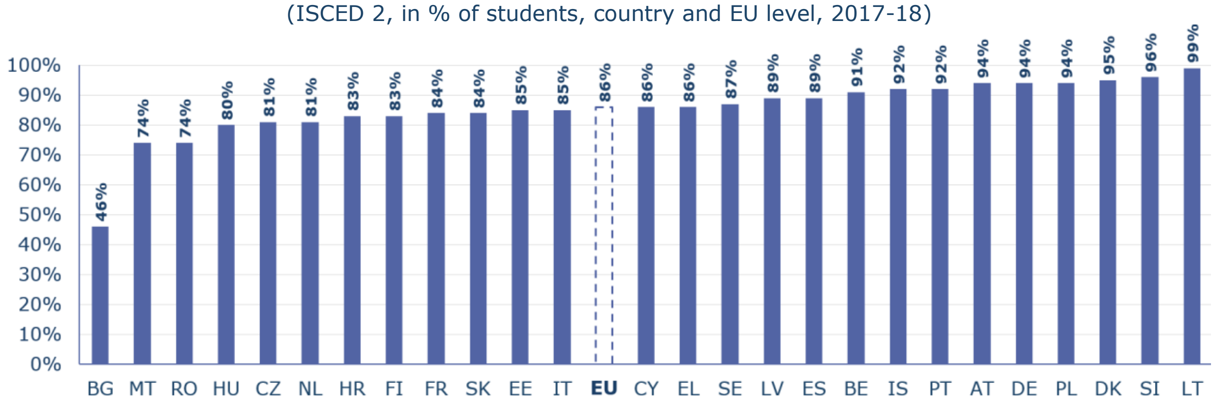
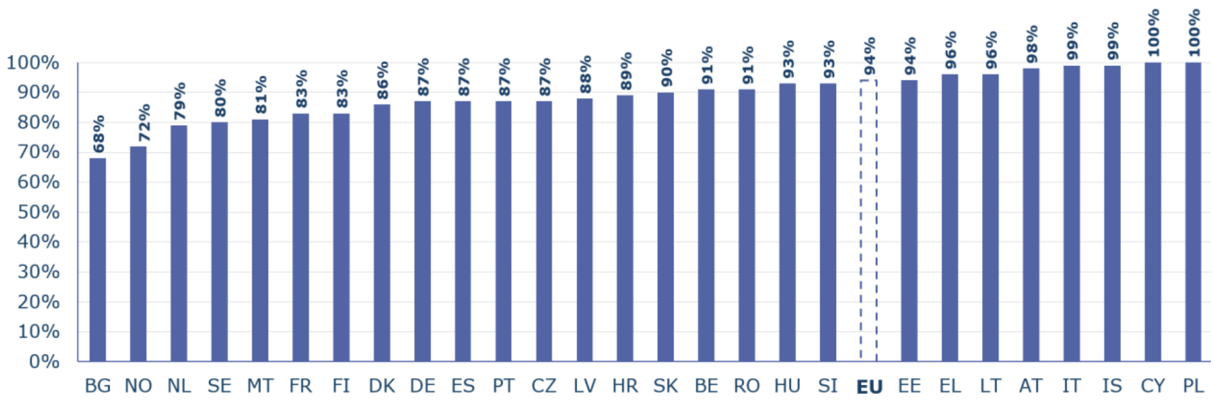


Fig. 1.13.c: Maintenance of equipment by school staff
(ISCED 3, in % of students, country and EU level, 2017-18)



In contrast to the above figures, external companies contracted by the school and education authorities are to a lesser extent used for equipment maintenance (see figures 1.14.a to 1.14.c).

Fig. 1.14.a: Maintenance of equipment by an external entity
(ISCED 1, in % of students, country and EU level, 2017-18)

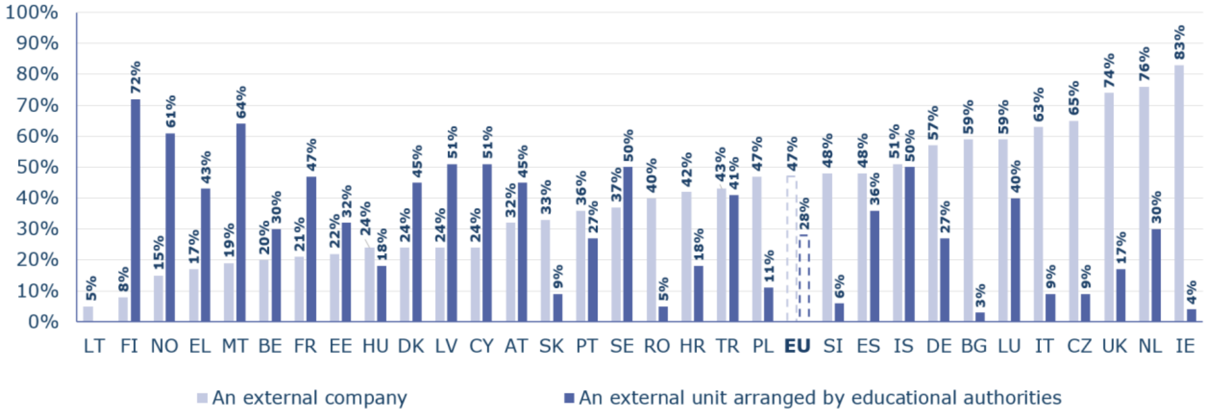


Fig. 1.14.b: Maintenance of equipment by an external entity
(ISCED 2, in % of students, country and EU level, 2017-18)

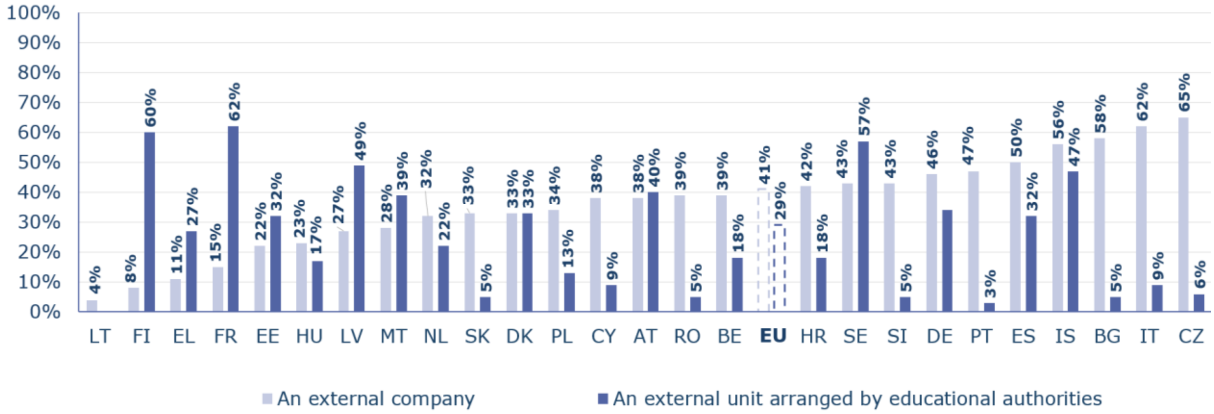
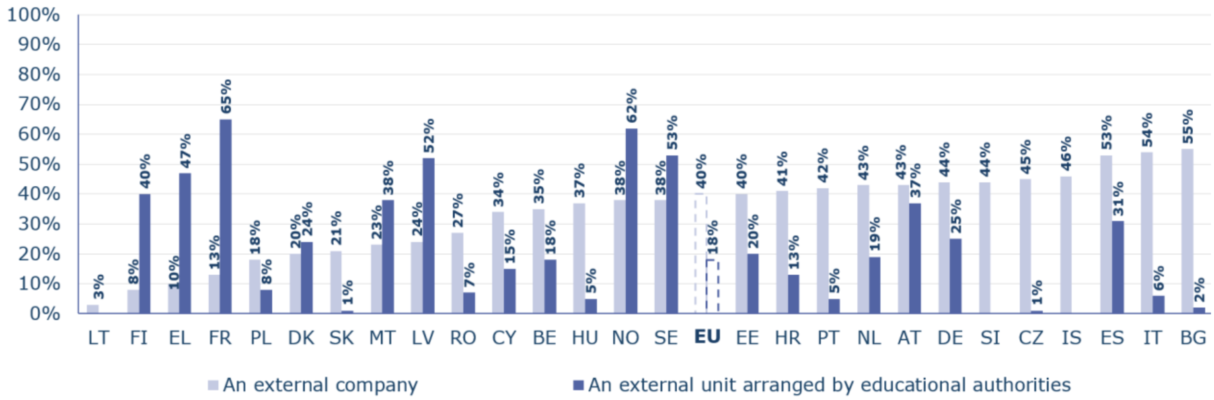


Fig. 1.14.c: Maintenance of equipment by an external entity
(ISCED 3, in % of students, country and EU level, 2017-18)



1.1.5. Cluster analysis: the digitally equipped and connected school

A cluster analysis was performed on survey data covering the four different areas depicted below, in order to detect two different school profiles with similar levels of connectedness and access to digital equipment:

- Equipment provision: numbers of desktop computers, laptops or notebooks, interactive whiteboards and digital cameras per 100 students (questions SC07_01, SC07_03, SC07_07, and SC07_08);

- The proportion of fully operational equipment (question SC08Q01);

- The Internet speed at school and type of Internet access (ADSL, cable, fibre, wireless LAN) (questions SC11Q01 and SC12Q011 - SC12Q017);

- Indicators of having access to digital content: having an own website publicly accessible, school email addresses for more than 50% of students and teachers, a student data management system, a virtual learning environment, a platform used for online school-home communication, a LAN (questions SC14Q01 - SC14Q15).

Figures 1.15.a to 1.15.c give an overview of these types of digitally equipped and connected schools over the different ISCED levels for the different countries. At the European level, on average, we find that the higher the ISCED level, the higher the likelihood that European students attend schools that belong to the cluster of highly digitally equipped and connected schools. In addition, we see that especially students from Nordic countries attend highly digitally equipped and connected schools. More precisely, 35%, 52% and 72% of ISCED 1, ISCED 2, and ISCED 3 European students attend schools that belong to the cluster of highly digitally equipped and connected schools.

Fig. 1.15.a: Digitally equipped and connected schools
(ISCED 1, in % of students, country and EU level, 2017-18)

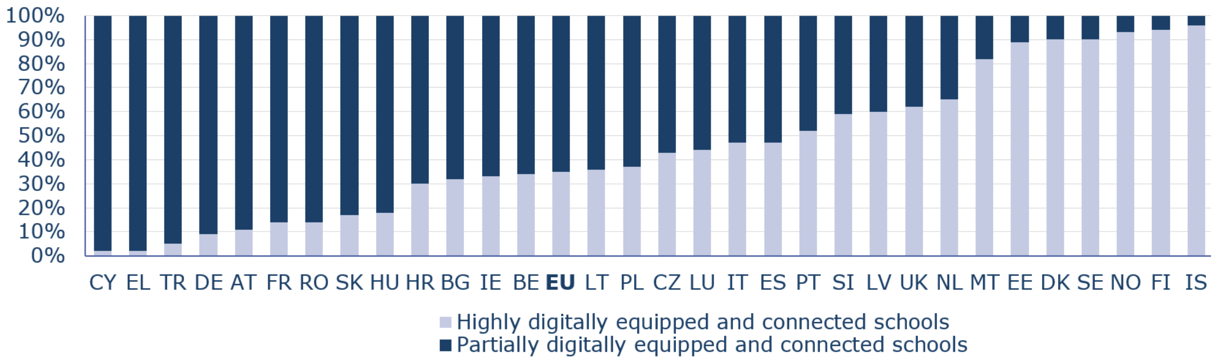


Fig. 1.15.b: Digitally equipped and connected schools
(ISCED 2, in % of students, country and EU level, 2017-18)

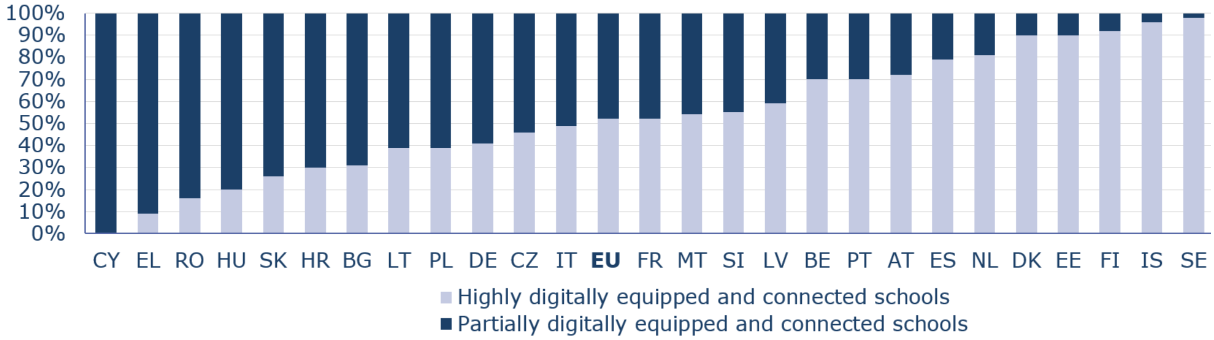
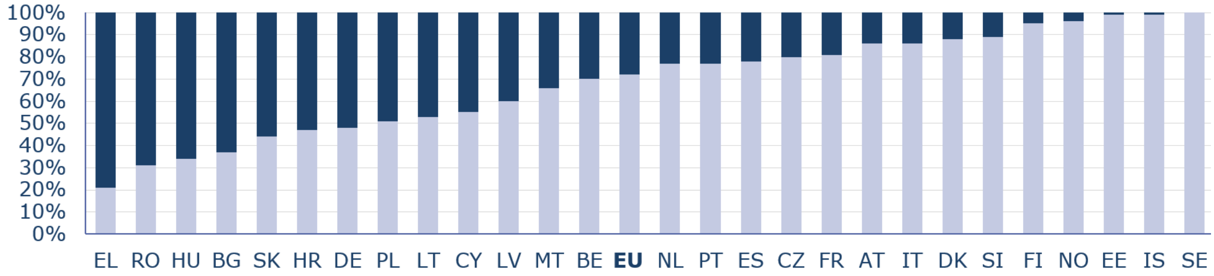


Fig. 1.15.c: Digitally equipped and connected schools

(ISCED 3, in % of students, country and EU level, 2017-18)



1.2. Use (and non-use) of digital technologies

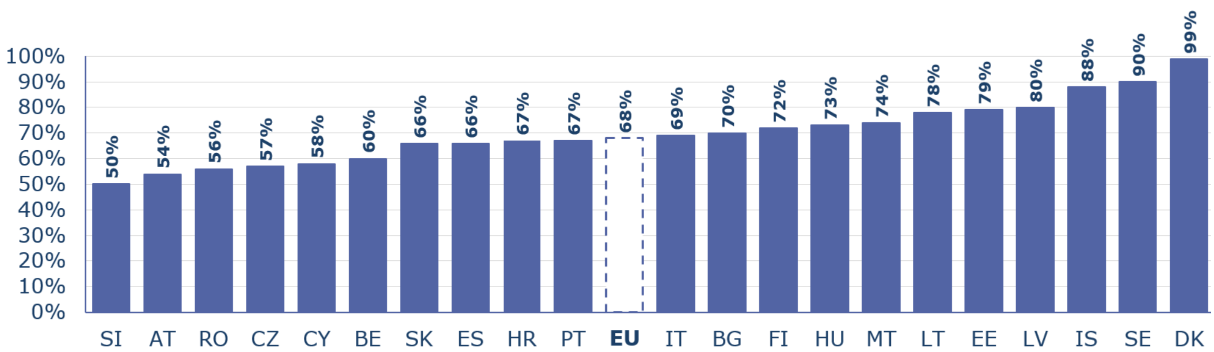
The provision of Internet connectivity and digital equipment is a key element for schools to be able to exploit the many benefits that digital technologies bring to teaching and learning. However, having access to digital technologies does not automatically translate into high rates of use. The goal of this section is therefore to provide insights into the use of digital technologies both by students and by teachers. In addition, this section presents some figures related to teachers' perceived obstacles preventing them from using digital technologies to a higher extent.

1.2.1. Students' use of digital technologies

In this first subsection[14], insight is given into students' use of Internet at school for learning purposes. Figures 1.16.a and 1.16.b, show for ISCED levels 2 and 3 respectively, the percentage of students who use the Internet at school for learning purposes at least once a week[15]. On average, in Europe, 68% of students at ISCED level 2 and 73% of students at ISCED level 3 use the Internet at least once a week for learning purposes. A minimum of 50% of all students in all countries at these two ISCED levels report using the Internet at school for learning purposes at least once a week. In several Nordic countries (Iceland, Denmark and Sweden), the percentage of students who use Internet at school for learning purposes is particularly high. Nordic countries seem thus to be frontrunners in the use of Internet at school.

Fig. 1.16.a: Students who use the Internet at school for learning purposes – At least once a week

(ISCED 2, in % of students, country and EU level, 2017-18)



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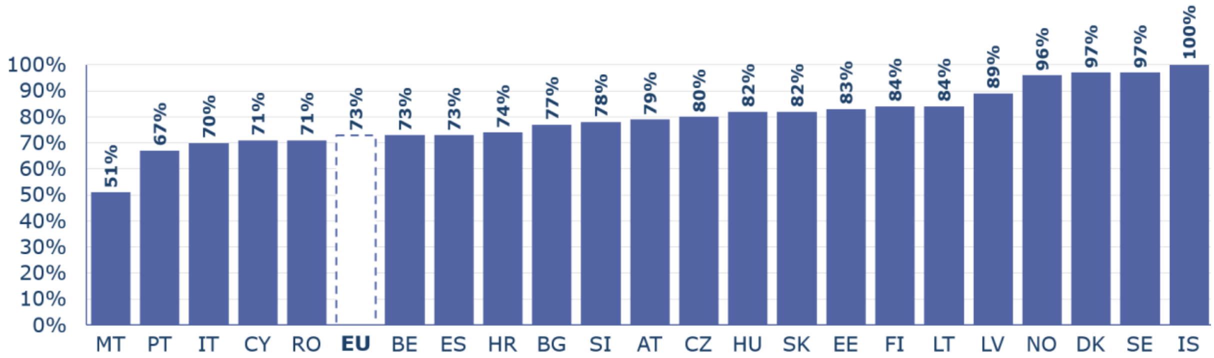
[14] While the questionnaires at the school, teacher and parent level were conducted for 3 ISCED levels (ISCED level 1, 2 and 3), students only participated at ISCED levels 2 and 3. In this chapter, therefore, only data is presented for ISCED levels 2 and 3.

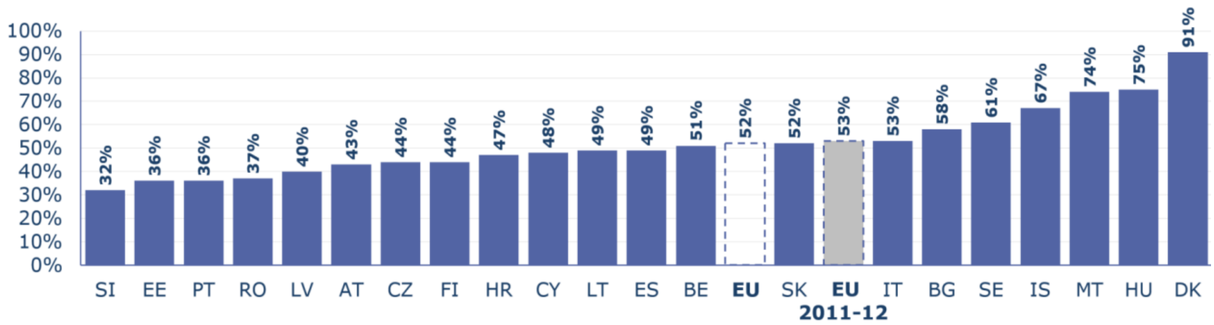
[15] The share of students who use the Internet at least once a week for learning purposes has been calculated by summing up two response options "At least once a week" and "Every day or almost every day".

Fig. 1.16.b: Students who use the Internet at school for learning purposes – At least once a week
(ISCED 3, in % of students, country and EU level, 2017-18)



Figures 1.17.a and 1.17.b[16] give insight into the use of a computer (including desktop computers and laptops/notebooks) at school for learning purposes. On average, in Europe, more than half of students at ISCED levels 2 and 3, respectively, use computers for learning purposes at least once a week[17]. In addition, figure 1.17.a shows that the percentage of students who use a computer at least once a week for learning purposes has remained stable compared to the '1st Survey of Schools: ICT in Education' for ISCED level 2 (European Commission, 2013a).

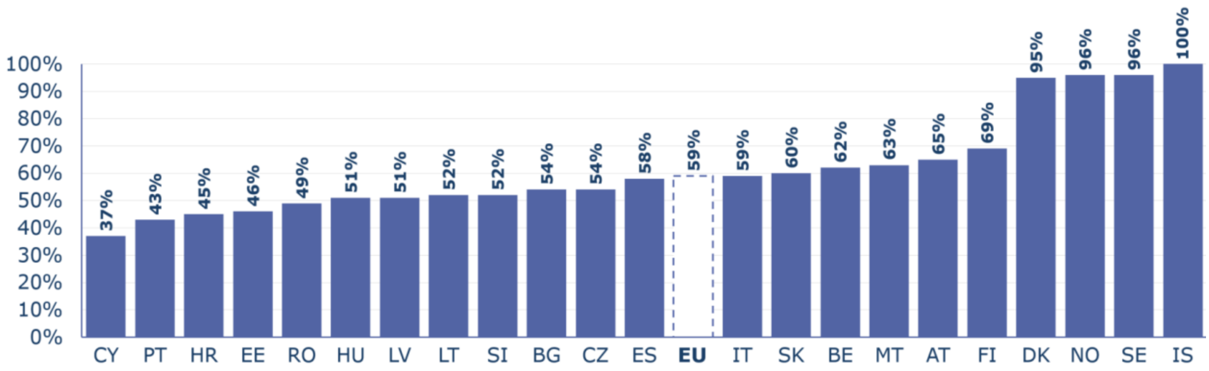
Fig. 1.17.a: Students who use a computer (desktop/laptop/notebook) at school for learning purposes – At least once a week
(ISCED 2, in % of students, country and EU level, 2017-18)



[16] For the graphs 1.17.a and 1.17.b, the question ST33 from the questionnaire was used, which asks students how regularly they use computers at school for learning purposes.

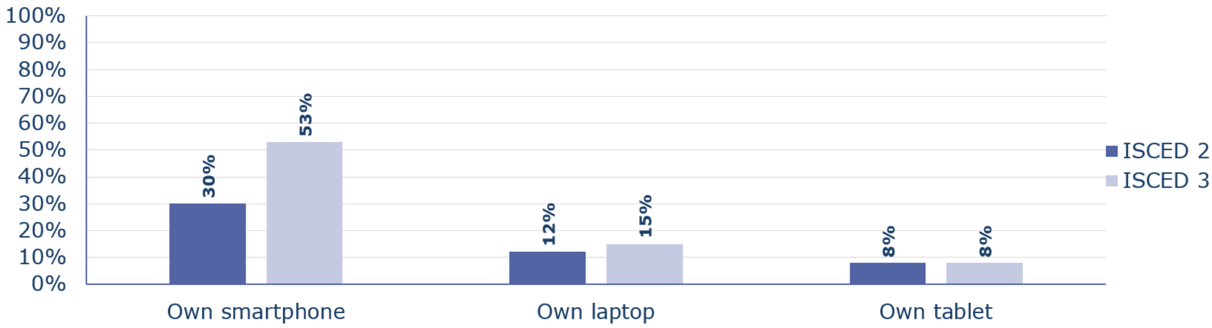
[17] The share of students who use computers for learning purposes at least once a week has been calculated by summing up two response options "At least once a week" and "Every day or almost every day".

Fig. 1.17.b: Students who use a computer (desktop/laptop/notebook) at school for learning purposes – At least once a week
(ISCED 3, in % of students, country and EU level, 2017-18)



In the survey, students from ISCED levels 2 and 3 were also asked whether they use their own digital equipment for learning purposes during lessons at schools. Figure 1.18 shows that across Europe, an own smartphone is the device students indicate to use the most for learning purposes during lessons at schools. More precisely, the results reveal that on average, between 30% and 53% of European students at ISCED levels 2 and 3 respectively, report using their own smartphone for learning purposes during lessons at least once a week. In addition, at European level, between 12% (ISCED 2) and 15% (ISCED 3) of students report using an own laptop at least once a week for learning purposes during lessons[18]. The own tablet is used weekly during lessons for learning purposes by 8% of the students, both at ISCED levels 2 and 3.

Fig. 1.18: Students who use an own equipment for learning purposes during lessons – At least once a week
(ISCED 2 and 3, in % of students, EU level, 2017-18)



Figures 1.19.a and 1.19.b give more insight into student's use of an own digital device for learning purposes during lessons at country level. The results reveal that there is again a high variance in the reported usage rates over the different countries. Denmark, for example, scores well above the European average with regard to students using an own laptop during lessons for learning purposes. Denmark is also the only country, next to Malta and Norway, where an own laptop seems to be used more intensively by students for learning purposes during lessons than an own smartphone. Figures 1.19.a and 1.19.b additionally reveal that, in contrast to the European average, students in Estonia, Lithuania, Latvia and Finland report a higher use of an own smartphone, compared to using computers provided by the school (see figures 1.17.a and 1.17.b). A possible explanation for the large country differences could be the implementation of an official

[18] The share of students who use an own equipment for learning purposes at least once a week has been calculated by summing up two response options "At least once a week" and "Every day or almost every day".

Bring Your Own Device (BYOD) policy in certain countries, allowing teachers and students to bring personally owned devices to school and to use those devices to access information, applications and services in order to support learning activities (European Commission, 2019a).[19] In Denmark, for example, the government encouraged BYOD, resulting in over two-thirds of schools adopting BYOD (Adkins, 2013). This could explain the high number of students using their own laptop for learning purposes during lessons in Denmark.

Fig. 1.19.a: Students who use an own equipment for learning purposes during lessons – At least once a week

(ISCED 2, in % of students, country and EU level, 2017-18)

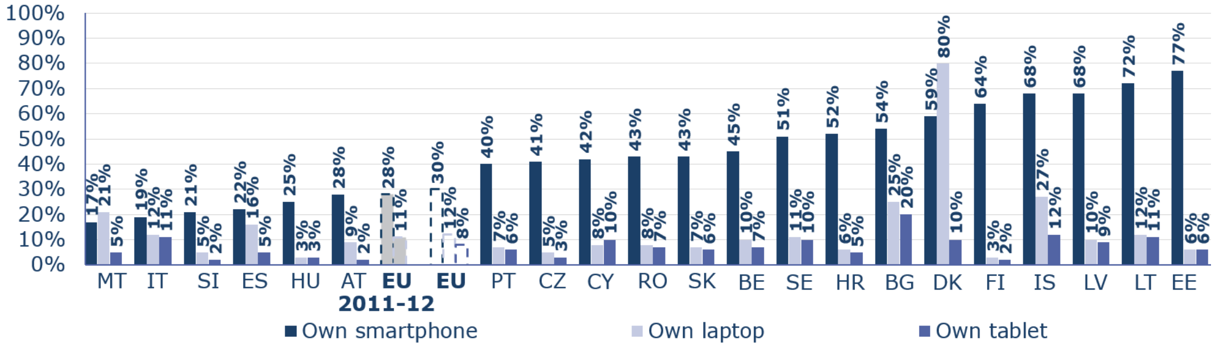


Fig. 1.19.b: Students who use an own equipment for learning purposes during lessons – At least once a week

(ISCED 3, in % of students, country and EU level, 2017-18)

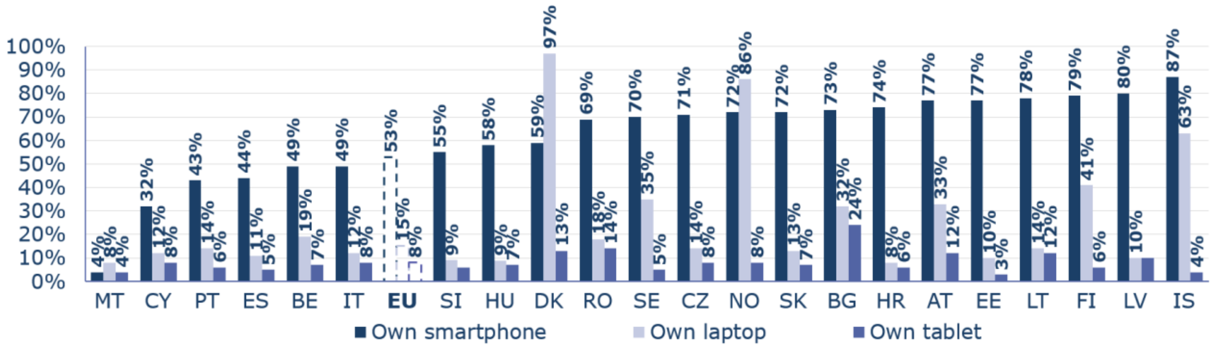
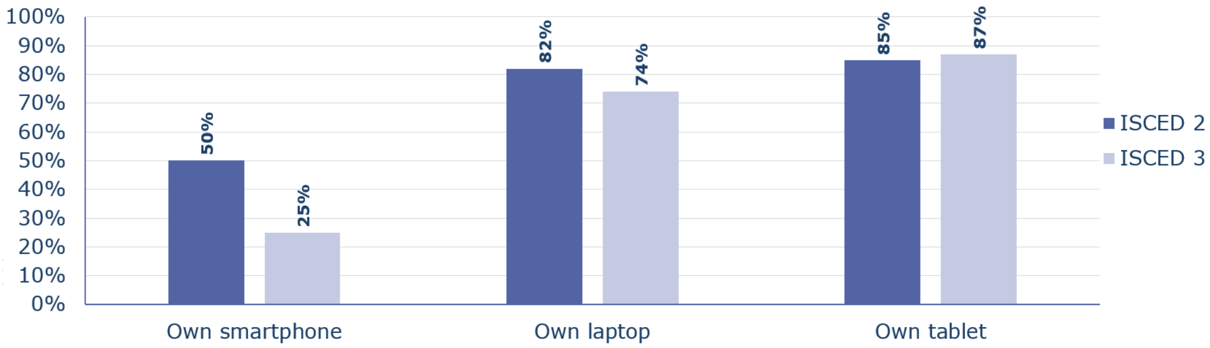


Figure 1.20.a provides evidence that there is still a significant share of students who never or almost never use own digital devices (including an own smartphone, an own laptop, an own tablet) for learning purposes at school. The data reveal that 82% of ISCED 2 students and 74% of ISCED 3 students never or almost never use an own laptop during lessons for learning purposes. In addition, 85% of ISCED 2 and 87% of ISCED 3 students never or almost never use an own tablet for learning purposes during lessons at school. In contrast, a much lower share of students indicate to never or almost never use an own smartphone for learning purposes during lessons. There are only between 50% and 25% of students at ISCED levels 2 and 3 respectively, who make no or very limited use of an own smartphone during lessons for learning purposes. To interpret the results, it has to be noted that the share of students who never or almost never use own equipment for learning purposes may also include students not owning such devices.

[19] For more information on this policy and the level of implementation in different countries, see "European Commission (2019). 2nd Survey of Schools: ICT in Education – Objective 2: Model for a 'highly equipped and connected classroom'. Luxembourg: European Commission. doi: 10.2759/831325". Recently, a technical advice for school leaders and IT administrators with regard to BYOD has been published (Attewell, 2017).

Fig. 1.20.a: Students who "never or almost never" use an own equipment for learning purposes
(ISCED 2 and 3, in % of students, EU level, 2017-18)



Figures 1.20.b and 1.20.c[20] provide country-level information on the percentage of students who never or almost never use a computer at school (reported for the last 3 months). The results show that approximately 20% of ISCED 2 students and 24% of ISCED 3 students in Europe indicate to never or almost never use a computer at school. In addition, figure 1.21.b shows that the share of students who never or almost never use a computer at school remained stable compared to the situation reported in the '1st Survey of Schools: ICT in education' at ISCED level 2 (European Commission, 2013a).

Fig. 1.20.b: Students who "never or almost never" used a computer at school in the last 3 months
(ISCED 2, in % of students, country and EU level, 2017-18)

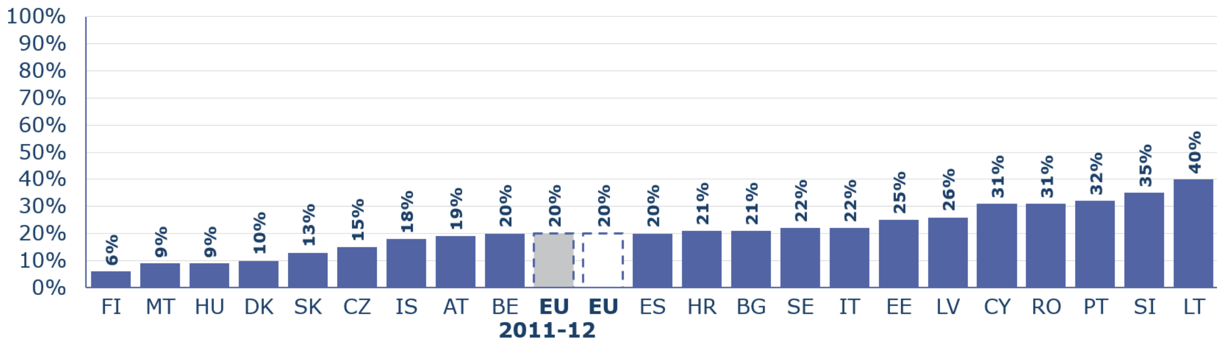
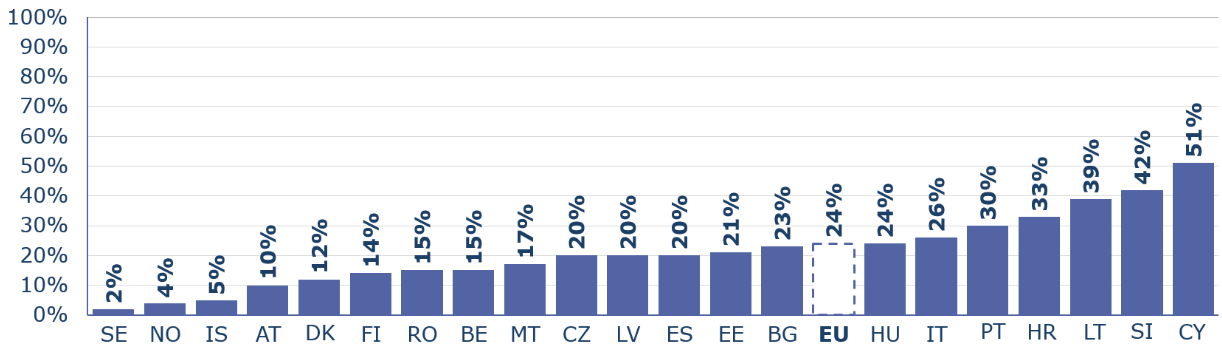


Fig. 1.20.c: Students who "never or almost never" used a computer at school in the last 3 months
(ISCED 3, in % of students, country and EU level, 2017-18)



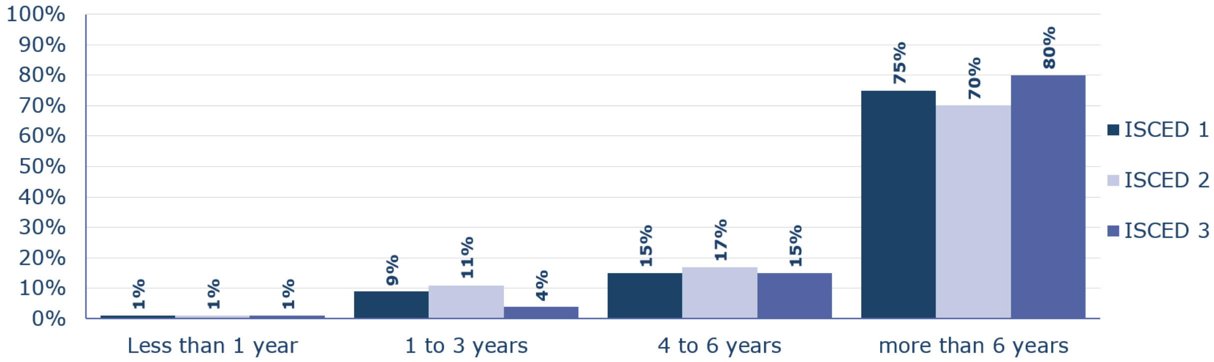
[20] For the graphs 1.20.b and 1.20.c, the question ST08Q01 from the questionnaire was used, which asks students how regularly they used computers at school in the last three months.

1.2.2. Teachers' use of digital technologies

The use of ICT in education largely depends upon teachers' experience with digital technologies. Teachers are vital for young learners in order to correctly develop and acquire the necessary knowledge and skills. It is recognised that curricula should promote innovative teaching and learning practices in order to respond to the needs of society (Brecko, Kampylis, & Punie, 2014). This can be done by integrating the use of ICT in the curriculum, which stimulates the use of ICT by both teachers and learners.[21]

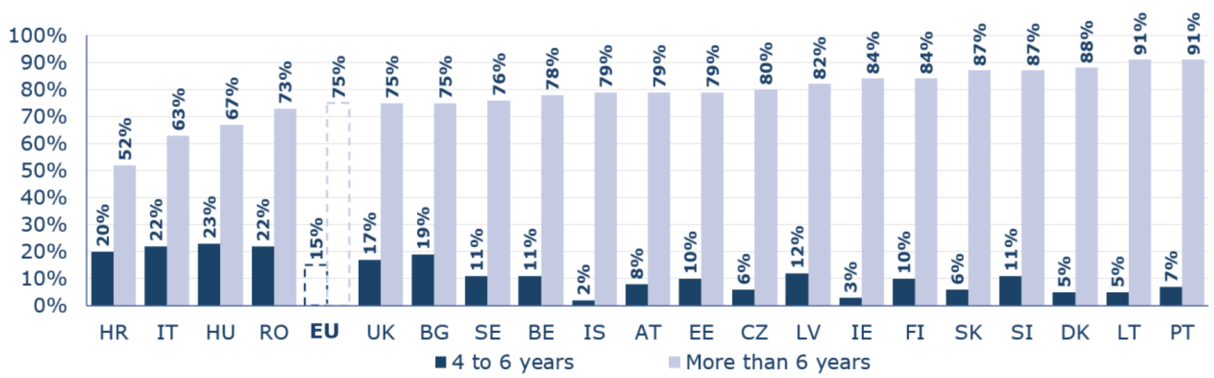
Figure 1.21 depicts the experience of teachers in using computers and/or the Internet at school. The results show that the majority of teachers at all ISCED levels have more than 6 years of experience in using computers and the Internet at school. Across all ISCED levels, there are very few teachers who have less than one year of experience in using computers and the Internet at school. It is important to note that this figure does not reflect how much teaching experience the teachers had. Some of the teachers who only started teaching recently would fall in any case into one of the lower categories.

Fig. 1.21: Teachers' experience in using computers/Internet at school by grade
(All ISCED level, in % of students, EU level, 2017-18)



Figures 1.22.a to 1.22.c focus on teachers' experience of more than 4 years of using computers and the Internet at school. In general, the results reveal important variations at the country level. While Croatia, for example, at ISCED 1, only has 52% of students with teachers having more than 6 years of experience with using computers and the Internet at school, other countries, including Portugal, Lithuania and Denmark, have close to or more than 90% of students who are taught by teachers who have more than 6 years of experience in using computers and the Internet at school.

Fig. 1.22.a: Teachers' experience in using computers/Internet at school
(ISCED 1, in % of students, country and EU level, 2017-18)



[21] The Swedish government, for example, added digital skills to the curriculum in secondary schools in order to strengthen the digital knowledge of students and teachers. For more information: see https://eacea.ec.europa.eu/national-policies/eurydice/content/digital-skills-enter-sweden-schools_en.

Fig. 1.22.b: Teachers' experience in using computers/Internet at school
(ISCED 2, in % of students, country and EU level, 2017-18)

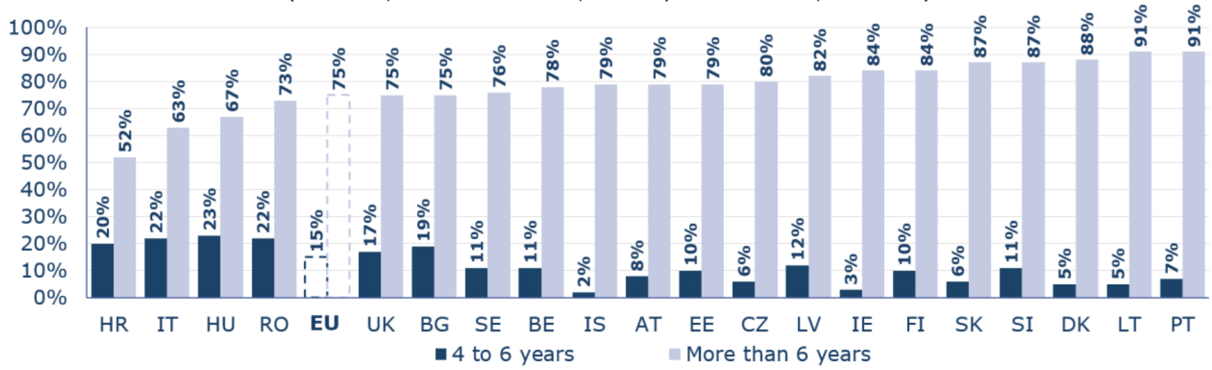
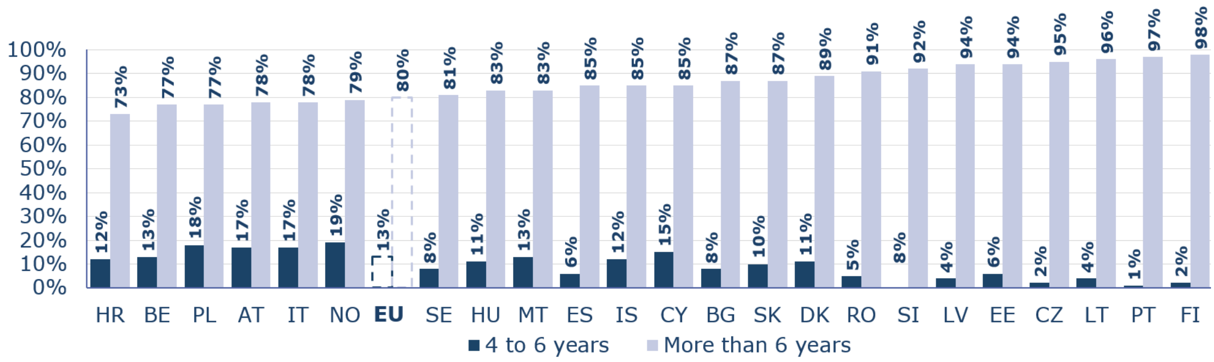


Fig. 1.22.c: Teachers' experience in using computers/Internet at school
(ISCED 3, in % of students, country and EU level, 2017-18)



Figures 1.23.a, 1.23.b and 1.23.c provide, across all ISCED levels, an overview of the intensity of use of digital technologies in lessons by teachers, over a 12 months timeframe. The results reveal that on average in Europe, 19%, 15% and 30% of European students have teachers who use ICT in more than 75% of lessons at ISCED levels 1, 2 and 3, respectively.

Fig. 1.23.a: Intensity of use of ICT in lessons by teachers over 12 months
(ISCED 1, in % of students, country and EU level, 2017-18)

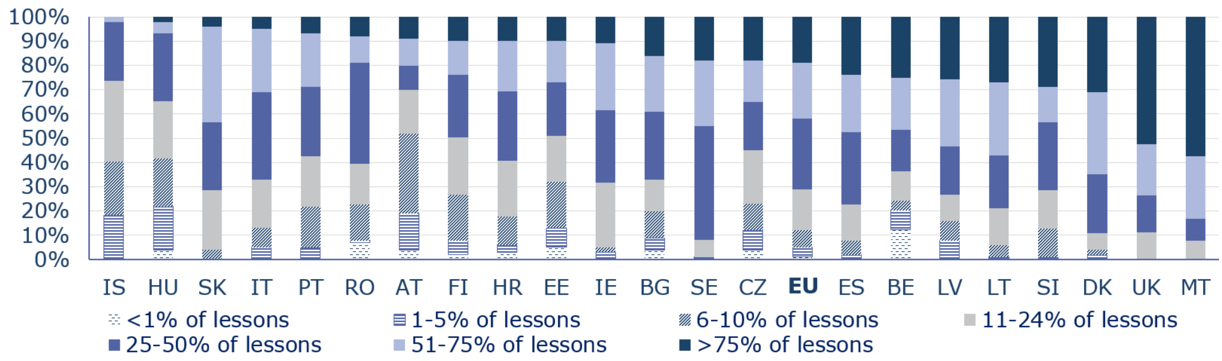


Fig. 1.23.b: Intensity of use of ICT in lessons by teachers over 12 months
(ISCED 2, in % of students, country and EU level, 2017-18)

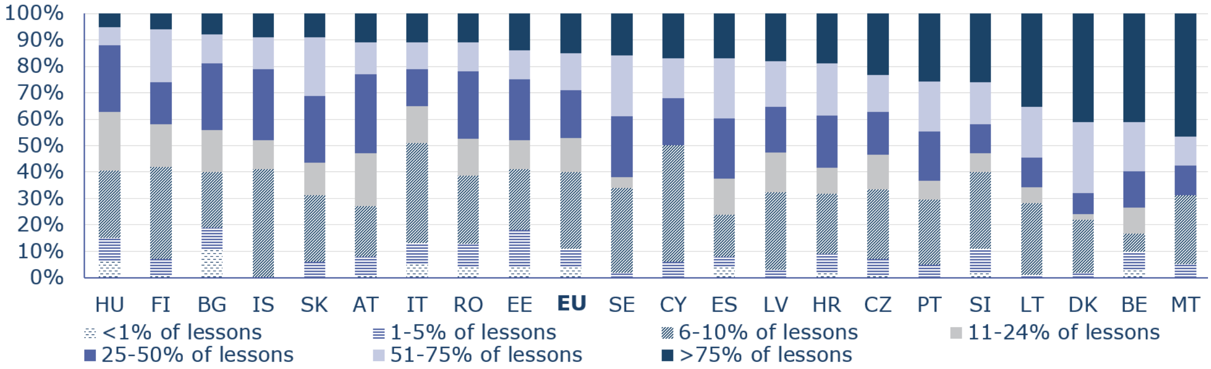
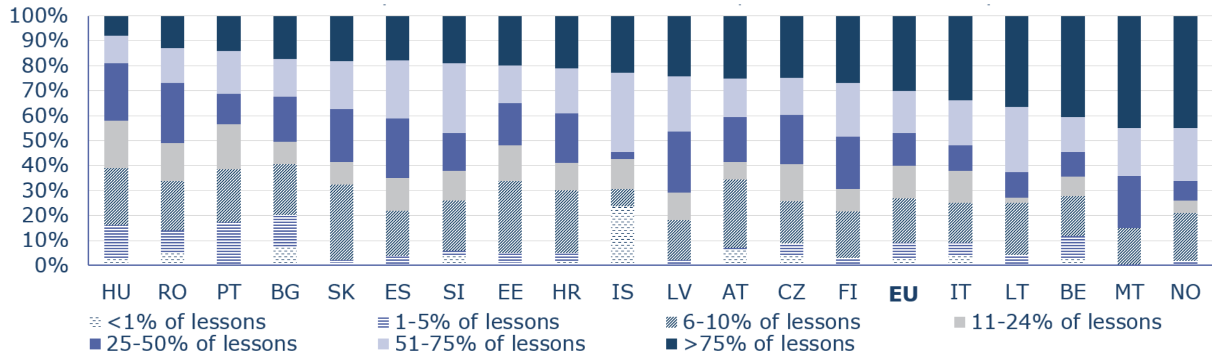


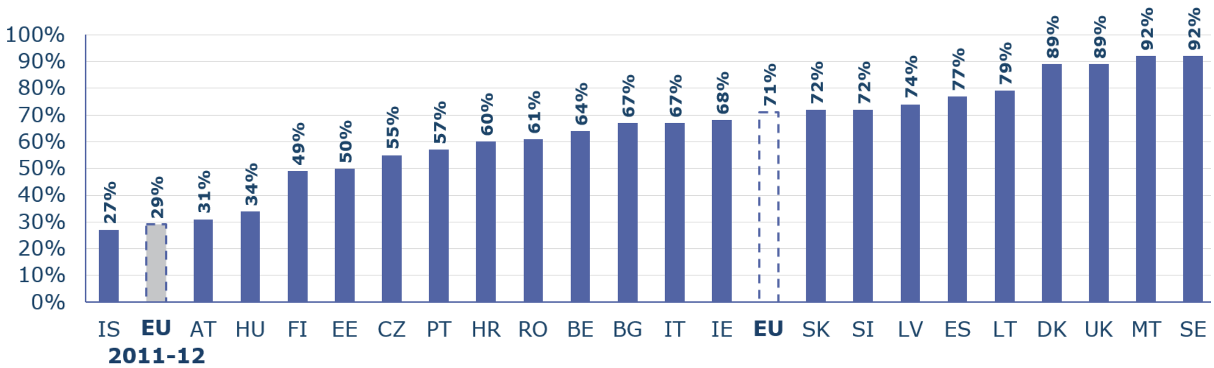
Fig. 1.23.c: Intensity of use of ICT in lessons by teachers over 12 months
(ISCED 3, in % of students, country and EU level, 2017-18)



Looking across the different ISCED levels, figures 1.24.a to 1.24.c suggest that 58% (ISCED 2), 65% (ISCED 3) and 71% (ISCED 1) of European students use ICT in more than 25% of lessons. Focusing on the individual figures on intensity of use of ICT per ISCED level, data reveals that there are nevertheless large variations across the different countries in terms of share of students whose teachers use ICT in more than 25% of lessons.

More precisely, figure 1.24.a shows that in Sweden, Malta, the United Kingdom and Denmark, for instance, close to 9 out of 10 ISCED level 1 students are taught by teachers who use ICT in more than 25% of lessons. In addition, the figure suggests that the percentage of ISCED level 1 students whose teachers use ICT in more than 25% of lessons, has increased by approximately 42 percentage points compared to the results reported in the '1st Survey of Schools: ICT in Education' (European Commission, 2013a).

Fig. 1.24.a: Teachers' use of ICT in more than 25% of lessons
(ISCED 1, in % of students, country and EU level, 2011-12 and 2017-18)



Figures 1.24.b to 1.24.c show similar results for the ISCED levels 2 and 3. These figures confirm again a large variability across countries. Figure 1.24.b also suggests that the percentage of ISCED 2 students whose teachers use ICT in more than 25% of lessons has increased by approximately 26 percentage points compared to the results reported in the '1st Survey of Schools: ICT in Education' (European Commission, 2013a).

Fig. 1.24.b: Teachers' use of ICT in more than 25% of lessons
(ISCED 2, in % of students, country and EU level, 2011-12 and 2017-18)

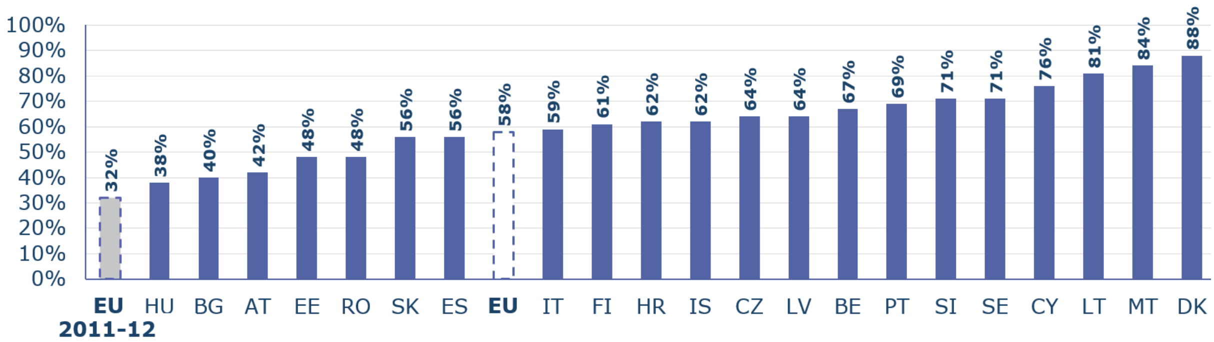
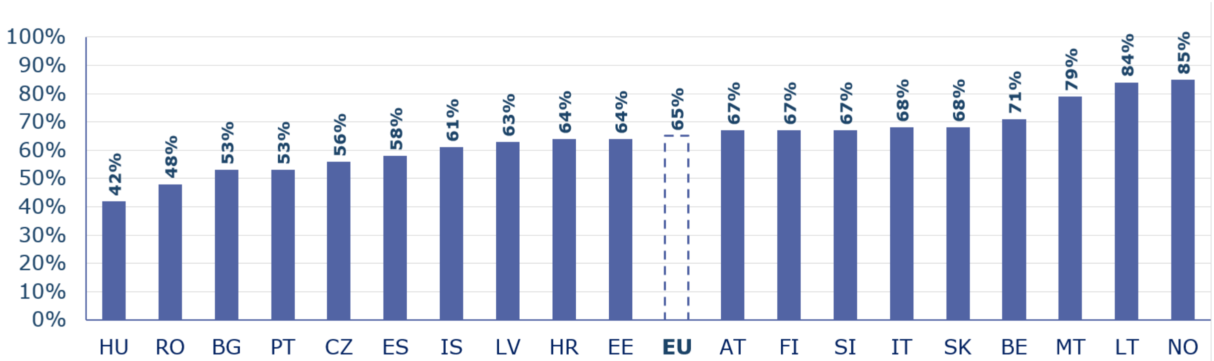


Fig. 1.24.c: Teachers' use of ICT in more than 25% of lessons
(ISCED 3, in % of students, country and EU level, 2011-12 and 2017-18)



1.2.3. Teachers' perceived obstacles to the use of digital technologies

The previous sections highlighted the large variations in the use of digital technologies by teachers during lessons at schools. In order to investigate the reasons why patterns of use vary, teachers were asked about the factors that, according to them, adversely affected their use of digital technologies in their lessons.

In total, 22 factors, regrouped in three major sets of obstacles were analysed:

1. **Equipment-related obstacles:** Insufficient number of computers; insufficient number of tablets provided by the school; insufficient number of laptops/notebooks; insufficient number of Internet connected computers; insufficient number of interactive whiteboards; school computers out of date and/or needing repair; and insufficient Internet bandwidth or speed;

2. **Pedagogy-related obstacles:** Lack of adequate skills of teachers; insufficient technical support for teachers; insufficient pedagogical support for teachers; lack of adequate content/ material for teaching; lack of content in national language; difficulty of integration of ICT in the curriculum; and lack of pedagogical models on how to use ICT for learning;

3. **Attitude-related obstacles:** Resistance of parents; resistance of teachers; lack of interest of teachers; no or unclear benefit to use ICT for teaching; and the use of ICT in teaching and learning not being a goal in the school.

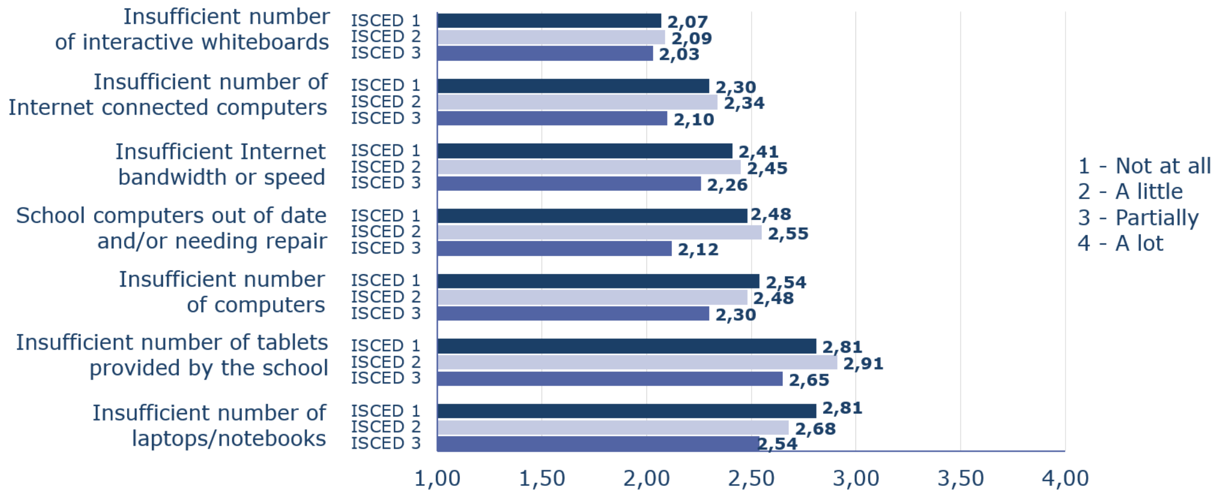
Three items did not fall into any of these three sets of obstacles: school time organisation (fixed lesson time, etc.), school space organisation (classroom size and furniture, etc.), and pressure to prepare students for exams. These items are reported separately below in Fig. 1.28. In general, results suggest that equipment-related obstacles were perceived as most important in adversely affecting the use of digital technologies by teachers. Relative to equipment-related obstacles and the other obstacles discussed, teachers seem to perceive attitude-related obstacles as less of an issue.

1.2.3.1. Equipment-related obstacles

In general, the results in figure 1.25 show that students have teachers who perceive an insufficient provision of digital devices (particularly an insufficient number of tablets and laptops/notebooks) as the most important obstacle adversely impacting the use of digital technologies for the teaching and learning.

Fig. 1.25: Teachers' perception of equipment-related obstacles to the use of ICT in teaching and learning

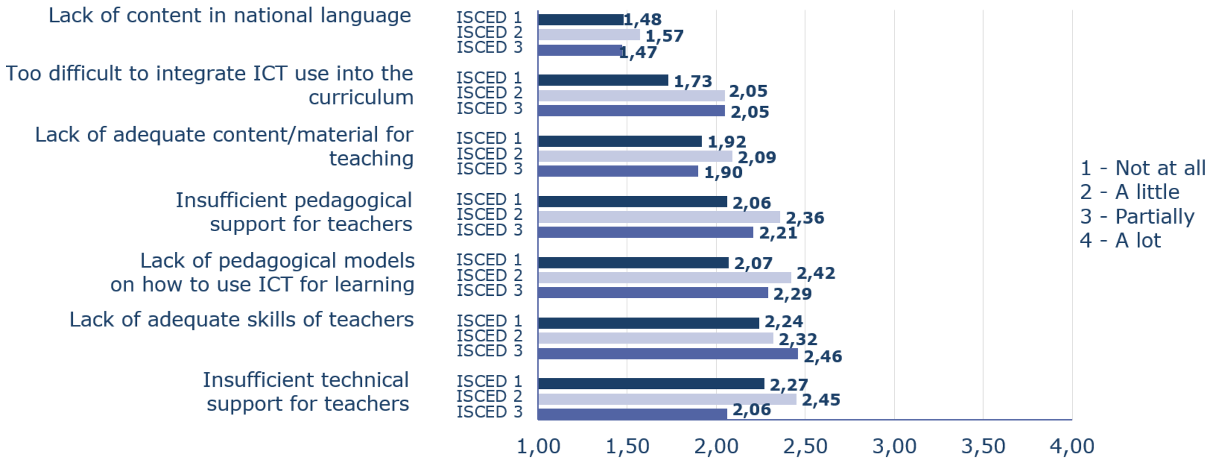
(All ISCED levels, EU level, 2017-18)



1.2.3.2. Pedagogy-related obstacles

As already stated above, equipment itself is a key requirement in order to use digital technologies. Next to a lack of equipment, pedagogical-related obstacles could also negatively affect the use of ICT in teaching and learning. Within the category of pedagogy-related obstacles, teachers especially perceive a lack of pedagogical models on how to use ICT for learning as an important obstacle, next to insufficient technical support for teachers, a lack of adequate skills of teachers and insufficient pedagogical support for teachers (figure 1.26).

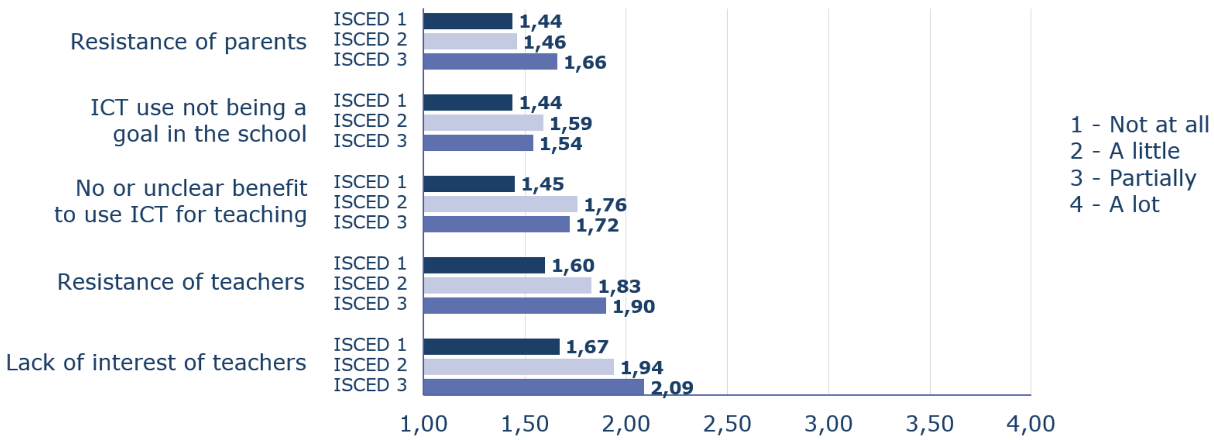
Fig. 1.26: Teachers' perception of pedagogy-related obstacles to the use of ICT in teaching and learning
(All ISCED levels, EU level, 2017-18)



1.2.3.3. Attitude-related obstacles

Figure 1.27 shows the extent to which teachers perceive attitude-related obstacles as negatively influencing their use of digital technologies for teaching and learning. In general, these factors seem to be perceived as less important compared to equipment-related obstacles or pedagogy-related obstacles. Nevertheless, these figures reveal some interesting findings. Within the set of attitude-related obstacles, 'ICT use not being a goal in the school' and 'resistance of parents' are least perceived as obstacles to the use of ICT in teaching and learning. Within the category of attitude-related obstacles, especially teachers at ISCED level 3 indicate that a lack of interest of teachers is the most crucial obstacle to the use ICT for teaching and learning.

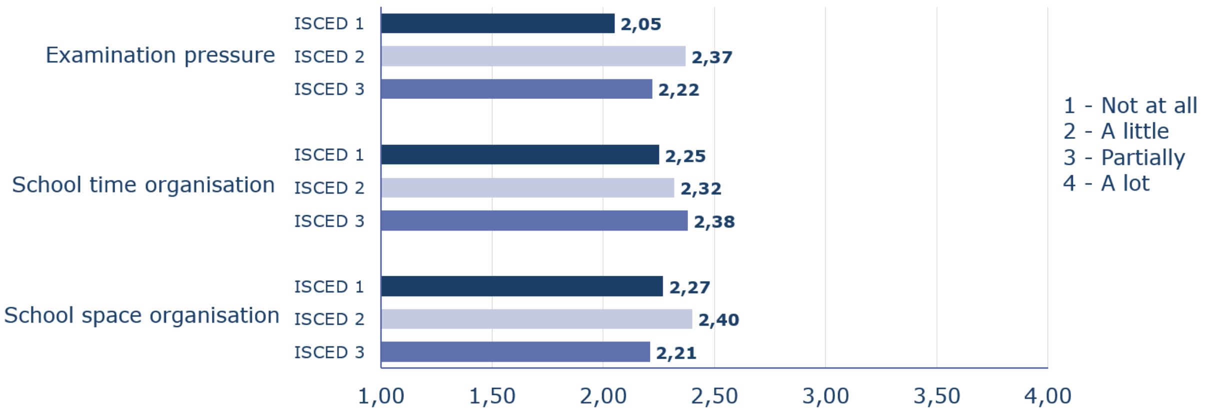
Fig. 1.27: Teachers' perception of attitude-related obstacles to the use of ICT in teaching and learning
(All ISCED levels, EU level, 2017-18)



1.2.3.4. Other obstacles

Other items that could adversely affect the use of ICT in teaching and learning are the school time organisation, the school space organisation and the pressure to prepare students for exams and tests. Nevertheless, figure 1.28 shows that within this category, the use of ICT in teaching and learning is similarly adversely affected by those three items.

Fig. 1.28: Teachers' perception of other obstacles to the use of ICT in teaching and learning
(All ISCED levels, EU level, 2017-18)



2. TEACHERS AND STUDENTS: DIGITAL ACTIVITIES AND CONFIDENCE OF TEACHERS AND STUDENTS IN THEIR DIGITAL COMPETENCE

This section looks in more detail at different **ICT-based activities** and **the confidence** in the **own digital competence** of teachers (**section 2.1**) and students (**section 2.2**).

Summary of Key Findings

- Across all ISCED levels, more than 90% of students have teachers using ICT to prepare lessons.
- 60% of students in all ISCED levels have teachers who use **digital technologies to communicate with parents**.
- There is a higher frequency of **communication via emails and apps** between teachers and students at higher ISCED levels.
- Teachers are most confident in their own **digital competence** in the areas of **safety**, **communication**, **collaboration** as well as **information and data literacy**.
- In terms of **digital content creation**, teachers feel most confident with basic activities (e.g. producing texts) while they feel least confident in more complex tasks (e.g. coding).
- **Male teachers** feel more confident in coding/programming across all ISCED levels compared to female teachers.¨
- Only 3% of ISCED level 2 students and 6% of ISCED level 3 students engage in **coding activities** on a highly frequent basis (e.g. every day or almost every day). Between 76% and 79% of students in ISCED levels 3 and 2, respectively, never or almost never undertake coding activities during lessons.
- **Male students** engage more frequently in coding/programming during lessons than female students.
- Students seem to be **most confident in the digital competence areas** communication and collaboration and least confident in the digital competence areas related to problem solving and digital content creation.
- Compared to teachers, students seem to be somewhat less confident in performing fairly basic tasks such as producing a text file. **Students** seem to be **more confident** than teachers regarding **coding and programming apps, programs or robots**.
- **Male students** feel **more confident in coding/programming** across all ISCED levels compared to female students.

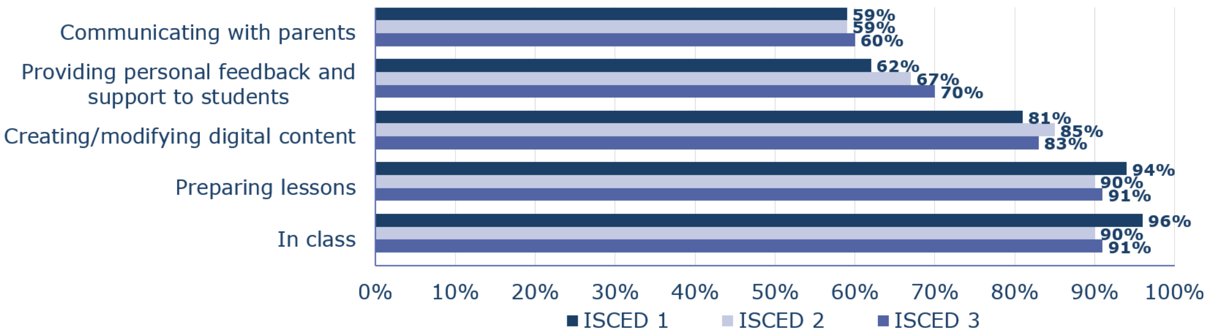
2.1. Teachers' digital activities and confidence in their digital competence

2.1.1. Teachers' digital activities

2.1.1.1. Teachers' ICT based activities with the class

Teachers can use digital technologies for a variety of activities related to teaching. Figure 2.1 gives an overview of the activities for which teachers report ICT use over a 3-months timeframe. Overall, approximately 9 out of 10 students across all ISCED levels are in schools where teachers use ICT in class or to prepare lessons. More precisely, between 90% (ISCED 2) and 94% (ISCED 1) of students are in schools where teachers report using ICT to prepare lessons, and between 90% (ISCED 2) and 96% (ISCED 1) of students are in schools where teachers report using ICT in class. Interestingly, the figure suggests that the percentage of teachers using ICT for preparing lessons and in class is somewhat higher at ISCED level 1 than at ISCED levels 2 and 3. In addition, there are between 59% (ISCED 1 and 2) and 60% (ISCED 3) of students in schools where teachers report ICT use for communicating with parents. Similarly, between 62% (ISCED 1), 67% (ISCED 2) and 70% (ISCED 3) of students attend schools where teachers report using ICT for providing personal feedback and support to students.

Fig. 2.1: Students whose teachers report ICT use in the last 3 months
(All ISCED levels, in % of students, EU level, 2017-18)



Figures 2.2.a to 2.2.c give a more detailed overview of different ICT activities related to teaching for all ISCED levels. At ISCED level 1, many students have teachers who browse or search the Internet to collect information to prepare lessons. 61% of ISCED 1 students have teachers who do this every day or almost every day respectively, which is significantly higher than the figures reported in the '1st Survey of Schools: ICT in Education' (European Commission, 2013a). Not surprisingly, most of the ISCED 1 students have teachers who do not communicate with them via email, mobile applications, a smartphone or a tablet or via online tools / platforms on a computer. In contrast, figures 2.2b and 2.2c show that there is a higher frequency of communication via emails and apps between teachers and students at higher ISCED levels.

Fig. 2.2.a: Frequency of teachers' ICT based activities
(ISCED 1, in % of students, EU level, 2011-12 and 2017-18)

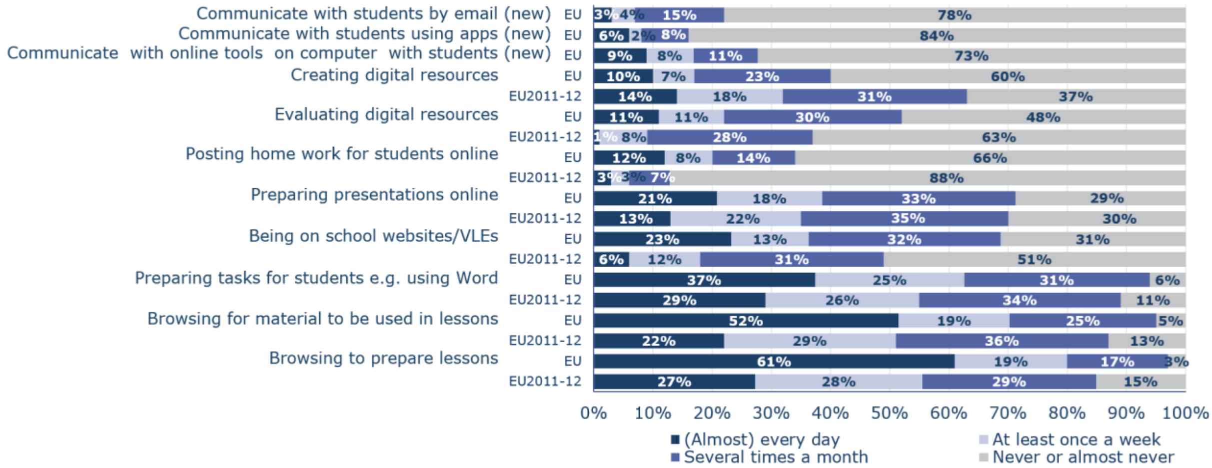


Fig. 2.2.b: Frequency of teachers' ICT based activities
(ISCED 2, in % of students, EU level, 2011-12 and 2017-18)

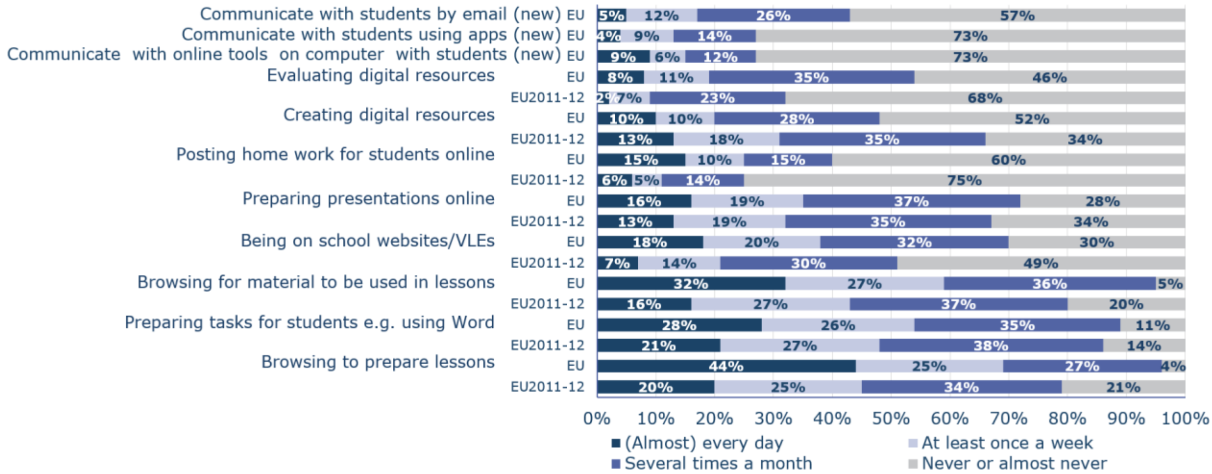
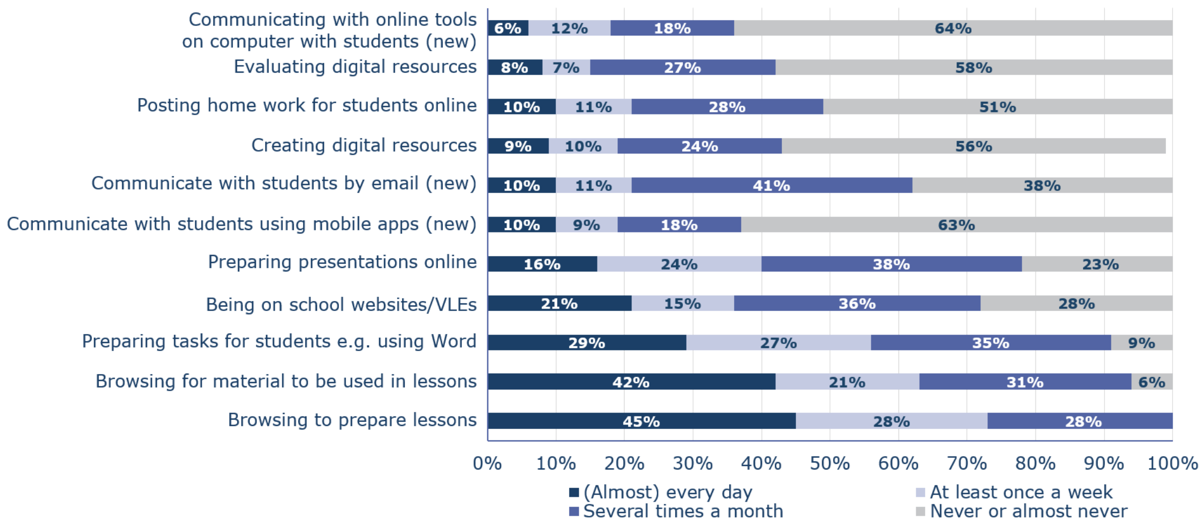


Fig. 2.2.c: Frequency of teachers' ICT based activities
(ISCED 3, in % of students, EU level, 2017-18)

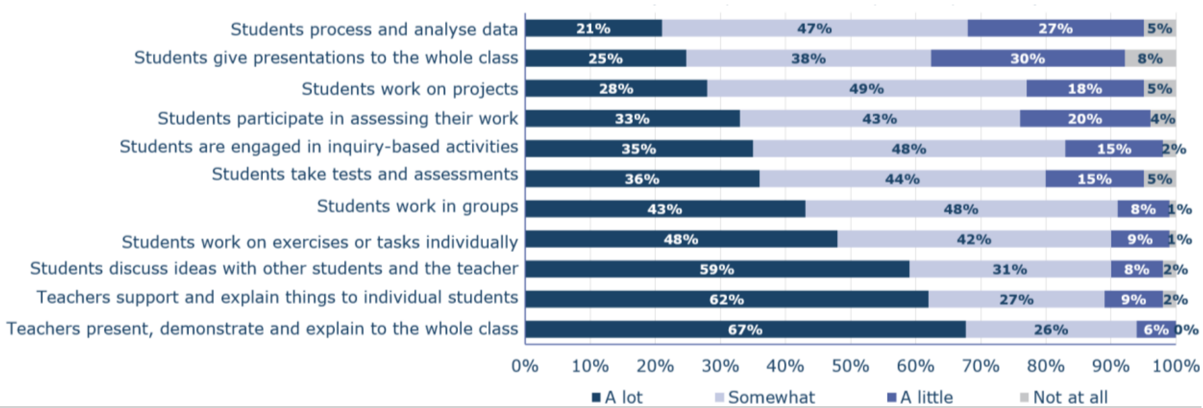


2.1.1.2. Student- versus teacher-centred teaching (with or without ICT)

Teaching can be done in a variety of ways. With traditional teacher-centered teaching approaches, teachers usually transmit information to rather passive recipients, i.e. the students. In contrast, more student-centred teaching models, allowing students to learn at their own pace, has been acknowledged by many experts to be beneficial for students. The PISA 2015 study, for example, found that students score higher in science when their science teachers adapted the lessons to individual needs and provided more individual feedback.[22] With the possibilities offered by digital technologies, it is possible to increase the focus on student-centred activities and increase, amongst others, the level of self-assessment, peer feedback and e-portfolios (Brecko, Kampylis, & Punie, 2014).

Figures 2.3.a to 2.3.c give an overview of the extent to which students are taught by teachers that implement different student- and teacher-centred activities. The results reveal that teachers seem to be less engaged in student-centred activities (e.g. students working on projects) in comparison to more traditional teacher-centred activities (e.g. teachers give a presentation to the class). At all ISCED levels, at least 6 out of 10 students are taught by teachers who frequently engage in presenting, demonstrating and explaining a topic to the whole class. Nevertheless, it has to be noted that some of the more student-centred activities also seem to be regularly implemented by teachers. At ISCED level 1 for example, nearly 59% of students have teachers who frequently let students discuss ideas with other students and the teacher. In general, it seems that the student-centred activities are implemented on a more regular basis at ISCED level 1 compared to ISCED levels 2 and 3.

Fig. 2.3.a: Student and teacher-centered activities implemented by teachers
(ISCED 1, in % of students, EU level, 2017-18)



[22] For more information on the PISA 2015 study, see http://www.oecd.org/pisa/.

Fig. 2.3.b: Student and teacher-centered activities implemented by teachers
(ISCED 2, in % of students, EU level, 2017-18)

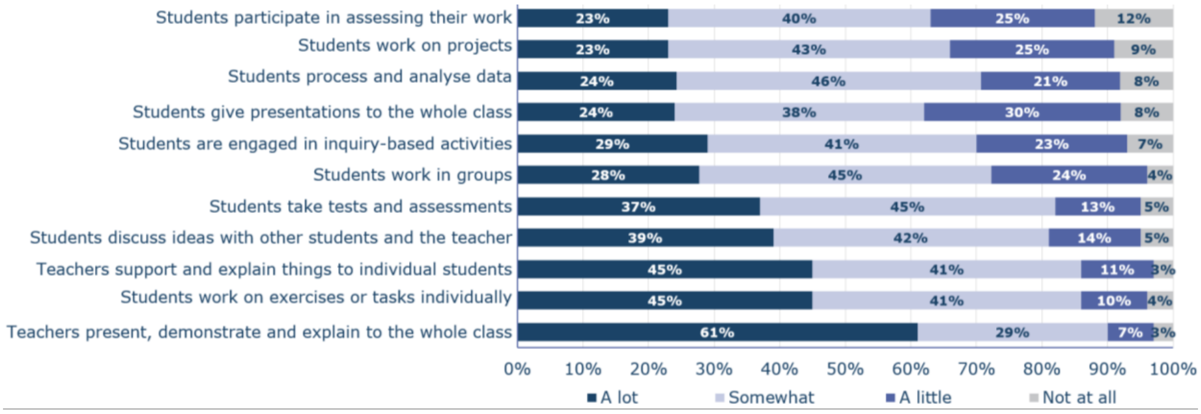
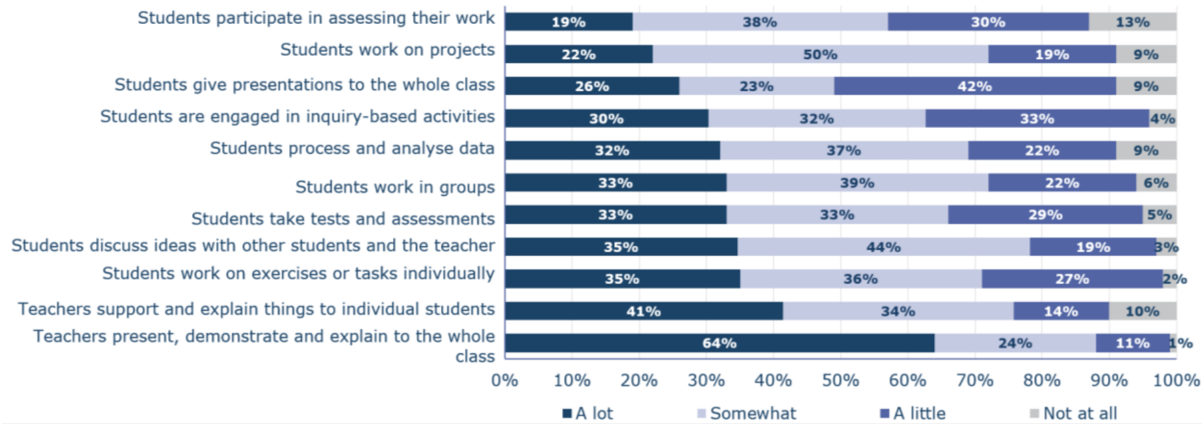


Fig. 2.3.c: Student and teacher-centered activities implemented by teachers
(ISCED 3, in % of students, EU level, 2017-18)



2.1.2. Confidence of teachers in their digital competence

The Digital Competence Framework for Citizens (DigComp), which was created by the European Commission, Joint Research Centre in Seville on behalf of DG EAC and EMPL, is used in order to match several questions on teachers' confidence from the survey with the five categories of the DigComp framework.[23] This DigComp framework identifies the key components of digital competence in 5 areas:

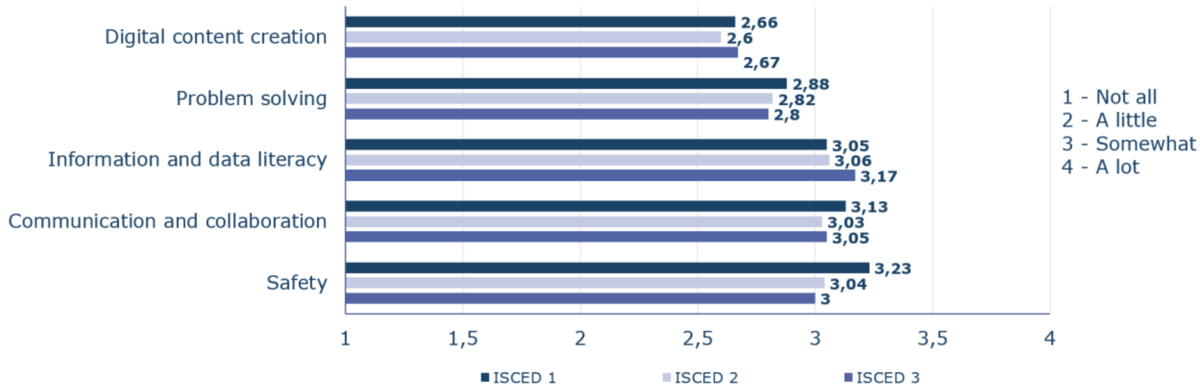
- **Information and data literacy:** Searching, evaluating, managing data, information and digital content;
- **Communication and collaboration**: Interacting, sharing, engaging, collaborating through digital technologies and managing digital identity;
- **Digital content creation:** Developing digital content, programming, understanding Copyright and licences;
- **Safety:** Protecting devices, personal data and privacy and well-being;

[23] For more information on the Digital Competence Framework for Citizens, see https://ec.europa.eu/jrc/en/digcomp/digital-competence-framework.

- **Problem solving:** Solving technical problems, identifying needs and technological responses and digital competence gaps.

Since competence was not directly measured in this survey, the confidence level of teachers is used as an approximate measure of digital competence. Figure 2.4. presents these five categories for teachers. Per category, the European average for each ISCED level is shown. The results reveal that teachers seem to be most confident in the DigComp areas safety, communications and collaboration, as well as information and data literacy. Teachers seem to be least confident in the area of digital content creation.

Fig. 2.4.: Confidence of teachers in their digital competence (based on the DigComp framework)
(All ISCED levels, EU level, 2017-18)



Figures 2.5.a to 2.5.c show the 5 areas of the DigComp framework for the different countries.

Fig. 2.5.a: Confidence of teachers in their digital competence (based on the DigComp framework)
(ISCED 1, country and EU level, 2017-18)

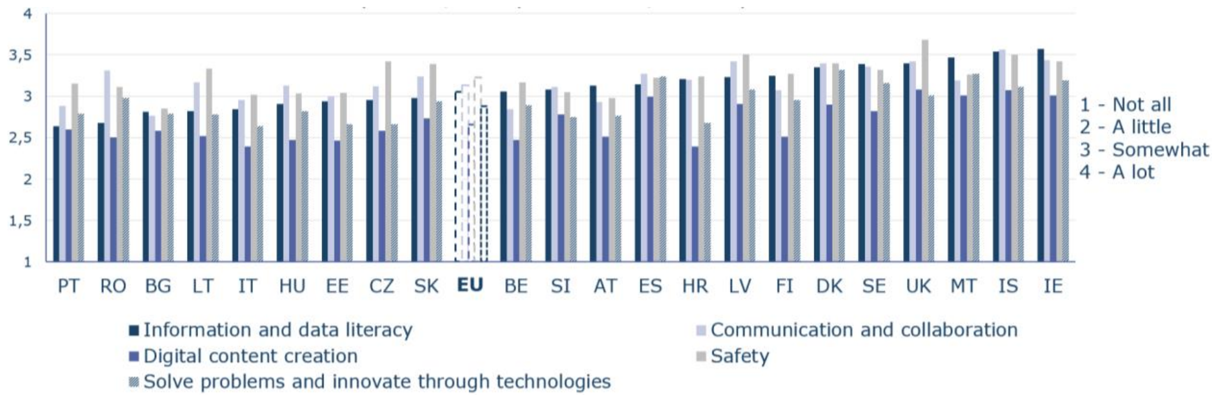


Fig. 2.5.b: Confidence of teachers in their digital competence (based on the DigComp framework)
(ISCED 2, country and EU level, 2017-18)

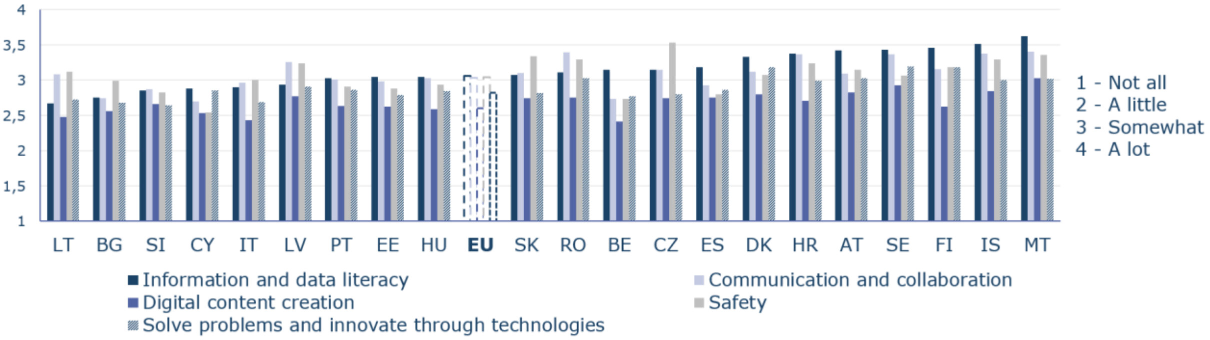


Fig. 2.5.c: Confidence of teachers in their digital competence (based on the DigComp framework)
(ISCED 3, country and EU level, 2017-18)

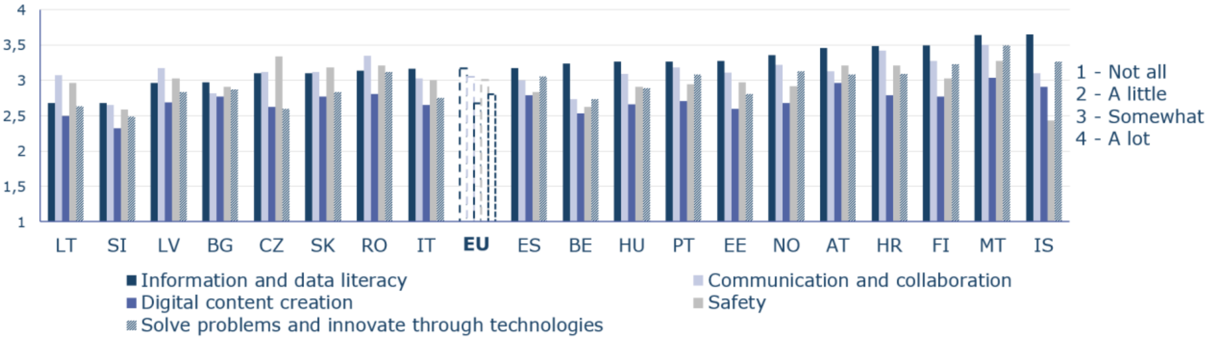
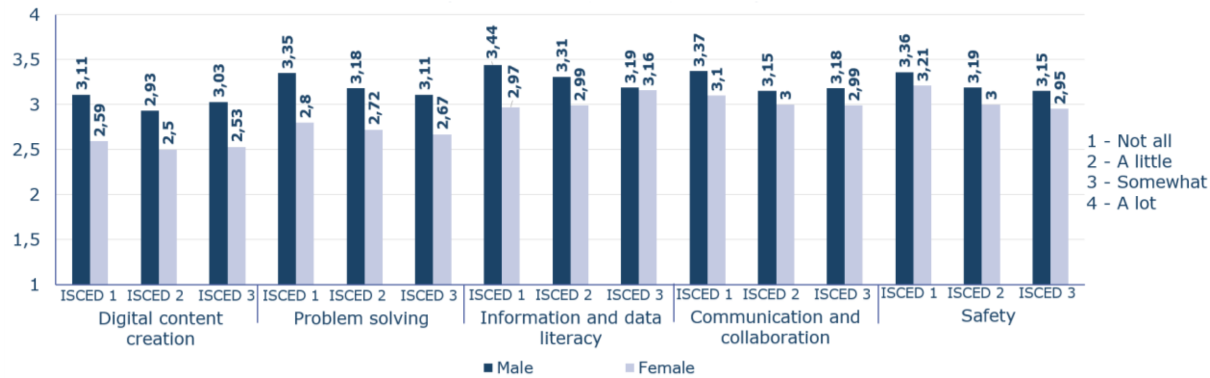


Figure 2.6. shows that male teachers seem to be more confident than female teachers across the five DigComp areas in all ISCED levels. Male teachers are particular confident in the "information and data literacy" competence area.

Fig. 2.6: Gender difference regarding confidence of teachers in their digital competence (based on the DigComp framework)
(All ISCED levels, EU level, 2017-18)



Figures 2.7.a to 2.7.c show the confidence level as indicated by the teachers for the following four areas of the DigComp framework: safety, communication and collaboration, information and data literacy, as well as problem solving. The data reveals that across all ISCED levels at European level, teachers seem to be rather confident in emailing a file to someone/student/teacher, save and store a file on a hard drive/cloud platform and using the Internet safely.

Fig. 2.7.a: Teachers' confidence in the digital competence areas safety, communication and collaboration, information and data literacy and problem solving (based on the DigComp framework)
(ISCED 1, EU level, 2017-18)

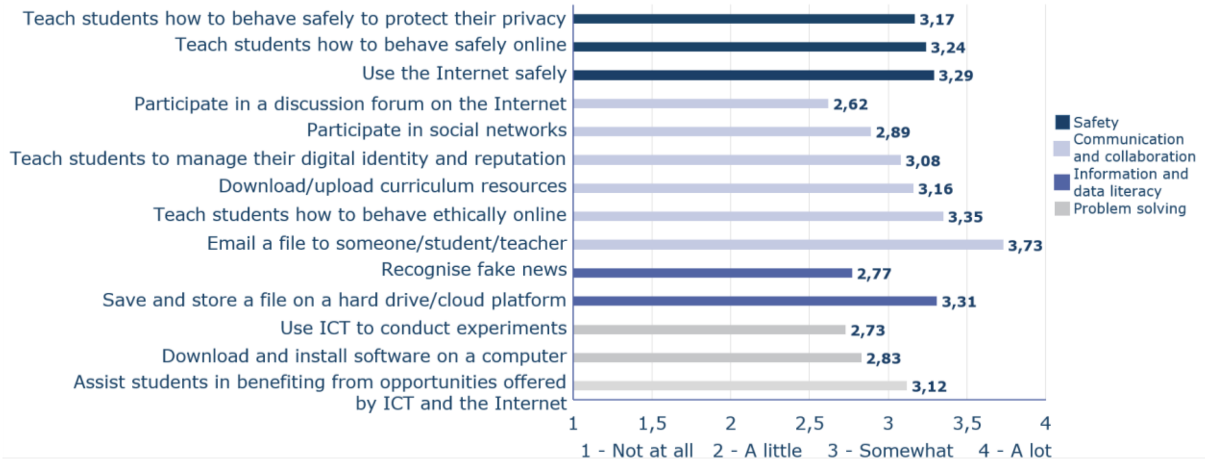


Fig. 2.7.b: Teachers' confidence in the digital competence areas safety, communication and collaboration, information and data literacy and problem solving (based on the DigComp framework)
(ISCED 2, EU level, 2017-18)

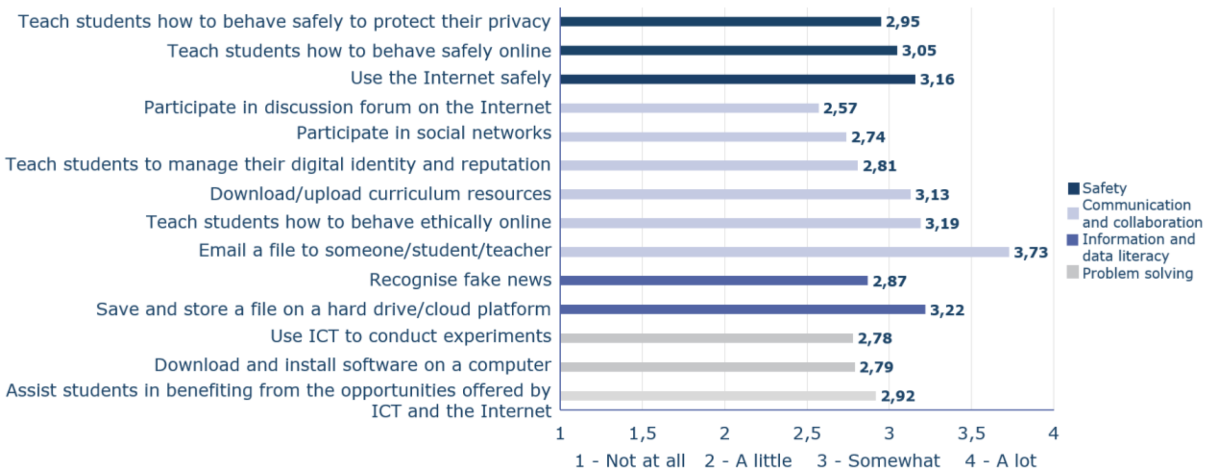
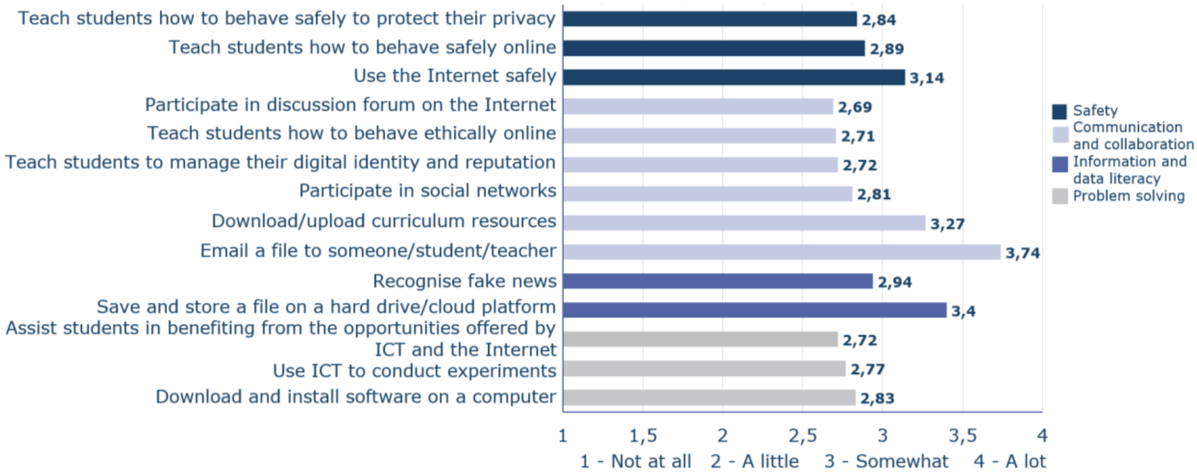


Fig. 2.7.c: Teachers' confidence in the digital competence areas safety, communication and collaboration, information and data literacy and problem solving (based on the DigComp framework)
(ISCED 3, EU level, 2017-18)



Figures 2.8.a to 2.8.c show the level of teachers' confidence separately for the digital content creation area of the DigComp framework. The results show that teachers across all ISCED levels at European level seem to be especially confident in producing texts using a word-processing software. However, when it comes to more complex tasks such as coding or programming apps or programs or robots, teachers across all ISCED levels at European level indicate that they feel rather unconfident.

Fig. 2.8.a: Teachers' confidence in the digital competence area digital content creation (based on the DigComp framework)
(ISCED 1, EU level, 2017-18)

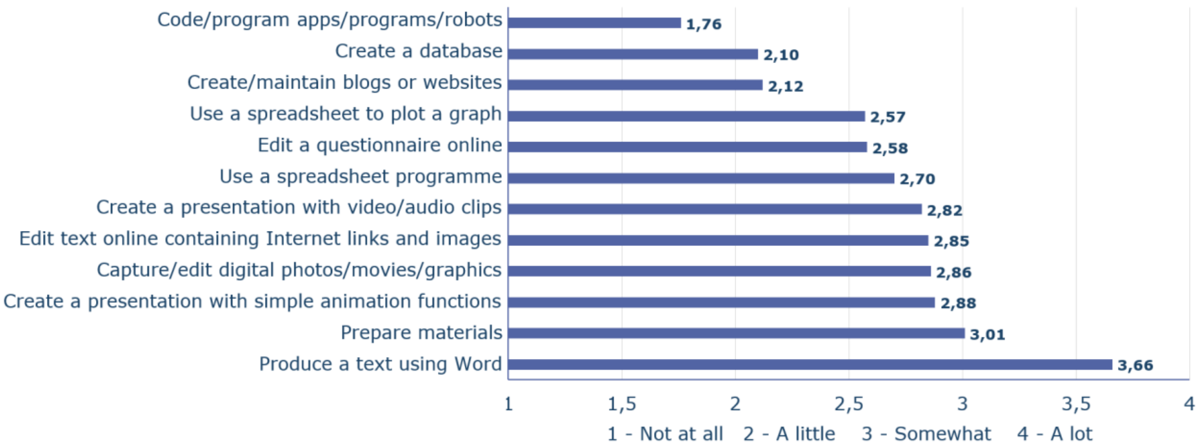


Fig. 2.8.b: Teachers' confidence in the digital competence area digital content creation (based on the DigComp framework)
(ISCED 2, EU level, 2017-18)

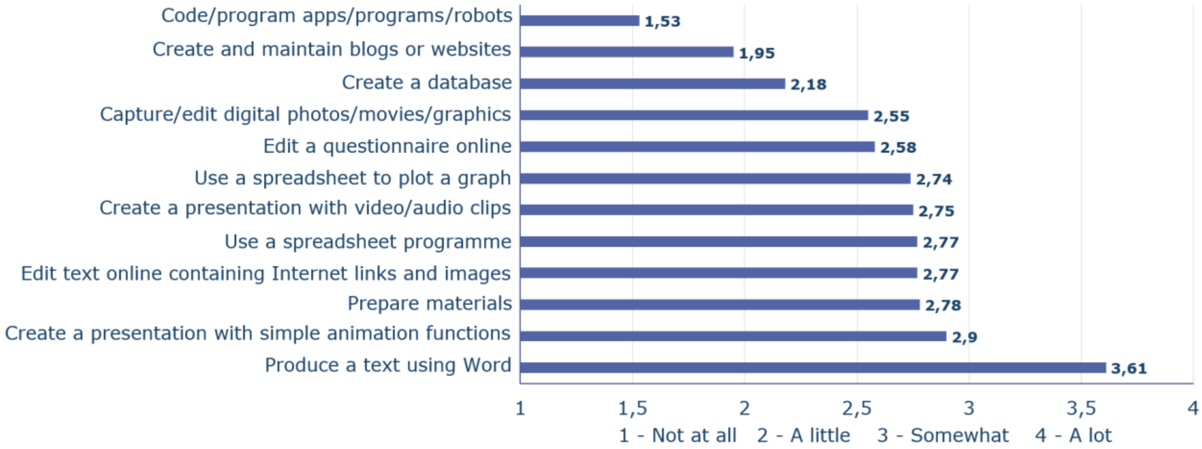
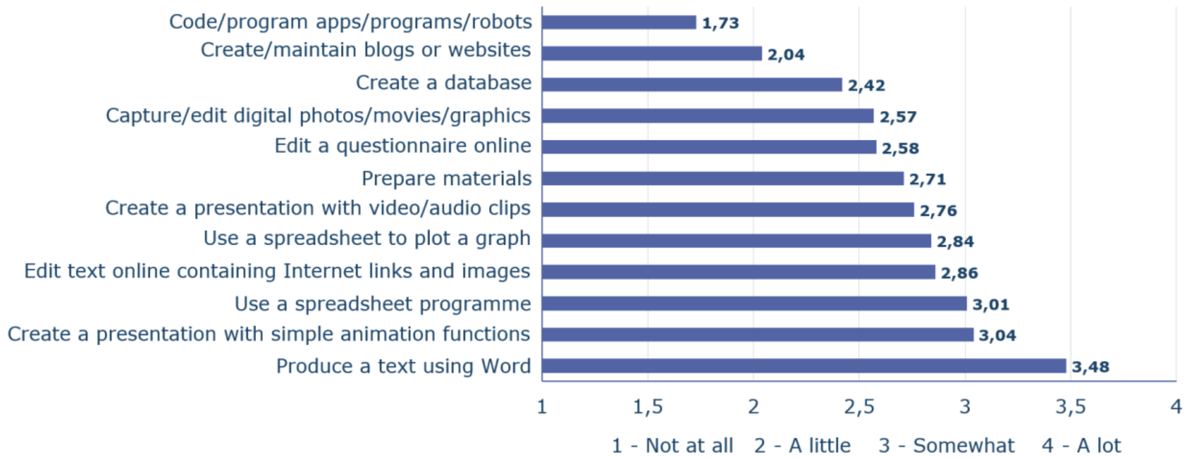
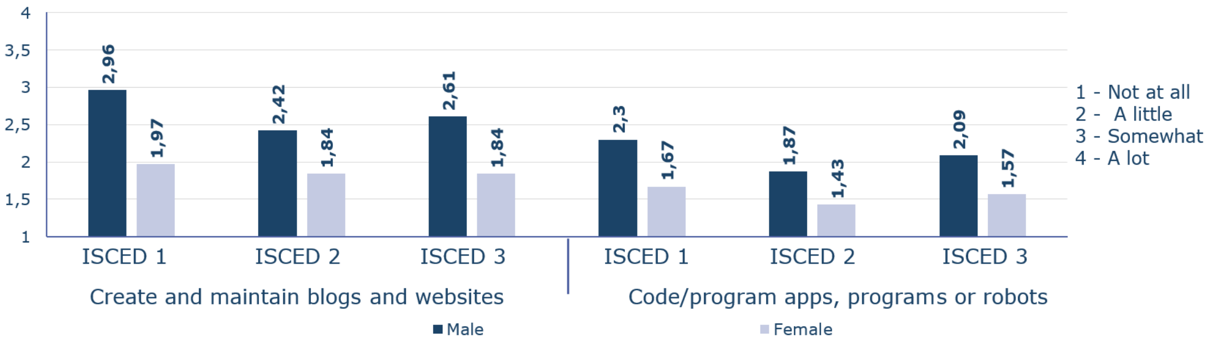


Fig. 2.8.c: Teachers' confidence in the digital competence area digital content creation (based on the DigComp framework)
(ISCED 3, EU level, 2017-18)



Moreover, Figure 2.9. shows that at European level, male teachers feel more confident in creating and maintaining blogs and websites compared to their female counterparts, especially at ISCED level 1. Furthermore, at European level, male teachers are more confident than female teachers in coding or programming across all ISCED levels.

Fig. 2.9: Gender difference regarding confidence of teachers in creating and maintaining blogs and websites as well as in coding/programming apps, programs or robots
(All ISCED levels, EU level, 2017-18)



2.1.3. Cluster analysis: digitally active, confident and supported teachers

A cluster analysis was performed on the survey data in order to detect different teacher profiles with similar levels of using digital technologies for teaching ("being active"), similar confidence levels in their own digital competence ("being confident") and having profited from teachers' professional development and having access to digital technologies for teaching ("being supported"). The different variables taken into account were the following:

- The way in which ICT is taught – as a separate subject, integrated in the subject because the teachers choose to do so, or because of curriculum requirements (question TE04);
- Percentage of teaching time using computers/Internet in the past twelve months (question TE07);
- Teachers' professional development undertaken during the past two school years (question TE14);
- Time dedicated to such professional development (question TE15);
- Use of ICT by students in the teachers' lessons (question TE30);
- Shortages or inadequacy in different areas affecting the provision of ICT use in teaching and learning (question TE20);
- Teachers' confidence in different ICT based activities (question TE22);
- Teachers' confidence in teaching students on topics of safety and cyber security (question TE33);
- Teachers' attitudes towards ICT in teaching and learning (question TE24);
- Teachers' access to ICT infrastructure (question TE09);
- Teachers' access ICT infrastructure for their own use via the school (question TE10).

Based upon these input variables, three clusters of teachers were detected:

- Highly digitally active, confident and supported teachers;
- Highly digitally active and confident teachers with a rather low level of support;
- Less digitally active, confident and supported teachers.

Teachers who are highly digitally active, confident and supported are defined by regularly using computers/Internet during their lessons for teaching and learning purposes; invest more time in professional development; voluntarily integrate ICT in their subjects because they chose to do so; feel that less obstacles prevent them from using ICT for teaching; are more confident in using ICT as well as teaching topics on safety and cyber security, have a more positive attitude towards the use of ICT; have a higher level of access to a wide range of different digital equipment; and have access to ICT infrastructure for their own use via the school.

The results in figures 2.10.a to 2.10.b reveal that between 45% (ISCED 1) to 52% (ISCED 2 and 3) of European teachers can be defined as being less digitally active, confident and supported. In contrast, the data suggests that between 33% (ISCED 1), 25% (ISCED 2), 24% (ISCED 3) of teachers are highly digitally active, confident and supported. In addition, about 1 out of 4 European teachers across all ISCED levels can be defined as highly digitally active and confident but only receive a rather low level of support in terms of having access to ICT infrastructure at school. This finding could be interpreted in a way that teachers might engage frequently in professional development (possibly even in their own time) or have a high confidence in their ICT use, even if access to digital technologies in teaching and learning is rather limited.

Fig. 2.10.a: Digitally active, confident and supported teachers
(ISCED 1, in % of students, country and EU level, 2017-18)

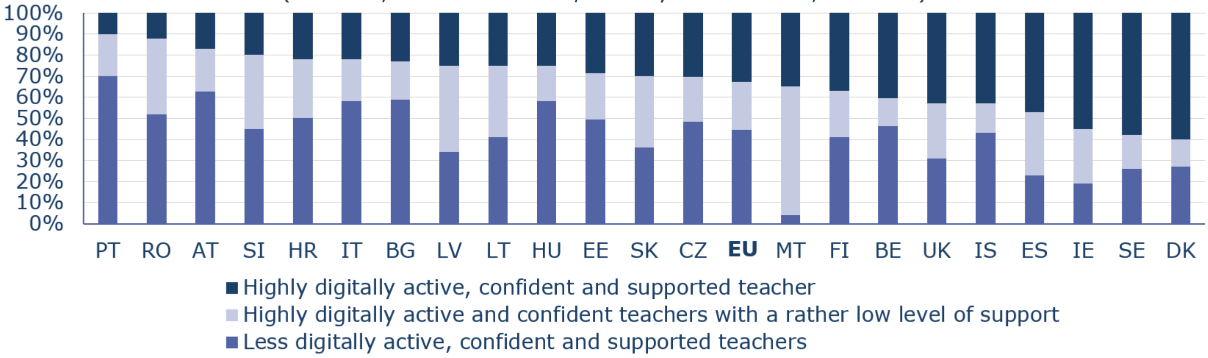


Fig. 2.10.b: Digitally active, confident and supported teachers
(ISCED 2, in % of students, country and EU level, 2017-18)

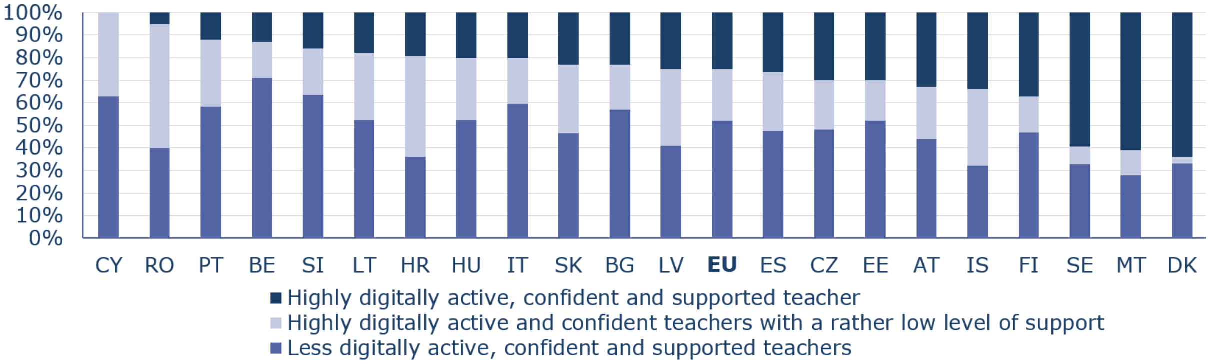
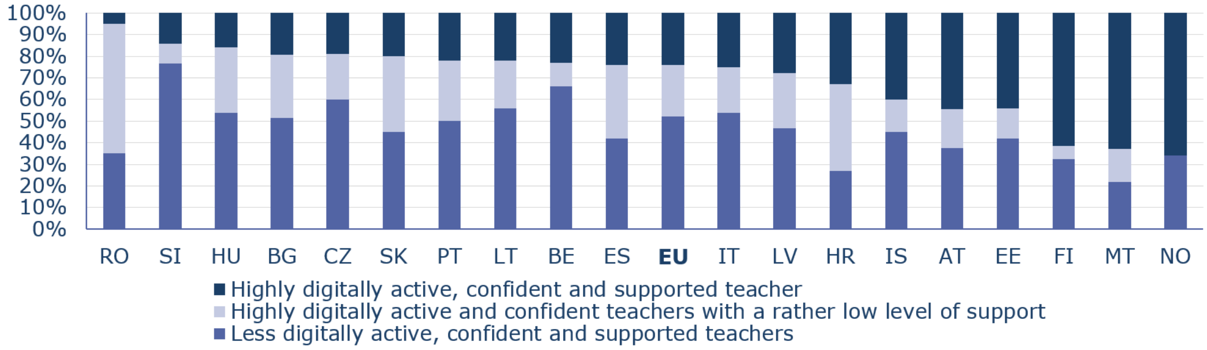


Fig. 2.10.c: Digitally active, confident and supported teachers
(ISCED 3, in % of students, country and EU level, 2017-18)



2.2. Students' digital activities and confidence in their digital competence

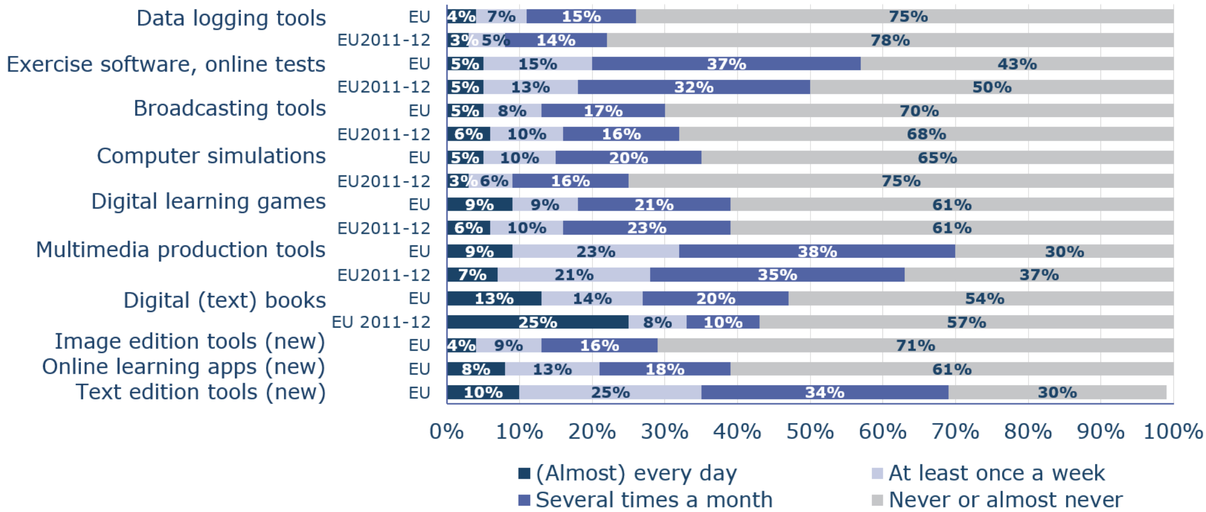
2.2.1. Students' digital activities

The International Computer and Information Literacy Study (ICILS) reports that being born in a digital era does not imply a good ability to use digital technologies in a critical, creative and informative way (European Commission, 2014). Similarly, it is suggested that the simple provision of ICT equipment is not sufficient, but that ICT is only linked to better student performance when, amongst others, computer software and Internet connections help to increase students study time and practice (OECD, 2015). Therefore, it is interesting to get a better understanding of the ICT-based activities of students and their use of resources and tools in lessons. In addition, this chapter analyses whether, according to students, learning is in general more student- or teacher-centred. Finally, this chapter provides some insight into the confidence of students in their own digital competence.

2.2.1.1. Students' use of digital resources and tools

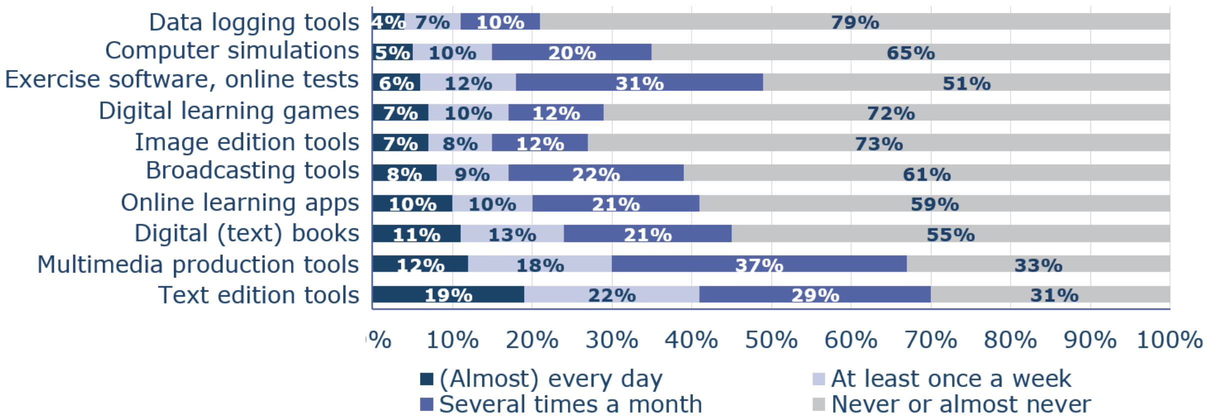
Figures 2.11.a to 2.11.b show to what extent different digital resources and tools are used by students during lessons[24]. Over ISCED levels 2 and 3, the data reveal that a lot of these resources and tools are actually never used by students. For instance, between 75% (ISCED 2) and 79% (ISCED 3) of students never use data logging tools at school. Furthermore, between 71% (ISCED 2) and 73% (ISCED 3) never or almost never use image editing tools.

Fig. 2.11.a: Use of resources and tools during lessons
(ISCED 2, in % of students, EU level, 2011-12 and 2017-18)



[24] While the questionnaires at the school, teacher and parent level were conducted for 3 ISCED levels (ISCED level 1, 2 and 3), students only participated at ISCED levels 2 and 3. In this sub-chapter, therefore, only data is presented for ISCED levels 2 and 3.

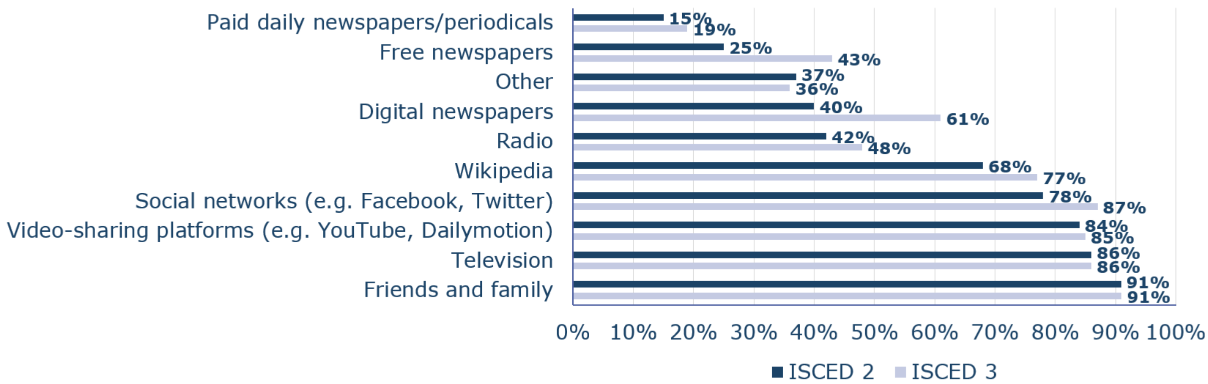
Fig. 2.11.b: Use of resources and tools during lessons
(ISCED 3, in % of students, EU level, 2017-18)



2.2.1.2. Students' news sources

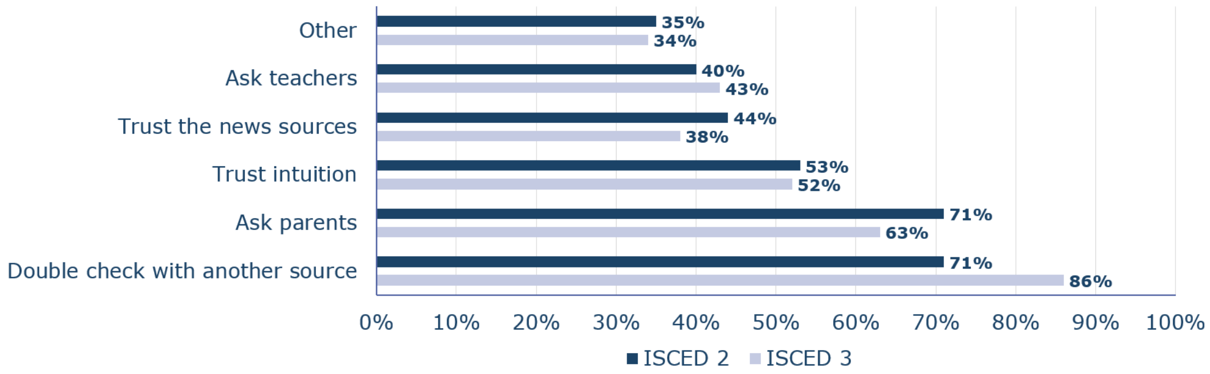
Figure 2.12 shows which news sources students use, and to what extent, at ISCED levels 2 and 3. More than 80% of students across ISCED levels indicate that family and friends, television, video-sharing platforms and social networks are their main sources of news. The use of free newspapers as a news source differs the most strongly between ISCED 2 and 3 (ISCED level 2: 25% vs. ISCED level 3: 43%). Similarly, students at ISCED level 3 (61%) use digital newspapers as a news source more often than students at ISCED level 2 (40%).

Fig. 2.12: Students' news sources
(ISCED 2 and 3, in % of students, EU level, 2017-18)



When reading the news, it is increasingly important to check the reliability of the information, which figure 2.13 looks into. At ISCED levels 2 and 3, a majority of students prefer asking their parents (ISCED level 2: 71%; ISCED level 3: 63%) or double check the source with another source (ISCED level 2: 71%, ISCED 3: 86%).

Fig. 2.13: Students' verification of the reliability of information in news sources
(ISCED 2 and 3, in % of students, EU level, 2017-18)



2.2.1.3. Students' ICT-based activities during lessons

This section points to the different ICT-based learning activities performed by students during lessons. Generally, figure 2.14.a and Fig. 2.14.b show that the share of ISCED level 3 students who engage daily or almost daily in ICT-based activities during lessons tends to be higher compared to ISCED level 2 students. Similar to the results reported for teachers, students often search the Internet to collect information during lessons. More precisely, 26% of ISCED level 2 and 42% of ISCED level 3 students search the Internet for resources every day or almost every day.

In addition to that, an activity that is intensively fostered at the European level is coding (Balanskat & Engelhardt, 2014). The European Commission highlights this skill as being an important component of digital skills. Within the Digital Education Action Plan, one of the action points is devoted to coding in order to foster digital skills by increasing the number of participating schools in EU Code Week (European Commission, 2018c). The EU Code Week wants to make programming more visible and show how ideas can be brought to life with code.[25] One of the main goals is to let young and old discover how to have fun with coding and to demystify these skills (European Commission, 2018c). In spite of its presumed importance, figures 2.14.a and 2.14.b reveal that coding is rarely done on a daily basis in both ISCED levels 2 and 3. More precisely, only 3% of ISCED level 2 students and 6% of ISCED level 3 students engage in coding activities on a highly regular basis (e.g. every day or almost every day). In contrast, between 76% and 79% of students at ISCED levels 3 and 2, respectively, never or almost never undertake coding activities. In light of these figures, activities to strengthen students' coding skills at EU, Member States and local level need to be further scaled up. In fact, the goal of the European Commission is to encourage 50% of schools in Europe to participate in the **EU Code Week** by 2020, which is a grassroots movement promoting programming and computational thinking in a fun and engaging way[26].

[25] For more information on the Code Week initiative, see https://codeweek.eu/.
[26] For more information on the Code Week initiative, see https://ec.europa.eu/digital-single-market/en/news/code-week-2018-bringing-coding-schools-europe.

Fig. 2.14.a: Students' ICT based activities frequency during lessons
(ISCED 2, in % of students, EU level, 2017-18)

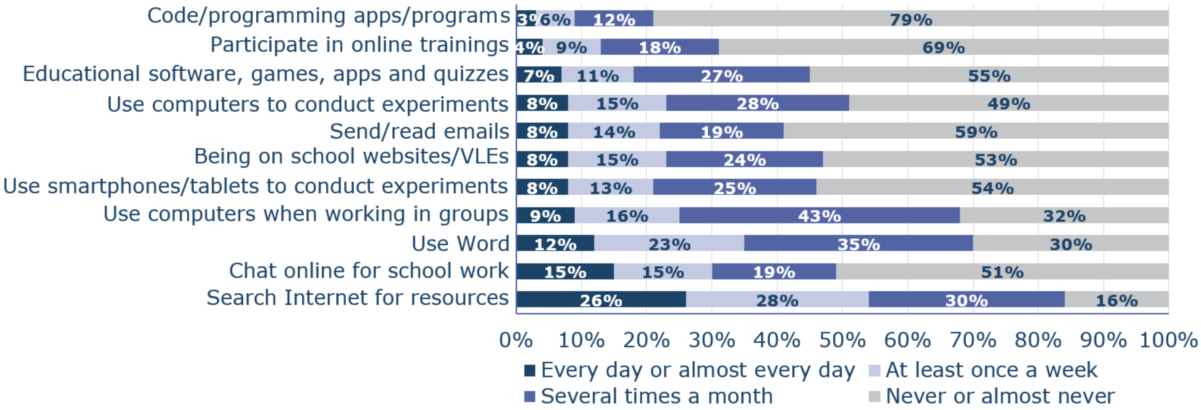
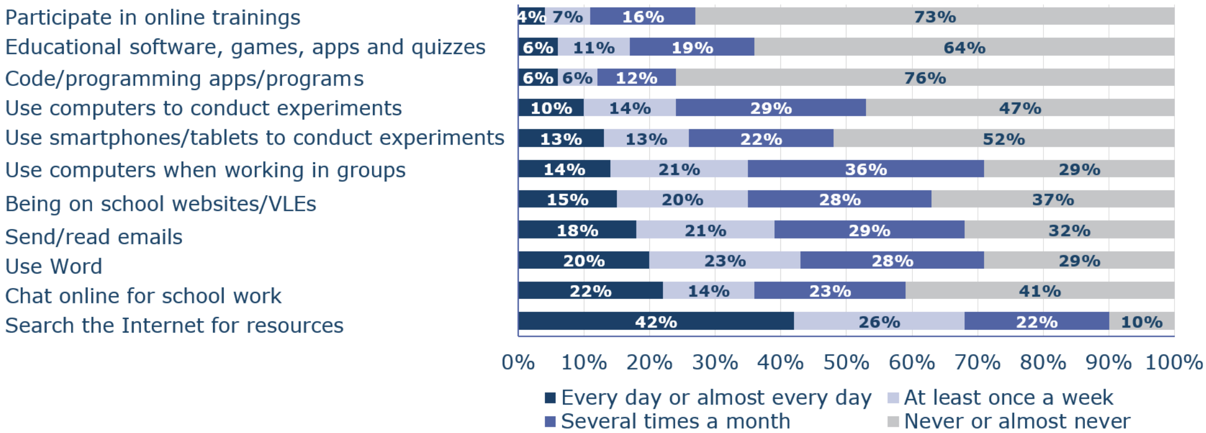


Fig. 2.14.b: Students' ICT based activities frequency during lessons
(ISCED 3, in % of students, EU level, 2017-18)



Figures 2.15.a and 2.15.b give further insight into the extent to which students code or program in the different European countries. In general, data show that, over all countries, students are not frequently engaging in these activities during lessons.

Fig. 2.15.a: Students frequency in coding/programming apps or programs during lessons
(ISCED 2, in % of students, country and EU level, 2017-18)

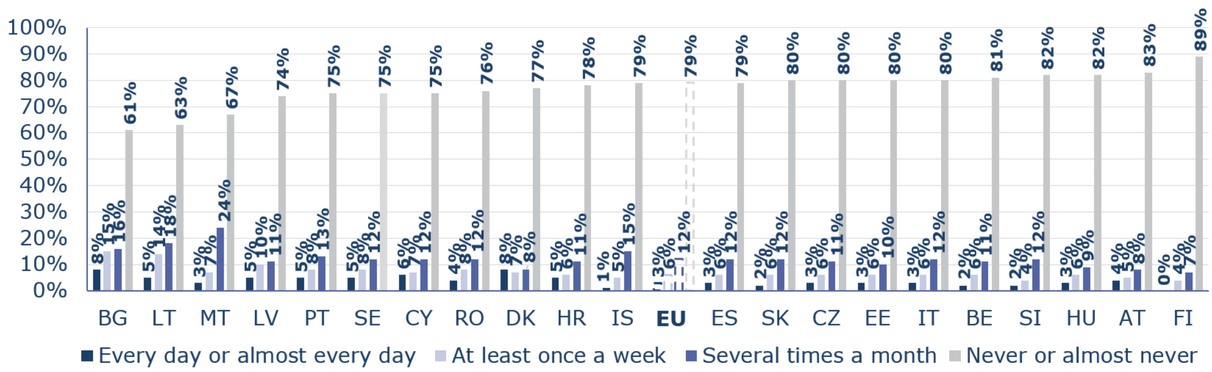


Fig. 2.15.b: Students frequency in coding/programming apps or programs during lessons
(ISCED 3, in % of students, country and EU level, 2017-18)

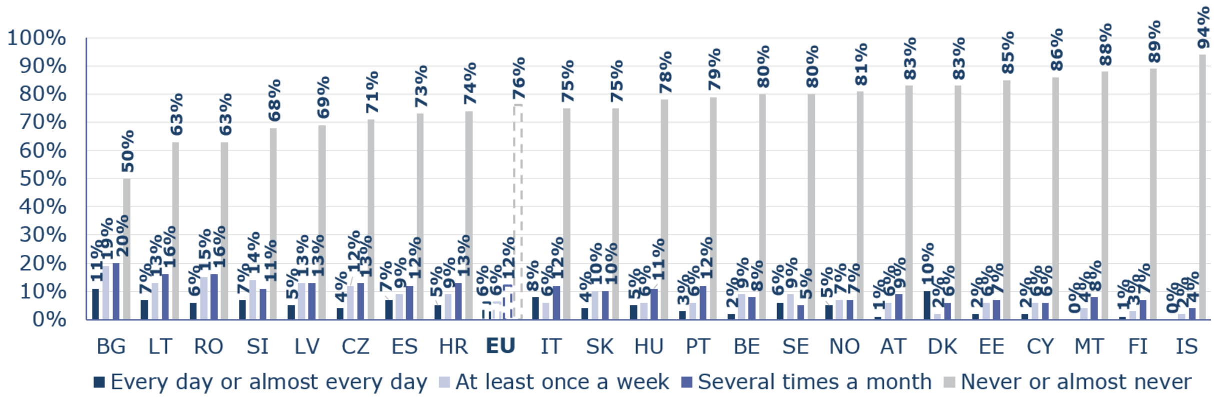


Figure 2.16.a and 2.16.b show that both male and female students rarely engage in coding/programming activities at European level. Male students engage more frequently in these activities than female students. In fact, 76% of male students and 82% of female students at ISCED level 2 never or almost never engage in these activities. While female students engage slightly less at ISCED level 3 compared to ISCED level 2 (85% never or almost never engage in coding/programming at ISCED level 3), male students more frequently engage in coding/programming at ISCED level 3 compared to ISCED level 2 (only 66% of ISCED level 3 students never or almost never engage in coding/programming). These figures support the European Commissions' strategy to get more women interested in digital by tackling three areas: the image of women in the media, digital skills for girls and women and increasing the number of female tech entrepreneurs.[27]

[27] For more information on the European Commissions' strategy to get more women interested in digital, see: https://ec.europa.eu/digital-single-market/en/women-ict.

Fig. 2.16.a: Gender difference regarding students frequency in coding/programming apps or programs during lessons
(ISCED 2, in % of students, country and EU level, 2017-18)

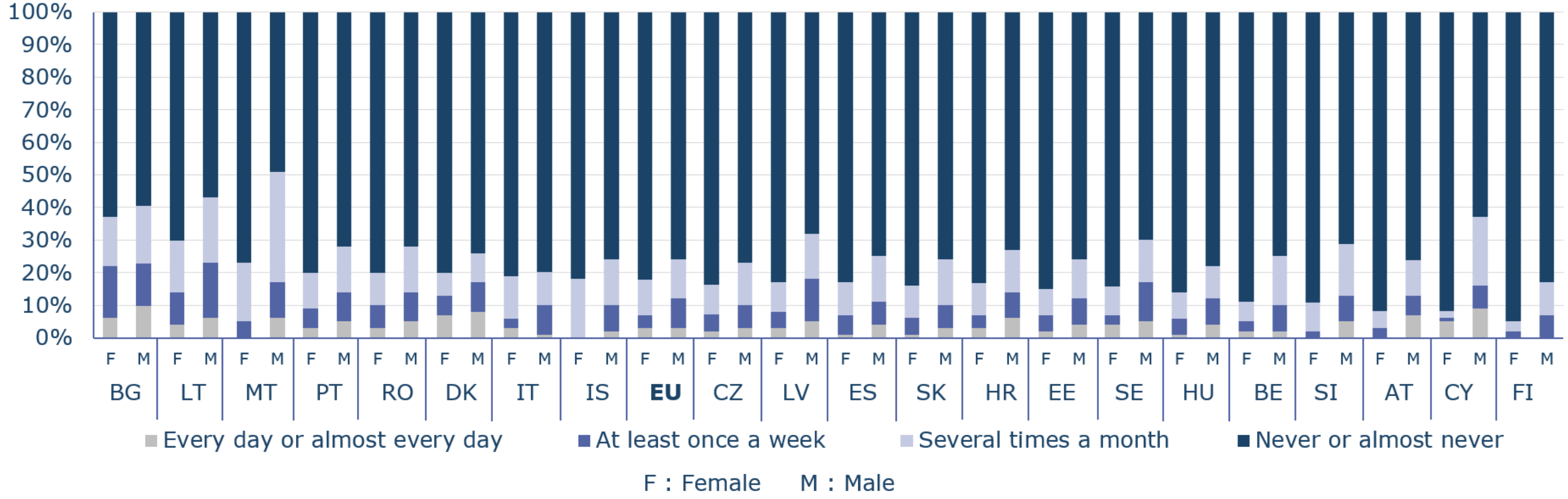
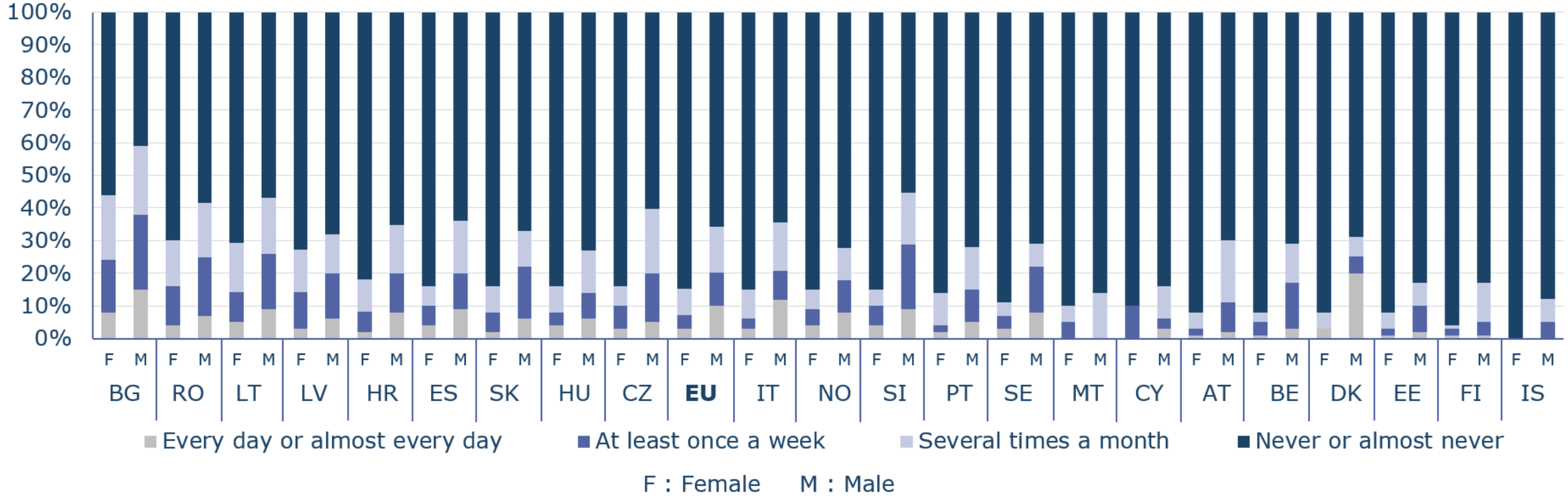


Fig. 2.16.b: Gender difference regarding students frequency in coding/programming apps or programs during lessons
(ISCED 3, in % of students, country and EU level, 2017-18)



2.2.1.4. Level of student versus teacher-centred activities performed in lessons as perceived by students (with or without ICT)

Figures 2.17.a and 2.17.b show how students perceive lessons to be student- or teacher-centred. In general, similar to what teachers report, most of the students perceive that lessons are, on a daily basis, mostly teacher-centred. For instance, only 13% of ISCED level 2 students and 11% of ISCED level 3 students work in small groups with their peers on a daily (or almost daily basis), even though these collaborative student-centred teaching practices are often considered as enablers of successful adoption of digital skills (European Commission, 2014).

Fig. 2.17.a: Student and teacher-centered activities declared by students
(ISCED 2, in % of students, EU level, 2017-18)

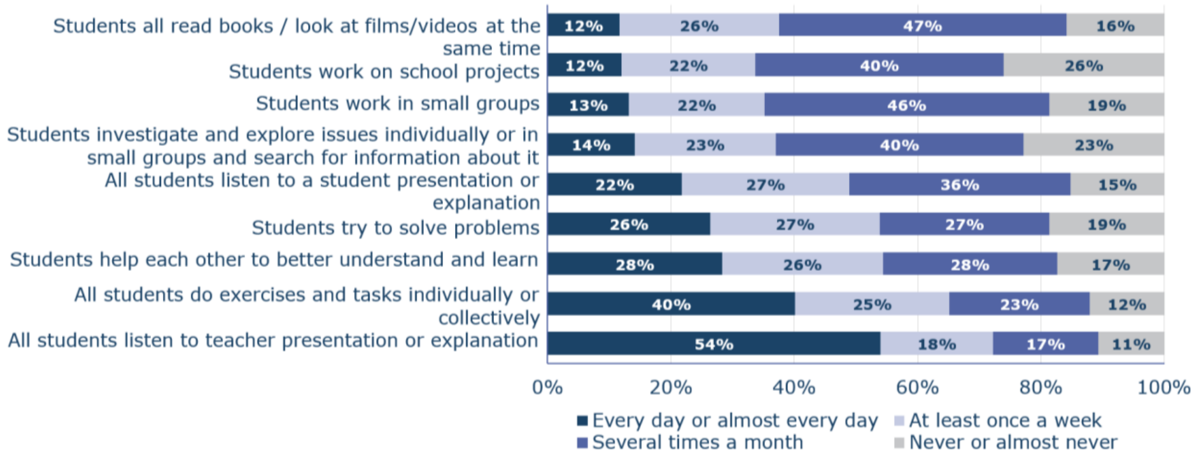
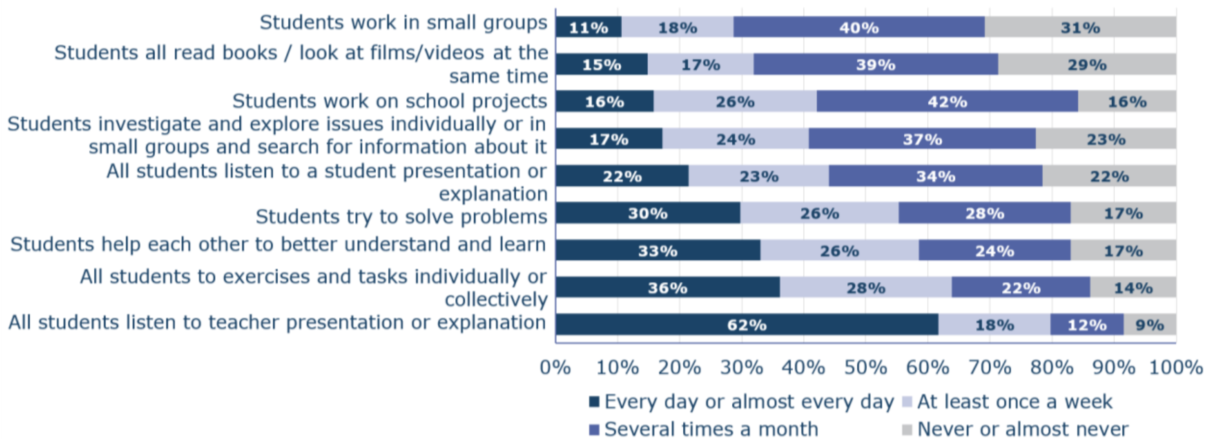


Fig. 2.17.b: Student and teacher-centered activities declared by students
(ISCED 3, in % of students, EU level, 2017-18)



2.2.2. Confidence of students in their digital competence

This section reports on students' confidence in their digital competence. Just like for teachers in section 2.1.2, the confidence level of students is used as an approximate measure of digital competence in the five areas of the Digital Competence framework[28].

[28] The Digital Competence Framework for Citizens (DigComp), which was created by the European Commission, Joint Research Centre in Seville on behalf of DG EAC and EMPL, is used in order to compile a competence framework for teachers. For more information, see https://ec.europa.eu/jrc/en/digcomp/digital-competence-framework.

The results reveal that students seem to be most confident in the area of communication and collaboration (figure 2.18). They seem to be least confident in the areas of digital content creation and problem solving. Figures 2.19.a and 2.19.b show the detailed figures at the country level.

Fig. 2.18: Confidence of students in their digital competence (based on the DigComp framework)
(ISCED 2 and 3, EU level, 2017-18)

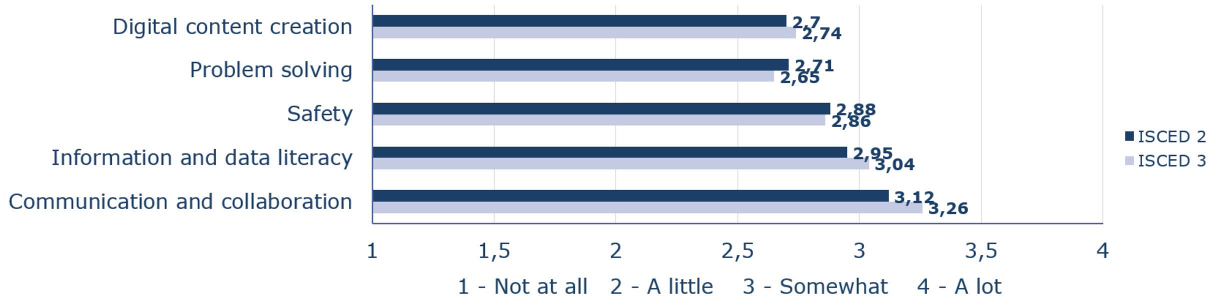


Fig. 2.19.a: Confidence of students in their digital competence (based on the DigComp framework)
(ISCED 2, country and EU level, 2017-18)

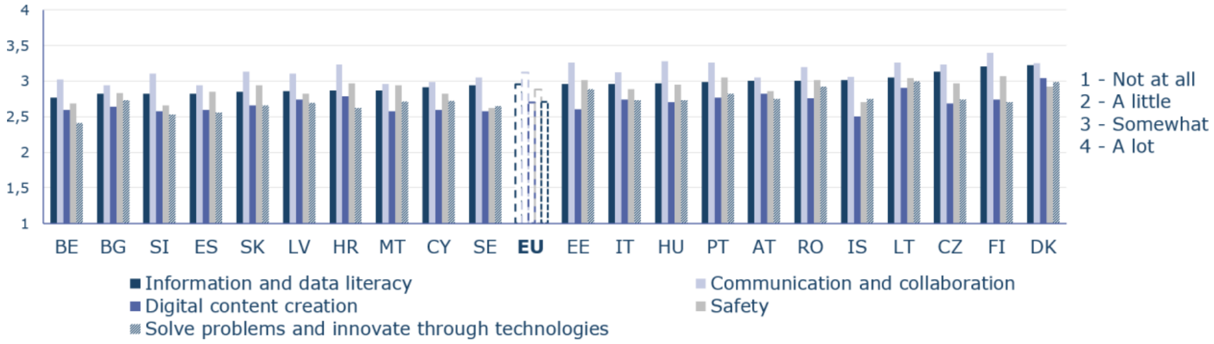


Fig. 2.19.b: Confidence of students in their digital competence (based on the DigComp framework)
(ISCED 3, country and EU level, 2017-18)

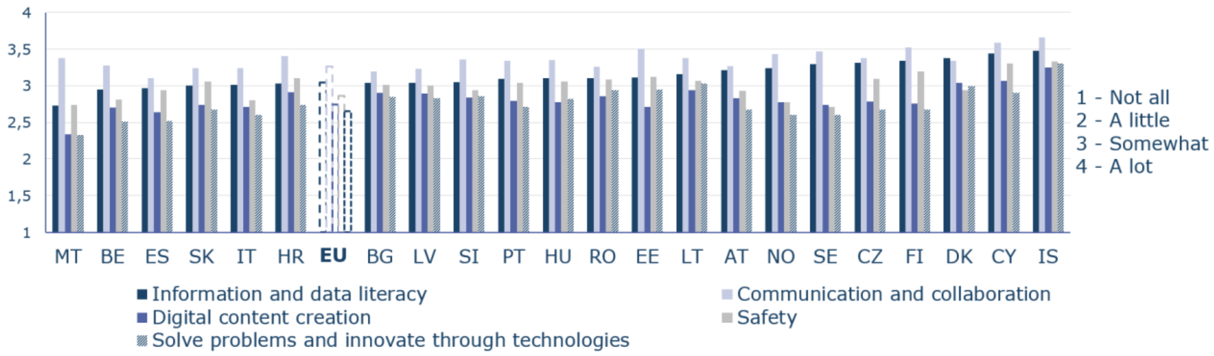
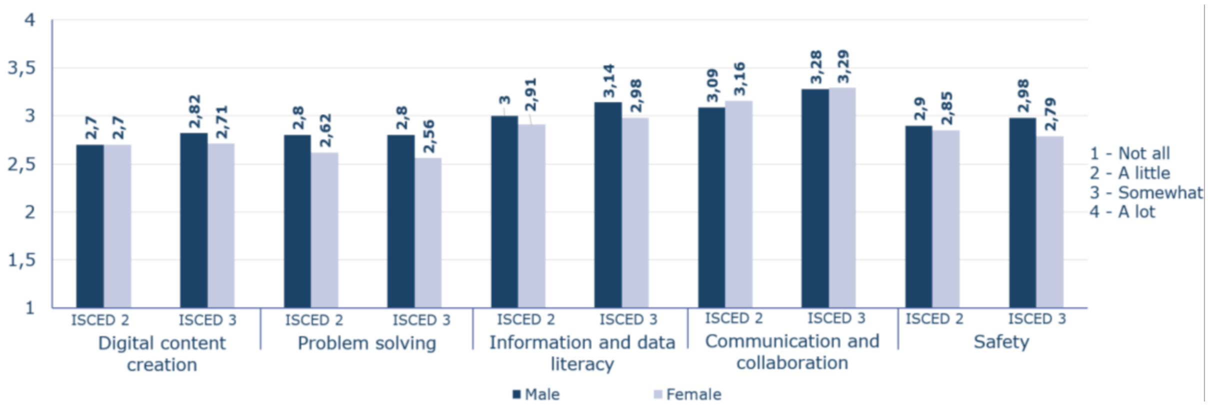


Figure 2.20 shows that male students, compared to female students, are slightly more confident in most digital competence areas, particularly in the DigComp areas of problem solving, information and data literacy and safety. In contrast, at ISCED level 2, male and female students feel equally confident regarding the competence area of digital content creation. In addition, and as opposed to female teachers, female students feel slightly more confident in the competence areas communication and collaboration in comparison to their male counterparts at ISCED level 2.

Fig. 2.20: Gender differences regarding confidence of students in their digital competence (based on the DigComp framework)
(All ISCED levels, EU level, 2017-18)



Figures 2.21.a to 2.21.b show the confidence level as indicated by the students for the following four areas of the DigComp framework: safety, communication and collaboration, information and data literacy, as well as problem solving. Over both ISCED levels 2 and 3, students seem to be most confident in using mobile apps on a smartphone or tablet.

Fig. 2.21.a: Students' confidence in the digital competence areas safety, communication and collaboration, information and data literacy and problem solving (based on the DigComp framework)
(ISCED 2, EU level, 2017-18)

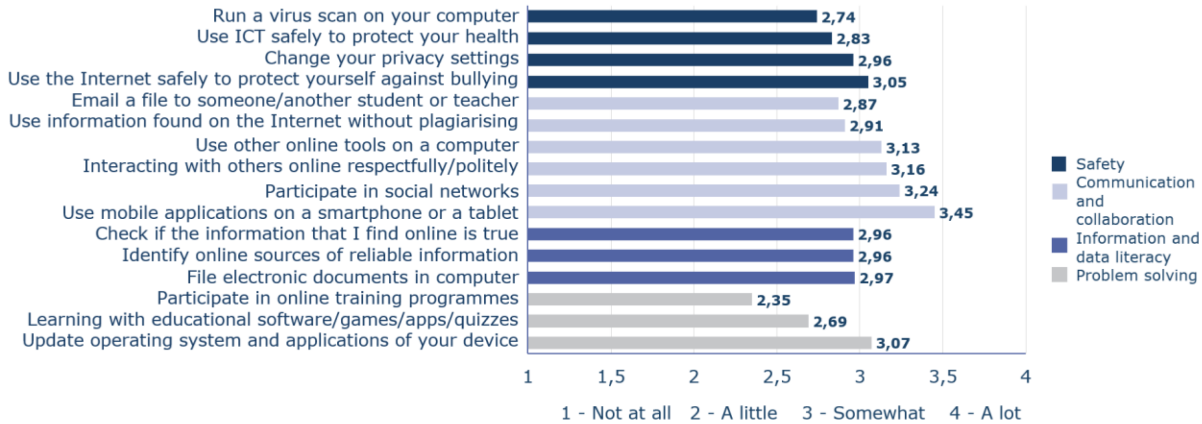
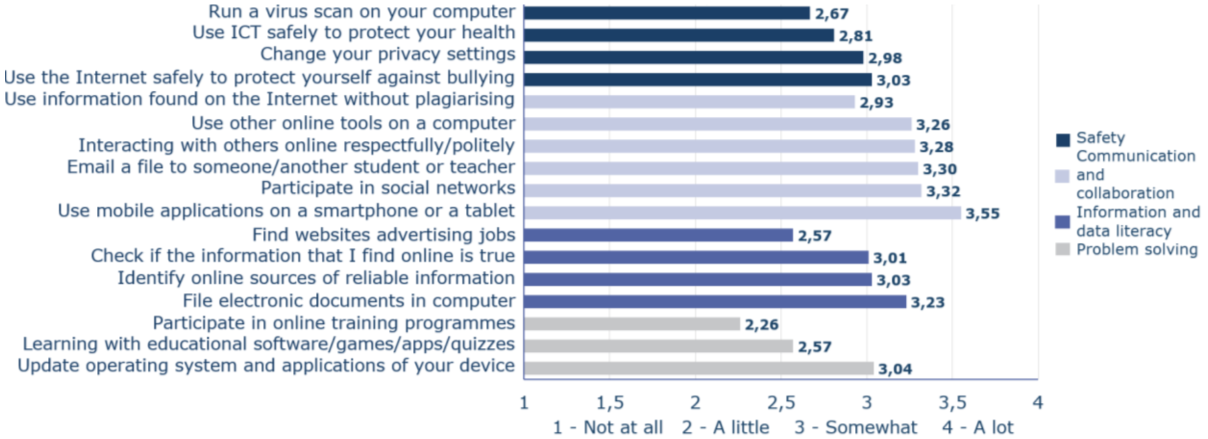


Fig. 2.21.b: Students' confidence in the digital competence areas safety, communication and collaboration, information and data literacy and problem solving (based on the DigComp framework)
(ISCED 3, EU level, 2017-18)



Figures 2.22.a to 2.22.b show the level of students' confidence separately for the digital content creation area of the DigComp framework. Compared to teachers, students seem to be somewhat less confident in fairly basic skills such as producing a text using word than teachers. In contrast, students seem to be more confident than teachers in coding and programming apps, programs or robots. Nevertheless, to put this in context, confidence in coding still remain lowest in comparison to the other items in the list.

Fig. 2.22.a: Confidence of students in digital content creation
(ISCED 2, EU level, 2017-18)

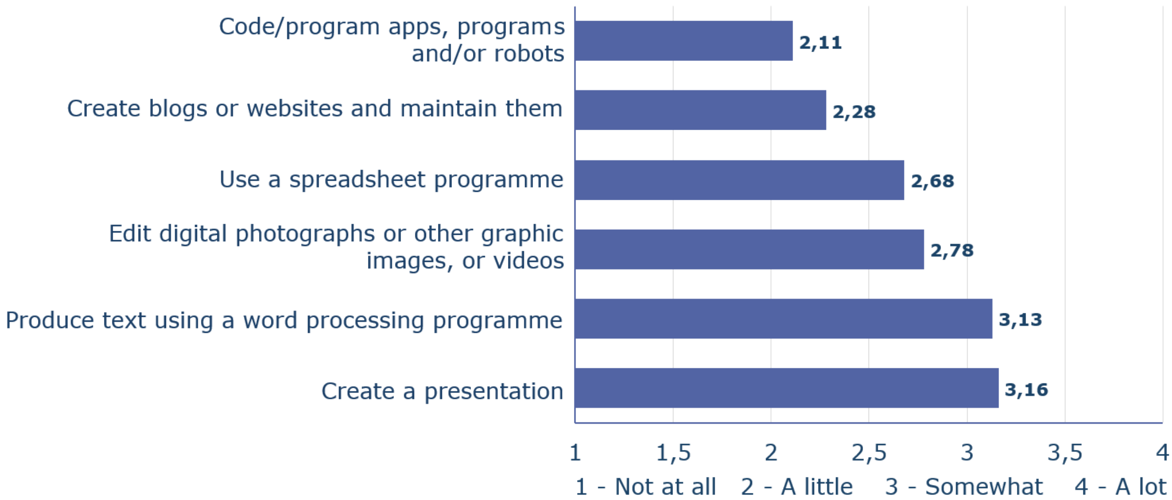


Fig. 2.22.b: Confidence of students in digital content creation
(ISCED 3, EU level, 2017-18)

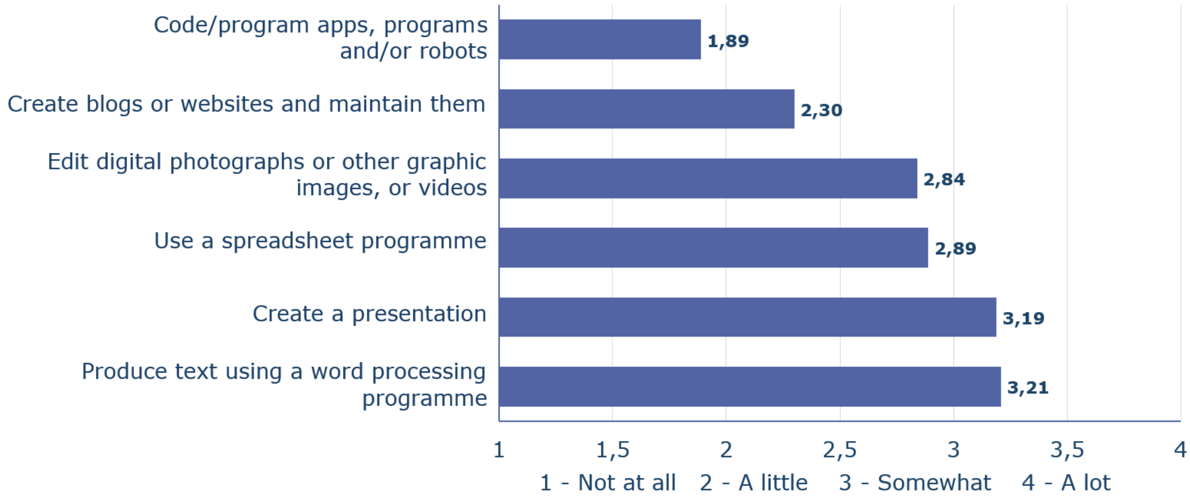
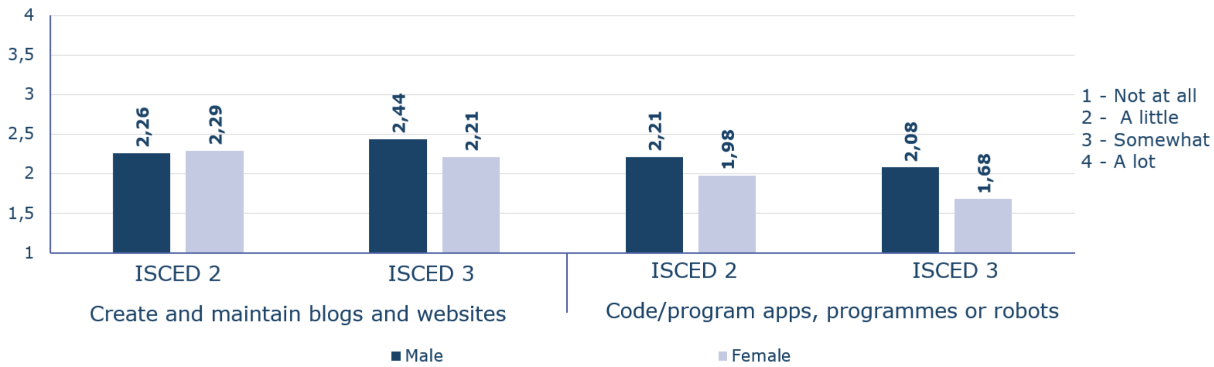


Figure 2.23 shows that male students are more confident in creating and maintaining blogs and websites at ISCED level 3 than female students. In addition to that, at both ISCED levels 2 and 3, male students are more confident in coding/programming than female students.

Fig. 2.23: Gender difference regarding confidence of students in creating and maintaining blogs and websites as well as code/program apps, programs or robots
(All ISCED levels, EU level, 2017-18)



2.2.3. Cluster analysis: digitally active and supported students

A cluster analysis was performed on the survey data in order to detect different student profiles with similar levels of performing digital activities in and outside of school and having a positive attitude towards the use of ICT during lessons ("being active") and having access to digital technologies in and outside of school ("being supported"). The different variables related to access and use that were used are the following:

- Access to digital technologies at home, or outside of school (Question ST03);
- Access to own digital equipment (laptop/notebook, tablet, mobile phone) during lessons (question ST11);
- Digital activities undertaken in free time, at home or any place other than school (question ST05);
- Digital activities undertaken during lessons (question ST13);

- Attitude towards the use of ICT during lessons (question ST16).

Based upon these input variables, two clusters of students were detected:

- Highly digitally active and supported students
- Less digitally active students with a rather moderate / low level of support

Students who are highly digitally active and supported are defined by having access to more digital technologies at home, at school or outside of school, engage more frequently in digital activities during lessons our outside of school, and more positively evaluate the impact of ICT use during lessons.

The results reveal that at European level, about 39% of European ISCED 2 students and 50% of ISCED level 3 students can be defined as being highly digitally active and supported. Figures 2.24.a and 2.24.b reveal that Denmark ranks highest with regard to the share of highly digitally active and supported students both at ISCED 2 and 3 levels.

Fig. 2.24.a: Digitally active and supported students
(ISCED 2, in % of students, country and EU level, 2017-18)

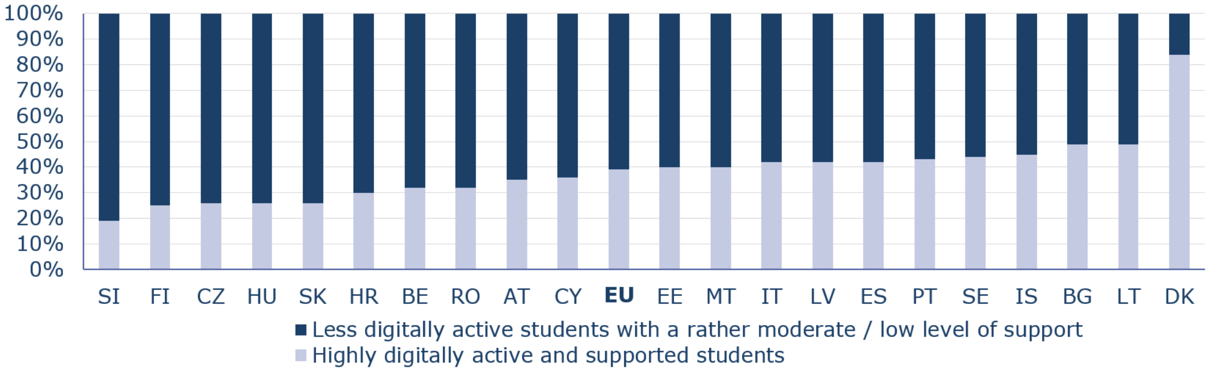
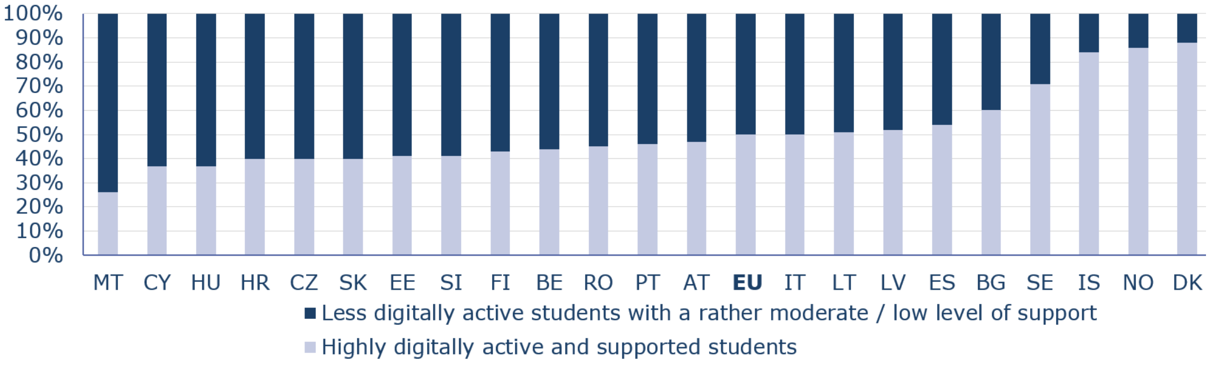


Fig. 2.24.b: Digitally active and supported students
(ISCED 3, in % of students, country and EU level, 2017-18)



3. ICT RELATED TEACHER PROFESSIONAL DEVELOPMENT

Teachers are key agents for the successful implementation of digital technologies in the classroom and enable the build-up of digital competence by students. Initial teachers' training plays a crucial role in equipping teachers with the key competences required for their role. However, the European Commision recognises that teacher professional development throughout the career is also a key factor to ensure high-quality education (European Commission, 2014). The idea that professional development (PD) can enable high-quality teaching is widely accepted (Stewart, 2014; Kennedy, 2016). Several studies and reports find that teachers are, amongst other skills, especially in need of "ICT skills for teaching" (OECD, 2014; European Commission, 2013b). Member states have the important role to promote all forms of professional development, including incorporating digital skills in the curriculum of initial teacher training and in in-service training of teachers. Their role also includes guiding schools in incorporating the goals on digital technologies in school policies, strategies and overall vision. The Education and training 2020 (ET2020)[29] framework, and more specifically Erasmus+[30] offers many successfully established tools for exchanging best practices, peer learning and professional development of teachers at EU level (e.g. through tools as eTwinning[31], School Education Gateway[32], Teacher Academy[33], SELFIE[34]).

Section 3.1 looks into the different options in which teachers can engage in ICT related professional development (e.g. compulsory training, personal learning about ICT in free time, etc.). Section 3.2 provides insight into the different types of trainings in which teachers engage (e.g. taking pedagogical courses on the use of ICT, equipment-specific training, etc.). Section 3.3 provides insights into the intensity of professional development activities undertaken.

Summary of Key Findings

- More than 6 out of 10 students across all ISCED levels are taught by teachers who engage in **personal learning about ICT in their own time**.
- Between 29% (ISCED 2) and 41% (ISCED 1) of students are taught by teachers who participate in **online communities** for professional discussions with other teachers.
- In contrast, only between 12% (ISCED 3) and 27% (ISCED 1) of European students are taught by teachers who **participated in a compulsory ICT training**.
- Between 43% (ISCED 1) and 50% (ISCED 3) of students are taught by teachers who have undertaken **pedagogical courses** on the use of ICT.
- **Introductory courses** on Internet use and general applications are more common among teachers than more advanced courses: between 27% (ISCED 2) and 31% (ISCED 2 and 3) of students are taught by teachers who undertook such introductory courses.
- Between 45% (ISCED 1) and 55% (ISCED 2) of students have teachers who invested **more than 6 days in professional development in ICT** during the past two years.
- Only between 2% (ISCED 1) and 4% (ISCED 2 and 3) of European students have teachers who report having spent **no time at all on ICT related professional development activities** over the past two years.

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[29] For more information on the ET2020 framework, see http://ec.europa.eu/education/policy/strategic-framework_en.

[30] For more information on the Erasmus + program, see http://ec.europa.eu/programmes/erasmus-plus/node_en.

[31] https://www.etwinning.net

[32] https://www.schooleducationgateway.eu

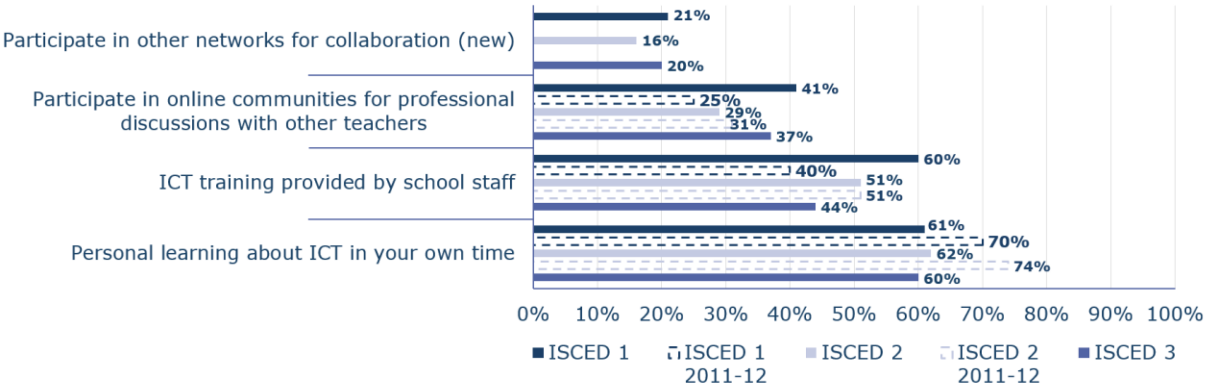
[33] https://www.schooleducationgateway.eu/en/pub/teacher_academy.htm

[34] https://ec.europa.eu/education/schools-go-digital_en

3.1. Different avenues to engage in teachers' ICT-related professional development

Figure 3.1 gives insight into the percentage of students whose teachers have engaged in various forms of ICT related professional development during the past two years. Figure 3.1 shows that, more than 6 out of 10 students across all ISCED levels are taught by teachers who have engaged in personal learning about ICT in their own time. In addition to that, between 44% (ISCED 3) and 60% (ISCED 1) of students are taught by teachers that received ICT training provided by school staff (compulsory or non-compulsory) during the past two years. In contrast, participation in a compulsory ICT training is less common (see figure 3.4). In short, as teacher training in ICT is rarely compulsory, most teachers end up devoting their spare time to develop these skills. Moreoever, it is often suggested that especially collaboration with peers is fundamental in order to gain sufficient skills to cope with the changing learning environments (European Commission, 2013b; European Commission, 2014). In fact, participation in online communities or other networks for collaboration are considered as important means through which teachers can develop their digital knowledge (OECD, 2014). In this respect, between 29% (ISCED 2) and 41% (ISCED 1) of students are taught by teachers that have participated in an online community for ICT related professional development during the past two years.

Fig. 3.1: Teachers' participation in different types of ICT related professional development during the past two years
(All ISCED levels, in % of students, EU level, 2011-12 and 2017-18)



Figures 3.2.a to 3.2.c show the percentage of students whose teachers are involved in personal learning about ICT in their own time over the different countries. The data reveal that important differences can be observed between the different countries. In Lithuania at ISCED level 1, for instance, 93% of students have teachers who are involved in learning about ICT in their own time whereas in other countries, less than half of students have teachers who engage in learning about ICT in their own time.

Fig. 3.2.a: Teachers' involvement in personal learning about ICT in their own time during the past two years
(ISCED 1, in % of students, country and EU level, 2017-18)

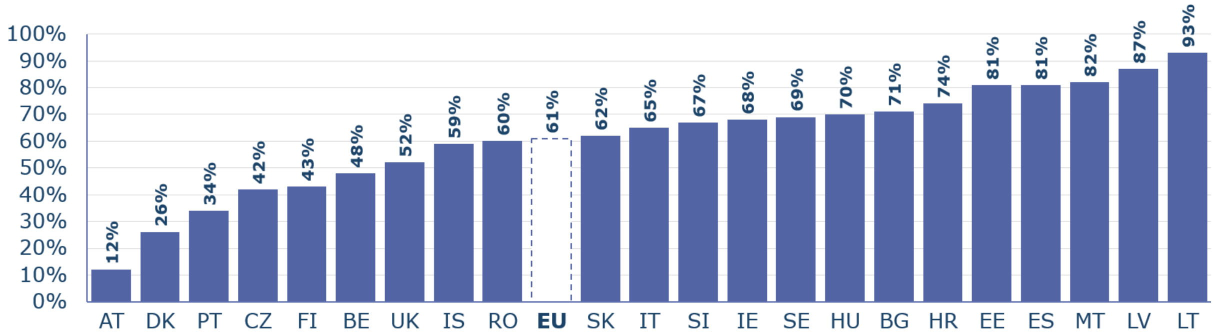


Fig. 3.2.b: Teachers' involvement in personal learning about ICT in their own time during the past two years
(ISCED 2, in % of students, country and EU level, 2017-18)

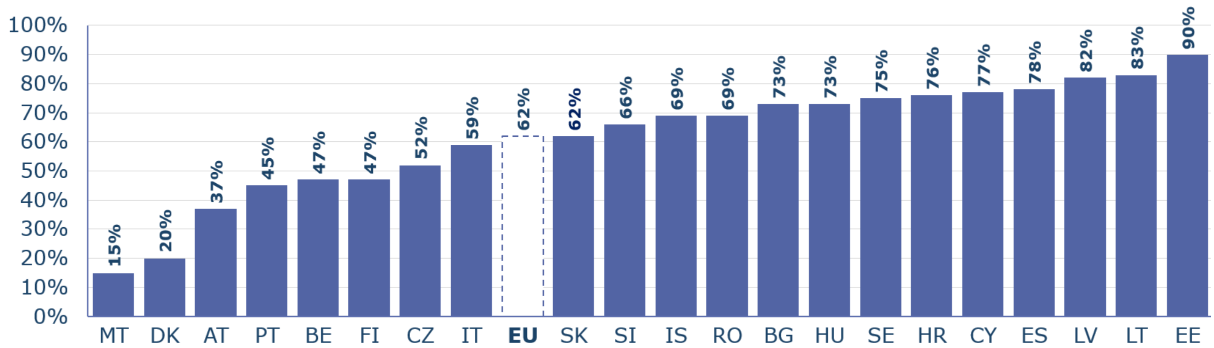
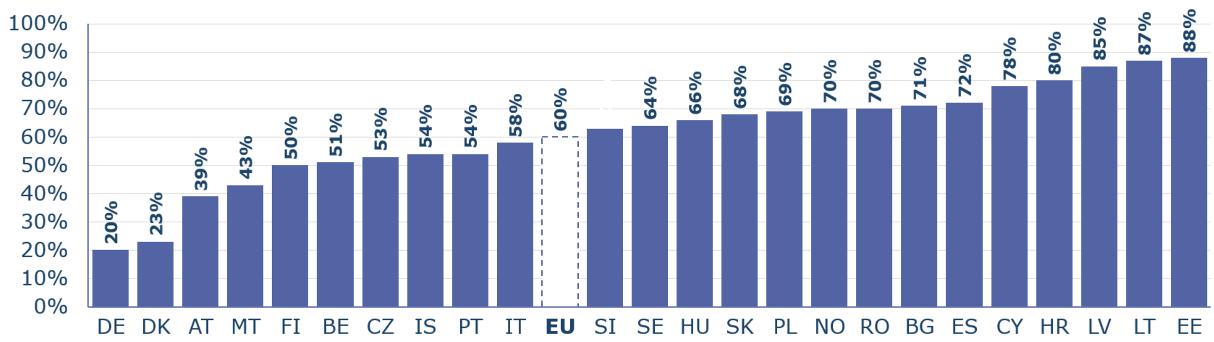


Fig. 3.2.c: Teachers' involvement in personal learning about ICT in their own time during the past two years
(ISCED 3, in % of students, country and EU level, 2017-18)



Figures 3.3.a to 3.3.c give more insight into the percentage of students whose teachers participate in ICT training provided by school staff. It is not specified whether this type of training is compulsory or not. These figures show again that there are large country differences.

Fig. 3.3.a: Teachers' participation in ICT training provided by school staff during the past two years
(ISCED 1, in % of students, country and EU level, 2017-18)

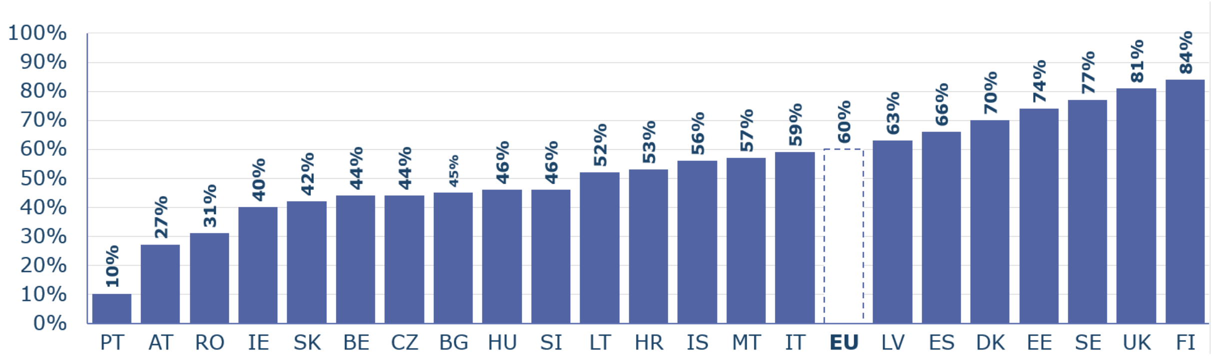


Fig. 3.3.b: Teachers' participation in ICT training provided by school staff during the past two years
(ISCED 2, in % of students, country and EU level, 2017-18)

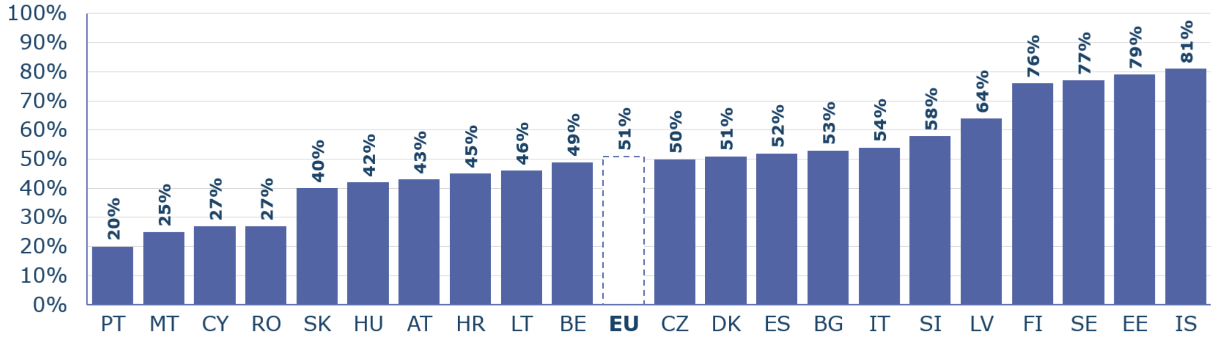


Fig. 3.3.c: Teachers' participation in ICT training provided by school staff during the past two years
(ISCED 3, in % of students, country and EU level, 2017-18)

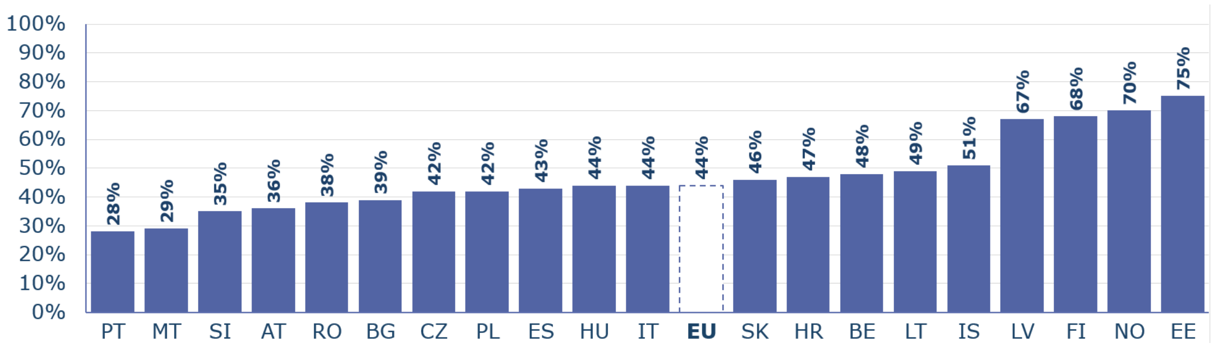
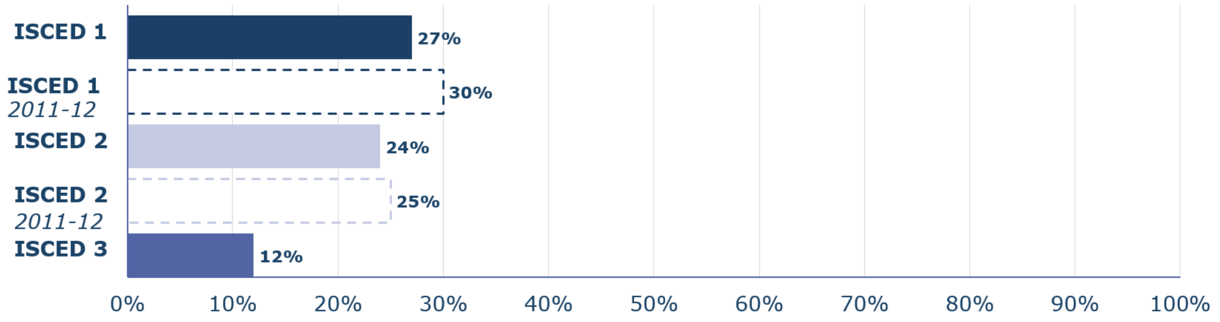


Figure 3.4 shows to what extent students are taught by teachers who participate in compulsory ICT training. The figure suggests that between 12% (ISCED level 3) and 27% (ISCED level 1) of European students are taught by teachers who participate in compulsory ICT training. The data reveal that the younger the students, the more likely it is that they are taught by teachers who underwent compulsory ICT trainings, which is in line with the findings reported in the '1st Survey of Schools: ICT in Education' (European Commission, 2013a).

Fig. 3.4: Teachers' participation in compulsory ICT training
(All ISCED levels, in % of students, country and EU level, 2017-18)



When looking at compulsory participation in ICT training at the country level (see figures 3.5.a – 3.5.c), remarkable differences across the countries can be observed.

Fig. 3.5.a: Teachers' participation in compulsory ICT training
(ISCED 1, in % of students, country and EU level, 2017-18)

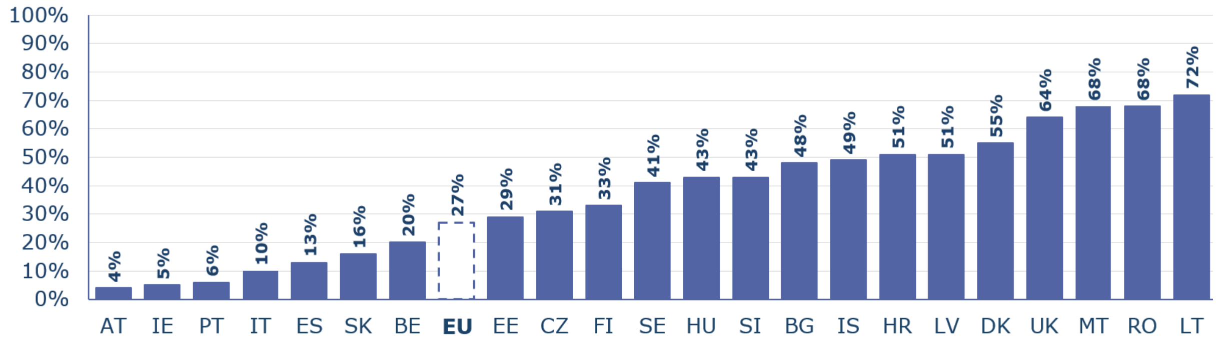


Fig. 3.5.b: Teachers' participation in compulsory ICT training
(ISCED 2, in % of students, country and EU level, 2017-18)

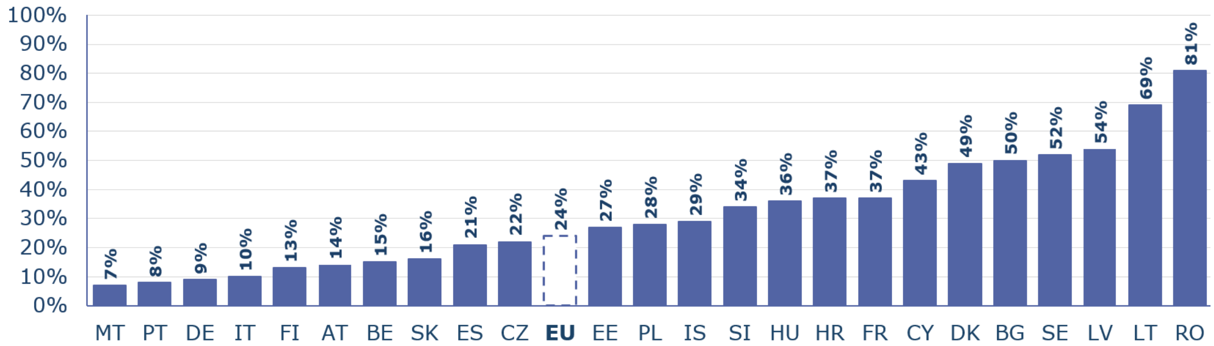
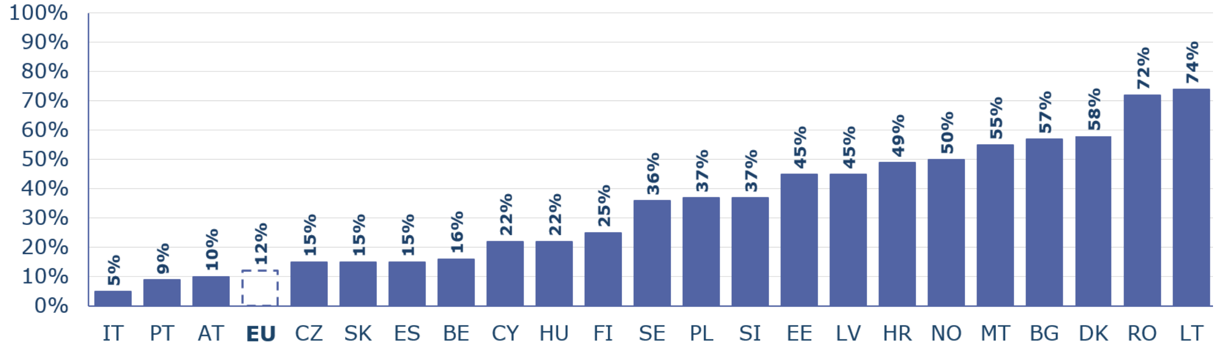


Fig. 3.5.c: Teachers' participation in compulsory ICT training
(ISCED 3, in % of students, country and EU level, 2017-18)



Figures 3.6.a to 3.6.c show the extent of teacher participation in online communities in the different surveyed countries.

Fig. 3.6.a: Teachers' participation in online communities for professional discussions with other teachers during the past two years
(ISCED 1, in % of students, country and EU level, 2017-18)

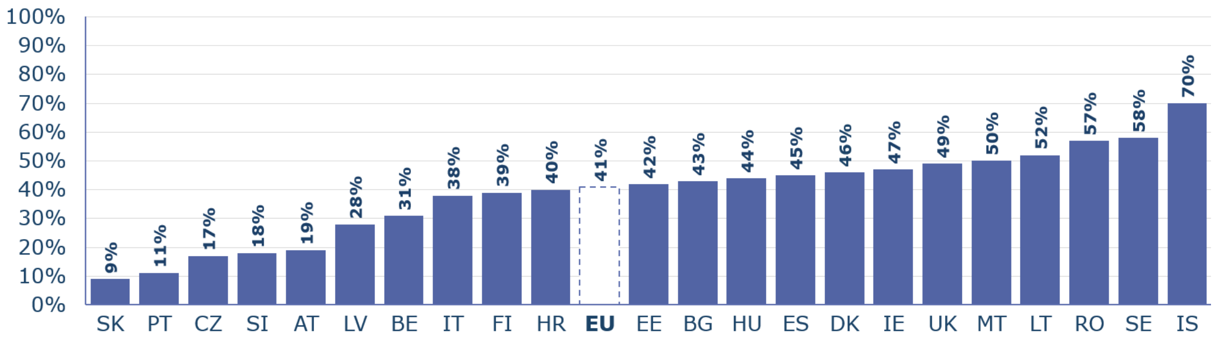


Fig. 3.6.b: Teachers' participation in online communities for professional discussions with other teachers during the past two years
(ISCED 2, in % of students, country and EU level, 2017-18)

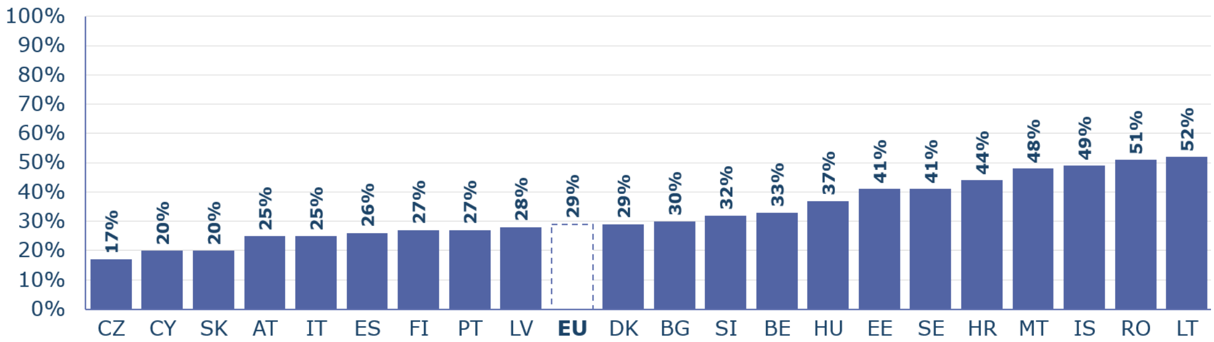
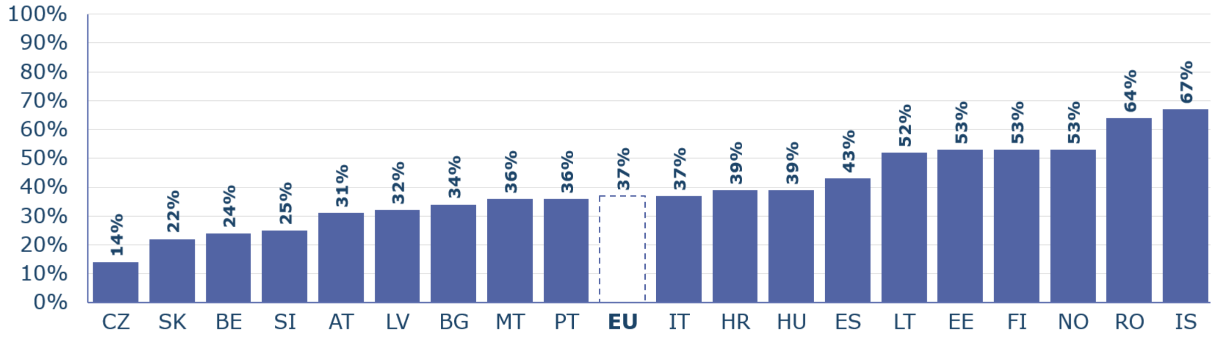


Fig. 3.6.c: Teachers' participation in online communities for professional discussions with other teachers during the past two years
(ISCED 3, in % of students, country and EU level, 2017-18)



To sum up, the above figures reveal that there are large variations among countries over the different categories of professional development. Some of the countries have notable variations in percentage in the various types of professional development in which students' teachers engage in. This indicates that no single figure should be interpreted in isolation, but always in conjunction with the other graphs describing the different possibilities to engage in teachers' ICT-related professional development.

3.2. Types of digital professional development

Section 3.2 gives some insight into the specific types of ICT related professional development undertaken by teachers during the past two years. Current literature recognizes the importance of integrating content, technology and pedagogy in the trainings (Jimoyiannis, 2008). The Technological Pedagogical Content Knowledge (TPACK) and technological pedagogical science knowledge (TPASK) frameworks, for example, integrate the critical parameters of content, pedagogy and technology in one framework and do not consider these aspects in isolation (Jimoyiannis, 2010; Mishra & Koehler, 2006).

Figure 3.7. shows that equipment-specific training, subject-specific training on learning applications and pedagogical courses on the use of ICT seem to be equally adopted in the course of professional development among teachers across all ISCED levels. A comparison with the '1st Survey of Schools: ICT in Education' reveals that the distribution of the different courses remained more or less at the same level (European Commission, 2013a). Nevertheless, it should be noted that there seem to be less students whose teachers undertake equipment-specific training in the current survey compared to the '1st Survey of Schools: ICT in Education' (European Commission, 2013a). On the other hand, the percentage of students whose teachers undertook subject-specific training on learning applications during the past two years has increased.

Fig. 3.7: Types of ICT related professional training undertaken by teachers during the past two years

(All ISCED levels, in % of students, EU level, 2011-12 and 2017-18)

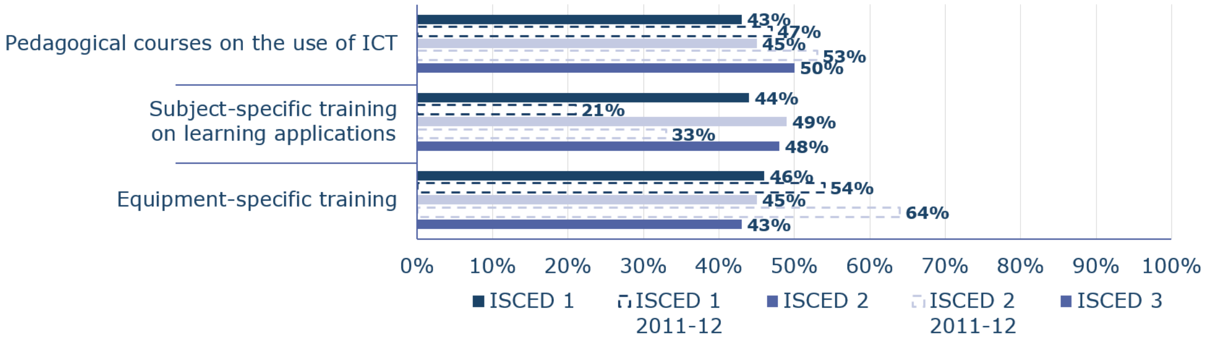
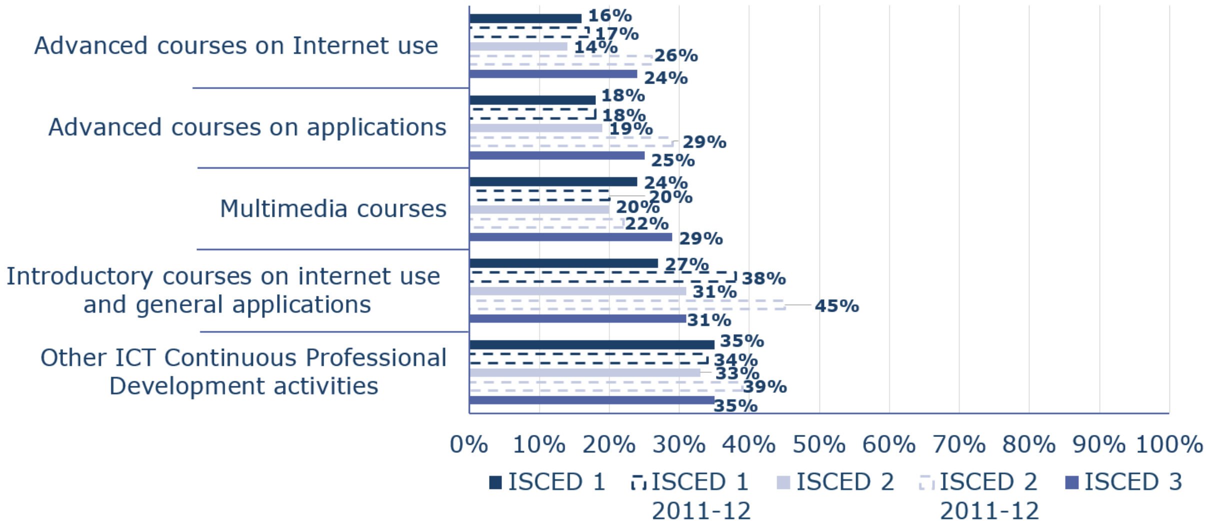


Figure 3.8. shows that, besides the category of other continuous professional development activities, introductory courses on Internet use and general applications are most commonly followed among teachers: between 27% (ISCED 1) and 31% (ISCED 2 and 3) of students are taught by teachers who took a course in this subject matter. In contrast, more advanced courses on, for example, applications or Internet use seem to be less common among teachers.

Fig. 3.8: Specific ICT related courses taken by teachers during the past two years

(All ISCED levels, in % of students, EU level, 2011-12 and 2017-18)



Figures 3.9.a to 3.9.c show the extent to which students have teachers who participate in courses focusing on the pedagogical use of ICT in teaching and learning. The data reveals large differences between countries. In Spain and Iceland, for instance, 3 out of 4 ISCED 1 students are taught by teachers who participated in courses on the pedagogical use of ICT in teaching and learning during the last two years, which is significantly different compared to other countries where such training is less common.

Fig. 3.9.a: Teachers' participation in courses on the pedagogical use of ICT in teaching and learning during the past two years
(ISCED 1, in % of students, country and EU level, 2017-18)

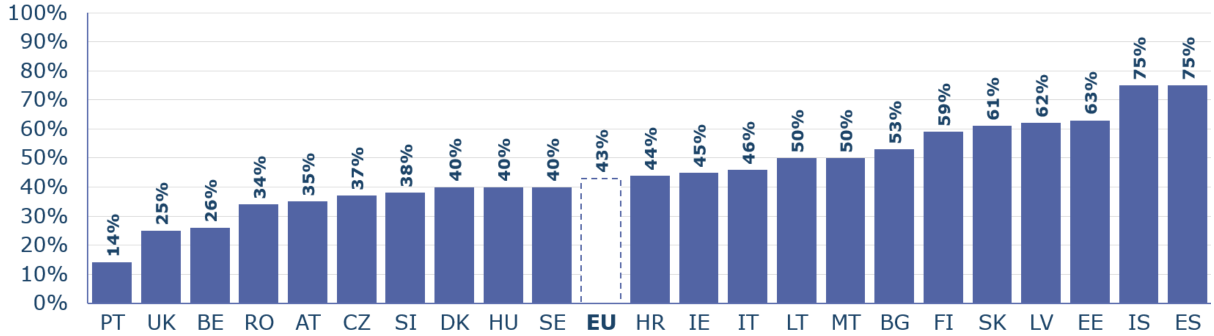


Fig. 3.9.b: Teachers' participation in courses on the pedagogical use of ICT in teaching and learning during the past two years
(ISCED 2, in % of students, country and EU level, 2017-18)

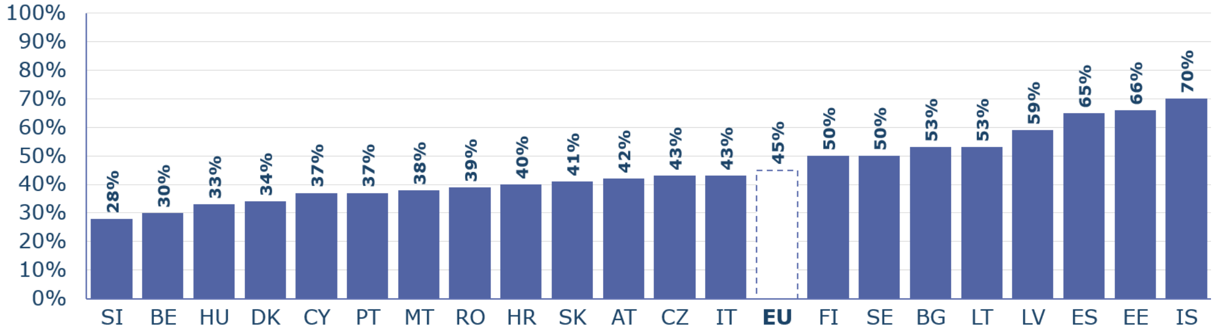


Fig. 3.9.c: Teachers' participation in courses on the pedagogical use of ICT in teaching and learning during the past two years
(ISCED 3, in % of students, country and EU level, 2017-18)

Figures 3.10.a to 3.10.c focus on another type of ICT related professional development, namely subject-specific training on learning applications. Again, figures reveal large country differences.

Fig. 3.10.a: Teachers' participation in subject-specific training on learning applications during the past two years
(ISCED 1, in % of students, country and EU level, 2017-18)

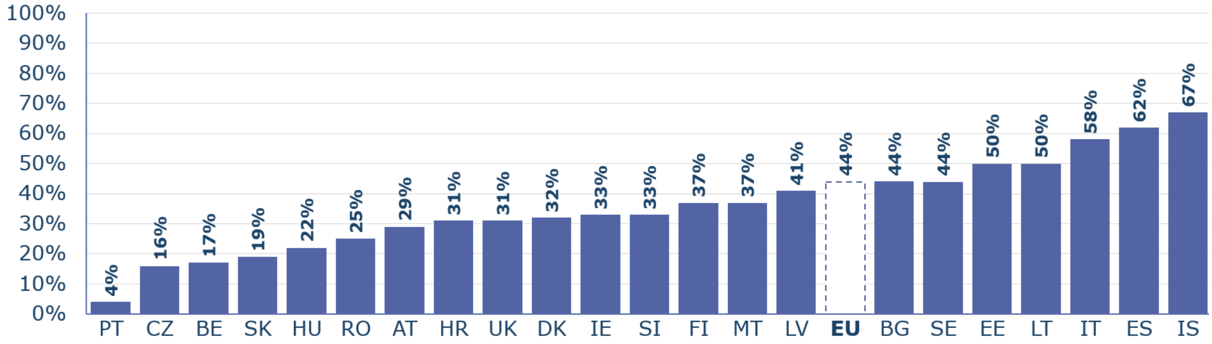


Fig. 3.10.b: Teachers' participation in subject-specific training on learning applications during the past two years
(ISCED 2, in % of students, country and EU level, 2017-18)

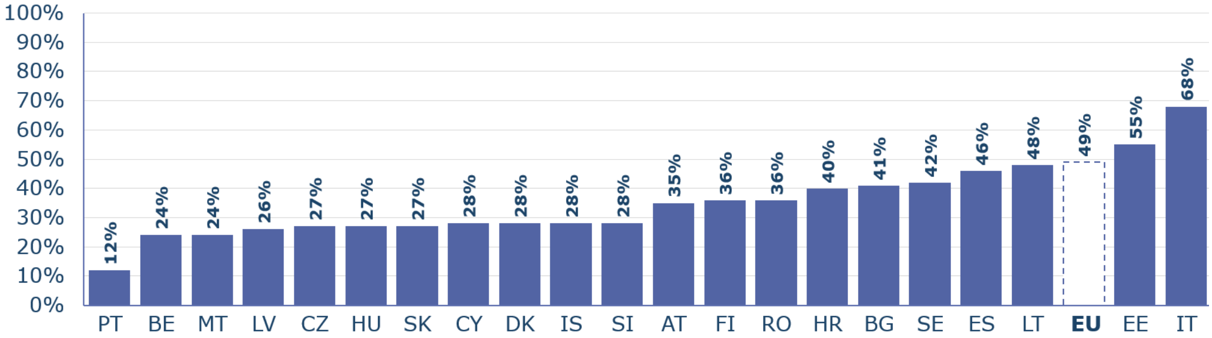
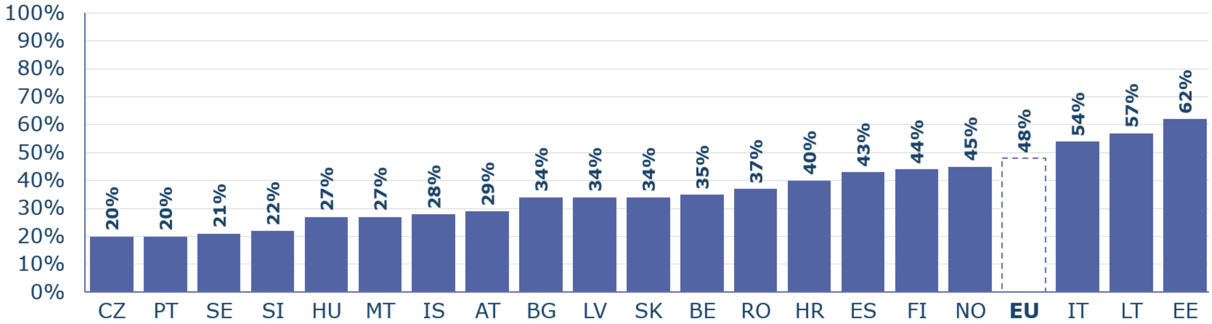


Fig. 3.10.c: Teachers' participation in subject-specific training on learning applications during the past two years
(ISCED 3, in % of students, country and EU level, 2017-18)

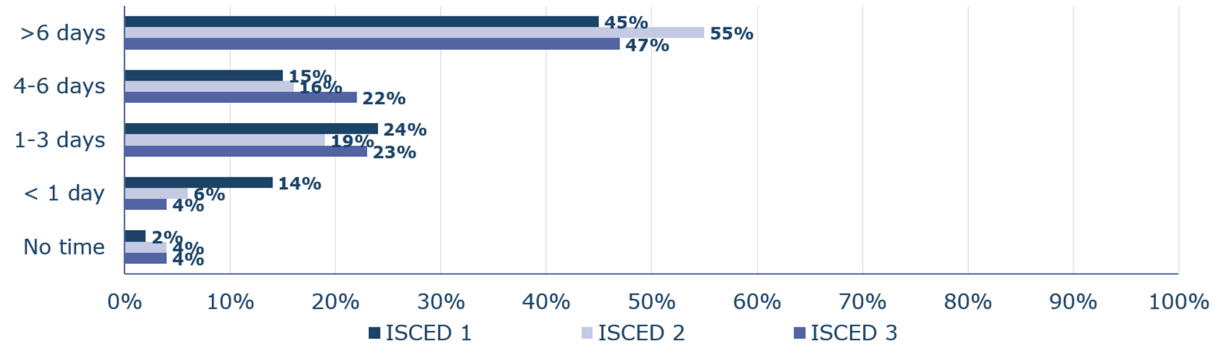


3.3. Frequency of professional development activities

The above sections gave a deeper understanding of the different ways in which teachers can improve their knowledge on ICT and the different focuses of ICT trainings. However, these figures did not give an insight into the actual intensity of involvement in these activities. Figure 3.11 gives a general overview, per ISCED level, of the time invested by teachers in professional development activities during the past two years years at the European level. In general, there is an increased focus on Continuous Professional

Development (CPD), referring to learning and training on a more continuous basis (European Commission, 2014; European Commission, 2013b; OECD, 2014; Kennedy, 2016). The results shows that 45% of ISCED level 1 students, 55% of ISCED level 2 students and 47% of ISCED level 3 students have teachers who invested more than 6 days in professional development during the past two years.

Fig. 3.11: Time invested by teachers in professional development activities during the past two years
(All ISCED levels, in % of students, EU level, 2017-18)



Figures 3.12.a to 3.12.c give more insight into the intensity of teachers' professional development across the different countries and ISCED levels. These figures show how many students have teachers who report having spent more than 6 days on ICT related professional development activities during the past two years. In general, large differences between countries prevail: countries like Romania, Italy and Spain seem to have many students whose teachers spend more than 6 days on ICT related professional development whereas many countries fall below the European average.

Fig. 3.12.a: Teachers reporting having spent more than 6 days on ICT related professional development activities during the past two years
(ISCED 1, in % of students, country and EU level, 2017-18)

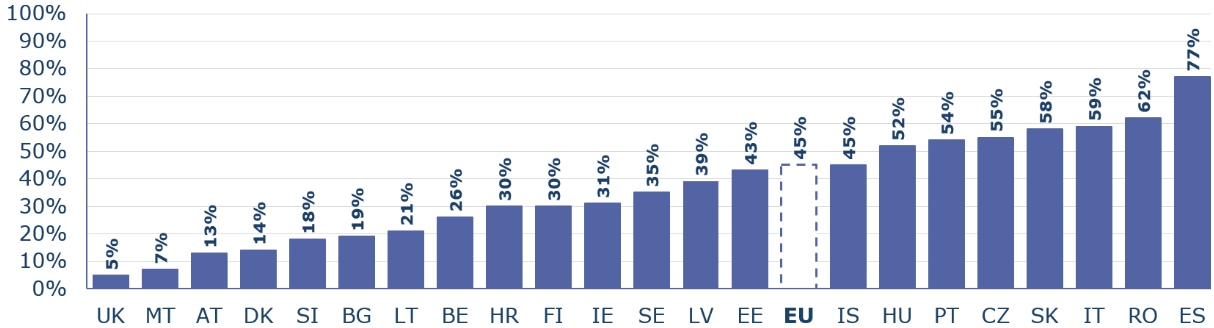


Fig. 3.12.b: Teachers reporting having spent more than 6 days on ICT related professional development activities during the past two years
(ISCED 2, in % of students, country and EU level, 2017-18)

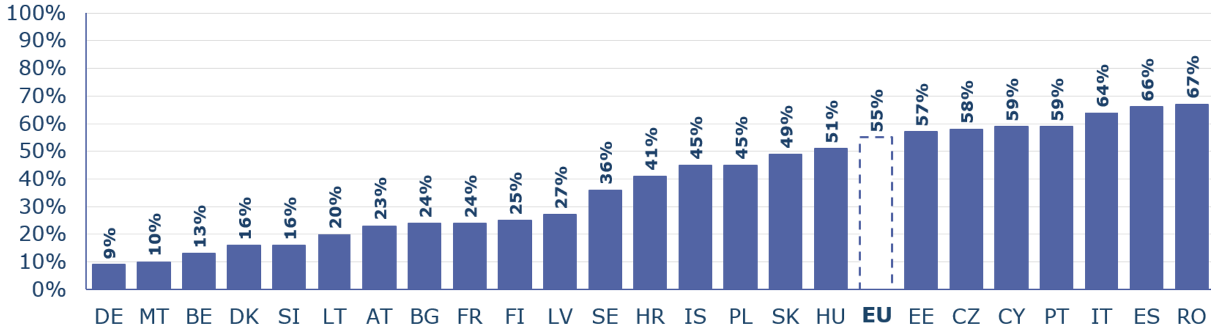
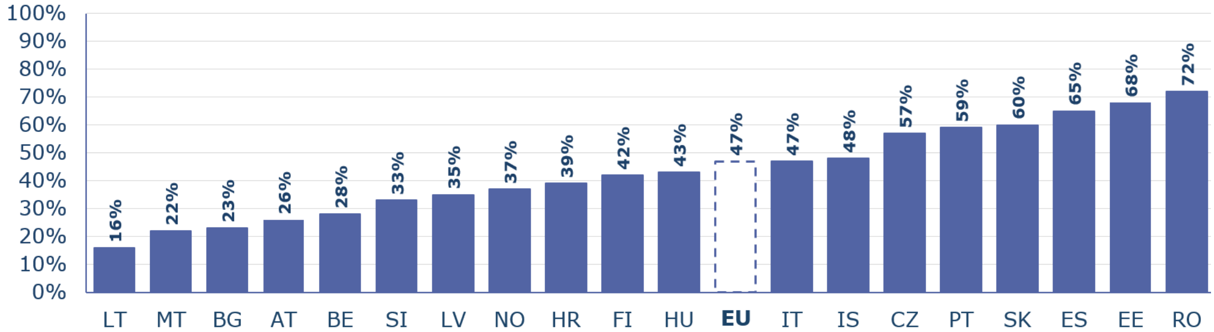


Fig. 3.12.c: Teachers reporting having spent more than 6 days on ICT related professional development activities during the past two years
(ISCED 3, in % of students, country and EU level, 2017-18)



Figures 3.13.a to 3.13.c show what percentage of students have teachers who did not spend any time at all on ICT related professional development activities during the past two years. The data show that, on average at European level, only between 2% (ISCED 1) and 4% (ISCED 2 and 3) of students have teachers who report having spent no time at all on ICT related professional development activities during the past two years.

Fig. 3.13.a: Teachers reporting having spent no time on ICT related professional development activities during the past two years
(ISCED 1, in % of students, country and EU level, 2017-18)

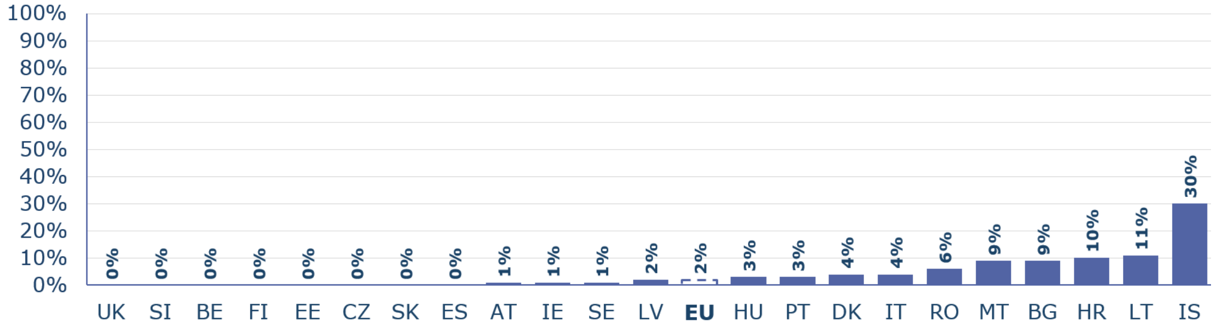


Fig. 3.13.b: Teachers reporting having spent no time on ICT related professional development activities during the past two years
(ISCED 2, in % of students, country and EU level, 2017-18)

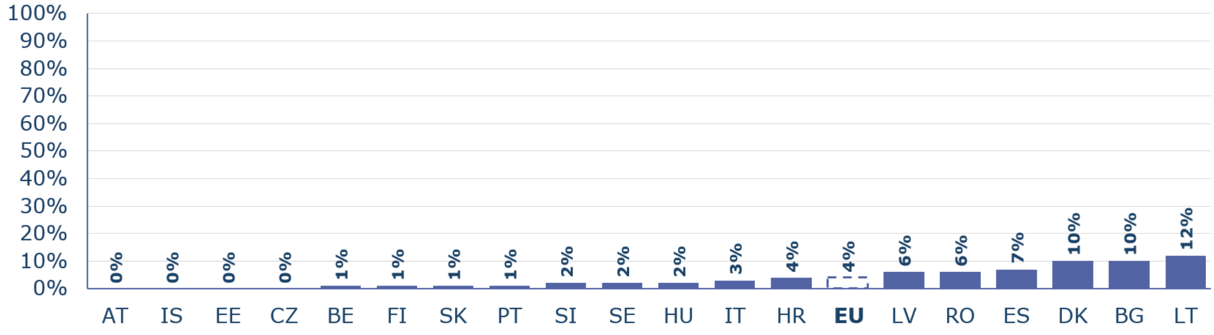
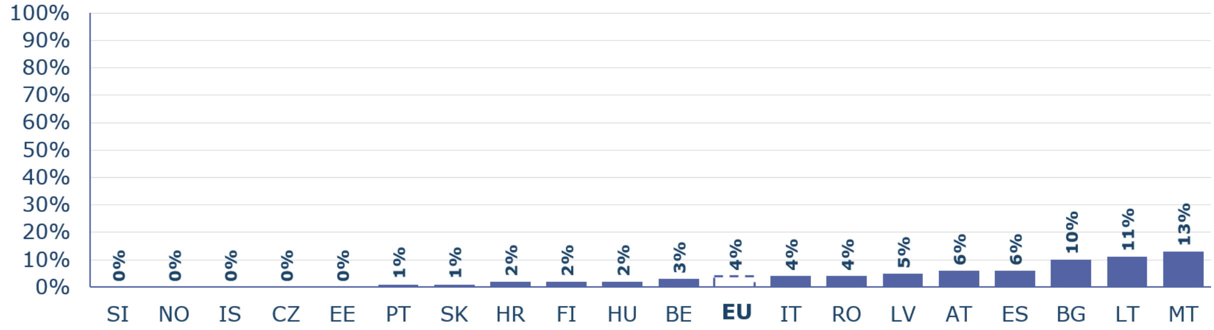


Fig. 3.13.c: Teachers reporting having spent no time on ICT related professional development activities during the past two years
(ISCED 3, in % of students, country and EU level, 2017-18)



4. DIGITAL HOME ENVIRONMENT OF STUDENTS

It is widely acknowledged that parents are a child's first educator (Stephen, Stevenson, & Adey, 2013). Several literature reviews on the topic recognise the relationship between parental involvement in the education of their children and their performance at school (Wilder, 2014; Cabus & Ariës, 2017). This suggests that a good home environment in terms of ICT equipment provision and ICT use can also help children better develop digital competence. Already from a very young age, children get in touch with digital technologies and depend heavily on the behaviour of their parents and older siblings (Chaudron, Di Gioia, & Gemo, 2018). Therefore, in this new era of pervasive technology, a **positive attitude of parents** towards digital technologies is key for the successful implementation of ICT at school. Unlike their parents, most students today were born in a completely digitised world. The results of this survey reveal that the **majority of European parents** nevertheless believe that digital technologies can help their children to study more efficiently.

This section will discuss **the infrastructure provision at home** (**section 4.1**) and the **digital activities** students are involved in **at home** (**section 4.2**). **Section 4.3** will elaborate upon **parents' awareness** of their children's use of digital technologies. In addition, this section provides some insight into the extent to which parents **supervise** their children when using digital technologies at home or control their children by means of parental control tools.

Summary of Key Findings

- Across all ISCED levels, most students have **access to computers** (e.g. desktop computers, laptops or notebooks) at home. While **tablet access** is lower for students in higher ISCED levels (81 % at ISCED level 1 and 59% at ISCED level 3), **smartphone access** seems to increase with the age of students (80% at ISCED level 1 and 91% at ISCED level 3).
- Students often chat online, participate in social networks and watch video clips or download music, games or software from the Internet at home. Activities like coding or other learning activities using educational software, games, apps or quizzes are less common.
- A large share of students at ISCED levels 2 and 3 never or almost never discuss the risks of the Internet with their parents (42% ISCED 2, 51% ISCED 3).
- On average, 79% of ISCED 1 students, 59% of ISCED 2 students and only 39% of ISCED 3 students have parents that indicate that they **know enough about their child's online activities.**
- **The younger the child, the more frequently parents engage in ICT-related activities** with them.
- More than 3 out of 5 students at ISCED levels 1 and 2, but only half of ISCED 3 students, have parents who are highly confident in teaching their children how to use the Internet safely and responsibly.
- Still, 1 out of 5 students at ISCED levels 1 and 2 have parents who declare having only low (or no) confidence in teaching their children how to use the Internet safely and responsibly. This figure is higher at ISCED level 3 with 30%.
- Students at ISCED level 1 are more likely to have parents that use **parental control** tools than students at ISCED levels 2 and 3, while 1 out of 3 ISCED level 1 students have parents who do not implement any parental control tool.
- The most used parental control tools over all ISCED levels are **online content filters** (e.g. filtering out adult-related sites, illegal activity and social networking sites) and program blockers to stop children from running certain programs.

4.1. Students' access to digital technologies at home

It is often suggested that policy makers should not only focus on the access to digital technologies in the school environment, but also in the home environment (Livingstone, 2012). Access to digital technologies in the home environment guarantees continuous learning and enables the development of high-quality digital skills.

Figures 4.1.a to 4.1.c look at the devices that students have access to at home. The figures show that at European level, between 92% (ISCED 1) to 97% (ISCED 3) of students have access to computers (e.g. desktop computers, laptops, or notebooks) at home. Smartphone access seems to increase with the age of students, while tablet access is higher for lower ISCED level students. In general, only about 1 of 5 students in all ISCED levels have access to e-readers at home.

The country level figures are relatively in line with the European average. Only when looking into the results regarding the share of students that have access to a tablet or smartphone at home, some variations over the different European countries and over the different ISCED levels can be noticed. For example, while 90% of Finnish ISCED level 3 students have access to a tablet at home, this is the case for only 46% for Bulgarian students at ISCED level 3.

Fig. 4.1.a: Students having access to ICT devices at home
(ISCED 1, in % of students, country and EU level, 2017-18)

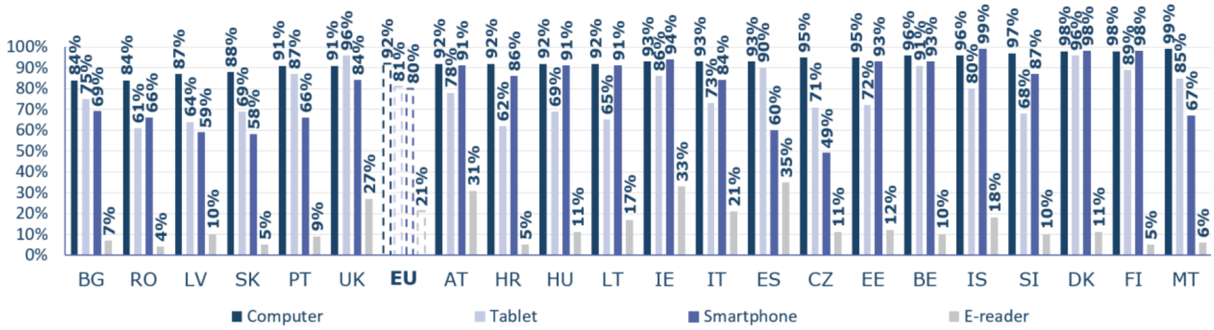


Fig. 4.1.b: Students having access to ICT devices at home
(ISCED 2, in % of students, country and EU level, 2017-18)

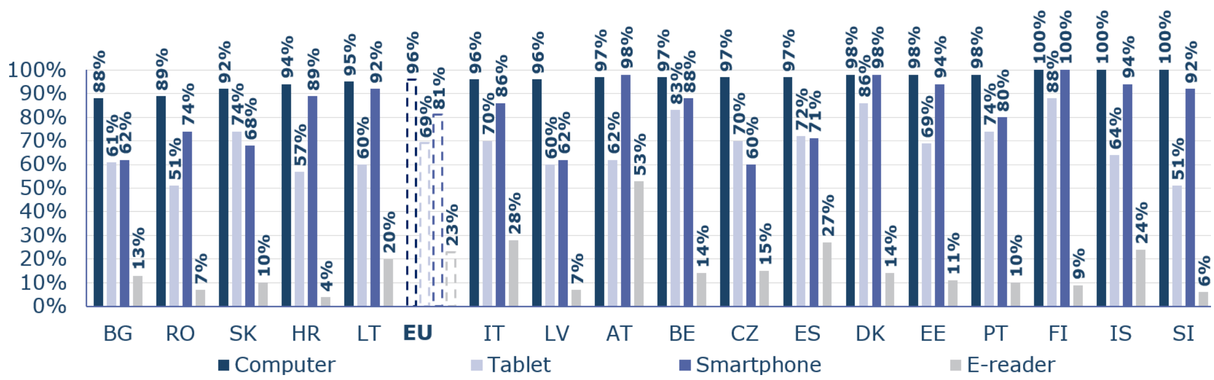
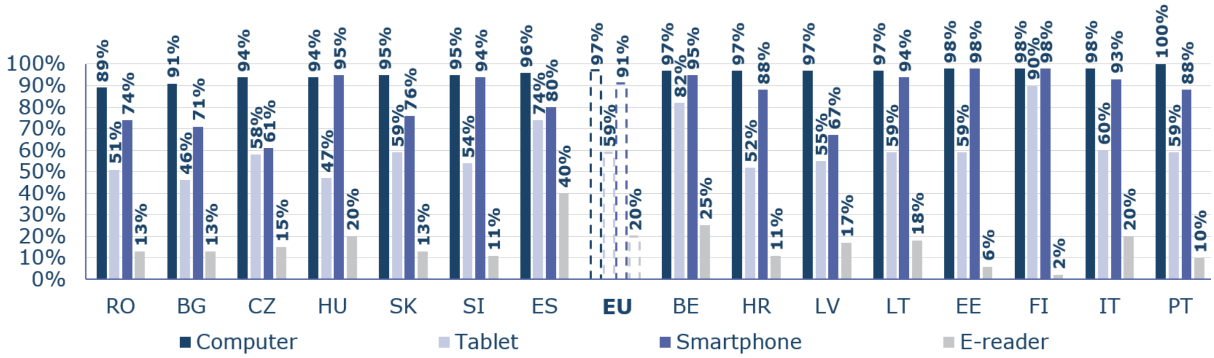


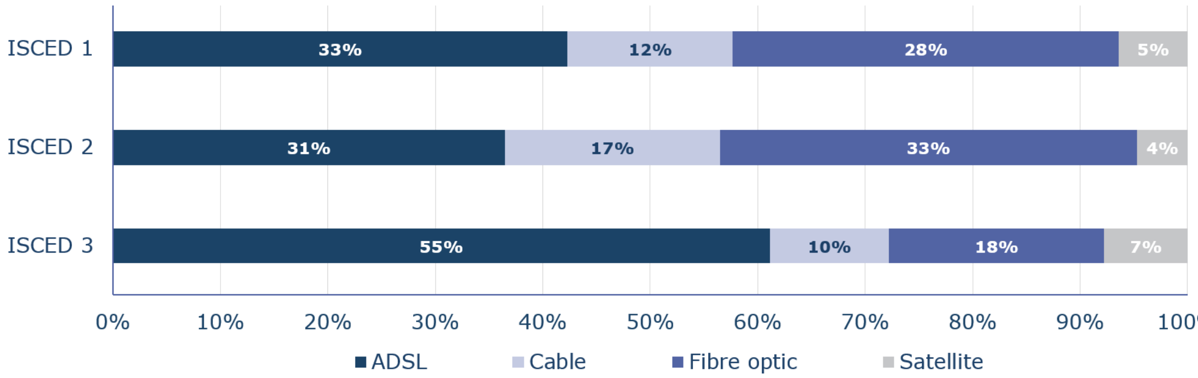
Fig. 4.1.c: Students having access to ICT devices at home
(ISCED 3, in % of students, country and EU level, 2017-18)



The survey on ICT usage in households and by individuals organised by Eurostat shows that the share of households with Internet access has risen over the past years.[35] Without an Internet connection, the array of information and multimedia tools that can be used is reduced and the opportunities to communicate and collaborate decrease. A good Internet connection at home is one of the conditions for a successful use of ICT tools for educational purposes.

Figure 4.2 gives some insight into the types of Internet connection students have at home as reported by parents. The results show that most students at ISCED 3 have access to the Internet via ADSL. Students at ISCED levels 1 and 2 mostly have access to the Internet at home via ADSL and fibre.

Fig. 4.2: Types of Internet at home
(All ISCED levels, in % of students, EU level, 2017-18)



4.2. Students' digital activities at home

Figures 4.3.a and 4.3.b give insight into the ICT related activities undertaken by students at home[36]. Unsurprisingly, the data reveals that students often chat online, participate in social networks and watch video clips or download music, games or software from the Internet at home. For instance, the European average shows that 82% of ISCED level 2 students and 91% of ISCED level 3 students chat online every day or almost every day. Activities like coding or performing other learning activities with the help of educational

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[35] For more information on the Community survey on ICT usage in households and by individuals, see https://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Community_survey_on_ICT_usage_in_households_and_by_individuals.

[36] While the questionnaires at the school, teacher and parent level were conducted for 3 ISCED levels (ISCED level 1, 2 and 3), students only participated at ISCED levels 2 and 3. In this sub-chapter, therefore, only data is presented for ISCED levels 2 and 3.

software, games, apps or quizzes are less common than reading and watching the news online or watching videos or downloading music and games. For instance, the European average shows that only 6% of ISCED level 2 students and 5% of ISCED level 3 students code at a daily (or almost daily basis). This is an important finding in light of the importance of coding in the curriculum of students (also see section 2). The more students engage in similar activities at home, the more this skill can be developed.

Fig. 4.3.a: Students' home activities
(ISCED 2, in % of students, EU level, 2017-18)

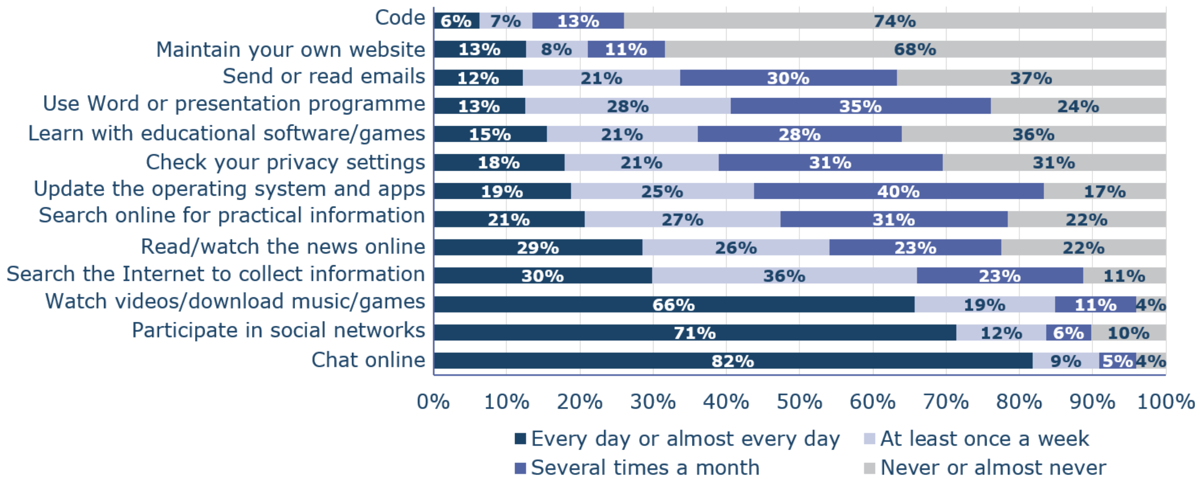
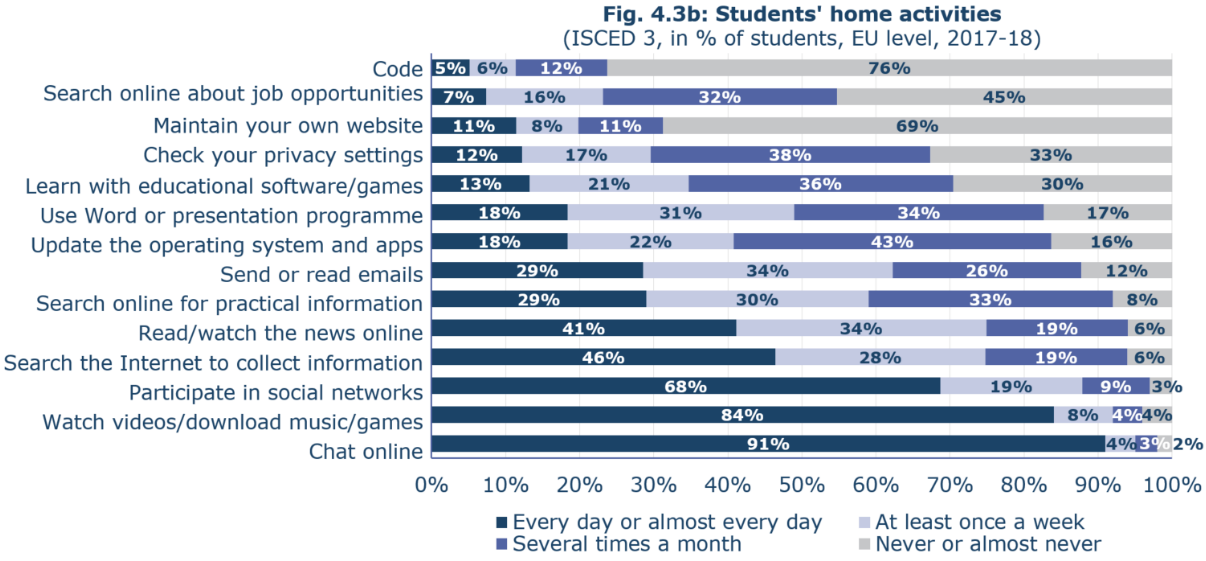


Fig. 4.3.b: Students' home activities
(ISCED 3, in % of students, EU level, 2017-18)



4.3. Parental supervision and control in ICT

The provision of ICT equipment at home encompasses both opportunities and risks (Livingstone, Mascheroni, Dreier, Chaudron, & Lagae, 2015). Regarding possible risks that the Internet and using digital technolgoies bear, it is crucial that children develop safe and valuable digital literacy skills, adjusted to their respective stages of development. In this context, digital literacy skills of parents is recognised as being the most important factor, enabling the development of digital literacy skills of children. The familiarity and expertise of parents with digital technologies largely determines how they manage their childrens' digital activities (Livingstone, Mascheroni, Dreier, Chaudron, & Lagae, 2015; Stephen, Stevenson, & Adey, 2013).

Among other things, the Commission co-funds Safer Internet Centres in Member States whose main task is to raise awareness and foster digital literacy among minors, teachers and parents. The Commission's Safer Internet Day is now a worldwide event in over 140 countries aiming to raise awareness of online safety. The Commission also launched in 2018 the EU-wide #SaferInternet4EU Campaign on online safety, media literacy and cyber-hygiene.

Figures 4.4.a to 4.4.c show the extent to which students have parents who are aware of what their children are doing online (e.g. when completing school work, playing games, browsing the internet, etc.). Next to a dichotomous division between 'Yes, I feel I know enough' and 'I don't know anything about my child's computer use', the survey allowed parents to indicate that they don't know as much as they would like to know about their child's computer use or that they know 'one or two things' but that there remain a lot of things they are not aware of. In general, the figures indicate that parents' awareness on their child's online activities seems to be higher the younger the child. On average in Europe, 79% of ISCED level 1 students have parents who indicate they know enough about their child's online activities. In contrast, the share of students having parents who indicate that they know enough about their child's online activities use is lower with 59% and 39% at ISCED levels 2 and 3 respectively. In addition to that, 2%, 4% and 12% of students have parents who indicate that they do not know anything about their childs' computer use at ISCED levels 1, 2 and 3, respectively.

Fig. 4.4.a: Parents' awareness on their child's online activities
(ISCED 1, in % of students, country and EU level, 2017-18)

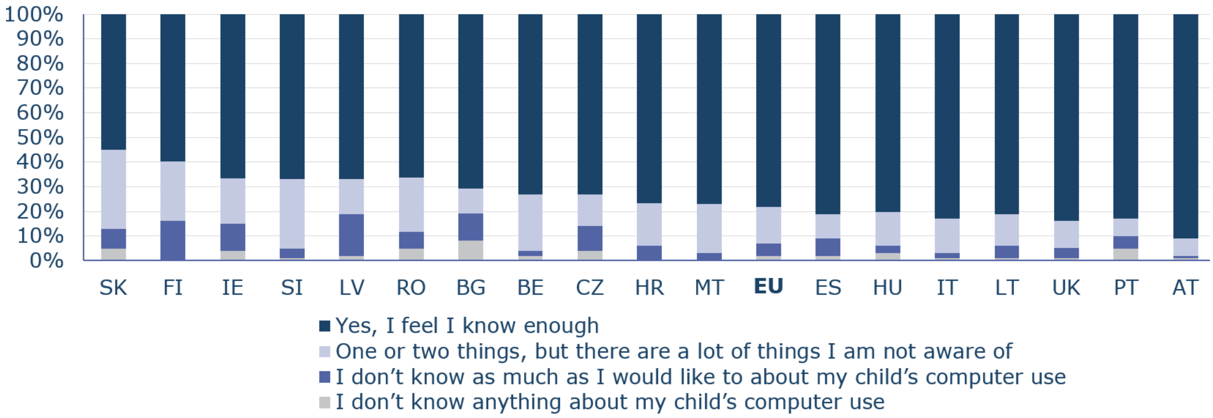


Fig. 4.4.b: Parents' awareness on on their child's online activities
(ISCED 2, in % of students, country and EU level, 2017-18)

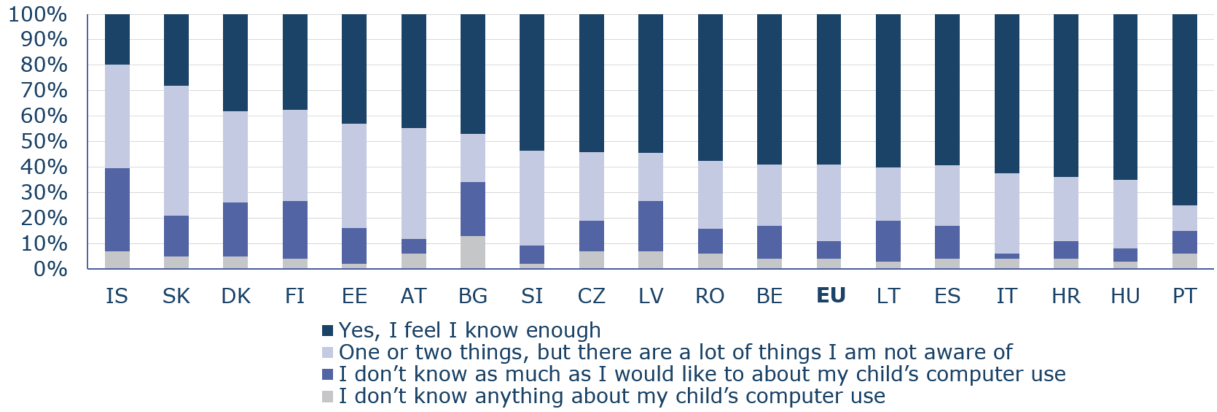
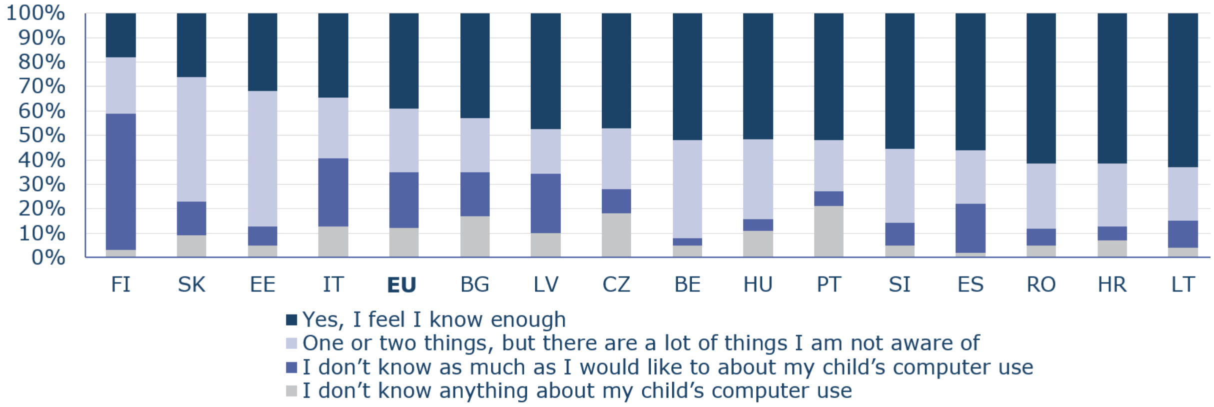
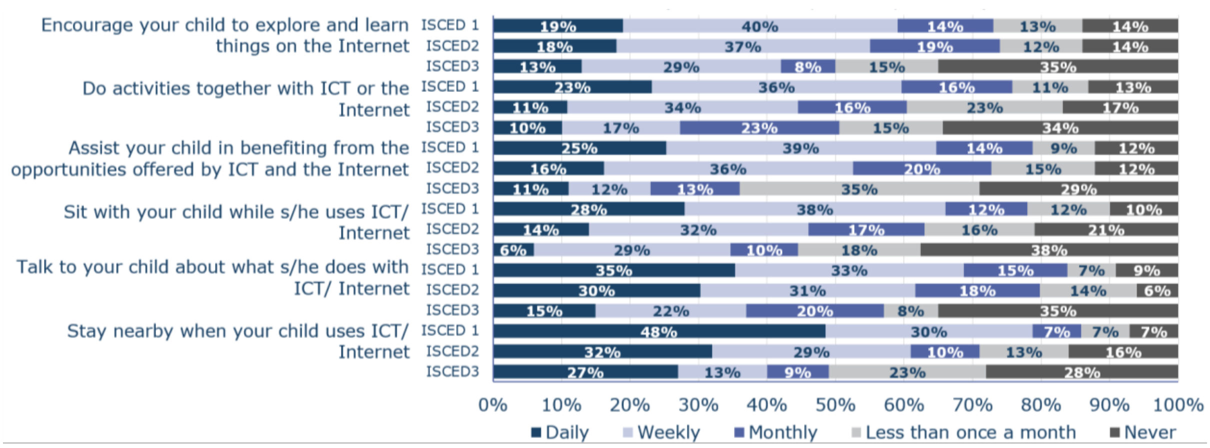


Fig. 4.4.c: Parents' awareness on their child's online activities
(ISCED 3, in % of students, country and EU level, 2017-18)



It is important that parents guide their children in order to use digital technologies safely and in order to exploit their digital skills to the best possible extent. This corresponds to active mediation of ICT and Internet use (Livingstone, Mascheroni, Dreier, Chaudron, & Lagae, 2015). Figure 4.5 shows to what extent parents interact closely with their children when using digital technologies and the Internet. The younger the child, the more frequently parents engage in ICT-related activities with their children. For example, at ISCED level 1, half of European parents stay nearby their child during the use of ICT or the Internet. This figure falls down to 27% at ISCED level 3.

Fig. 4.5: Parents engagement in ICT-related activities with their children
(All ISCED levels, in % of students, country and EU level, 2017-18)



The survey asked about the confidence of parents in teaching their children about safe and responsible Internet behaviour. More precisely, by means of three dichotomous questions, parents were asked whether they were confident in 1) teaching their child how to behave safely online (e.g. prevent cyberbullying), 2) teaching their child how to behave safely to protect his/her privacy and 3) teaching their child how to manage their digital identity and reputation. Subsequently, a scale based on those three dichotomous questions was created, resulting in four confidence levels: a) high confidence (all three items were affirmed), b) medium confidence (two items were affirmed), low confidence (one item was affirmed) and no confidence (no item was affirmed). While not giving a direct insight in the actual behaviour of parents, these questions give an indication of parents' competence in guiding their children, in terms of safe and responsible Internet use. This activity is also considered as active mediation (Livingstone, Mascheroni, Dreier, Chaudron, & Lagae, 2015).

Figures 4.6.a and 4.6.b show that 66% of ISCED level 1 and 67% of ISCED level 2 students have parents who feel highly confident in teaching their children how to use the Internet safely and responsibly. In contrast, the results show that only 52% European students at ISCED level 3 have parents that feel highly confident in teaching their children how to use the Internet safely and responsibly (see figure 4.6.c). In addition, the European average also shows that 15% of ISCED level 1 and 13% of ISCED level 2 students, have parents who declare having no confidence at all or having only low confidence in teaching their children how to use the Internet safely and responsible. This figure is slightly higher at ISCED level 3 where 30% of European students have parents who declare having no confidence at all. The different figures vary slightly across the different countries, with countries such as Finland, Croatia and Spain having a relatively high number of students with parents claiming a high confidence, across all ISCED levels.

Fig. 4.6.a: Parents' confidence in teaching their child how to use the Internet safely and responsibly
(ISCED 1, in % of students, country and EU level, 2017-18)

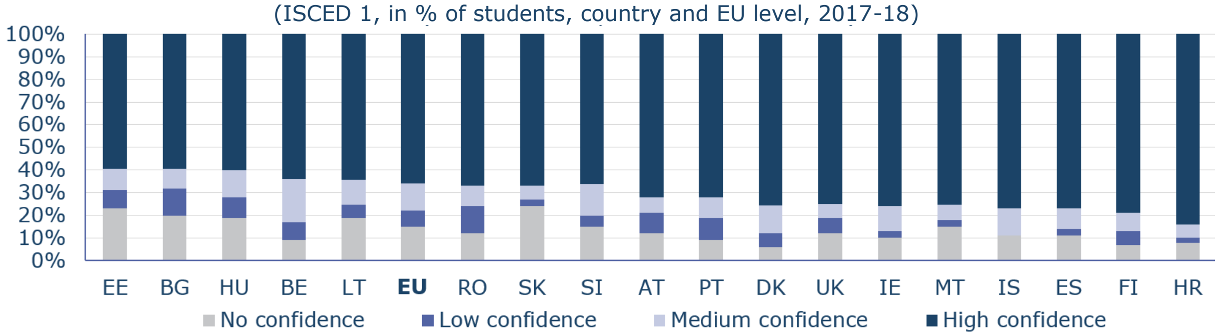


Fig. 4.6.b: Parents' confidence in teaching their child how to use the Internet safely and responsibly
(ISCED 2, in % of students, country and EU level, 2017-18)

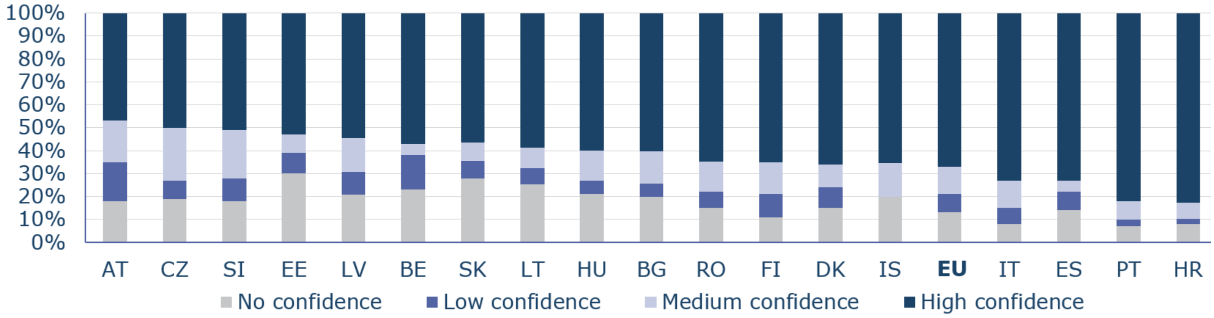
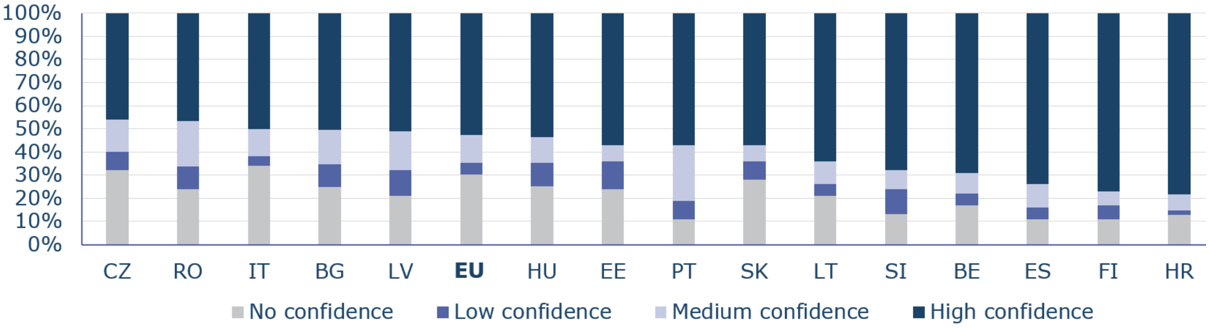


Fig. 4.6.c: Parents' confidence in teaching their child how to use the Internet safely and responsibly
(ISCED 3, in % of students, country and EU level, 2017-18)



Parents can also restrict their childrens' use of digital technologies. The use of parental control tools is also denoted as restrictive mediation (Livingstone, Mascheroni, Dreier, Chaudron, & Lagae, 2015). Figure 4.7 shows that European students at ISCED level 1 are more likely to have parents that use parental control tools than European students at ISCED levels 2 and 3. More precisely, the EU average shows that 73% of students at ISCED level 3 have parents who do not implement any parental control tool. Nevertheless, even at ISCED level 1, still close to 1 out of 3 students have parents who do not implement any parental control tool. The most used parental control tools over all ISCED levels are online content filters (e.g. filtering out adult-related sites, illegal activity and social networking sites) and program blockers to stop child from running certain programs.

Fig. 4.7 Parental controls used by parents for their child
(All ISCED levels, in % of students, EU level, 2017-18)

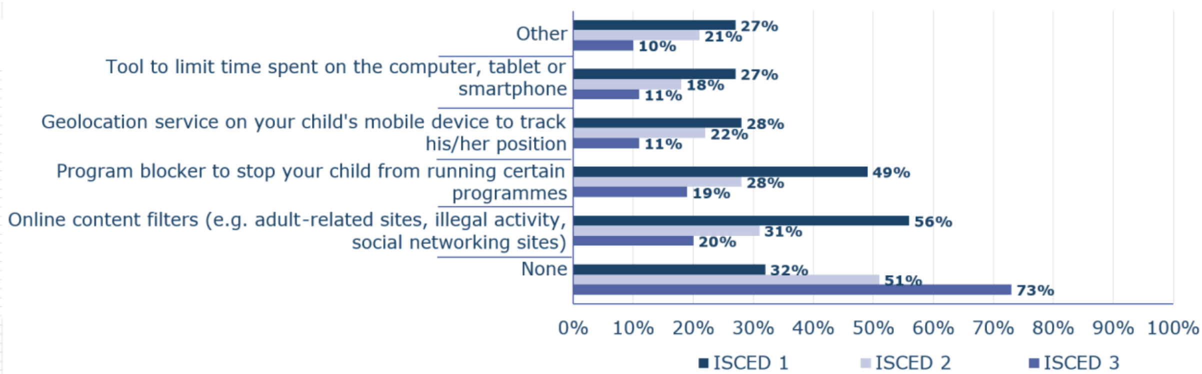
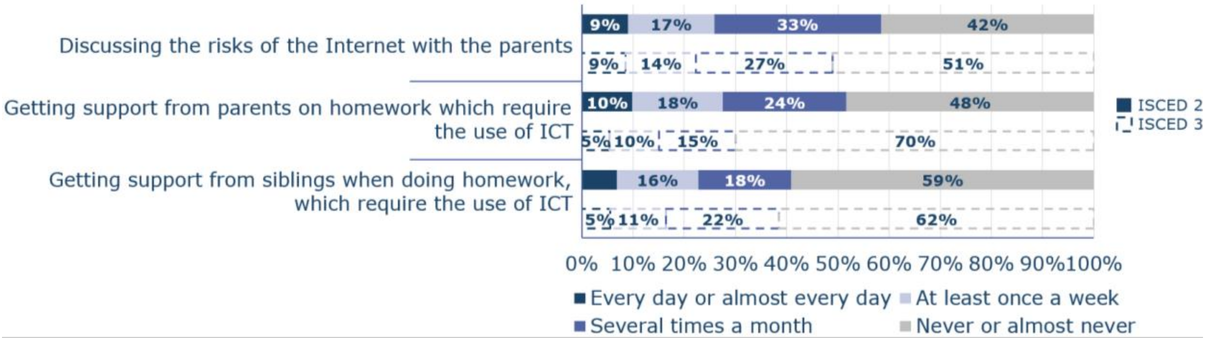


Figure 4.8 shows that more than half of students at ISCED levels 2 and 3 never or almost never get support from neither their parents nor their siblings regarding doing homework, which requires the use of ICT. Furthermore, a majority of students at ISCED levels 2 and 3 never or almost never discuss the risks of the Internet with their parents (42% ISCED 2, 51% ISCED 3).

Fig. 4.8: Frequency of support from parents and siblings
(ISCED 2 and 3, in % of students, EU level, 2017-18)



5. SCHOOLS' DIGITAL POLICIES, STRATEGIES AND OPINIONS

Section 5.1 presents key findings related to **digital policies and strategies of schools**. Implementing policies and strategies supporting digital technologies at school level allows a tailor-made implementation of digital technologies in schools and enables a shared vision among all stakeholders at the school-level, namely head teachers, teachers, students and parents. In line with this, **section 5.2** gives an overview of the **opinions on digital technologies used for teaching and learning of head teachers, teachers, students and parents**.

Summary of Key Findings

- In order to support its use in teaching and learning, most schools organise **regular discussions with teaching staff about ICT use for pedagogical purposes**. Over all ISCED levels, on average 50% (ISCED 1) to 56% (ISCED 2) of students are in schools which organise such regular discussions.
- Between 33% (ISCED level 3) and 38% (ISCED level 2) of students attend schools that implement **written statements about the use of ICT**.
- Only slightly more than 30% of students over all ISCED levels are in schools that have **policies and/or actions to assess the outcomes of using ICT for teaching and learning**.
- About 1 out of 2 European students across all ISCED levels attend schools where time or space for teachers to meet is scheduled in order to support ICT use through collaboration among peers.
- 64% of European students at ISCED level 1, 73% of European students at ISCED level 2 and 66% European of students at ISCED level 3 attend schools having a specific policy or programme in place to prepare students for **responsible behaviour on the Internet**.
- Over all ISCED levels, most applied methods by schools in order to **reward teachers** for ICT use in teaching and learning are: providing additional training hours and additional ICT equipment for the classroom.
- Between 56% (ISCED 1) and 71% (ISCED 3) of students across all ISCED levels attend a school having **initiatives in place to encourage innovation**.
- Between 62% (ISCED 1) and 81% (ISCED 2) of students are in schools with an **ICT coordinator**.
- Both teachers and head teachers over all ISCED levels have a very **positive attitude** towards using ICT for learning and teaching. In this respect, the positive opinions of head teachers are even more pronounced.
- Both teachers and head teachers clearly agree that ICT use in teaching and learning is essential to prepare students to **live and work in the 21st century**.
- The majority of **students** at ISCED levels 2 and 3 'strongly agree' or 'agree' that it is worth using a computer because it will help them in the future'.
- The majority of **parents** believe that digital technologies have a positive impact on their children to study more efficiently (e.g. the use of digital technologies lead to a better understanding, a higher motivation, etc.).
- About 70% of students have **parents** who believe 'a lot' or 'somewhat' that the use of ICT will help their child to find a job in the labour market.

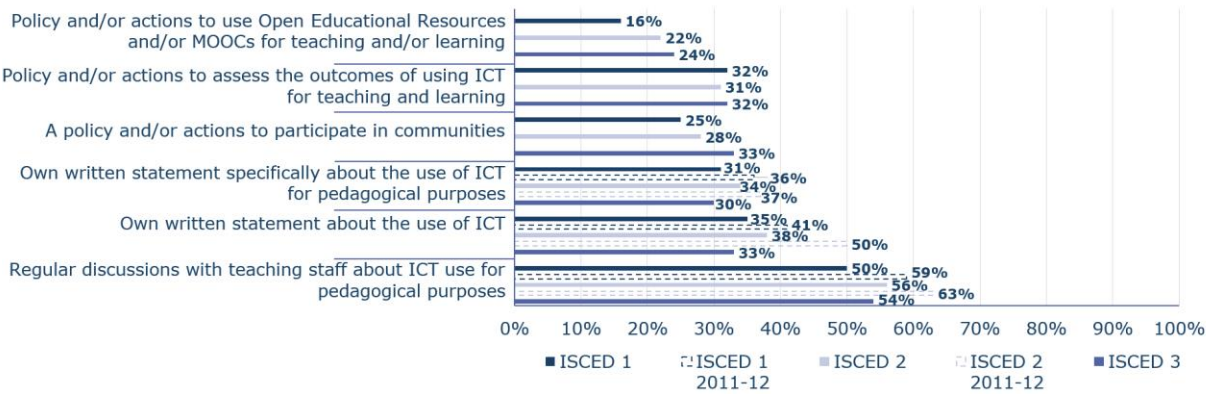
5.1. Schools' digital policies and strategies

Next to country-level or European-wide digital policies, school-based policy planning gained increasing attention by scholars (Hew & Brush, 2007; Vanderlinde, Dexter, & van Braak, 2012). Research shows that schools need to have certain conditions in place if they want to efficiently support the use of digital technologies in their premises. These conditions go beyond a sufficient number of ICT infrastructure and effective training for teachers. It is also important that school leadership or ICT coordinators have a clear and shared vision on ICT use by the school. By stipulating policies and setting up strategies reflecting the opinions and beliefs of all stakeholders at the school level, schools enable the uptake and use of digital technologies (Tondeur, van Keer, van Braak, & Valcke, 2008; Vanderlinde, Dexter, & van Braak, 2012). School leadership can take up the important role of not only facilitating ICT use, but also acting as gatekeeper if necessary (Pelgrum, 2009).

5.1.1. School policies and strategies

In order to integrate ICT in class and at the school level, it is important that schools implement support measures. Figure 5.1 gives an example of different support measures that can be implemented by schools, ranging from informal to more formal measures, such as written statements.

Fig. 5.1: Schools' general strategies to support ICT use in teaching and learning
(All ISCED levels, in % of students, EU level, 2017-18)



The most popular support that schools seem to offer for digital technologies is the organisation of regular discussions with teaching staff about ICT use for pedagogical purposes. Over all ISCED levels, on average 50% (ISCED 1) to 56% (ISCED 2) of students attend schools organizing such regular discussions. In comparison to that, written statements about the use of ICT seem to be implemented to a lower extent: between 33% (ISCED level 3) and 38% (ISCED level 2) of European students attend schools that implement written statements about the use of ICT. A similar share of students attend schools at European level that implement written statements specifically about the use of ICT for pedagogical purposes (ISCED 1: 31%, ISCED 2: 34%, ISCED 3: 30%). In fact, literature suggests that the implementation of written statements results in more teachers using ICT in lessons (Tondeur, van Keer, van Braak, & Valcke, 2008). Figure 5.1 also suggests that, surprisingly, only slightly more than 30% of European students over all ISCED levels are in schools that have policies and/or actions to assess the outcomes of using ICT for teaching and learning. In spite of some variations, there are no noteworthy differences in the data compared to the '1st Survey of Schools: ICT in Education' (European Commission, 2013a).

Figures 5.2.a to 5.2.c shows the variation in the implementation of a written statement about ICT use over the different European countries. In addition, the different figures show that there are large variations over the different European countries for all ISCED levels. In some countries, only 3% of students attend schools that implemented written statements about the use of ICT, while in other countries, more than 90% of students attend such schools.

Fig. 5.2.a: Own written statement about the use of ICT
(ISCED 1, in % of students, country and EU level, 2017-18)

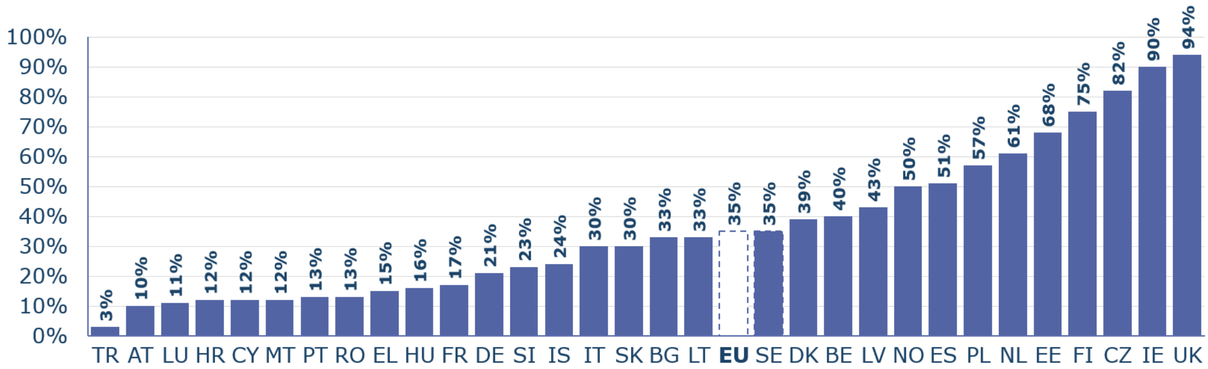


Fig. 5.2.b: Own written statement about the use of ICT
(ISCED 2, in % of students, country and EU level, 2017-18)

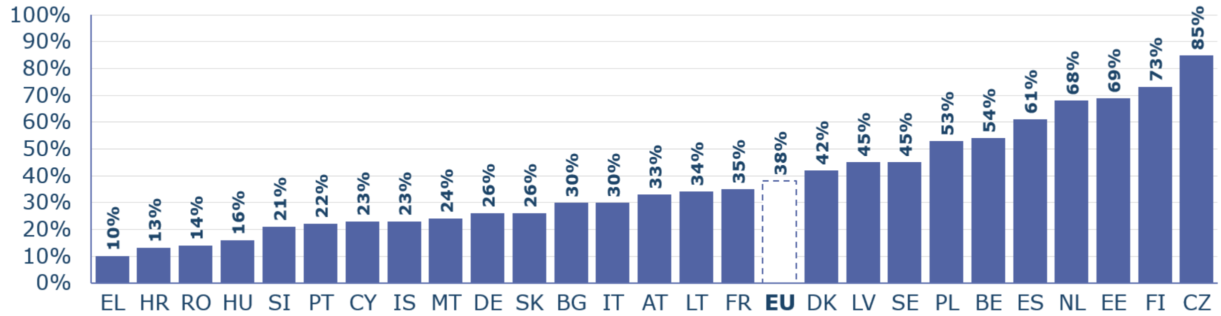
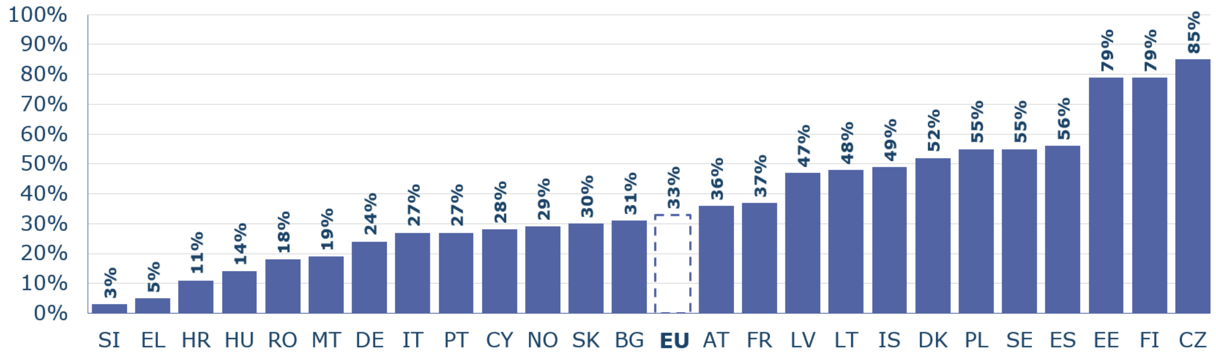
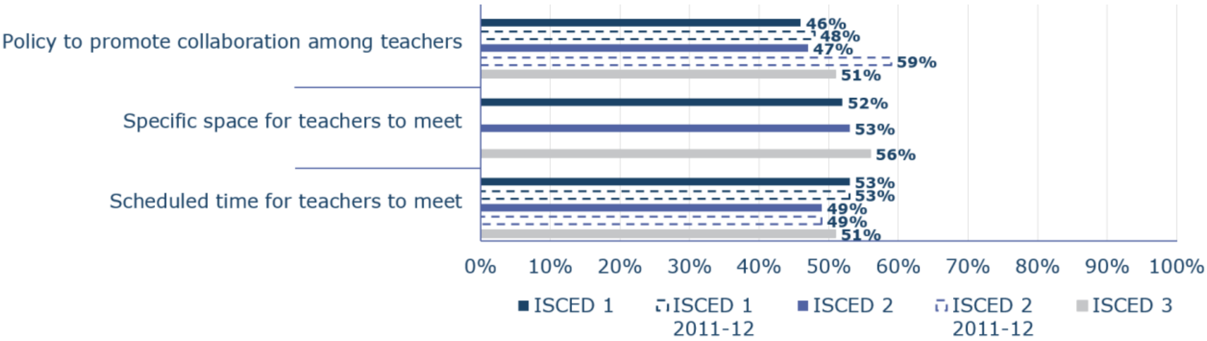


Fig. 5.2.c: Own written statement about the use of ICT
(ISCED 3, in % of students, country and EU level, 2017-18)



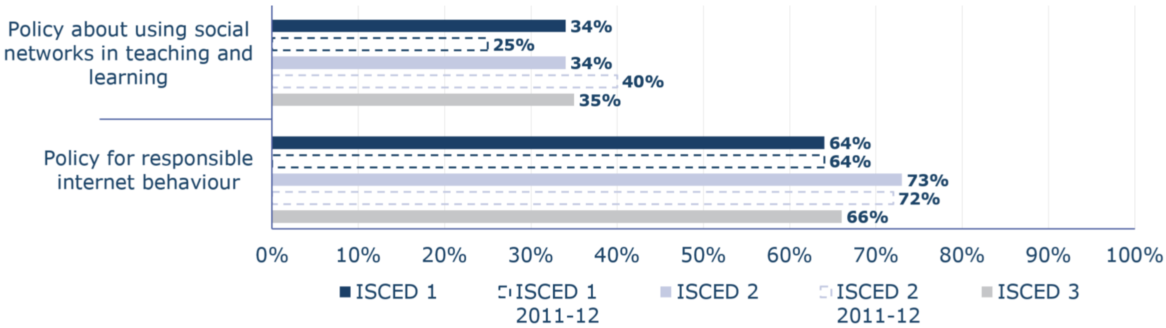
Schools can also install specific strategies to support ICT use through collaboration among teachers. Figure 5.3 shows the share of students that attend schools where school-specific strategies are in place to support ICT use through collaboration among others. The results show that about 1 out of 2 European students across all ISCED levels attend schools where scheduled time or space for teachers to meet are provided. In addition, also close to 1 out of 2 European students across all ISCED levels attend schools where a policy is in place that promotes collaboration among teachers.

Fig. 5.3: Schools that have school – specific strategies are in place to support ICT use through collaboration among others
(All ISCED levels, in % of students, EU level, 2017-18)



In light of an increased focus on responsible and conscious use of digital technologies and cyber security in general, schools also have the option to incorporate these topics in their schools' policies and strategies. Fig. 5.4. provides insight into the share of students that attend schools that have specific strategies about responsible Internet behaviour and the use of social networks in teaching and learning in place. The results shows that a large number of schools implemented policies in order to enhance responsible Internet behaviour. More precisely, 64% of European students at ISCED level 1, 73% of European students at ISCED level 2 and 66% European of students at ISCED level 3 attend schools having a specific policy or programme in place to prepare students for responsible Internet behaviour. However, only a bit more than 1 out of 3 European students across all ISCED levels attend schools that have a specific policy in place regarding the use of social networks in teaching and learning.

Fig. 5.4: Schools that have school – specific strategies in place about responsible use of Internet and social networks
(All ISCED levels, in % of students, EU level, 2017-18)

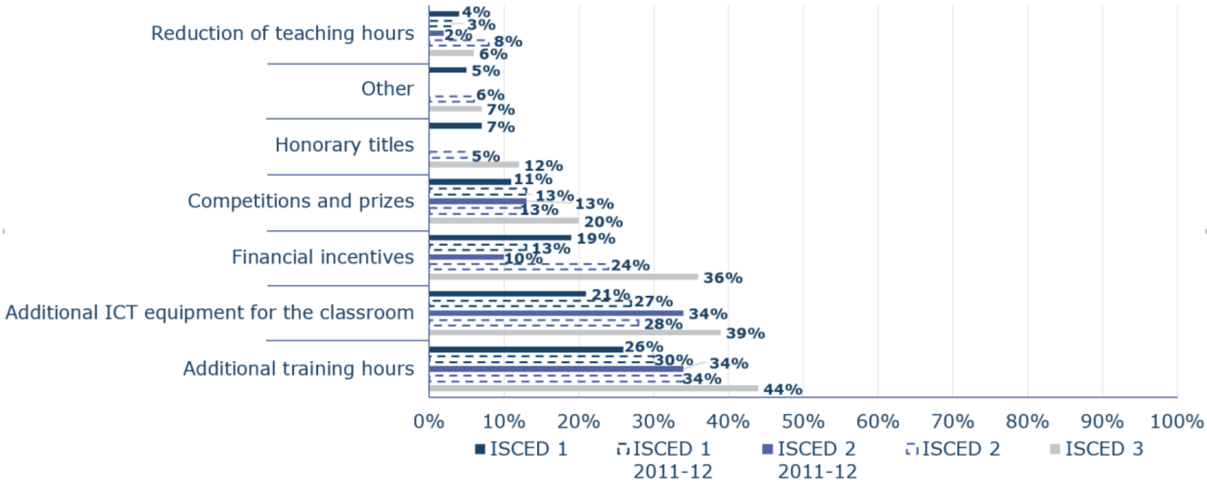


5.1.2. Incentives to reward teachers

It is clearly recognised that high-quality performing, motivated and valued teachers are at the heart of excellent education and unlock the potential of students (European Commission, 2017). There is, however, no clear consensus on how to improve the quality of the teacher workforce. Pay, contractual status and clear career prospects are considered as essential for the attractiveness of this profession. However, it is also important to give targeted incentives if a specific skillset, in this case the digital skillset, is to be developed. In the digital context, other types of incentives could be used, such as extra teaching material and participation in additional training in digital technologies.

Figure 5.5 gives a first insight into the reward system that encourages teachers to use ICT in teaching and learning. In general, it seems that the different reward systems for teachers are not often used at ISCED level 1. Across all ISCED levels, the most used incentive to reward teachers for ICT use in teaching and learning is providing additional training hours. More precisely, between 26% (ISCED level 1) and 44% (ISCED level 3) of students attend schools that provide additional training hours as a reward. In contrast, a reduction of teaching hours or the attribution of honorary titles does not seem to be implemented very often by schools to reward the use of digital technologies in teaching and learning.

Fig. 5.5: Incentives to reward teachers for using ICT in teaching and learning
(All ISCED levels, in % of students, EU level, 2017-18)



Given the increased focus on professional development (see section 3), it is interesting to gain a better understanding of the country-level dispersion of additional training hours as a method to reward ICT use. Figures 5.6.a to 5.6.c give a first insight into the use of both providing additional training hours and providing additional ICT equipment for the classroom as incentives to reward teachers' use of ICT in teaching and learning. The country-level figures show that the use of both reward methods is closely linked, suggesting that countries implementing one of the reward systems are also more likely to implement the other reward system. In addition, the figures reveal that there are large differences between the European countries in their intensity to reward teachers for the use of digital technologies in teaching and learning.

Fig. 5.6.a: Additional training hours and additional ICT equipment for the classrooms as incentives to reward teachers' use of ICT in teaching and learning
(ISCED 1, in % of students, country and EU level, 2017-18)

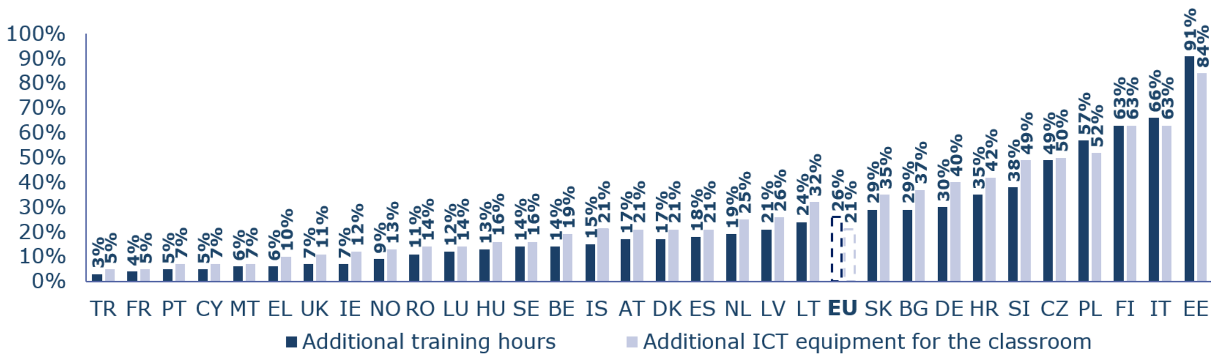


Fig. 5.6.b: Additional training hours and additional ICT equipment for the classrooms as incentives to reward teachers' use of ICT in teaching and learning
(ISCED 2, in % of students, country and EU level, 2017-18)

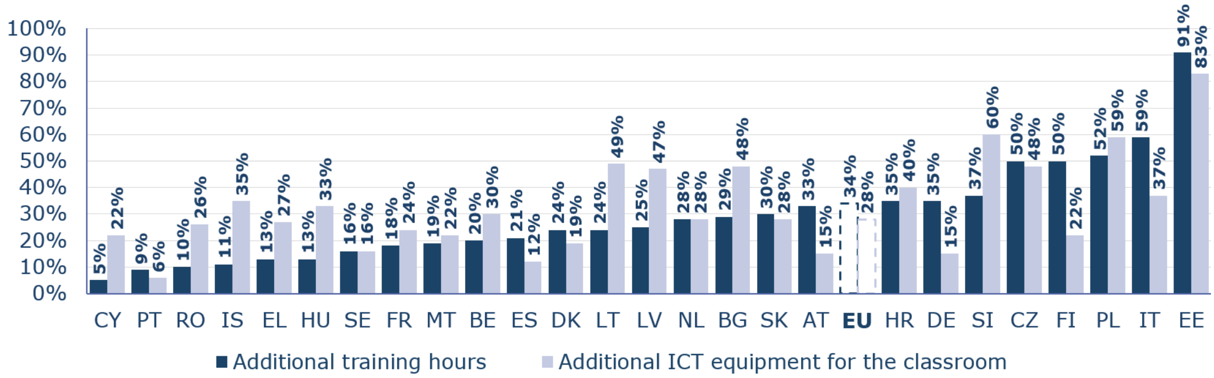
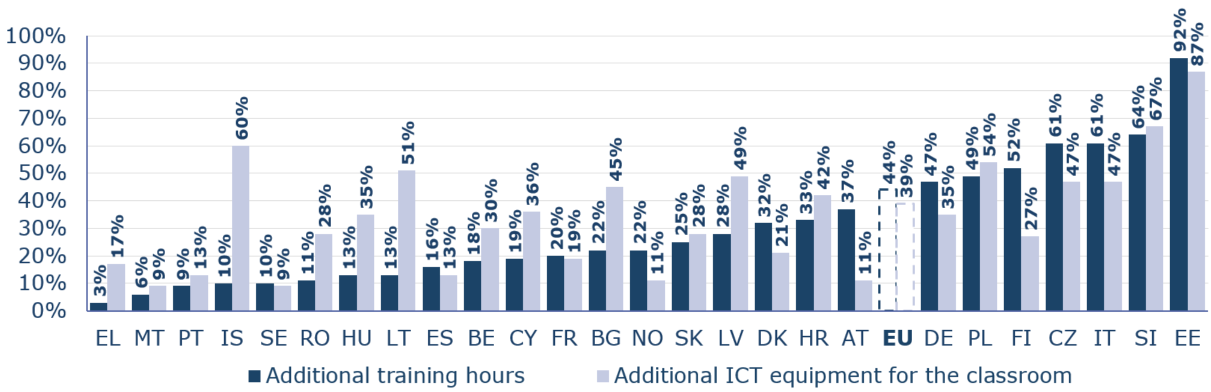


Fig. 5.6.c: Additional training hours and additional ICT equipment for the classrooms as incentives to reward teachers' use of ICT in teaching and learning
(ISCED 3, in % of students, country and EU level, 2017-18)



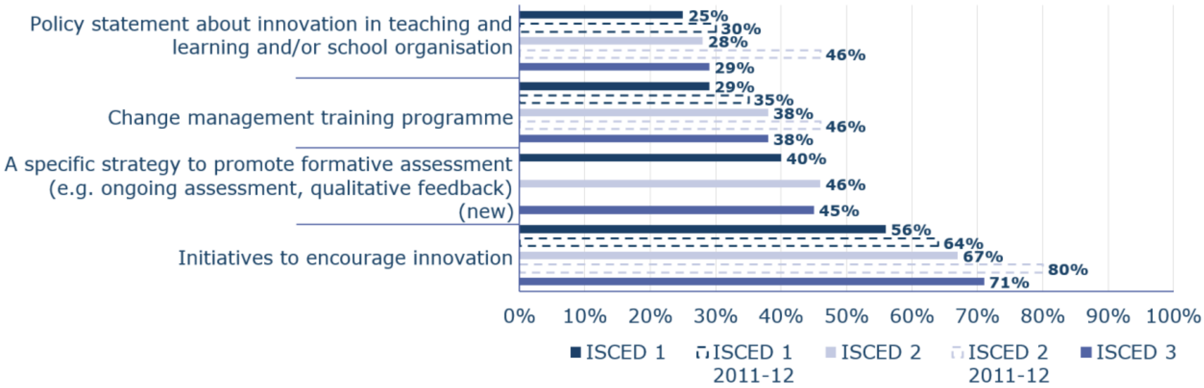
5.1.3. Innovation policy

The different strategies and incentives to support the use of ICT in teaching and learning fit within the more over-arching policies favouring innovation in education. Innovation and creativity are considered as important drivers of the 21st century knowledge society (Ferrari, Cachia, & Punie, 2009). It is also recognised that the ability to be creative and to innovate can be developed, and therefore be fostered by teachers, and more broadly, schools. A proficient digital skillset is considered as one of the important elements to engage in and foster innovation. Therefore, strategies and policies to support the use of digital technologies in teaching and learning can be topped with more over-arching policies favoring innovation in teaching and learning and/or school organization.

Figure 5.7 gives some insights into the percentage of students whose schools have innovation-related initiatives in place. The results show that 56% of ISCED level 1 students, 67% of ISCED level 2 students and 71% of ISCED level 3 students attend a school having initiatives in place to encourage innovation. In contrast, at European level, only between 25% (ISCED level 1) to 29% (ISCED level 3) of students attend schools that have implemented policy statements about innovation in teaching and learning methods and/or school organisation more generally.

In addition to that, between 29% (ISCED 1) and 38% (ISCED 3) of students attend schools that have a change management training programme in place. Moreover, some schools initiate a specific strategy to promote formative assessment. This type of assessment involves qualitative feedback focusing on details of content and performance rather than simply listing scores for both student and teachers. The results of the assessment are used to make decisions about the next steps in education (Black & William, 2009). This type of assessment is recognized as helping students to identify their strengths and weaknesses and also considered as helping teachers to recognize struggling points of their students. Figure 5.7 suggests that 40% (ISCED 1) to 46% (ISCED 2) of students are in schools where there is a specific strategy to promote such formative assessment.

Fig. 5.7: Schools' innovation policy
(All ISCED levels, in % of students, EU level, 2017-18)



Figures 5.8.a to 5.8.c give insight into the country differences of students being in schools having a specific strategy in place to promote formative assessment. In line with previous graphs, there are important country differences over the European countries.

Fig. 5.8.a: Schools' initiatives to promote formative assessments
(ISCED 1, in % of students, country and EU level, 2017-18)

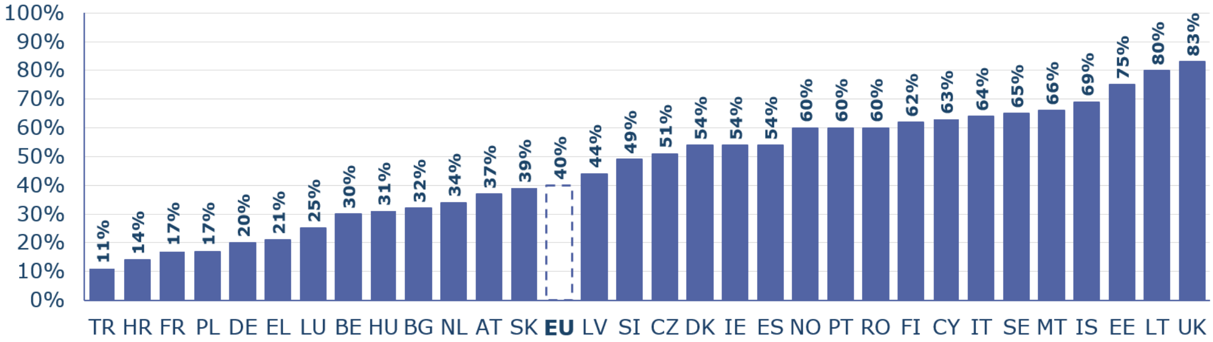


Fig. 5.8.b: Schools' initiatives to promote formative assessments
(ISCED 2, in % of students, country and EU level, 2017-18)

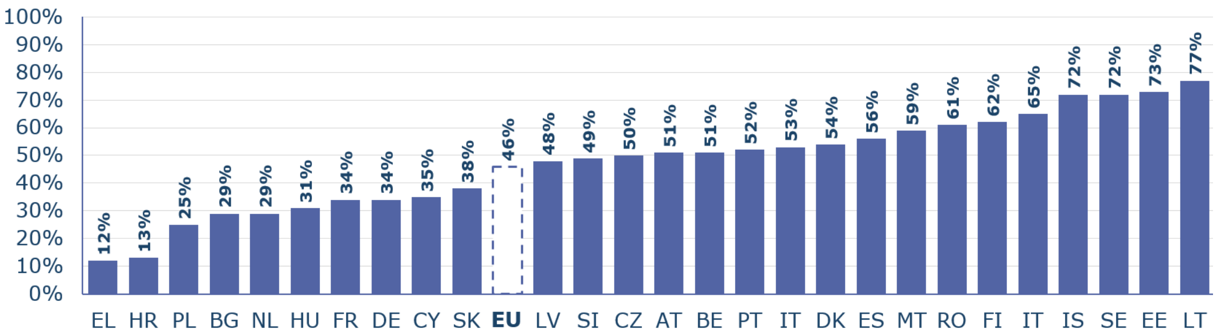
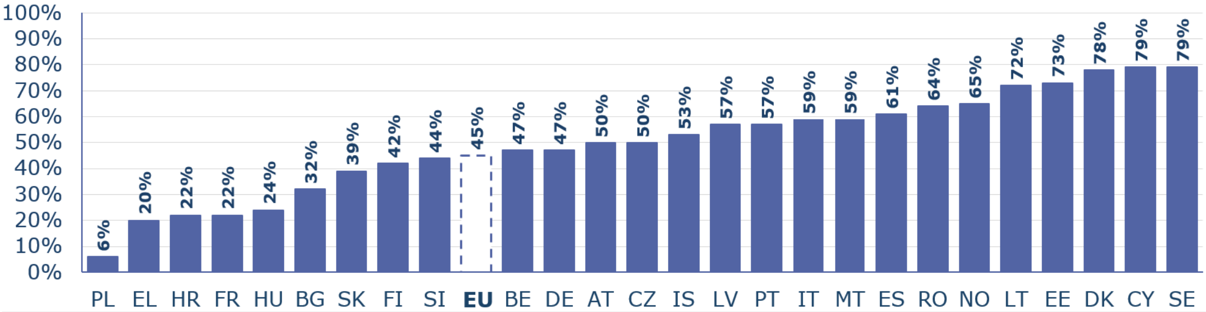


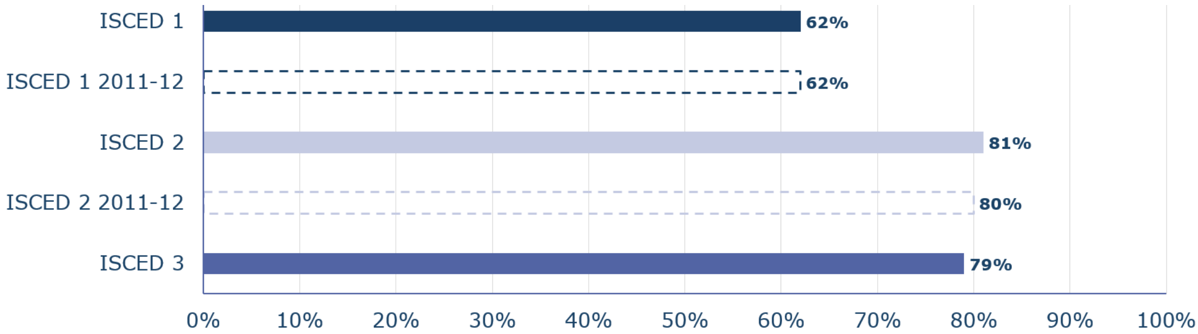
Fig. 5.8.c: Schools' initiatives to promote formative assessments
(ISCED 3, in % of students, country and EU level, 2017-18)



5.1.4. ICT coordinator

It is often stated that schools need leaders that guide and support them in the process of implementing ICT in education. Next to head teachers, this role is often assigned to an ICT coordinator. An ICT coordinator plays an important role in the integration and management of ICT in schools (Lai & Pratt, 2004). Figure 5.9 shows that between 62% (ISCED 1) and 81% (ISCED 2) of students attend schools with an ICT coordinator. These numbers are in line with the '1st survey of schools: ICT in education' (European Commission, 2013a).

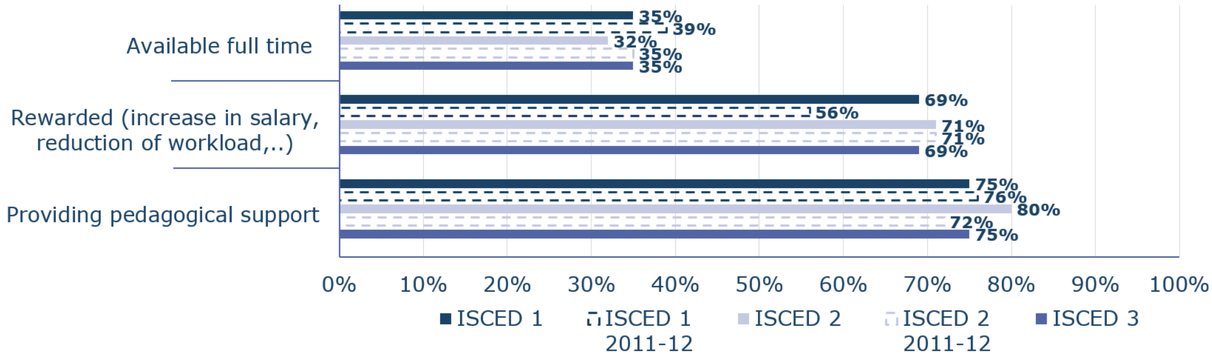
Fig. 5.9: Schools which have an ICT coordinator
(All ISCED levels, in % of students, EU level, 2017-18)



Scholars often underline the importance of ICT coordinators since they are taking up a wide array of roles, amongst others: policy makers, leaders and change agents. In addition, it is suggested that ICT coordinators should contribute to educational change by taking up a more pedagogical role (Devolder, Vanderlinde, van Braak, & Tondeur, 2010; Tondeur, Coopert, & Newhouse, 2008). In this context, figure 5.10 indicates that on average, 75% or more of the European students are in schools where the ICT coordinator provides pedagogical support.

Moreover, considering the importance attributed to the role of the ICT coordinator, it is interesting to see whether this coordinator is available full time and rewarded for taking up this role or not. On average, approximately 70% of students across all ISCED levels are in schools having an ICT coordinator who is also rewarded for his or her function. In addition, results show that between 32% (ISCED 2) and 35% (ISCED 1 and ISCED 3) of students are in schools where the ICT coordinator is available even full time. This is an important finding in light of the important role scholars attribute to ICT coordinators in a successful transition to a fully digitally school. It is often claimed that an ICT coordinator can help the school in continuously following new evolutions in terms of ICT equipment and ICT use in teaching and learning.

Fig. 5.10: Engagement of the ICT coordinator – availability, rewarded, support provided
(All ISCED levels, in % of students, EU level, 2011-12 and 2017-18)



Figures 5.11.a to 5.11.c give a country-level overview of the provision of an ICT coordinator. In some countries, close to 100% of students are in schools having an ICT coordinator. Only in a handful of countries, this percentage falls below 50%.

Fig. 5.11.a: Schools' provision of an ICT coordinator
(ISCED 1, in % of students, country and EU level, 2017-18)

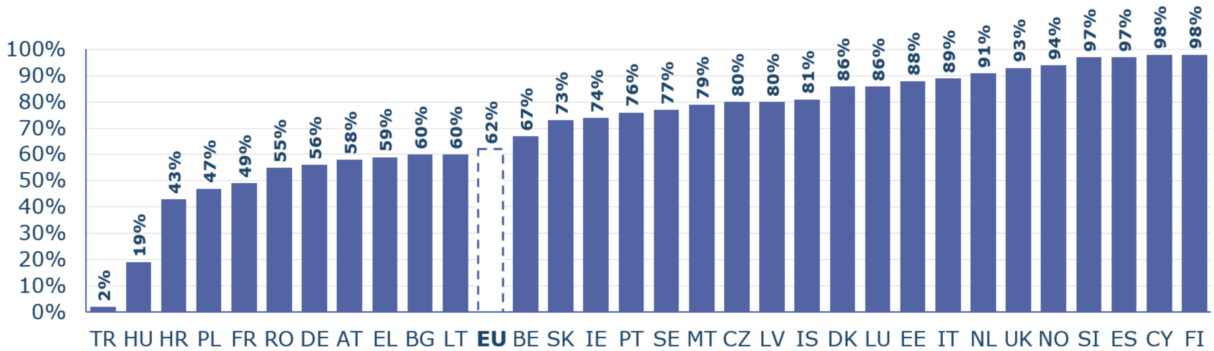


Fig. 5.11.b: Schools' provision of an ICT coordinator
(ISCED 2, in % of students, country and EU level, 2017-18)

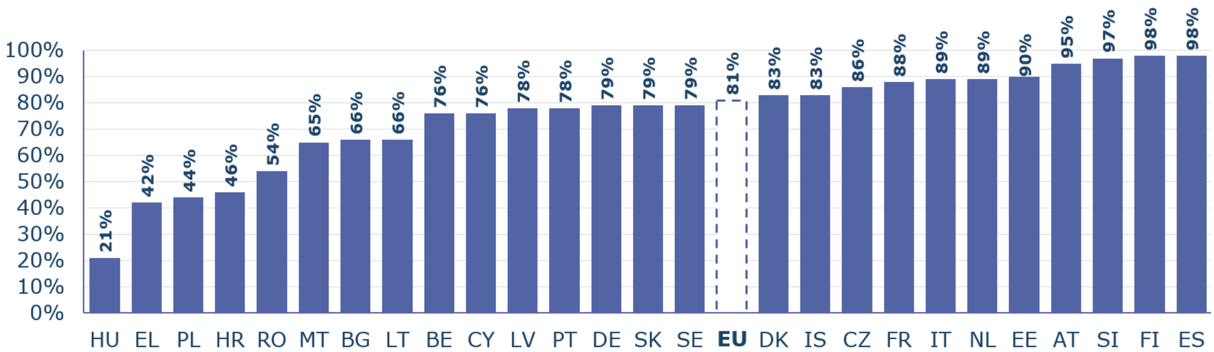
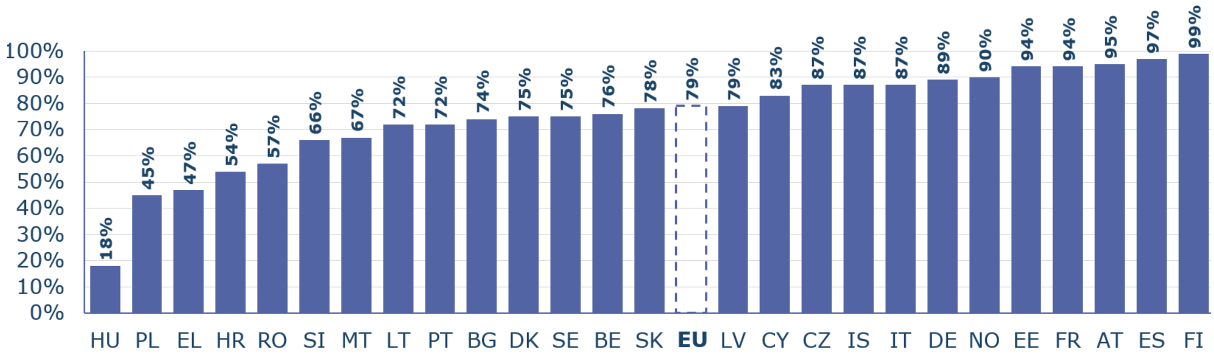


Fig. 5.11.c: Schools' provision of an ICT coordinator
(ISCED 3, in % of students, country and EU level, 2017-18)



5.1.5. Cluster analysis: Schools' policies and support of ICT use in teaching and learning

A cluster analysis was performed in order to detect similar clusters of schools, having similar levels of digital policies and support schemes in place. First, a cluster analysis of the head teachers' answers to different questions related to **school policy** was processed, namely:

- Existing school policies and strategies to use ICT in teaching and learning (question SC18);
- Incentives to reward teachers using ICT (question SC19)
- Policy related to accessibility of school Internet with an own device (question SC31).

Another cluster analysis of the head teachers' answers to **concrete support measures** was processed, namely:

- Percentage of school teachers that have undertaken professional development in the past two school years (question SC15);
- The availability of an ICT coordinator (question SC16);
- School strategies related to use of own devices within the school premises or during lessons (questions SC29 – SC30).

Each of these two cluster analyses revealed two profiles that could be cross tabulated. This resulted in four school profiles with a similar level of policy and support:

- Strong policy & strong support
- Weak policy & strong support
- Strong policy & weak support
- Weak policy & weak support

Schools, which have a strong policy and a strong support for ICT use in teaching and learning, show:

- A higher availability of existing school strategies to use ICT in teaching and learning (e.g. own written statements about the use of ICT or the use of ICT for pedagogical purposes, specific policy or programme to prepare students for responsible Internet behaviour, etc.) (school policy);

- A higher availability of incentives to reward teachers using ICT (e.g. financial incentives, reduced number of teaching hours, etc.) (school policy);
- A slightly higher tendency to allow accessing the Internet at school from personal devices by using the school network (school policy);
- A slightly higher percentage of students whose teachers undertake professional development training in the past two school years (concrete support measure);
- A slightly higher availability of an ICT coordinator in schools (concrete support measure);
- A stronger tendency to allow the use of devices within the school premises (concrete support measures) (concrete support measure); and
- A higher level of support in terms of allowing the use of devices during lessons (concrete support measure).

Figures 5.12.a to 5.12.c reveal that, at ISCED level 3, 1 out of 2 European students attend schools that have a strong policy and strong support for the use of ICT in teaching and learning (51% at ISCED 3). In contrast, only 1 out of 5 ISCED level 1 students (20%), and 1 out of 3 ISCED level 2 (33%) European students attend such schools with a strong policy & strong support profile.

In addition to that, the percentage of students attending schools that have a weak policy but a strong support profile is highest for the ISCED level 3 (33% at ISCED 3 compared to 12% at ISCED level 1 and 21% at ISCED level 2). In addition, for ISCED level 1, the percentage of students attending a school with both a weak policy and a weak support profile is 39%, which differs to 24% and 8% at ISCED levels 2 and 3, respectively.

Results reveal that there are large differences across countries in Europe. In general, Baltic and Nordic countries seem to have the largest percentage of students attending schools having a strong policy and strong support profile.

Fig. 5.12.a: Schools' policies and support of ICT use in teaching and learning
(ISCED 1, in % of students, country and EU level, 2017-18)

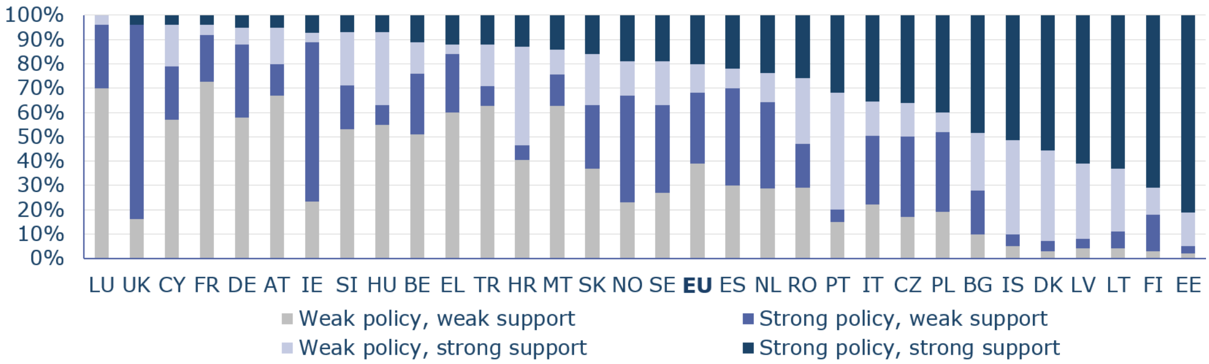


Fig. 5.12.b: Schools' policies and support of ICT use in teaching and learning
(ISCED 2, in % of students, country and EU level, 2017-18)

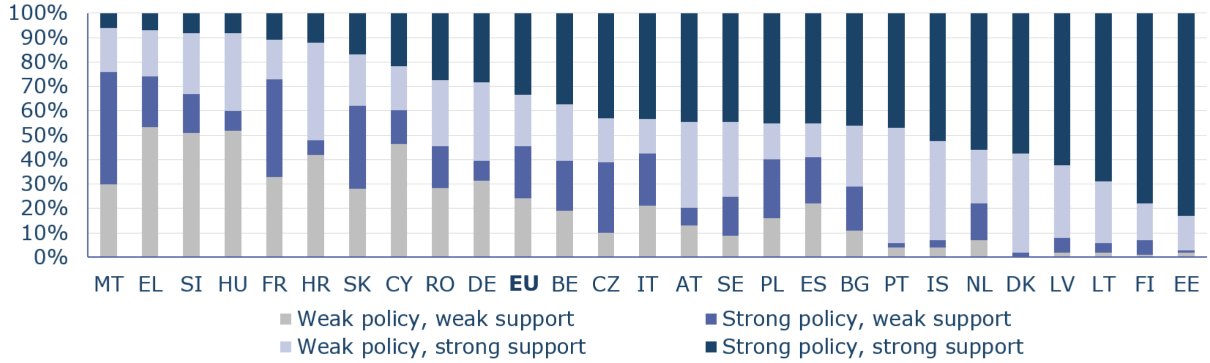
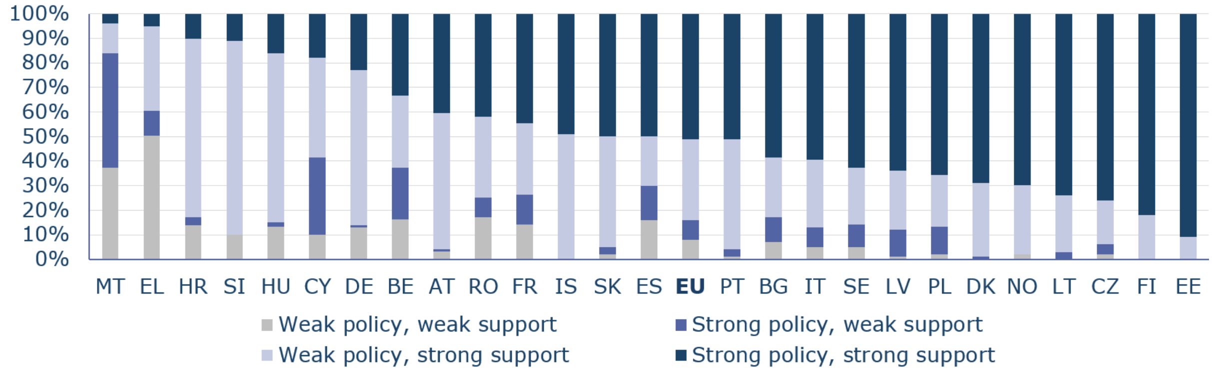


Fig. 5.12.c: Schools' policies and support of ICT use in teaching and learning
(ISCED 3, in % of students, country and EU level, 2017-18)



5.2. Opinions on ICT use at school

When integrating digital technologies in schools, it is important that head teachers, teachers, and parents as well as students are fully aware of – and agree with – the different benefits these technologies and their use could entail. A positive attitude towards digital technologies is a key lever for the successful implementation of the different policy recommendations in schools. Therefore, this section looks into the opinion of these stakeholders regarding the use of digital technologies at schools.

5.2.1. Head teachers' and teachers' opinions on ICT use in teaching and learning

Figures 5.13.a to 5.13.c reflect upon the opinions of head teachers and teachers regarding whether ICT should be used in schools for different learning activities. The data reveals that both teachers and head teachers over all ISCED levels have a positive attitude towards using ICT for learning and teaching. In this respect, the positive opinions of head teachers are even more pronounced.

Fig. 5.13.a: Head teachers' and teachers' opinions about whether ICT should be used for students
(ISCED 2, in % of students, EU level, 2017-18)

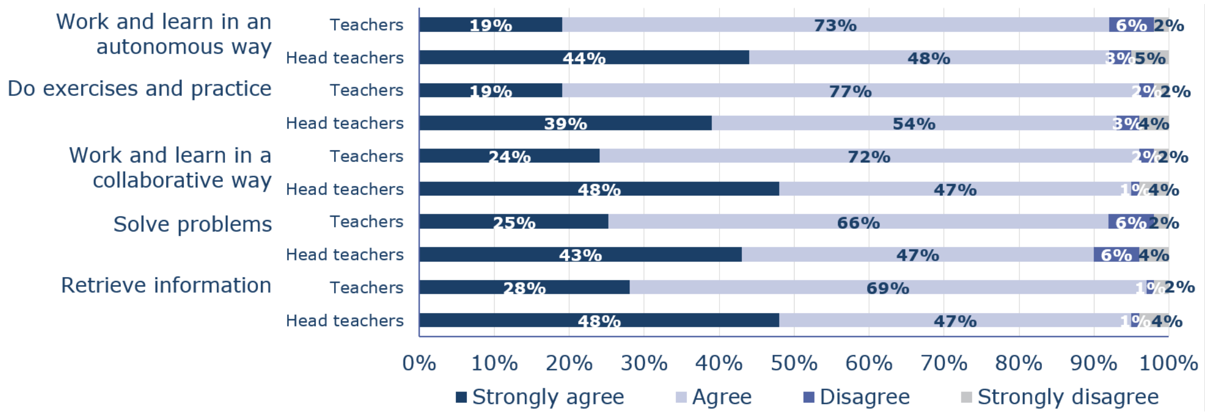


Fig. 5.13.b: Head teachers' and teachers' opinions about whether ICT should be used for students
(ISCED 3, in % of students, EU level, 2017-18)

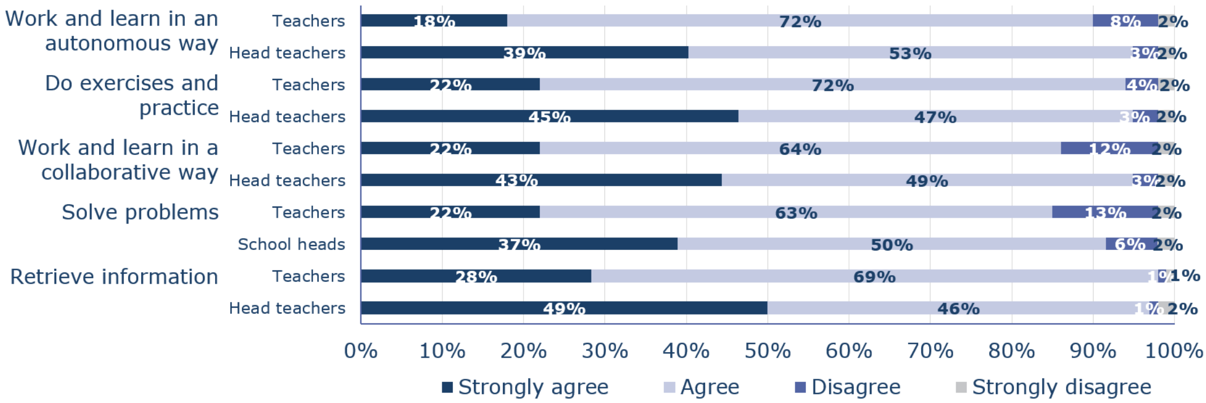
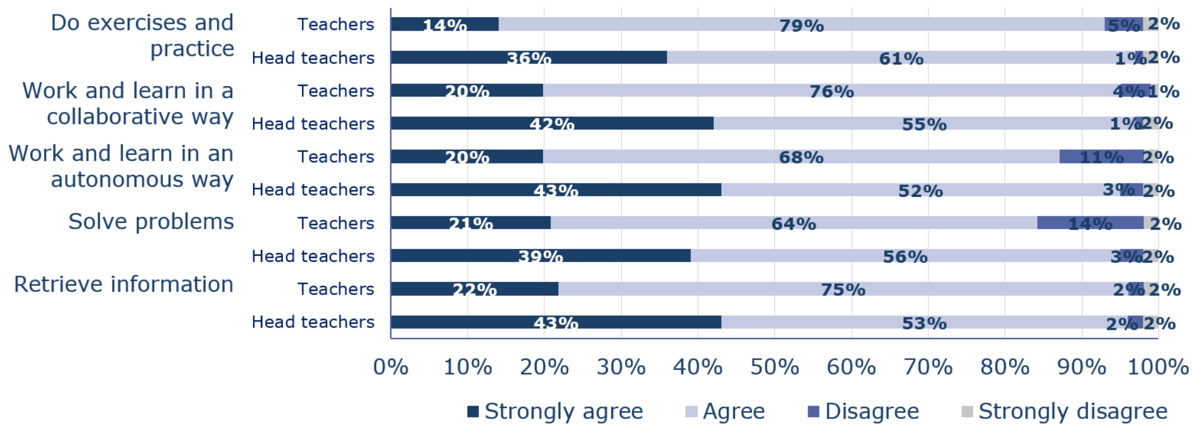


Fig. 5.13.c: Head teachers' and teachers' opinions about whether ICT should be used for students
(ISCED 3, in % of students, EU level, 2017-18)



Head teachers and teachers were also asked to provide their opinions related to the question whether ICT use in teaching and learning positively affects students' achievement and motivation, students' "higher order thinking skills" (i.e. critical thinking, analysis, problem solving) and students' competence in transversal skills (i.e. learning to learn, social competences, etc.). Figures 5.14.a to 5.14.c show that head teachers are more likely than teacher to 'strongly agree' with the fact that ICT use in teaching and learning positively affects students' achievement, motivation, higher order thinking and transversal skills.

Over all ISCED levels, students seem to have both teachers and head teachers who 'strongly agree' especially with the fact that ICT use has a positive impact on students' motivation. Interestingly though, at ISCED levels 2 and 3, a little more than 1 out of 4 European students have teachers who disagree with the fact that ICT use at school has a positive impact on transversal skills (i.e. learning to learn, social competences, etc.) and more than 3 out of 10 ISCED levels 2 and 3 students have teachers who disagree with the fact that ICT use has a positive impact on higher order thinking skills (i.e. critical thinking, analysis, problem solving).

Fig. 5.14.a: Head teachers' and teachers' opinions about positive impact of ICT use at school
(ISCED 1, in % of students, EU level, 2017-18)

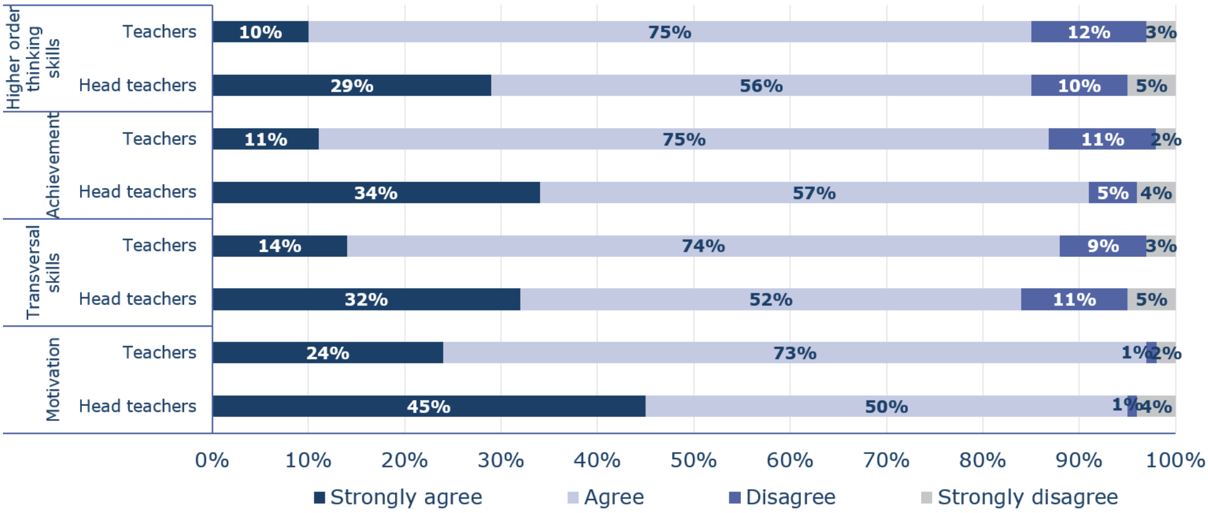


Fig. 5.14.b: Head teachers' and teachers' opinions about positive impact of ICT use at school
(ISCED 2, in % of students, EU level, 2017-18)

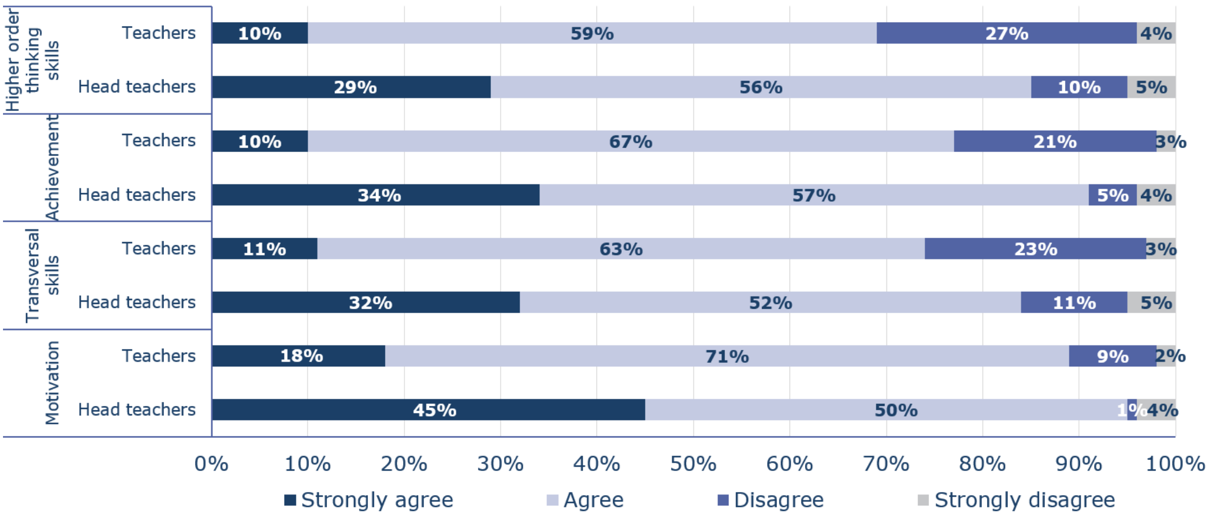


Fig. 5.14.c: Head teachers' and teachers' opinions about positive impact of ICT use at school
(ISCED 3, in % of students, EU level, 2017-18)

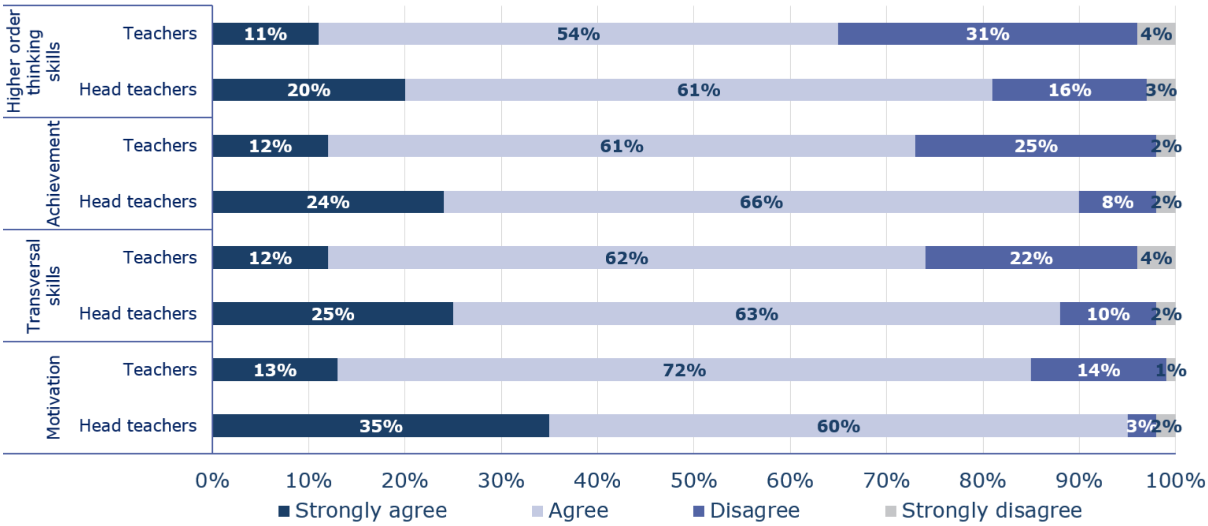
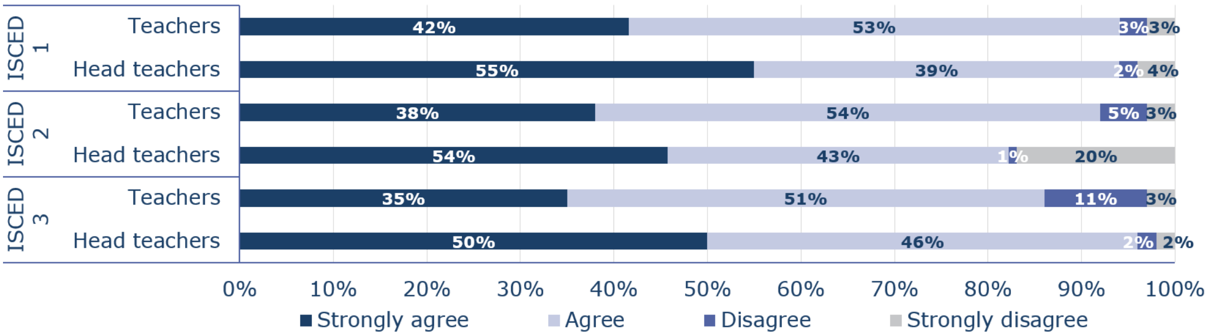


Fig. 5.15 provides insight into the opinion of teachers and head teachers regarding the question whether ICT use in teaching and learning is considered essential to prepare students to live and work in the 21st century. The data show that both teachers and head teachers across all ISCED levels clearly agree with the fact that ICT use in teaching and learning is essential to prepare students to live and work in the 21st century.

Fig. 5.15: Head teachers' and teachers' opinion on whether ICT use in teaching and learning is essential to prepare students to live and work in the 21st century
(All ISCED levels, in % of students, EU level, 2017-18)



5.2.2. Students' opinions on ICT use in teaching and learning

This section provides insight into the opinions of students regarding whether ICT use during lessons has a positive impact on different aspects of learning (e.g. collaborating, understanding, etc.). This section also looks into the reasons behind why students consider using a computer for learning as important[37].

Fig. 5.16.a and 5.16.b show that at both ISCED 2 and 3 level, more than 30% of students agree 'a lot' that ICT use during lessons has a positive impact on the class atmosphere, enables them to collaborate with other students on tasks, enables them to remember and understand more easily what they have learnt, enables them to feel more independent in

[37] While the questionnaires at the school, teacher and parent level were conducted for 3 ISCED levels (ISCED level 1, 2 and 3), students only participated at ISCED levels 2 and 3. In this sub-chapter, therefore, only data is presented for ISCED levels 2 and 3.

learning, prompts them to try harder in what they are learning and enables them to concentrate more on what they are learning.

In contrast, figures 5.16.a and 5.16.b still reveal that about 1 out of 10 students at ISCED levels 2 and 3 think that ICT use during lessons has no impact at all on these aspects of learning.

Fig. 5.16.a: Students' opinions regarding the positive impact of ICT use during lessons
(ISCED 2, in % of students, EU level, 2011-12 and 2017-18)

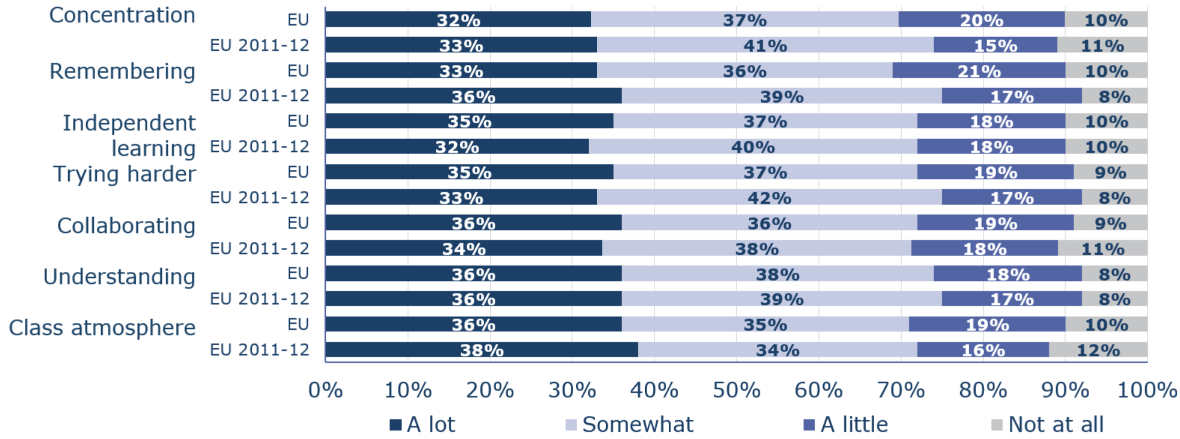
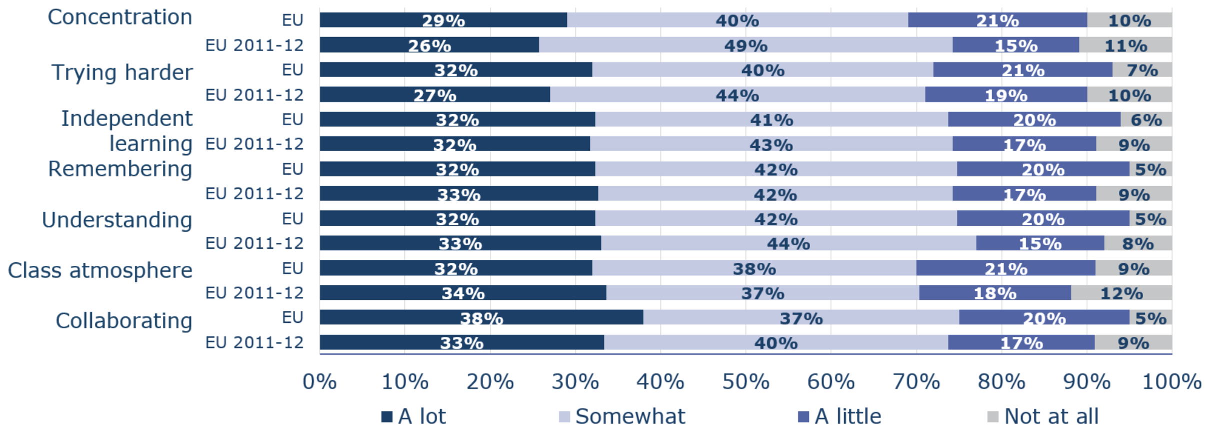


Fig. 5.16.b: Students' opinions regarding the positive impact of ICT use during lessons
(ISCED 3, in % of students, EU level, 2011-12 and 2017-18)



Figures 5.17.a and 5.17.b provide insight into the reasons behind why students consider using a computer for learning as important. The results reveal that more than 8 out of 10 students at ISCED levels 2 and 3 strongly agree or agree with the statement that it is really worth using a computer because it will help them in the future. Compared to the '1st Survey of Schools: ICT in Education', the level of agreement with this statement has therefore increased (European Commission, 2013a).

Fig. 5.17.a: Students' reasons why they use a computer for learning
(ISCED 2, in % of students, EU level, 2017-18)

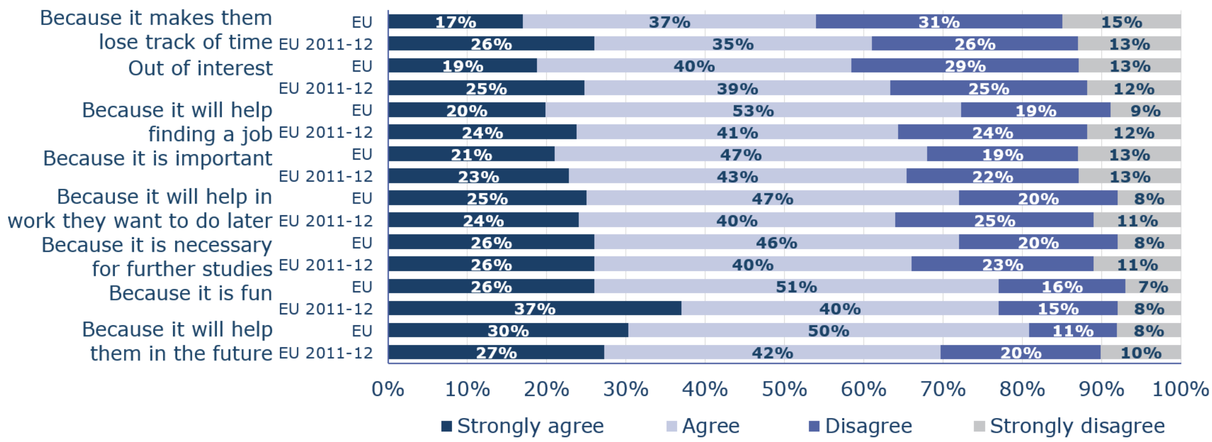
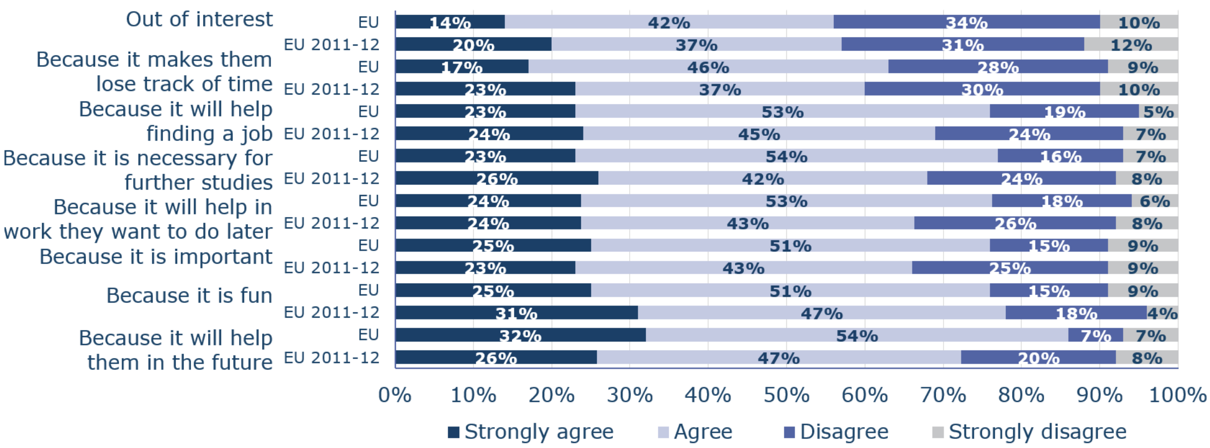


Fig. 5.17.b: Students' reasons why they use a computer for learning
(ISCED 3, in % of students, EU level, 2017-18)



5.2.3. Parents' opinions on ICT use at school

In this new era of pervasive technology, a positive attitude of parents towards digital technologies is key for the successful implementation of ICT at school. It is therefore suggested that academic achievement be rooted in a home climate that is school-supportive (Cabus & Ariës, 2017). Therefore, the next figures, 5.18.a to 5.18.c look into the opinion of parents on the use of ICT at school.

Unlike their parents, most students today were born in a completely digitalised world. Figures 5.18.a – 5.18.c reveal that the majority of European parents nevertheless believe that digital technologies can help their children to study more efficiently.

In addition, the results show that parents recognise that the world has changed and that the use of ICT at school has become fundamental to prepare young people for the future. In fact, about 90% of the European students have parents who believe to at least some extent that the use of ICT at school will help their child find a job in the labour market.

In contrast, still 1 out of 4 students at ISCED levels 1 and 2, and 2 out of 5 students at ISCED level 3 have parents thinking that the use of ICT at school has no impact at all at their childrens' concentration.

Fig. 5.18.a: Parents' attitudes towards the use of ICT at school
(ISCED 1, in % of students, EU level, 2017-18)

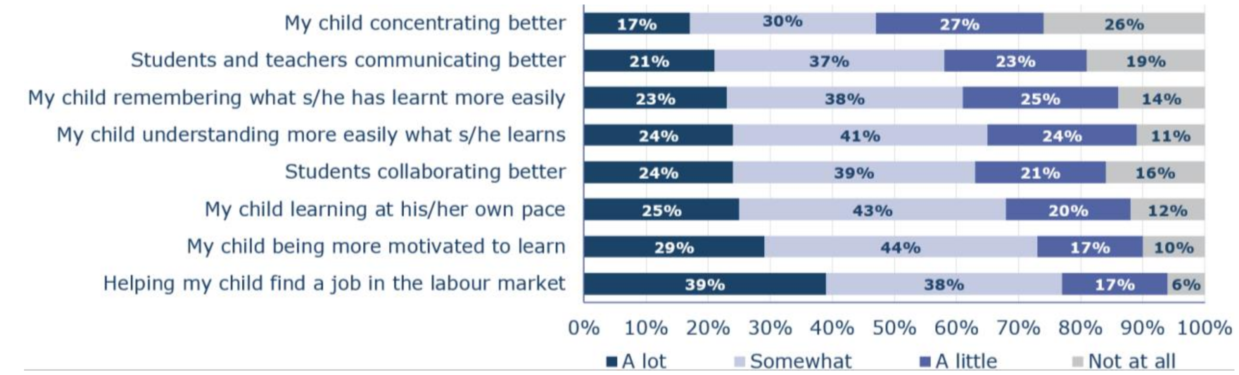


Fig. 5.18.b: Parents' attitudes towards the use of ICT at school
(ISCED 2, in % of students, EU level, 2017-18)

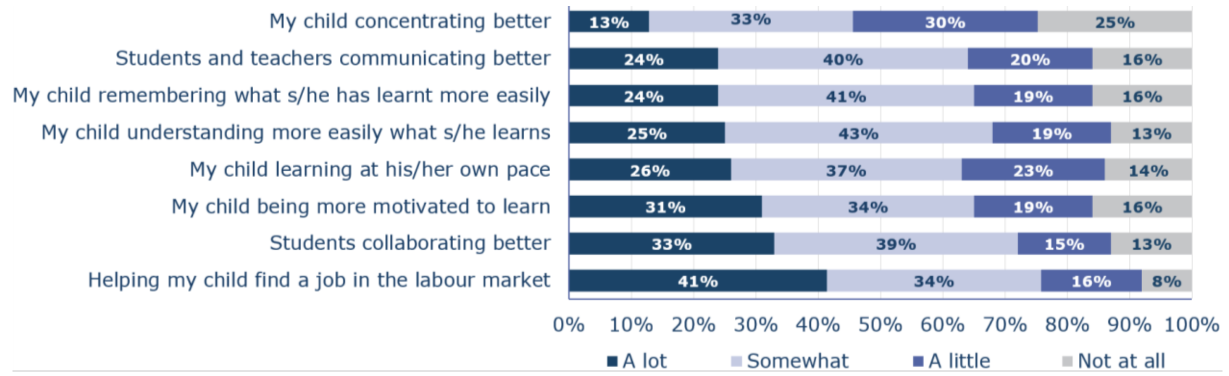
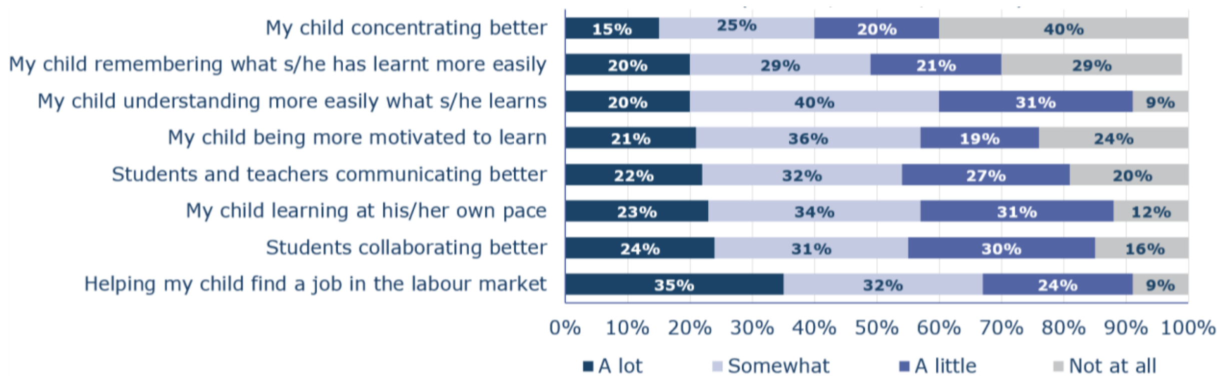


Fig. 5.18.c: Parents' attitudes towards the use of ICT at school
(ISCED 3, in % of students, EU level, 2017-18)



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