SURVEY OF SCHOOLS: ICT IN EDUCATION

BENCHMARKING ACCESS, USE AND ATTITUDES TO TECHNOLOGY IN EUROPE'S SCHOOLS

FINAL STUDY REPORT

May 2012

Disclaimer

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EXECUTIVE SUMMARY

In 2011, the European Commission Directorate General Information Society and Media launched the Survey of Schools: ICT in Education, the primary goal of which is to benchmark countries' performance in terms of access, use and attitudes to ICT at grades 4, 8 and 11. The Survey of Schools is one of a series within the European Union's cross-sector benchmarking activities comparing national progress to i2010 and EU2020 goals. The Survey is funded by the European Commission Information Society and Media Directorate General and is a partnership between European Schoolnet and the Service d'Approches Quantitatives des faits éducatifs in the Department of Education of the University of Liège. It is the first Europe-wide survey of schools' ICT for six years, following Europe 2002 and EU2005 surveys.

The survey is the first in this series to be conducted online and the first one to include students directly. Work on the survey took place between January 2011 and May 2012, with data collection in autumn 2011. Outputs include a final report, the three questionnaires used in the survey, and the complete dataset in a variety of formats.

This report begins with an outline of the conceptual framework behind the survey and the methodology followed, and then presents descriptive results in terms of ICT infrastructure and use, ICT-based learning activities, teacher and student digital confidence, school vision and strategies, attitudes and opinions, and key trends since the previous survey. The report culminates in a final section presenting the results of investigations across sets of variables, resulting in a comprehensive overview of the digitally supportive school, teacher and student. A short conclusion proposes a number of recommendations for future actions at all levels. In annex is a technical report, detailed results tables from the surveys, the three survey questionnaires and a set of detailed country profiles. All material is freely available on the European Commission's Digital Scoreboard web site.

KEY FINDINGS

Based on over 190,000 responses from students, teachers and head teachers in 27 countries collected between September and December 2011, it can be said that, in general, students and teachers in Europe's schools have unprecedented access to educational technology and their attitudes to its value and impact are overwhelmingly positive. However there are major differences between and within countries and ICT use levels in schools remain an issue despite fewer obstacles than in the past. Institutional and support factors influence ICT use in lessons more than equipment and connectivity provision.

1: ICT INFRASTRUCTURE

- On average in the EU, 37 percent of grade 4, 24% of grade 8, 55% of grade 11 general and 50% of grade 11 vocational students are in 'digitally equipped schools' (i.e. with high equipment levels, fast broadband (10mbps or more) and high 'connectedness' (e.g. having a web site, email, a virtual learning environment and a local area network). There are large differences between countries in terms of percentages in high and low levels of such schools.
- There are between three and seven students per computer on average in the EU; the older the student the lower the student to computer ratio in most countries.
    - There is large variation between countries. Denmark, Norway and Sweden have the highest ratios at all grades, Spain, Malta, Cyprus and Belgium at some grades.
- Laptops, tablet and netbooks are becoming pervasive; on average in the EU there are between eight and 16 students per laptop at grades 4 and 11 vocational respectively.
    - There are high ratios of laptops to students in Denmark, Norway and Sweden at all grade levels, Spain and Finland at some levels
- Some two-thirds of computers are located in computer rooms on average.
    - There is a split between groups of countries locating in labs and those distributing computers throughout the school, not entirely dependent on the numbers of computers in the school.
- There are on average over 100 students per interactive whiteboard and 50 per data projector.
    - Malta, Denmark, Finland, Norway and Estonia have lower than average ratios of student to interactive whiteboards at more than one grade. Finland has consistently low ratios of students to data projectors at all grades.

- More than 9 out of ten students are in schools with broadband, generally from 2 to 30mbps, on average in the EU.
    - Denmark, Estonia, Luxembourg, Norway and Sweden have the highest bandwidth at most if not all grades, Portugal at grades 8 and 11 general.
- Most schools are 'connected' at a basic level, that is, having a web site, email for students and teachers or a virtual learning environment. One in three grade 4 students is in a school with a VLE, rising to almost two-thirds in vocational schools.
    - High levels of VLE provision can be seen in Norway, Portugal, Finland, Sweden, Denmark and Luxembourg; in some all students are in such schools.
- Generally speaking it is school staff who play a large part in maintaining the growing amount of ICT equipment in schools, but in most countries there is a mix of school staff and external support, whether public or private sector.

2: ICT USE

- Grade 11 vocational students are more than twice as likely than those at other grades to be in a school where the teacher uses ICT equipment in more than half of lessons. At other levels, one in five grade 8 students in the EU never or almost never use a computer and one in two grade 8 and 11 students never use an interactive whiteboard, and one in four students is in a school where the teacher uses ICT in *fewer* than one in 20 lessons.
    - High teacher use levels at grade 4 are in Malta, Turkey, Slovenia, Ireland, Estonia, Cyprus and France and at grade 8 in Turkey, Portugal, Ireland and Estonia.
- On average in the EU more than half of secondary school students use desktop computers at least once a week, one in three grade 8 students using an interactive whiteboard at least weekly.
- Between 28 and 46 percent of students say they use their own mobile phone for learning purposes in schools at least once a week.
- There is no correlation at EU level between level of computer provision in schools and frequency of use by students.
- Insufficient ICT equipment is considered more of an obstacle to ICT use than pedagogical issues by head teachers and teachers, equipment more of a concern the younger the students. Teachers are more concerned about pedagogical inhibitors than head teachers. Insufficient laptop computers and interactive whiteboards are of more concern than other items of equipment, and one in five students is in a school where head teachers report insufficient technical support as a major inhibitor, particularly at grade 4.
    - Higher than average levels of concern about equipment can be seen in Turkey, Romania and Greece by both head teachers and teachers, and about pedagogy in Greece by both.

3: ICT ACTIVITIES

- The experience of teachers in using computers/internet at school can always increase but **at EU level around 75% of students at all grades** are **taught by teachers declaring more than four years of such a use at school.** In addition, teachers with less than one year of experience are extremely rare (around 3% of students having such teachers). Highly experienced teachers are found in Spain, Czech Republic, Denmark, Finland, Latvia and Portugal; lowest levels of experience in Greece.
    - The most frequent ICT based activities developed by teachers at EU level remains related to **lessons preparation**: around 40-45% of students are taught by teachers declaring they do it every day or almost, or at least once a week. **Browsing internet in the classroom is as frequent**. **Creating digital resources**, and **being on the school website or virtual learning environment** also happen every day or almost, or at least once a week, for teachers of respectively 25%, and 20% of students.
    - But **between 60% and 85% of students** are **taught by teachers declaring they never or almost never communicate online with parents, assess students using ICT, evaluate digital resources nor post home work for their students**.
    - When looking at different types of ICT based activities all together to focus on frequency, teachers appear to implement ICT based activities **several times a month** (i.e. far from 'at least once a week'). **Even in countries where such frequency is higher** as Spain, Latvia,

Lithuania, Norway, Slovakia, Turkey, it remains closer to several times a month, and not up to at least once a week. Lowest frequencies are declared in Greece and Italy.

- **Student's experience with computer** is **still longer at home compared to school**. Between 40 and 60% of students have more than six years of experience at home compared to 20-30% of students in this situation at school.
    - The **low frequency of use of digital resources and tools seems alerting**. Digital text books at grade 8 and multimedia tools at grade 11 are the resources most frequently used. Nevertheless, around 30% of students use them once a week or every day or almost, but **more than 50% of students at all grades never or almost never use such resources**.
    - When looking at different types of ICT based activities all together to focus on frequency, students appear to implement ICT based activities **between several times a month** and never or almost never. Such frequency is lower compared to teacher's ICT based activities frequency. Only at grade 11 in Denmark and Norway, two countries where such frequency is the highest compared to other countries, the frequency corresponds to several times a month.
    - Student- and teacher-centered teaching and learning activities are both present at EU level up to a similar extent: from teacher's answers, student-centered approach seems a little bit more frequent; but student's answers shows the opposite, i.e. slightly more frequent activities being teacher-centered.

4: COMPETENCE AND SKILLS

- **Concerning teachers' professional development:** At EU level, only around 25% of students at grade 8 and 11 (general and vocational education) and 30% at grade 4 are taught by teachers for whom ICT training is compulsory.

  In **Lithuania** around 75% and in **Romania** around 65% of students at all grades are taught by teachers for whom it is compulsory to participate in ICT training, while 13% or less of students are taught by such teachers in **Luxembourg, Austria** and **Italy**.

  Although ICT training is included in initial teacher education in over half of all EU countries, implementation varies according to the higher education institutions providing the training, and a large portion of EU countries still have complete institutional autonomy in this area. In view of today's need for all teachers to integrate ICT into their daily teaching practice because of the known associated benefits when appropriate approaches are used, countries might be wise to ensure that ICT training is made a compulsory component of all initial teacher education programmes.

  At EU level, around 75% of students at all grades are taught by teachers who have engaged in personal learning about ICT in their own time. Other ways of teachers engaging in ICT professional development include ICT training provided by school staff, which around 50% of students at all grades benefit from, and participation in online communities, benefitting around 30% of students across grades.

  In **Norway** around 80% of students at all grades are taught by teachers who have undertaken ICT training provided by school staff, while only around 10% of students in **France** (at grade 4), **Luxembourg** (at grades 4 and 8), and **Turkey** (at grade 11 vocational education) are taught by such teachers. **Slovenia** stands out as the only country which has around 50% of students across all grades who are taught by teachers who have participated in online communities for professional exchanges with other teachers, during the last two years. Conversely, only 10% or less of students at grades 4 and 8 in the **Czech Republic** and **Luxembourg,** in **Belgium** (particularly at grades 8 and 11 general education), and in **France** at grade 11 (vocational education) are taught by teachers who actively participate in online learning communities.

- **We know that teachers often have difficulty in implementing ICT into T&L, despite having access and positive attitudes towards it, and therefore require support not only from the technical point of view but also from the pedagogical perspective. Increasing the training provided by school staff and others to teachers of all disciplines should therefore be encouraged. Moreover, we know that online professional collaboration between teaches can lead to effective changes in their practice, and a deeper awareness of their own professional development needs. Although centrally managed online resources such as blogs, forums or other social networking sites facilitating professional exchanges between teachers are widely available in Europe, they are a relatively new way for teachers to engage in professional development, and as our survey results show, only a minority are actually using them and exploiting their benefits. There is a need therefore to further promote such online platforms and the opportunities they can afford to the European teaching community.**

  At EU level, around 60% of students at most grades are taught by teachers who have participated in equipment-specific training, and around 50% of students at most grades are taught by teachers who have undertaken courses on the pedagogical use of ICT in the past two school years. Subject-specific training is less commonly participated in by teachers, rating at around 30% across all grades, and only around 20% of students are taught by teachers who have participated in advanced courses on applications or the internet, and multimedia training.

  In **Lithuania** around 70% of students across all grades are taught by teachers who have undertaken courses on the pedagogical use of ICT, while this is the case for only around 20% of students in **Turkey**. **Estonia** stands out as the country with around 55% of students at most grades being taught by teachers who have participated in subject-specific training on learning applications, such as tutorials and simulations, in the past two years. In **France, Portugal, Denmark, Sweden, Luxembourg** and **Belgium**, 15% or less of students at two grades or more are taught by such teachers.

  While training teachers how to use specific ICT equipment, the internet and general applications is important, we know that without feeling competent in how to integrate ICT into teaching appropriately, both from the pedagogical perspective as well as the specific view point of the subject being taught, teachers are less likely to use ICT in the classroom for T&L. The need therefore for more professional development opportunities on the pedagogical use of ICT and particularly subject-specific training on learning applications, currently pursued by fewer teachers, deserves underlining.

  Concerning teachers' confidence in using ICT skills: Teachers and students were asked to rate their level of confidence in their ability to perform a list of ICT related tasks (later categorized as operational skills, social media skills, and additionally for students, the ability to use the internet safely and responsibly, after subjecting the data to factorial analysis) according to a Likert scale ranging from 'none' to 'a lot'.

  At EU level, the mean score across grades of students taught by teachers declaring confidence in using social media skills is consistently substantially lower than that of students taught by teachers declaring confidence in their operational skills.

  At country level, the mean score of students taught by teachers declaring confidence in their operational skills is high across almost all grades in **Portugal** and **Austria**. Students in **Belgium** and **Croatia** across most grades however, are taught by teachers who have a relatively lower level of confidence in their ability to perform operational tasks using ICT. **Estonia and Finland** stand out as countries where a relatively high mean score of students at all grades are taught by teachers who express a certain degree of confidence in their social media skills, while the mean scores of students across almost all grades is rather low in **Latvia,** the **Czech Republic** and **Belgium**.

  Although measuring teachers' confidence in relation to various ICT skills as this survey does, says nothing about teachers' actual competence in these areas, it is nevertheless important as

it can be said to have some potential influence on the frequency with which teachers use ICT based activities for T&L within the classroom. This is confirmed by the positive correlation found in the data of this survey between teachers' confidence in their operational skills and social media skills and the frequency with which they use ICT based activities across all grades. Correlation analysis also shows that participation in professional development, and to a lesser extent, the amount of time spent on such training, is also positively correlated to teachers' confidence in both their operational and social media skills.

- **Concerning students' confidence in using ICT skills:** At EU level, students across all grades have a higher mean score in their confidence to use the internet safely and a lower mean score in their confidence to use social media skills than in any other ICT skill they were asked to express their level of confidence in. Regardless of the type of ICT skill in question, grade 11 (general education) students' mean score in their confidence to use them is consistently higher, while grade 8 students' mean score is consistently lower.

- Generally speaking, students at all grades across countries declare a rather high level of confidence in their ability to use the internet safely, with students across all grades in **Portugal, Poland, Norway, Lithuania, Slovakia, Estonia** and the **Czech Republic** scoring particularly highly. Conversely, students across all grades in **Bulgaria, Greece, Latvia, Cyprus** and **Luxembourg** have relatively low mean scores in their confidence to use the internet safely.

- Students across all grades in **Poland** have a high mean score with regards their confidence in using the internet responsibly, while in **Luxembourg** at grade 8 students have a particularly low mean score, as do students in **Cyprus** at grade 11 (vocational education).

5: SCHOOL VISION AND STRATEGIES

- Formalised policies (written statements) about using ICT precisely in T&L, or in subjects exist in schools frequented by 50% of the students at all grades. Such a percentage decreases to 20-30% of students concerned when considering policies and strategies covering ICT use in general, as well as precisely in T&L and in subjects. Higher percentages of students are in this situation in Denmark, Turkey, and Slovenia, conversely to Austria, Croatia, Italy and Greece.

- Around 50% of students are in schools where time is scheduled for teachers to share, evaluate or develop instructional material and approaches. The percentage decreases to around 35% in such schools developing as well ad hoc policies in favour of collaboration amongst teachers. In Romania and Italy, the percentages are higher, conversely to Austria where such approach is much less frequent.

- 60% of students are in schools where the school head declares that there is a policy about responsible internet use, and 30-45% of students in schools where a policy about safe internet use exists. Such a European survey can't investigate in details what it really means and it is certainly an issue to be investigated further. Slovakia, Croatia and Austria have the highest percentages of students going to schools having both.

- The two most frequent incentives used to boost ITC use in T&L are additional ICT material for the class and additional training hours for the teachers; Between 35 and 45% of students are in schools implementing one or the other, and between 20 and 25% having both. Competitions and prizes, as well as financial incentives are less frequent; between 15 and 20% of students are in schools using them. The situation is nevertheless different in the Eastern countries where percentages of students going to schools using these incentives, in addition to others already mentioned are much higher. Reduction of teaching hours is almost never used as an incentive.

- Around 75% of students are in schools where the school head declare that initiatives to support innovation, not necessarily related to ICT, are implemented. When looking more concretely at the existence of change management training programme organised, between 45 and 50% of students are

in schools having them. Such programmes are particularly frequent in Estonia, Slovenia, Romania and Poland. Slovakia, Croatia and Austria have the highest percentages of students going to schools having both. Here again, a European survey like the present one can't investigate in details what it really means and it is certainly an issue to be investigated further.

- Between 60 and 80% of students are in schools where an ICT coordinator is available, on average full time in only one case out of three, rewarded in around one case out of two and providing pedagogical support in three cases out of four. 6: Attitudes and opinions

- Generally speaking, at EU level, both school heads and teachers are positive about ICT use and impact.
    - **Around or more than 90% of students** go to a school where the school head agrees or strongly agrees about ICT use to retrieve information, do exercise and practice, learn in an autonomous and collaborative way; a similar proportion of students is taught by teachers sharing such opinion, again at all grades.
- **Around or more than 80% of students** go to a school where the school head agrees or strongly agrees about the positive impact of ICT use on motivation, achievement, transversal skills and higher order thinking skills. A similar proportion of students is taught by teachers sharing the same opinion concerning the impact on motivation. Teachers remain positive but nevertheless a little bit more critical (except at grade 4) concerning the other areas of impact; indeed **around 70% of students** are taught by teachers agreeing or strongly agreeing about the positive impact of ICT use on achievement, transversal skills and higher order thinking skills.
- Around **95% of students** go to a school where the school head agrees or strongly agrees about ICT use in T&L being essential for students in the 21st century; the same proportion of students is taught by teachers sharing the same opinion; in both cases, no important differences to be noticed between grades.
- **Around 80% of students** go to a school where the school head agrees or strongly agrees about the need for a radical change at school level for ICT to be fully exploited in T&L; a similar proportion of students is taught by teachers sharing this opinion.
- At EU level, **around one third of students**, with no important differences between grades, strongly agree about the use of ICT having a positive impact to a similar extent whatever the area concerned.
- Around **three quarters of the students** agree or strongly agree about the fact that using a computer is really fun and almost the same proportion about the fact that it will help in future life as an adult
- Around **60% of students** agree or strongly agree about the fact that they lose track of time when they are learning with a computer; the same proportion is observed concerning the use of a computer for learning because of an interest in computers as such.
- Opinions of students at all grades in Portugal and Bulgaria, as well as in Italy and Turkey at some grades, are the most positive ones, while student's opinions in Poland are much less positive (even negative).

6: ATTITUDES AND OPINIONS

- **School head's opinions** are **largely positive or very positive** about the use of ICT to retrieve information, do exercise, and learn in an autonomous and collaborative way, about the positive impact on transversal skills, achievement, higher order skills and above all student's motivation. **Above 80% of students**, and sometimes up to 95% on some issue, at all grades are in schools where school heads think so. **Teachers share this positive opinion** but just slightly less frequently.

- **School heads and teachers** are **both as frequently convinced** about the fact that ICT use in T&L is essential for students in the 21st century. **Around 95% of students** are schools where school heads think so and the same proportion of students are taught by teachers thinking the same.

- Interestingly, **school heads** - and teachers even more – **agree or strongly agree about a radical change needed for ICT to be fully exploited in T&L**. **Between 80% and 85% of students** are in schools where the school head have this opinion, and the same proportion I taught by teachers sharing these views.

- School heads in Denmark, Bulgaria and Estonia are particularly frequently convinced about the general positive impact of using ICT in T&L; the highest frequencies of students benefitting from such digitally positive leadership are found in these countries.

- **Students are very positive as well**, especially about the **positive impact of ICT use on the classroom atmosphere**. Highest percentages of students being generally positive about ICT use in T&L are found in Romania, Portugal, and Italy; the lowest in Finland and Croatia.

- **Students** express their **interest for ICT use in T&L** more frequently **because of its 'fun' aspect, as well as for its usefulness in their future life**. They do so particularly in Portugal, Bulgaria, Italy and Turkey; to be noticed that students in Poland express the lowest positive attitude throughout all grades.

7: TRENDS

- Comparing like for like as far as possible, there are around twice as many computers per 100 students in secondary schools as in 2006 but the large variations between countries reported in 2006 persist.
- Laptops and interactive whiteboards are now extensively found but not reported in 2006. There is a trend towards smaller and portable computers, from a focus on desktop computers in 2006 to laptops and personally owned devices such as mobile phones in 2011.
- In 2011 broadband is almost ubiquitous in schools, but in 2006 was in less than three-quarters of schools.
- More computers are located in places other than dedicated computer rooms compared to 2006.
- Percentages of schools with web sites, email for teachers and students, a local area network have increased at all grades.
- Almost all teachers at all grades have used ICT to prepare lessons and more than four out of five have used ICT in class in the past year, an increase since 2006. However, the percentages of teachers using ICT in more than 25% of lessons has remained fairly stable since 2006, either stable of in decline at all grades.
- Yet percentages of teachers reporting resource or pedagogical obstacles to the use of ICT has declined, particularly those stating that the benefits of ICT are unclear.
- Teachers' self-declared confidence levels in ICT skills such as word processing, using email, preparing a multimedia presentation and downloading and installing software have increased in most cases.

8: PATTERNS AND PROFILES

At EU level, **around 50% of students** at grades 8 and 11 in vocational education, i.e. the largest group of students, corresponds to the profile characterised by low access/use at school & high access/use at home (around 35% at grade 11 in general education). In addition, around **28% of students** at **grade 11 in general education** are part of the low access/use at school & home profile.

These findings plead for a reinforced public action at institutional, local, regional, national and European levels to boost ICT use at school with the objective to reduce the gap between ICT use out and within school, still there in 2012, and also give the opportunity to the around 30% of 16 year old students not having high access to ICT at home to experience it at school.

The three profile descriptions provide, for each country, the percentages of (i) digitally supportive schools, (ii) digitally supportive teachers, and (iii) digitally supportive students. A correlation analysis reveals relationships between these profiles. In other word, educational systems characterized by a high percentage of digitally supportive schools count a large percentage of digitally supportive teachers or students, or the reverse.

Up to a reasonable extent at grade 4 and at grade 11 in vocational education (0,43 and 0,54 correlation respectively), **as the percentage of digitally supportive schools increase, the percentage of digitally supportive teachers increase**. There might be national/regional contexts that might favor the

development of digitally supportive schools and teachers, or digitally supportive schools might encourage teachers to become supportive, or the reverse.

Up to a rather good extent at grade 11 in general education (0,70 correlation), **countries with a high percentage of digitally supportive schools are also countries with a high percentage of digitally supportive students** and few digitally supportive students can be found in countries with few digitally supportive schools. **A similar trend** is observed but **to a much smaller extent at grade 8 and 11 in vocational education** (0,26 and 0,19 correlation respectively).

Finally, a relationship is also observed between the digitally supportive teachers and digitally supportive students. **Up to a rather good extent at grade 11 in vocational education** (0,73 correlation), **countries with a high percentage of digitally supportive teachers are also countries with a high percentage of digitally supportive students** (even if the correlation is not statistically significant which, as mentioned previously, is not surprising because of the size of the population here concerned, i.e. the number of participating countries). **The trend is similar but to a more limited extent** (0,43 correlation; again, not statistically significant) **at grade 11 in general education**.

INTRODUCTION

This final report to the European Commission is Deliverable 6 of the Survey of Schools: ICT and Education. It comprises the following sections:

- Executive summary
- Conceptual approach and methodology
- Analysis of the results of the three surveys, including figures
- Preliminary conclusions
- Annexes containing:
  - Technical report
  - Data tables
  - Three survey questionnaires
  - Country profiles.

The report is based on data from five questionnaires:

- School (SC), completed by the head teacher
- Teacher (TE), completed by the teacher/s
- Student (ST), completed by students at three levels (two questionnaires for grade 8 and 11 general education, and one for grade 11 vocational education, including an additional question and some extra items relating to careers):

The questionnaires were made available online from September until December 2011, and the data analysis began in January 2012. The reference year for all data presented in this report is therefore 2011-12.

Throughout this report, school levels are described in terms of grades, as is the convention in OECD and other studies. The raw data uses ISCED levels[1].

Grade	**ISCED level**	**Description**	**Average age**
Grade 4	ISCED1	Primary school	9.5
Grade 8	ISCED2	Lower secondary	13.5
Grade 11 (general)	ISCED3A	Upper secondary general	16.5
Grade 11 (vocational)	ISCED3B	Upper secondary vocational	16.5

[1] International Standard Classification of Education:
http://www.unesco.org/education/information/nfsunesco/doc/isced_1997.htm

Figures are rounded to the nearest whole number throughout the report, and to one or two decimal places in certain figures, were appropriate. ‘EU’ figures are calculated and weighted for the countries in the EU27 for which data is available, and exclude countries in the survey but not in the European Union (i.e. Croatia, Iceland, Norway and Turkey). Survey responses from schools in Germany, Iceland, the Netherlands and the United Kingdom are excluded as the response rates were below threshold levels.

The authors would like to thank the 190,000 students, teachers and head teachers in over 11,000 schools, for giving their time to participate in this first online survey on this scale of schools in Europe, and to the 31 national coordinators and survey Steering Committee for their guidance.

May 2012

CONCEPTUAL APPROACH AND METHODOLOGY

The focus of the study is on developing indicators and gathering and analysing data on students' use, competence, and attitudes to ICT. Teacher and school level factors were investigated as regards their impact on students. The main areas of investigation are:

- Students' digital competence and attitudes towards ICT
- Students' ICT use in /out of classroom
- Teachers' professional ICT use in/out of classroom
- Teachers' attitudes towards pedagogical ICT use
- School infrastructure, connectivity and ICT access
- School leadership in ICT and ICT for pedagogy

CONCEPTUAL APPROACH

The survey began with a literature survey covering the following topics:

- Emerging technologies
- Digital competence
- Students digital use and competence
- Teacher digital use and competence
- Leadership
- ICT use in vocational education
- ICT use in and out of school

The review drew on a range of sources including:

- Scientific databases (Eric, EBSCO); scientific journals; national and international surveys; academic meta reviews; academic papers and selected policy papers
- In English, French, German and Spanish; covering as well US, Australia, South Korea, etc.
- Pelgrum (2009). Study on Indicators of ICT in Primary and Secondary Education (IIPSE). Enschede
- SITES 2006 (Second Information Technology in Education Study)
- National benchmarking of ICT in schools (NO, NL, UK; US)
- TALIS (Teaching and Learning International Survey),
- PISA 2006
- TIMMS 2007 (Trends in International Mathematics and Science Study)

From it was developed a reference framework

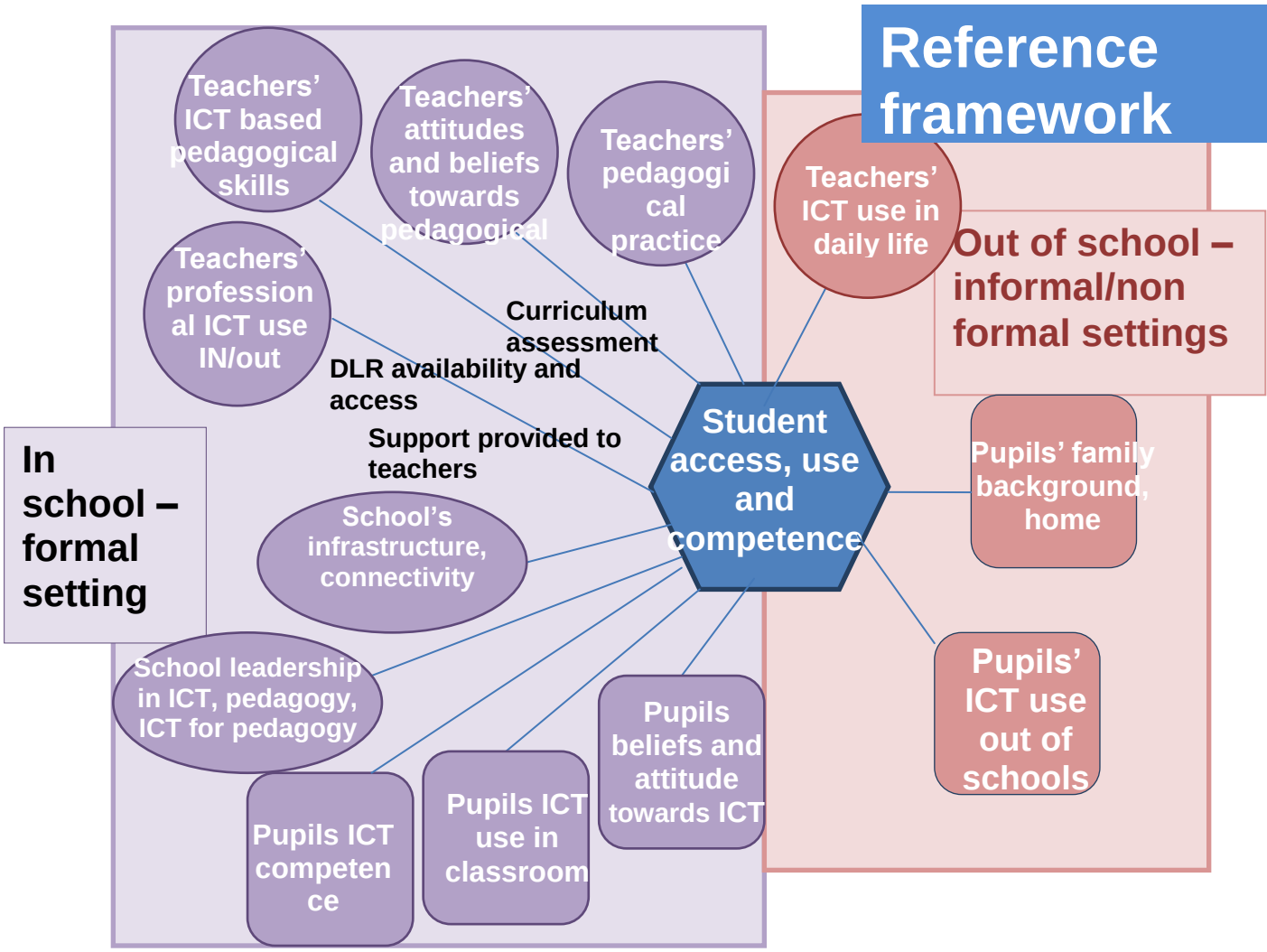


Figure 0.1: Reference framework

This analytical framework was then fine-tuned and the surveys designed in terms of scope and content (identifying the most important issues/indicators) with a view to gathering data to inform and support the overall evidence.

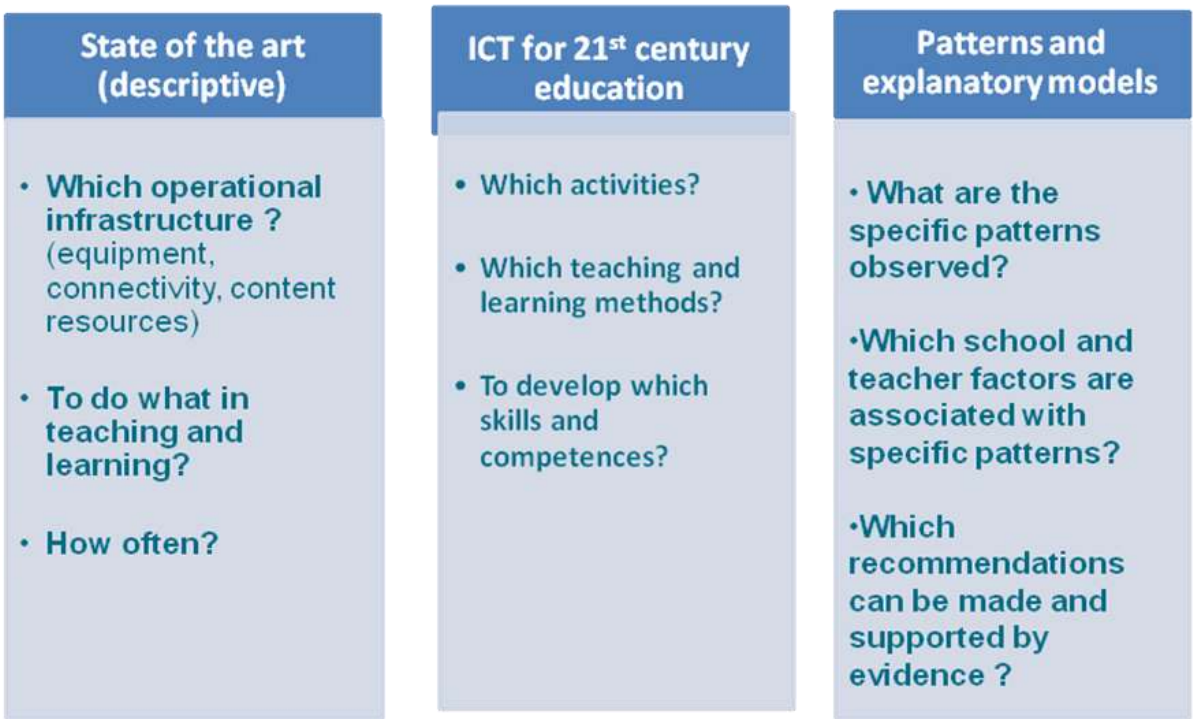


Figure 0.2: Investigation questions

From these questions a series of core data indicators for benchmarks was elaborated.

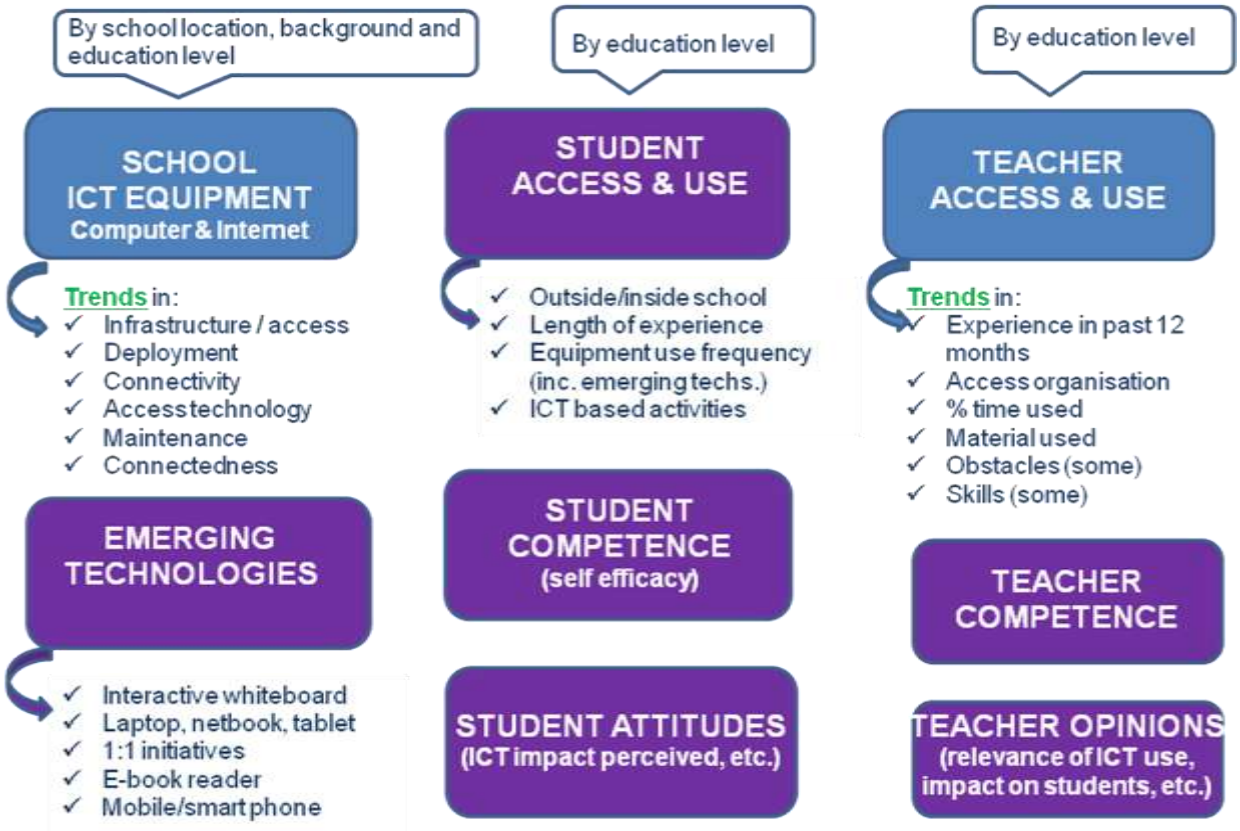


Figure 0.3: Core descriptive data

Finally, an overall conceptual model was agreed and this forms the basis of the findings reported in this report.

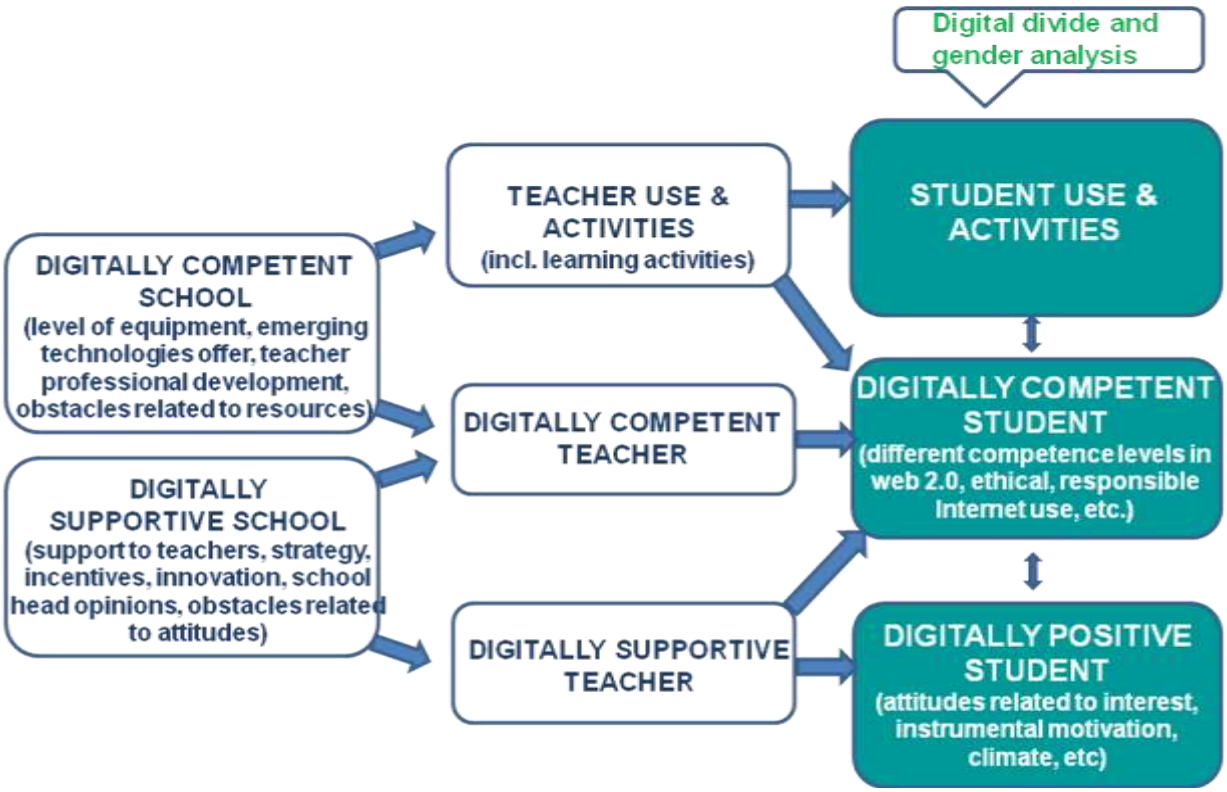


Figure 0.4: Conceptual model

METHODOLOGY

The technical annex describes in detail the stages leading to the data analysis. This section outlines briefly the process, in order to contextualise the sections that follow.

1. Work on the study begin in January 2011 with a literature review which provided evidence to shape the analytical framework and the questionnaires.

2. Three questionnaires were created and piloted in schools before being translated into 23 languages and published online. Two questionnaires focused on head teachers and class teachers at primary, lower secondary, upper secondary academic and upper secondary vocational education levels. They enable comparison with the surveys used by the eEurope 2002 and 2005 initiatives, for example Benchmarking Access and Use of ICT in European Schools), but are enriched and updated, addressing ICT use in and out of school. The third questionnaire is for two groups of students: one at ISCED 2 (grade 8 – 13.5 years old on average) and the other at ISCED 3 (grade 11 – 16.5 years old on average). The same questionnaire was administered to both groups of students and addresses ICT use both in and out of school. Questionnaires contain only closed questions, on facts (access and use, for example) and on opinions (statements, for example).

3. The survey used a two-stage stratified sampling cluster. In the first stage, schools are selected (stratified, explicitly and/or implicitly, and selected *in most cases* with probabilities according to their size). in a second stage, one class and all the student in this class are selected within the sampled school. Sampling began with defining the target population and exclusions (e.g. extremely small schools), obtaining from 31 national coordinators a stratified sampling frame – school lists including email addresses and measure of size compiled according to a sampling manual. Random school level samples were then drawn of 1200 schools in each country: 300 at each of four levels (grade 4, grade 8, grade 11 general and grade 11 vocational). In small countries all schools were included. For each school two replacements were identified.

	ISCED 1 grade 4	ISCED2 grade 8	ISCED3 academic grade 11	ISCED3 vocational grade 11	Questionnaire
SCHOOL	N=300	N=300	N=300	N=300	Principal
TEACHER	N=1	N=3	N=3	N=3	Teacher
STUDENT	/	N=all students in the selected class	N=all students in the selected class	N=all students in the selected class	Student

Table 0.1: Sampling

4. Data collection ran from September to December 2011. School leaders were contacted by email automatically sent by the online system. If they agreed to participate, a manual was sent by the system to a 'school coordinator' who drew a sample at teacher and class level, and supported the head teacher (principal), up to three teachers and one class of students in completing the online surveys. National coordinators provided national helpdesk support for schools throughout this period and they were supported by the contractor. Problems and participation levels were constantly monitored, and remedial action taken when necessary.

5. Data analysis began in January 2012 after the online survey system was closed down and the data exported. The database was cleaned and data weighted, at student and school level. School and teacher variables are analysed at the student level (as attributes of students) except when analysing trends (school variables analysed at the school level).

6. Unreliable data was identified – where numbers of responses are insufficiently high (i.e. below 40) - and excluded. This had the effect of eliminating Germany, Netherlands, Iceland and United Kingdom. In the case of Germany it was decided to contact schools again and re-open the online survey in March-April 2012, as the chances of reaching the 40 school threshold were judged to be higher, but this was not the case, despite strenuous efforts.

COUNTRY	ISCED1			ISCED2				ISCED3A				ISCED3B				TOT_Schools
	N_schools	N_Principals	N_Teachers	N_schools	N_Principals	N_Teachers	N_Students	N_schools	N_Principals	N_Teachers	N_Students	N_schools	N_Principals	N_Teachers	N_Students	
Austria	108	104	82	100	96	230	1466	45	43	103	746	80	68	189	1393	**333**
Belgium	105	99	79	80	64	181	922	63	54	125	706	75	61	178	760	**323**
Bulgaria	176	165	167	211	197	545	3509	135	130	361	2599	139	134	382	2519	**661**
Croatia	159	158	148	190	188	501	3138	**39**	38	105	986	124	116	331	2490	**512**
Cyprus	196	177	317	68	63	621	4200	55	51	443	3080	**7**	7	54	278	**326**
Czech_Republic	132	118	115	124	110	281	1703	126	111	305	2790	162	137	438	3109	**544**
Denmark	42	38	28	59	52	90	721	59	55	109	1087	15	13	33	252	**175**
Estonia	100	94	86	132	124	271	1888	86	77	185	1604	**15**	14	38	128	**333**
Finland	132	116	112	151	131	365	2313	134	114	325	2541	59	48	122	702	**476**
France	51	46	30	59	49	131	993	50	41	94	798	40	30	70	334	**200**
Germany	11	11	10	8	7	12	125	11	9	25	148	11	10	22	165	**41**
Greece	121	119	100	106	101	274	1753	130	124	329	2373	22	19	52	292	**379**
Hungary	152	136	142	180	165	499	3376	133	124	362	3342	137	128	392	3155	**602**
Iceland	9	9	5	23	18	36	301	**9**	8	19	170	4	4	6	34	**45**
Ireland	46	43	37	42	40	102	883	**32**	31	78	539	/	/	/	/	**120**
Italy	233	208	222	206	188	498	3761	201	170	539	3860	207	182	563	3588	**847**
Latvia	132	127	122	148	137	358	2076	117	108	279	2005	**25**	21	59	401	**422**
Lithuania	194	172	188	217	204	557	3672	183	166	449	3586	51	49	140	981	**645**
Luxembourg	50	47	67	**6**	4	278	3594	4	3	276	2027	**6**	5	33	1691	**66**
Malta	**28**	27	43	**26**	23	181	1621	**2**	2	20	122	/	/	/	/	**56**
Netherlands	31	23	23	9	5	16	137	7	3	39	454	/	/	/	/	**47**
Norway	85	77	60	66	55	122	1237	48	41	96	864	33	28	63	395	**232**
Poland	185	182	184	221	213	615	4417	206	198	567	5273	202	189	554	4323	**814**
Portugal	88	79	82	130	116	340	2303	87	74	201	1392	111	95	283	1532	**416**
Romania	184	176	169	186	170	718	4721	168	148	444	3920	147	130	394	2840	**685**
Slovakia	236	216	224	238	220	640	3991	116	106	304	2361	192	181	535	3950	**782**
Slovenia	106	85	94	106	81	248	1431	**22**	19	49	473	19	14	44	301	**253**
Spain	84	80	75	110	103	292	2065	116	109	288	2370	116	107	286	1802	**426**
Sweden	32	26	23	43	25	75	572	17	8	28	255	16	11	31	182	**108**
Turkey	52	47	46	45	38	68	508	87	80	206	1483	76	73	195	1394	**260**
United_Kingdom	14	11	13	10	5	22	129	12	10	22	163	/	/	/	/	**36**
TOT	3274	3016	3093	3300	2992	9167	63526	2500	2255	6775	54117	2091	1874	5487	38991	11165

OK below 40 but higher than 20% participation

Total Number of participating schools	**11165**
Total Number of principals	**10137**
Total Number of teachers	**24522**
Total Number of Students	**2E+05**

Table: Numbers of valid responses

	ISCED1	ISCED2	ISCED3A	ISCED3B	

COUNTRY	% participation	% participation	% participation	% participation	Mean % participation over all ISCED levels
Austria	36.24	33.56	**15.05**	26.67	**28**
Belgium	35.12	26.58	21.28	25.00	**27**
Bulgaria	58.67	65.73	45.92	46.33	**54**
Croatia	53.18	64.41	53.42	44.29	**54**
Cyprus	70.50	73.12	79.71	53.85	**69**
Czech_Republic	44.00	41.20	42.00	54.18	**45**
Denmark	**14.00**	**19.67**	29.95	13.04	**19**
Estonia	34.36	43.85	40.38	41.67	**40**
Finland	44.15	50.50	46.69	43.07	**46**
France	**17.29**	**19.67**	**16.67**	**13.33**	**17**
Germany	2.59	1.89	2.60	2.59	**2**
Greece	40.47	35.10	43.19	7.33	**32**
Hungary	50.67	66.67	44.48	45.51	**52**
Iceland	6.77	15.54	28.13	16.67	**17**
Ireland	39.66	25.00	22.38	/	**29**
Italy	77.15	69.36	66.56	69	**71**
Latvia	44.00	44.31	39.53	27.78	**39**
Lithuania	64.67	72.33	61.41	73.91	**68**
Luxembourg	32.68	23.08	14.29	40.00	**28**
Malta	29.17	48.15	50.00	/	**42**
Netherlands	10.33	3.36	3.33	/	**6**
Norway	28.33	22.37	**16.00**	11.00	**19**
Poland	61.67	73.42	68.90	67.33	**68**
Portugal	28.95	43.19	29.00	36.88	**35**
Romania	61.33	60.98	56.76	50.00	**57**
Slovakia	78.41	76.77	48.33	64.00	**67**
Slovenia	35.45	37.32	30.14	17.27	**30**
Spain	27.91	36.79	38.93	39.32	**36**
Sweden	10.67	**14.33**	5.67	5.33	**9**
Turkey	**17.28**	**14.52**	29.00	25.33	**22**
United_Kingdom	4.71	3.33	4.01	/	**4**
Mean % participating	**37.43**	**39.55**	**35.28**	**35.58**	

OK — below 20% but N of schools participating > 40

Table: Percentage participation levels

Pink: below 20% participation. Grey: below 20% but more than 40 schools participating. / = vocational schools do not exist separately from grade 11 general.

Such levels of participation from randomly sampled schools make confidence levels in the validity and reliability of results high. However, results at certain levels for certain countries, although included, should be interpreted with relatively more care, i.e. Austria grade 11 general, Denmark at grades 4, 8 and 11 general, France at all grades, Greece at grade 11 vocational, Luxembourg at grade 11 general, Norway at grade 11 general and vocational, Slovenia at grade 11 vocational, Sweden all grades and Turkey grade 4 and 8.

In this survey EU averages are given; these are weighted means for the EU27 excluding Germany, Iceland, Netherlands and the United Kingdom.

1. INFRASTRUCTURE PROVISION

In this section we explore data relating to the provision of ICT equipment, tools / applications and connectivity, that is the underlying infrastructure to underpin teaching and learning with technology. Changes and trends since the previous benchmarking survey in 2006[2] are described in section 7.

SUMMARY OF FINDINGS:

- There are between three and seven students per computer on average in the EU; the older the student the lower the student:computer ratio in most countries.
    - There is large variation between countries. Denmark, Norway and Sweden have the highest ratios at all grades, Spain, Malta, Cyprus and Belgium at some grades.
- Laptops, tablet and netbooks are becoming pervasive; on average in the EU there are between eight and 16 students per laptop at grades 4 and 11 vocational respectively.
    - There are high ratios of laptops to students in Denmark, Norway and Sweden at all grade levels, Spain and Finland at some levels
- Some two-thirds of computers are located in computer rooms on average.
    - There is a split between groups of countries locating in labs and those distributing computers throughout the school, not entirely dependent on the numbers of computers in the school.
- There are on average over 100 students per interactive whiteboard and 50 per data projector.
    - Malta, Denmark, Finland, Norway and Estonia have lower than average ratios of student to interactive whiteboards at more than one grade. Finland has consistently low ratios of students to data projectors at all grades.
- More than 9 out of ten students are in schools with broadband, generally from 2 to 30mbps, on average in the EU.
    - Denmark, Estonia, Luxembourg, Norway and Sweden have the highest bandwidth at most if not all grades, Portugal at grades 8 and 11 general.
- Most schools are 'connected' at a basic level, that is, having a web site, email for students and teachers or a virtual learning environment. One in three grade 4 students is in a school with a VLE, rising to almost two-thirds in vocational schools.
    - High levels of VLE provision can be seen in Norway, Portugal, Finland, Sweden, Denmark and Luxembourg; in some all students are in such schools.
- Generally speaking it is school staff who play a large part in maintaining the growing amount of ICT equipment in schools, but in most countries there is a mix of school staff and external support, whether public or private sector.
- On average in the EU, 37 percent of grade 4, 24% of grade 8, 55% of grade 11 general and 50% of grade 11 vocational students are in 'digitally equipped schools' (i.e. with high equipment levels, fast broadband (10mbps or more) and high 'connectedness'.

'COMPUTERS'

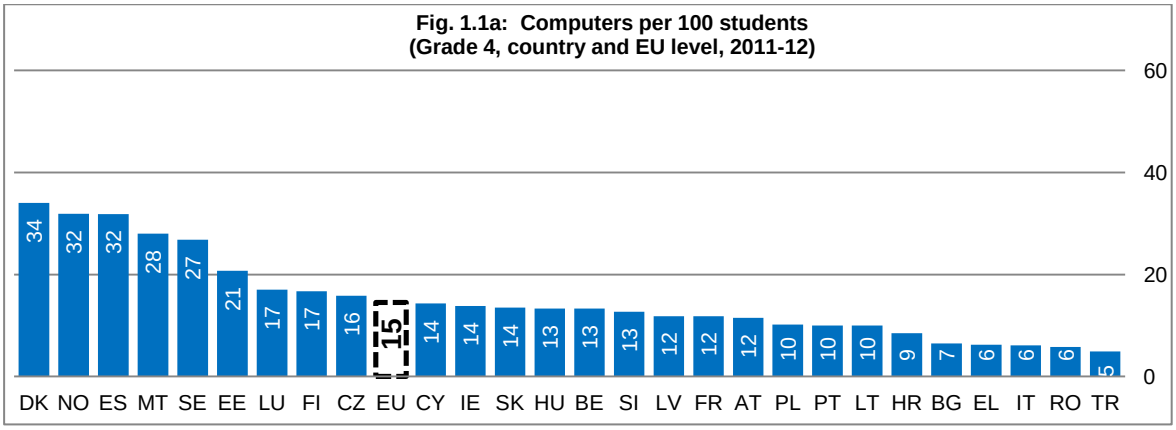
For the purposes of this survey, a computer is defined as a desktop, laptop, tablet or netbook computer used for educational purposes, whether or not connected to the internet. Of these computers, almost all are internet-connected, and are supplied by the school; in some countries (notably Denmark), there is a trend towards allowing students to bring their own laptops and tablets, a trend explored in later sections.

[2] Empirica Gesellschaft für Kommunikations- und Technologieforschung mbH (Empirica 2006), *Benchmarking Access and Use of ICT in European Schools 2006: Final Report from Head Teacher and Classroom Teacher Surveys in 27 European Countries*, August 2006

Countries with above average ratios of such computers per 100 students at three or all grades are Belgium, Cyprus, Denmark, Finland, Norway, Spain and Sweden (see FIG1_1a and b for the underlying data). At all grades there is a 'long tail' of countries with below average ratios and large differences between countries.

At grade 4 there are on average in the EU seven students per computer (15 computers per 100 students), three countries having twice the computers per 100 students and five half the EU average, as can be seen in fig. 1.1a.

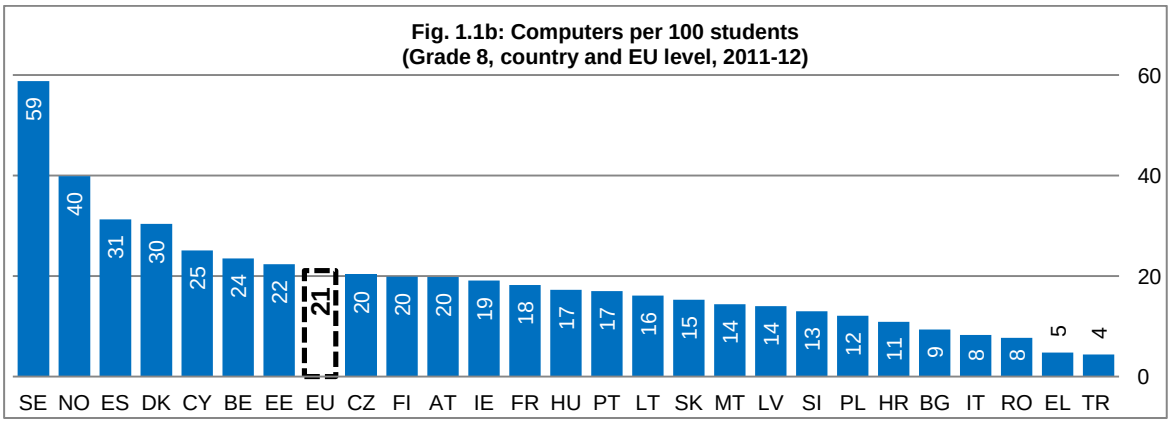
Fig. 1.1a: Computers per 100 students (Grade 4, country and EU level, 2011-12)



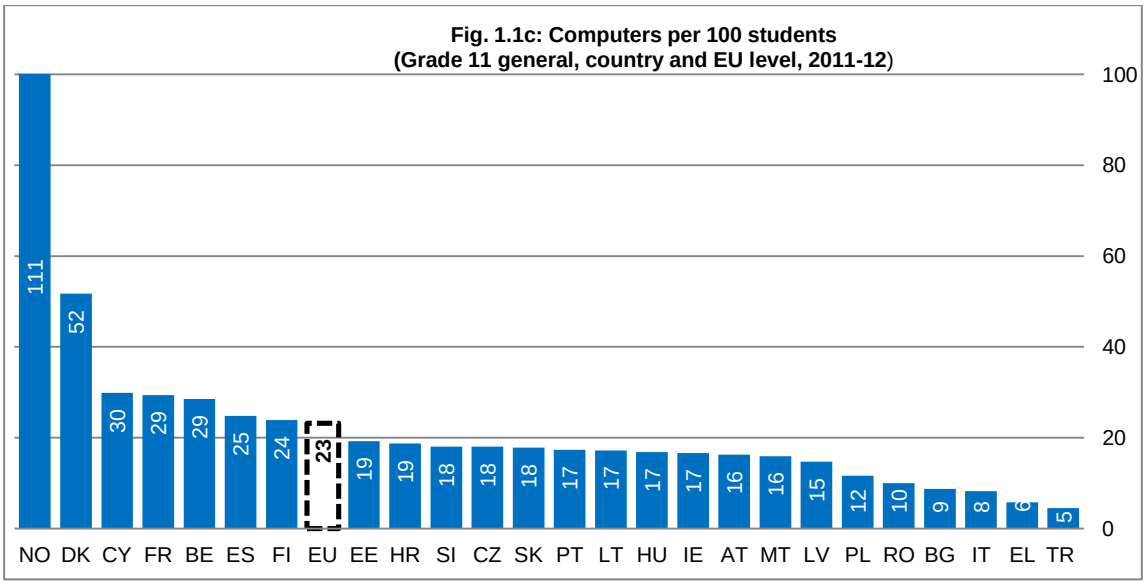
At grade 8 there are five students per computer on average in the EU (21 per 100).

In all countries except **Malta** there are more computers for learners at grade 8 than at grade 4, in some countries around twice as many (e.g. **Austria, Belgium, Sweden**).

Fig. 1.1b: Computers per 100 students (Grade 8, country and EU level, 2011-12)

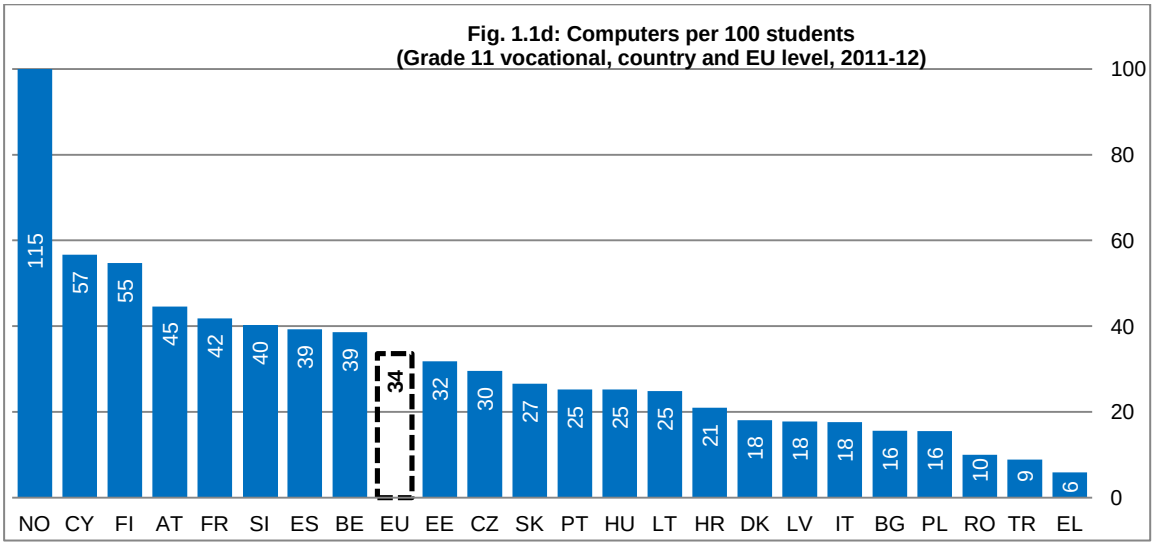


At grade 11 general there are almost four students per computer (23 computers per 100 students); note that the scale extends to 100 for grade 11.



At grade 11 vocational there are around three students per computer (31 per 100).

In **Norway** there can be said to be system-wide 1:1 computing at grade 11, both general and vocational, with more than 1:1 computing in both cases.



COMPUTER PROVISION, GRADE 4

This and the following sections consider the data concerning desktop and laptop computers at each of the four school levels, drawing on tables FIG1_2a to d, FIG1_2e and FIG1_2f. There is less than one non-internet connected computer per 100 students at all levels, EU average.

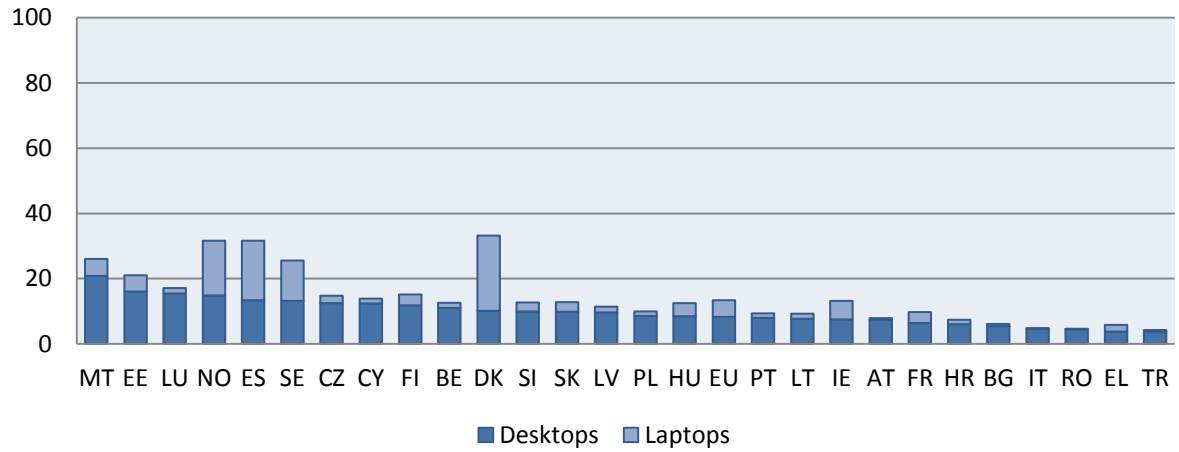
Laptops (including tablets, netbooks and mini-notebooks) are becoming pervasive in Europe's schools, almost all internet-connected[3] at every level. There are from 16 to 8 students per online laptop depending on level: 6 per 100 students at grade 4, 8 at grades 8 and 11 general and 12 at vocational level. In primary schools, students find, on average some two laptops for every three desktop computers.

[3] On average in the EU there are no more than 0.2 non-internet connected laptops per 100 students at any level.

Within the overall 15 computers per 100 students (EU average):

As figure 1.2a shows, while online computers are much in evidence in most countries, laptops are frequently found in **Denmark** (23 per 100 students), **Spain**, **Norway** and **Sweden**, but much less so in **Austria, Bulgaria, Italy, Romania** and **Turkey**.

Fig. 1.2a: Internet-connected desktop and laptop computers per 100 students (Grade 4, country and EU level, 2011-12)



No correlation at EU level is observed between students' socio-economic background and equipment levels, but there are significant (>0.2) correlations in some countries.

The higher the percentage of students from poor families in a school, the more online desktop computers tend to be available at grade 4 in **Hungary, Norway** and **Portugal**.

COMPUTER PROVISION, GRADE 8

Within the overall 21 computers per 100 students:

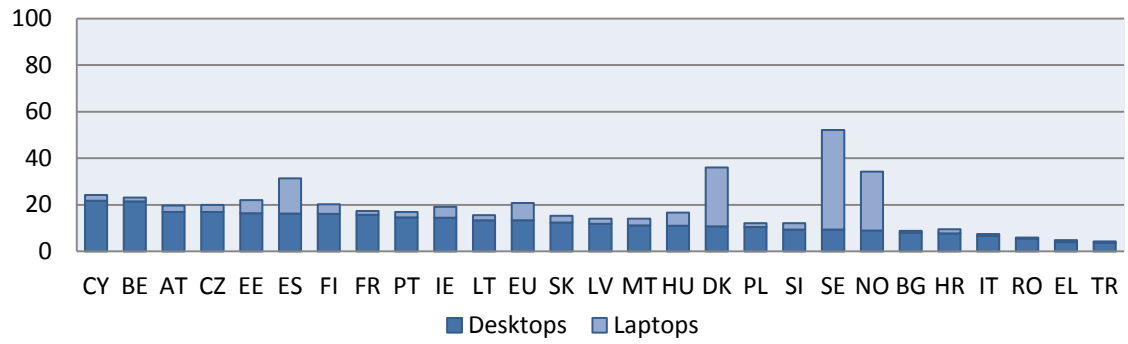
The highest ratios of online desktop computers per 100 students are to be found in **Cyprus** and **Belgium** (22), followed by **Austria** and the **Czech Republic**. There are below five online PCs per 100 students in **Greece** and **Turkey**, and between 5 and 10 per 100 in **Bulgaria, Croatia, Italy, Norway, Romania, Slovenia** and **Sweden**.

Laptops are much in evidence, more so than desktops in some countries, notably **Sweden**, where there are 43 laptops per 100 students[4], **Norway** and **Denmark** (both 25 per 100 students). In **Belgium, Bulgaria, Croatia, France, Greece, Italy, Poland, Romania** and **Turkey** there are fewer than 2 laptops

[4] but with a standard error of 11.37

per 100 students.

Fig. 1.2b: Internet-connected desktop and laptop computers per 100 students (Grade 8, country and EU level, 2011-12)



No significant correlation is observed between poverty and equipment provision at EU level, but a number of significant (>0.2) correlations between poverty and equipment levels are observed at country level.

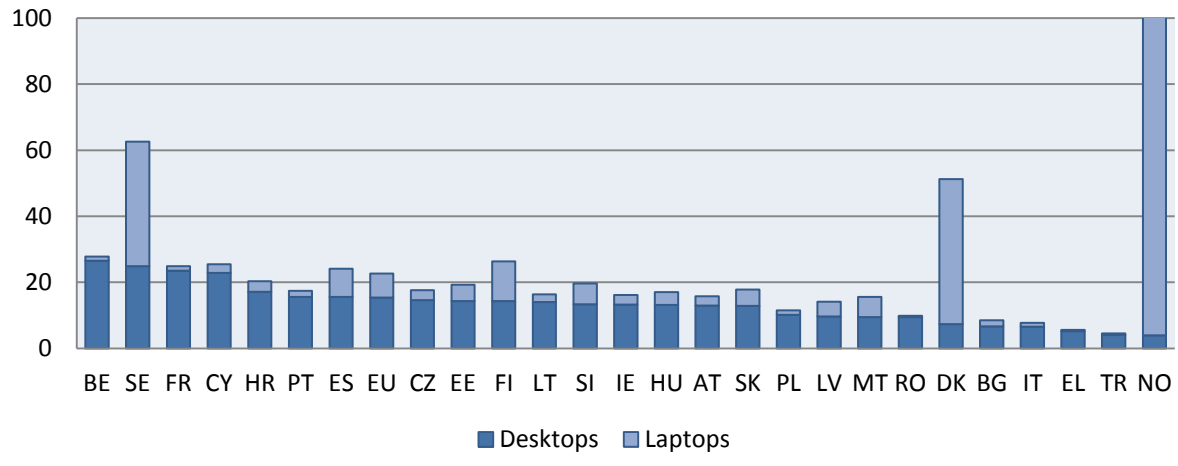
The higher the percentage of students from poor families in a school, the more online desktop computers tend to be available in **Latvia, Lithuania** and **Malta**, and the more internet-connected laptops per 100 students are provided in **Ireland**.

COMPUTER PROVISION, GRADE 11 GENERAL

Within the overall 23 computers per 100 students:

Grade 11 general students have the use of the highest numbers of online PCs in **Belgium** (27 per 100 students), **Sweden**, **France** and **Cyprus**. The lowest ratios are to be found in **Norway**, **Turkey** and **Greece**. There are more online laptops than online PCs per 100 students in **Norway**, **Denmark** and **Sweden**. Only **Finland** has more than 10 laptops per 100 students in addition to these three countries.

Fig. 1.2c: Internet-connected desktop and laptop computers per 100 students (Grade 11 general, country and EU level, 2011-12)



Again no link is observed between socio-economic background and equipment provision at EU level in grade 11 general schools, but there is a significant positive correlation in France between desktop provision and poverty, and a negative correlation in **Belgium** between percentage of students from poor families in a school and numbers of online desktop computers and of online laptops.

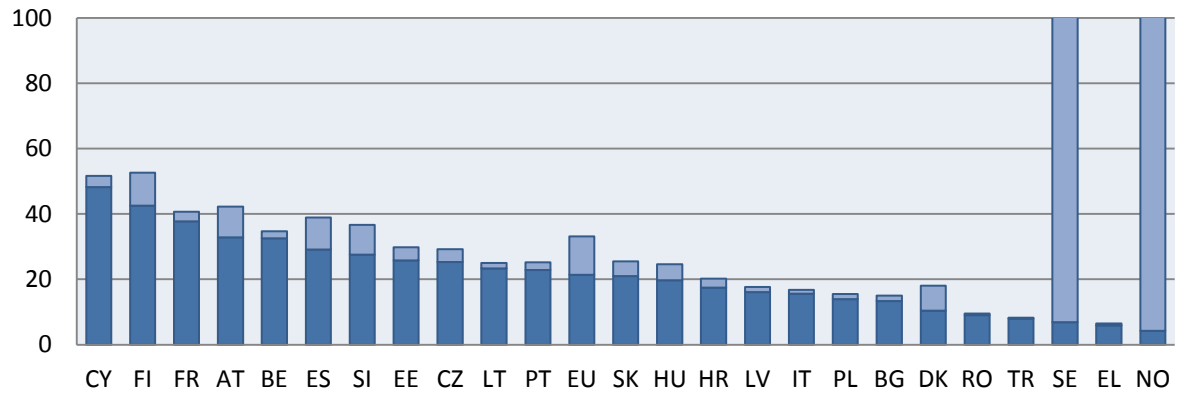
COMPUTER PROVISION, GRADE 11 VOCATIONAL

Within the overall 31 computers per 100 students:

Students in **Cyprus** have access to 48 internet-connected desktops per 100 students, followed by **Finland**, **France**, **Austria** and **Belgium**. Relatively low numbers are to be found in **Sweden**, **Greece** and **Norway**.

There is a 1:1 ratio of internet-connected laptops in **Norway** (107) and **Sweden** (98), whilst **Finland** and **Spain** have around 10 per 100 students.

Fig. 1.2d: Internet-connected desktop and laptop computers per 100 students (Grade 11 vocational, country and EU level, 2011-12)



No correlation was observed at EU level between socio-economic background and equipment levels, but significant (>0.2) correlations are observed at country level.

The higher the percentage of students from poor families in a school, the more online desktop computers tend to be available in vocational schools in **Cyprus** and **Portugal**. There are also positive correlations between the percentage of students from poor backgrounds in schools and the numbers of internet-connected laptops per 100 students in **Greece, Italy** and **Portugal**. However, there is a significant negative correlation between poverty levels and desktop computer provision in vocational schools in **Austria, Croatia, Czech Republic, Hungary, Spain** and **Sweden**.

DEPLOYMENT OF COMPUTERS

Europe's students tend to find their computers in dedicated computer rooms but there is wide variation between schools and between countries. The older the student, the more computers are to be found in labs and the less they are deployed in classrooms. The underlying data can be seen in FIG1_3a and 1_3b.

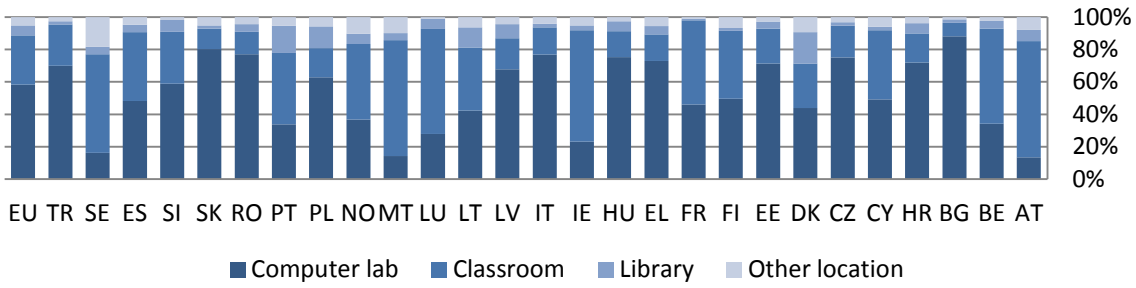
GRADE 4

On average in the EU grade 4 students are in schools where 58% of the computers are located in computer rooms, as seen in fig. 1.3a.

This figure rises to more than 75% in **Bulgaria, Czech Republic, Hungary, Italy, Romania** and **Slovakia**. Conversely in **Austria, Malta** and **Sweden** students are in schools where fewer than 20% of the computers are in labs. In these countries, as well as **Belgium, France, Ireland** and **Luxembourg**, computers tend to be located in classrooms. Students in **Denmark** (in particular), **Lithuania, Poland** and **Portugal** find their computers in libraries more than other countries. Relatively high numbers of

computers are located in other locations in **Denmark, Norway** and **Sweden**, in open resource areas for example.

Fig. 1.3a: Location of computers
(% of total, Grade 4, country and EU level)

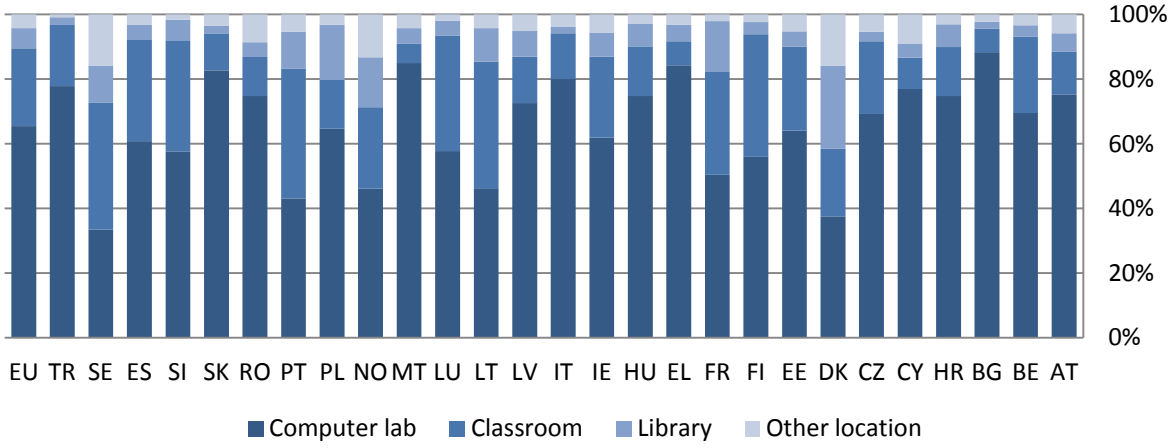


GRADE 8

Grade 8 students are more likely to find their computers in labs, with students in schools where 66% of the computers are located there.

The highest figures are in **Bulgaria, Greece** and **Malta**. Again, **Scandinavia**, as well as **Portugal** and **Lithuania**, tend not to deploy computers in dedicated labs. In six countries (**France, Lithuania, Luxembourg, Portugal, Slovenia** and **Sweden**) more than one in three students go to schools where computers are to be found in classrooms. Libraries and 'other places' in **Denmark, Norway** and **Sweden** (but not **Finland**) are where computers are more frequently located than in other countries, other places being, for example, open spaces, resource centres and corridors. It is in Portugal where students are most likely to find computers set up in classrooms, and in Bulgaria where they are least likely to have desktop computers in classrooms (6 to 10% of computers are located there).

Fig. 1.3b: Location of computers
(% of total, Grade 8, country and EU level)

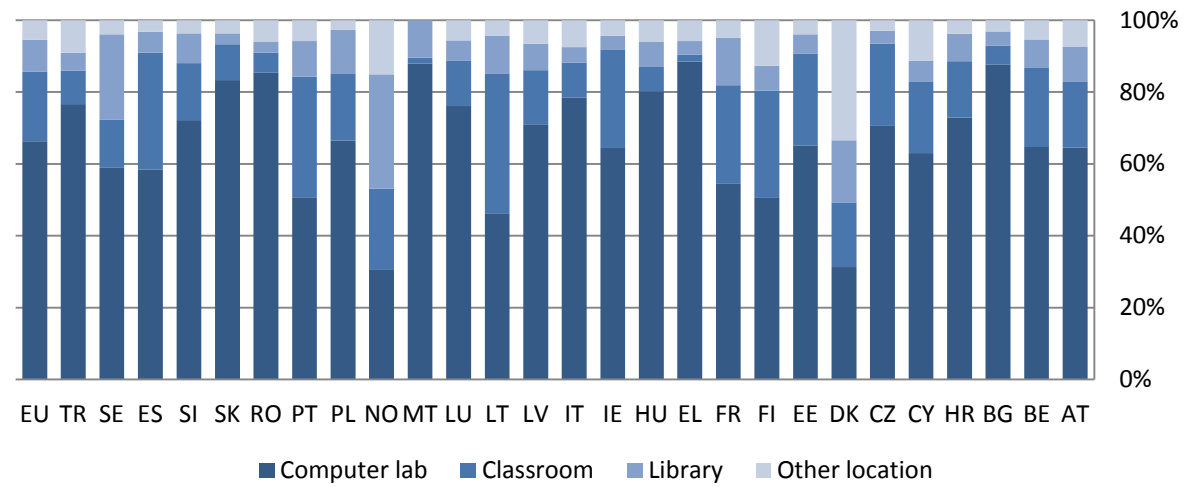


GRADE 11 GENERAL

At grade 11 general students are in schools where some two thirds of computers are located in labs on average in the EU.

Wide variation between schools is reported in **Luxembourg, Malta** and **Sweden**[5], the highest percentages being in **Bulgaria, Greece, Malta** and **Romania**, the lowest in **Denmark** and **Norway**. **Lithuania, Portugal** and **Spain** have the highest proportion of desktop computers in classrooms (33% to 39%), **Bulgaria, Italy, Romania,** and **Turkey** the lowest, with exceptionally low figures in **Greece** and **Malta** (both 2%). In **Denmark** computers are most likely to be located in 'other places' (i.e. resource centres, open spaces ...).

Fig. 1.3c: Location of computers
(% of total, Grade 11 general, country and EU level)



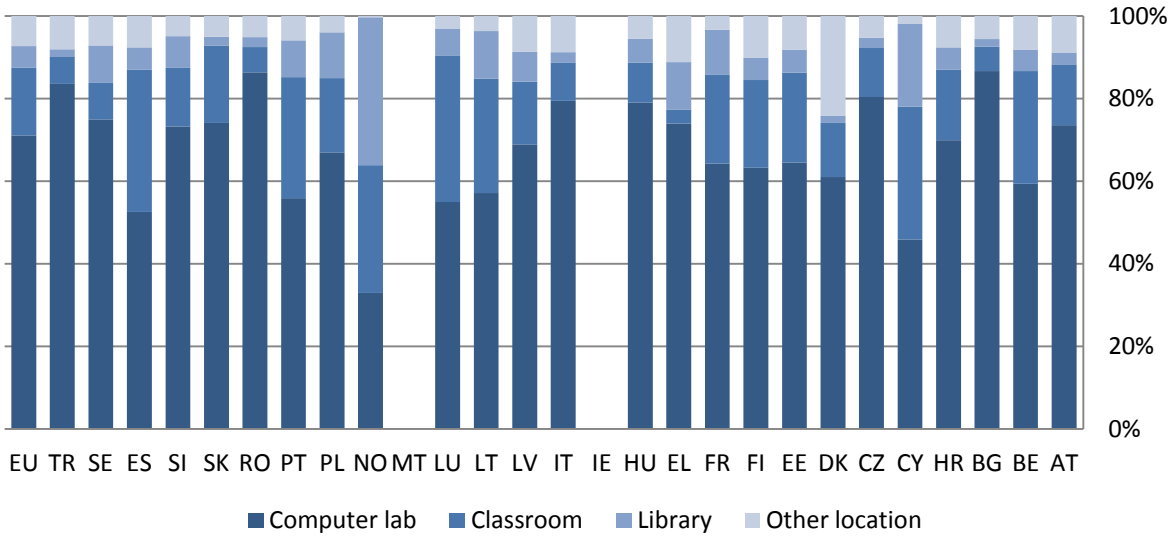
GRADE 11VOCATIONAL

It is at grade 11 vocational level that computers are most likely to be installed in labs: 71% of computers are located in labs (EU average).

This is especially the case in **Bulgaria, Romania** and **Turkey**. In **Cyprus** and **Norway** computers are more often than elsewhere located in libraries, and **Denmark**, again, has many computers located in other places.

[5] Standard error is high in these countries

Fig. 1.3d: Location of computers
(% of total, Grade 11 vocational, country and EU level)



OPERATIONAL COMPUTERS

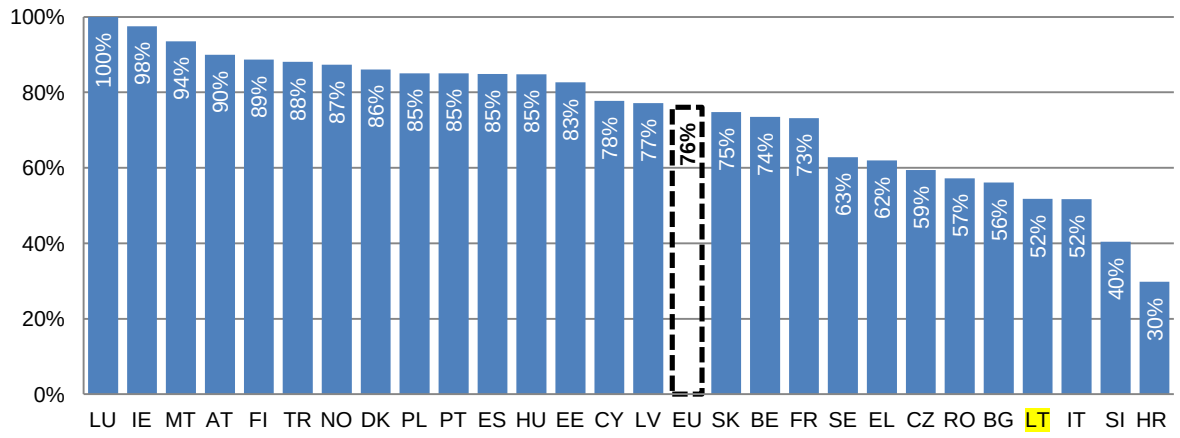
In Europe as a whole between 71% (grade 4) and 80% (vocational) of students are in schools where more than 90% of computers are operational (see FIG1_4a-b).

At grade 4, on average in the EU, 71% of students are in schools where more than 90% of the equipment is operational.

> In **Croatia** and **Slovenia**, 35% and 40% of grade 4 students are in schools where more than 9 out of 10 computers are fully operational. More than one in ten students in three countries (**Belgium, Finland** and **Sweden**) are in schools where more than half of the equipment is not fully operational.

76% of grade 8 students, on average in the EU, are in schools where more than 90% of the equipment is fully operational, as seen in fig. 1.4.

Fig. 1.4: Percentage of students in schools where more than 90% of equipment is operational (Grade 8, country and EU level) 2011-12)



The figure for students at grade 11 in general education, 74%, is close to that at grade 8.

Croatia and **Sweden**[6] appear to have high levels of non-operational equipment at this level.

Students at grade 11 in vocational education have the highest chances of using operational equipment: 80% are in schools where more than 90% of equipment is fully operational.

Sweden and **Finland** report relatively high numbers of students in upper secondary vocational schools with more than 50% of equipment not operational (14% and 23% respectively).

INTERACTIVE WHITEBOARDS

ACCESS TO IWBS

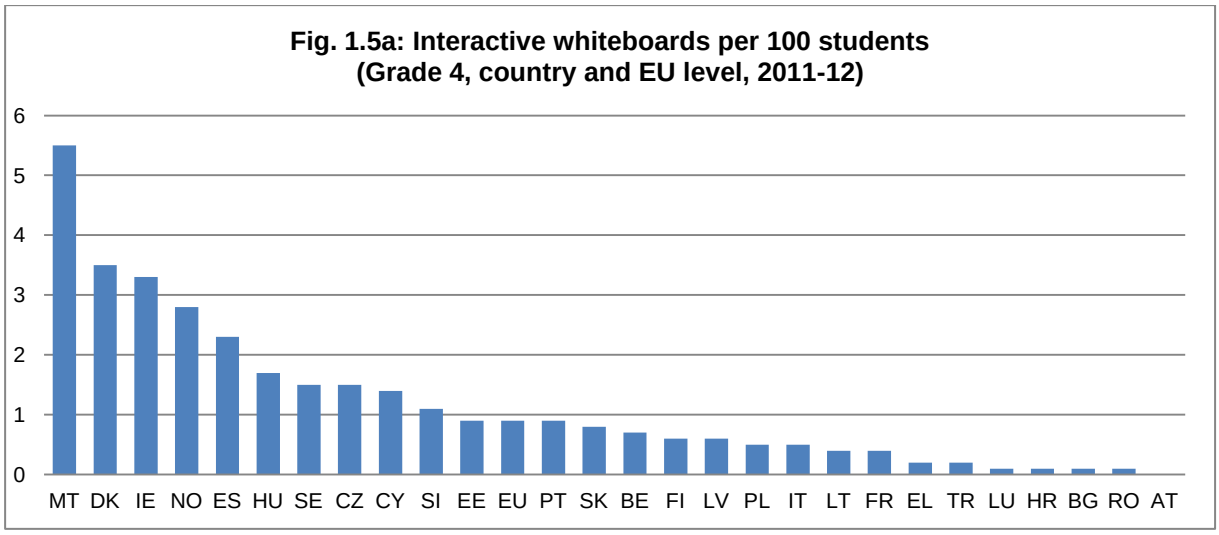
Interactive whiteboards (IWBs) are found across Europe at most levels, with approximately one per 100 students at all grades, as seen in fig.1.5. The data table is FIG1_2a-d.

At grade 4, there are 111 students per IWB.

The highest numbers of interactive whiteboards are reported in **Malta** (6 per 100 students), **Denmark** (4), **Ireland, Norway** (3) and **Spain** (2), and fewer than 0.5 per 100 students in **Austria, Bulgaria, Croatia, France, Greece, Lithuania, Luxembourg, Poland, Romania,** and **Turkey**.

Positive correlations at grade 4 between student socio-economic background and the provision of IWBs are observed in **Hungary** and **Norway**, while there is a negative correlation in **Bulgaria** and **Luxembourg**.

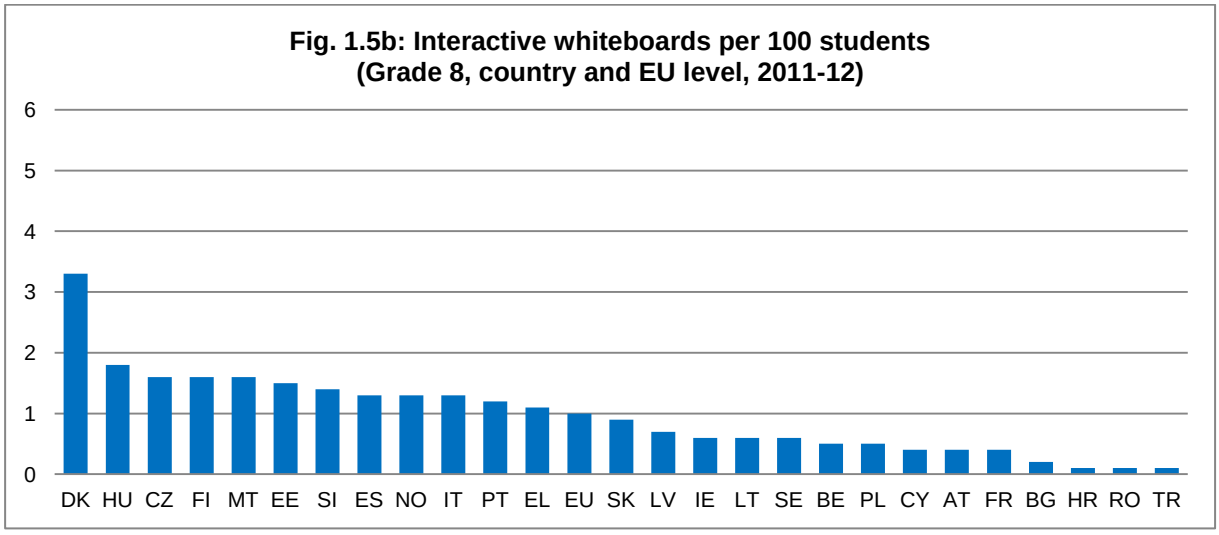
[6] (but note the high standard error)



At grade 8, there are 100 students per IWB.

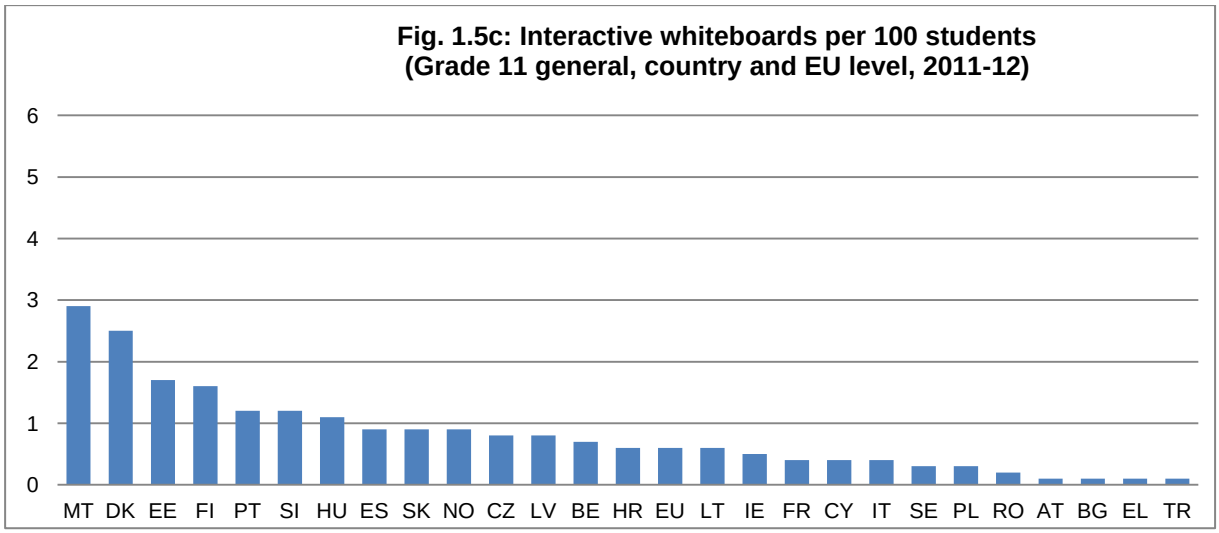
At grade 8, the highest numbers of interactive whiteboards are reported in **Denmark** (3 per 100 students), followed by **Hungary, Malta, Finland, Czech Republic** and **Estonia** (all around 2:100). 14 countries report fewer than one interactive whiteboard per 100 students.

A significant positive correlation between levels of poverty and the provision of IWBs is observed in **Hungary**.



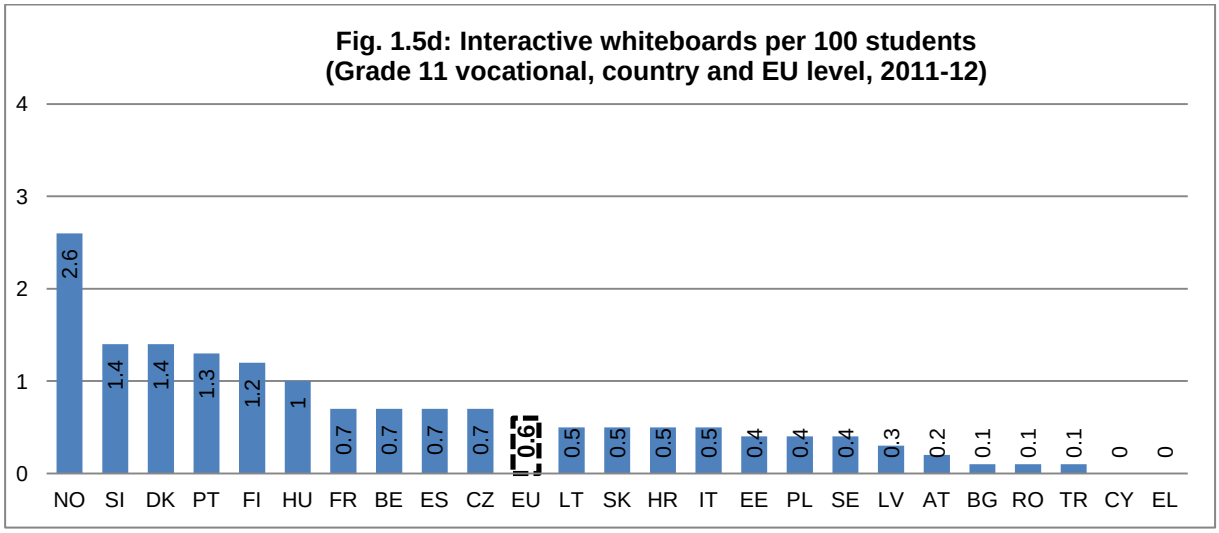
At grade 11 general, there are 167 students per IWB.

The highest ratios of interactive whiteboards are in **Denmark, Malta** (both around 3:100), **Estonia** and **Finland** (both with 2:100). There are fewer than one interactive whiteboard per 100 students in 18 countries.



At grade 11 vocational, there are also 167 students per IWB.

Norway has the highest ratio of interactive whiteboards (3 per 100 vocational students), followed by **Portugal, Finland, Slovenia** and **Denmark** (all slightly above 1:100). They are relatively scarce (less than one per 100) in 12 countries.



Not surprisingly, interactive whiteboards tend to be located in classrooms, where between 65 and 75 per cent of IWBs are installed. Few are located in libraries at any level. There are considerable variations in deployment between countries.

At grade 4, in **Turkey** for example 45% of IWBs are in labs but **Luxembourg** and **Sweden** have none at all, siting almost all in classrooms (a practice adopted in **Finland** and **Ireland** as well to a lesser extent). High standard errors could indicate considerable variation between schools within a country as well (e.g. **Turkey**). In **Bulgaria** and **Greece** more mobile IWBs appear to be deployed than other countries.

At grade 8 in **Denmark, Finland, Greece, Latvia, Norway** and **Sweden** over 85% of IWBs are located in classrooms.

The pattern is repeated at grade 11 general, in **Austria, Czech Republic, Denmark, Finland, Latvia** and **Norway** more than 85% of IWBs being located in classrooms.

At vocational level fewer IWBs are in classrooms (only **Norway** has over 85%), a tendency being to locate them more in computer labs on average (18%) than at other levels.

OTHER EQUIPMENT

E-READERS, MOBILE PHONES AND DIGITAL CAMERAS

Very few e-readers, mobile phones and digital cameras are reported in any country, fewer than one of each item per 100 students in almost all countries (see FIG1_2a-d).

In **Scandinavia** and **Ireland** there is more than one digital camera per 100 students at grade 4. At grade 11 general, mobile phones appear at levels above one per 100 students in **Bulgaria, Croatia, Denmark** and **Sweden** (all around 2:100). **Sweden** has the highest ratio of digital cameras at this grade (3 per 100 students), followed by **Finland** (2:100) and **Norway** (1:100). Digital readers are almost totally absent in vocational schools, but mobile phones feature in **Finland** (8 per 100 students), **Bulgaria** (3), **Estonia**, and **Latvia** (1:100). **Norway** also has the highest ratio of digital cameras at this level (4 per 100 students), together with **Finland** (3) and **Sweden** (2:100). Relatively few are to be found in **Denmark, Estonia, Greece, Italy, Latvia, Lithuania, Poland, Romania, Spain** and **Turkey**.

DATA PROJECTORS

There are approximately twice as many data projectors (also known as 'beamers') than interactive whiteboards in schools: fig. 1.6 shows that an average in the EU there are 2 per 100 grade 4 and grade 8 students and 3 per 100 grade 11 students. The source data is in FIG1_2a-d.

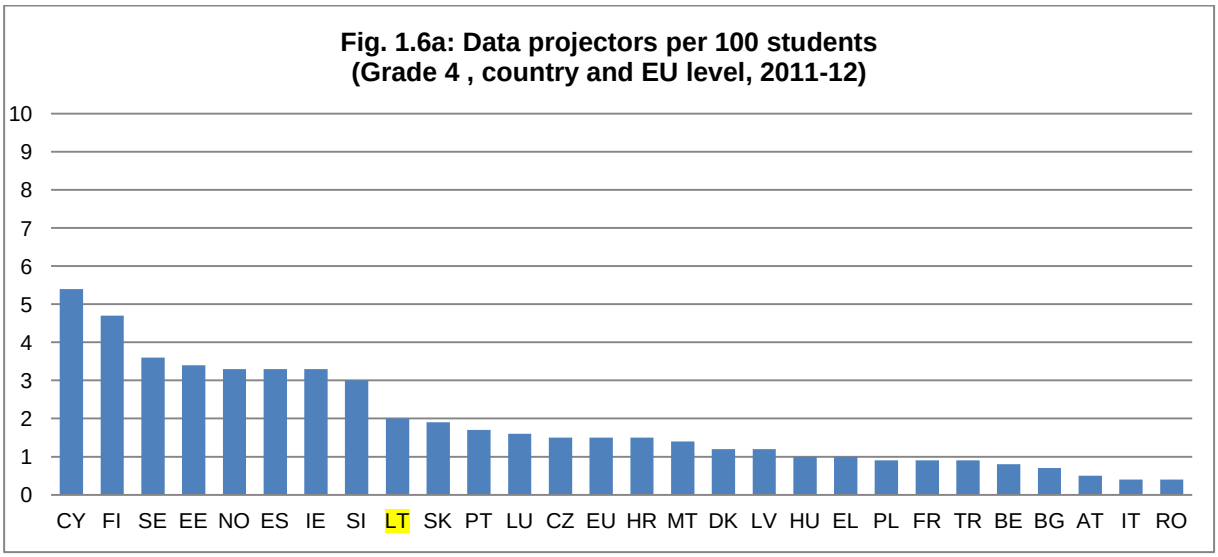
At grade 4, there are from 0.4 data projectors per 100 students (in **Romania**) to 5 (in **Cyprus** and **Finland**). High ratios (above 3 per 100) are also reported in **Estonia, Finland, Ireland, Norway, Spain** and **Sweden**.

At grade 8, **Ireland** and **Finland** have the highest ratio of data projectors per 100 students (6:100), followed by **Cyprus, Estonia, Sweden** (5) and **Slovenia** (4). Fewer than one data projector per 100 students are to be found in **Bulgaria, Greece, Italy** and **Romania.**

There are relatively high numbers of data projectors at grade 11 general in **Norway** (6 per 100 students), **Finland** and **Sweden** (both 5:100), few in **Romania** and **Italy** (both under 1:100).

Italy, Romania and **Turkey** have few data projectors in vocational schools compared to other countries, and the highest ratios are to be found in **Norway** (10 data projectors per 100 students), **Cyprus** (8), **Slovenia** (7), **Belgium** (5), **Estonia** (5), **Finland, Spain** and **France** (all 4:100).

Fig. 1.6a: Data projectors per 100 students (Grade 4 , country and EU level, 2011-12)



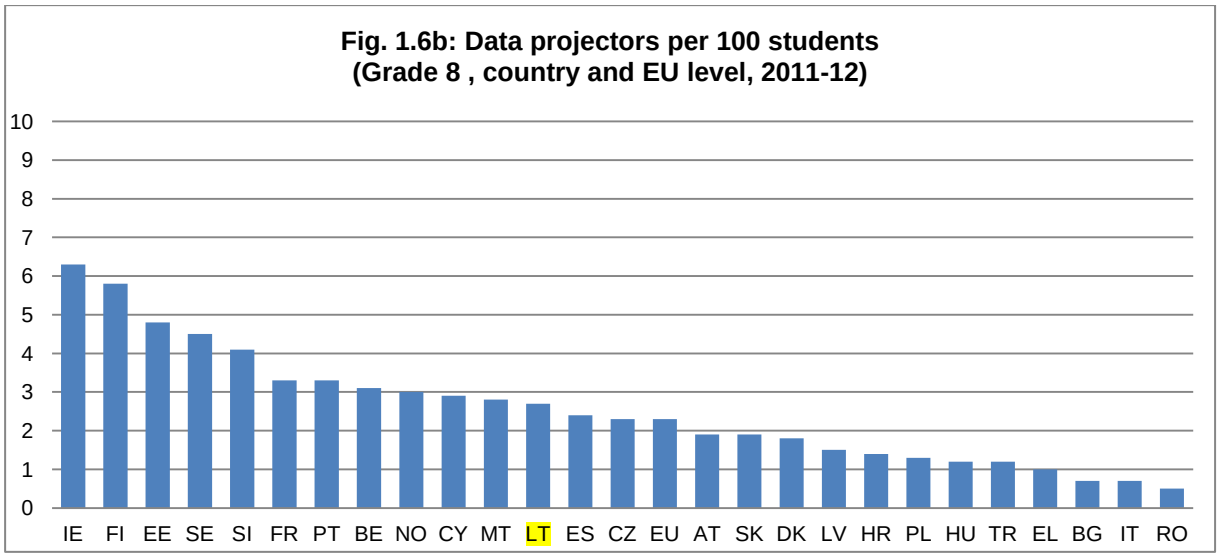


Fig. 1.6b: Data projectors per 100 students
(Grade 8 , country and EU level, 2011-12)
10
9
8
7
6
5
4
3
2
1
0
IE FI EE SE SI FR PT BE NO CY MT LT ES CZ EU AT SK DK LV HR PL HU TR EL BG IT RO

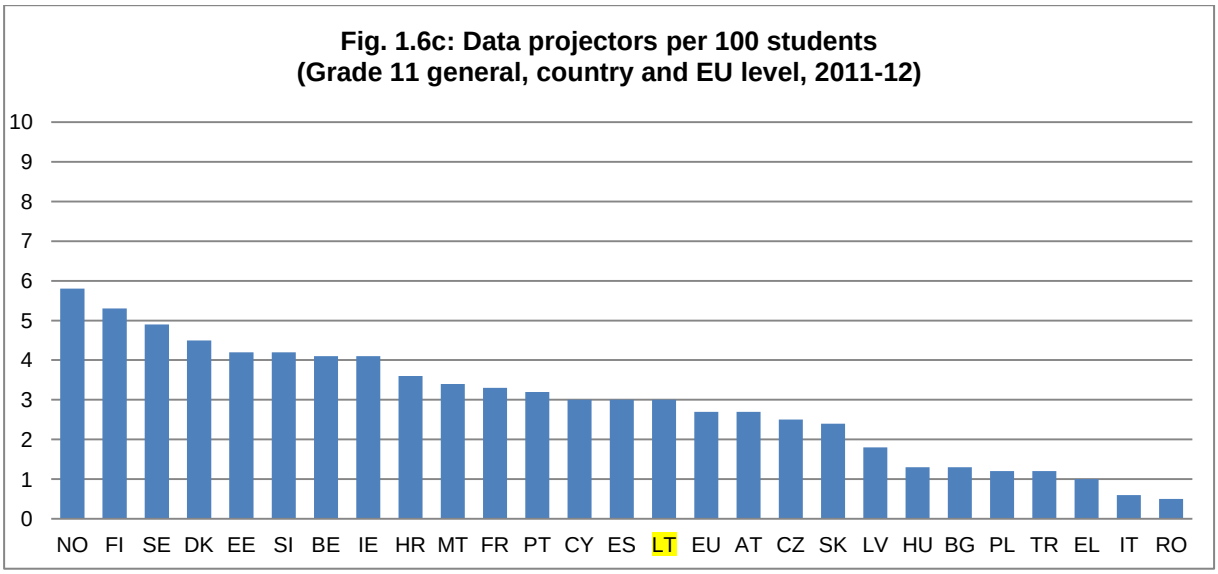


Fig. 1.6c: Data projectors per 100 students
(Grade 11 general, country and EU level, 2011-12)
10
9
8
7
6
5
4
3
2
1
0
NO FI SE DK EE SI BE IE HR MT FR PT CY ES LT EU AT CZ SK LV HU BG PL TR EL IT RO

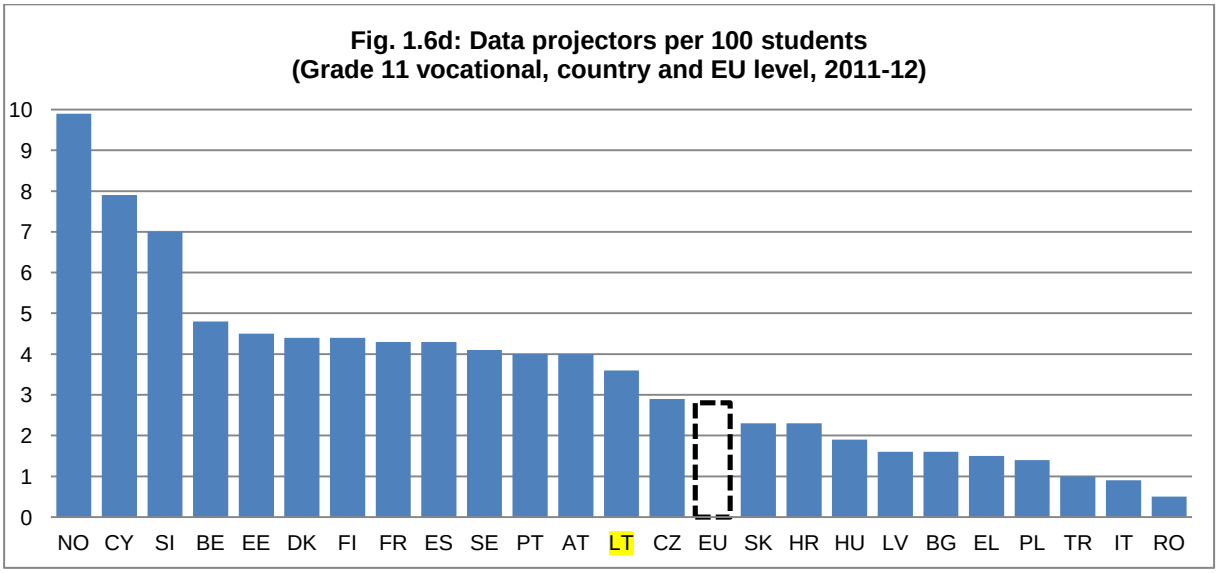
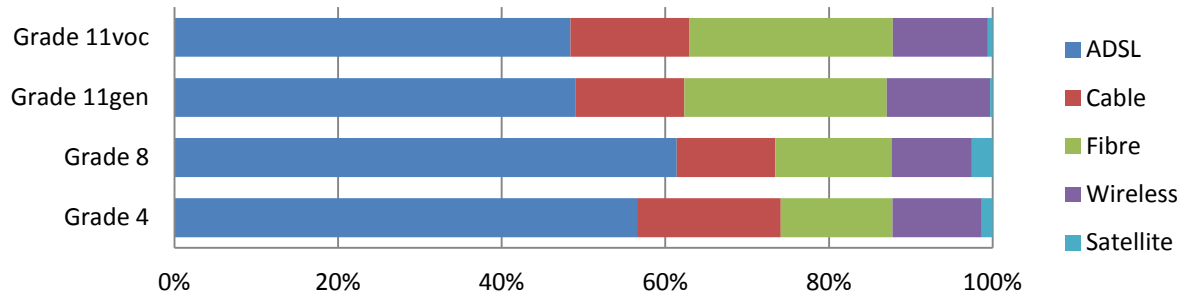


Fig. 1.6d: Data projectors per 100 students
(Grade 11 vocational, country and EU level, 2011-12)
10
9
8
7
6
5
4
3
2
1
0
NO CY SI BE EE DK FI FR ES SE PT AT LT CZ EU SK HR HU LV BG EL PL TR IT RO

TYPE OF CONNECTION

A European student is typically in a school connected via ADSL. In schools with broadband connectivity, between 48 and 61 per cent of students are in schools with access via ADSL (see FIG1_5a-d). At all levels, particularly in lower secondary schools (with 61%), this is the most frequent means of access. The percentage for 'wireless' may be unreliable as some respondents may have interpreted the question as referring to an internal network.

Fig. 1.7: Percentage of students in schools with broadband (All grades, EU average)



Satellite access is consistently low but significantly higher in **Ireland** at grade 4 (13% of students are in schools with such access), in **Czech Republic** at grade 8 (23%)[7].

At grade 4 over 50% of students are in schools connected via fibre in **Denmark**, **Norway** and **Portugal**. **Bulgaria** stands out as the country where most (62%) students are in schools connected over a cable network.

In lower secondary schools in **Cyprus, Greece** and **Turkey** over 85% of students are in schools with an ADSL connection to the internet.

BROADBAND SPEED

On average in the EU there is a spread across the range of broadband speeds (under 2mbps, 2-5 mbps, 5-10 mbps, 10-30 mbps and over 30 mbps) – see FIG1_6a-d.

One would expect schools with more students to have more bandwidth[8], but this is the case only in **Estonia** (at grades 4, 8 and 11 general), **Finland** (at grades 4 and 11), **Latvia** (at grade 8 and 11 general), **Lithuania** (grade 4), **Bulgaria** (grade 8), **Poland, Portugal** and **Slovakia** (grade 11 general), and in the **Czech Republic** and **Norway** at vocational level. Conversely, in **Malta** is there a negative correlation at grade 11 general, where larger schools appear to have lower broadband speeds.

Correlation tests reveal no significant association at EU level between the type of locality (rural/urban) and broadband speed, or between the size of schools and broadband speeds.

GRADE 4

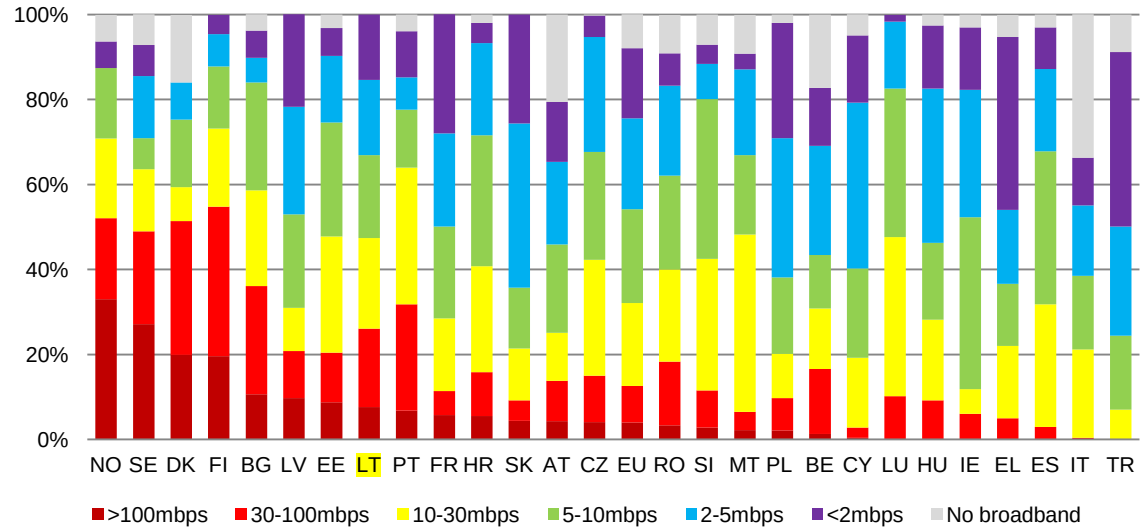
Figures 1.8 shows bandwidth by country and across the EU, blue shades being relatively slow and red fast; ranking is by percentages with over 100mbps. On average in the EU, three out of four grade 4 students are in schools with broadband speeds greater than 5 mbps.

[7] NB Standard error is quite high in both cases

[8] There are calls in the US for 100 mbps per 1000 users in schools.

At grade 4, relatively high numbers of students in **Denmark, Finland, Norway** and **Sweden** are in schools with high speed broadband (over 30mbps). Over 80% of students are in schools with at least 5mbps in **Bulgaria, Finland, Luxembourg, Norway** and **Slovenia**.

Fig. 1.8a : Broadband speed
(Grade 4, country and EU level, 2011-12)

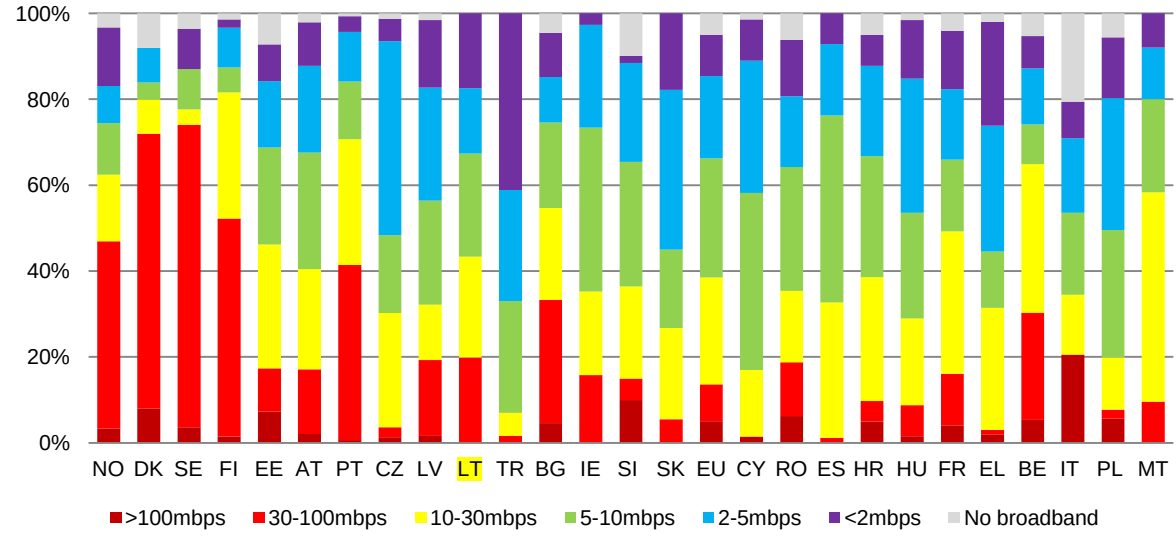


There are significant positive correlations between the population size of the school's locality and broadband speed in nine countries at grade 4 (**Bulgaria, Cyprus, Czech Republic, Estonia, Finland, Greece, Latvia, Luxembourg** and **Romania**).

GRADE 8

At grade 8, over 5mbps internet is available to over 50% of students in all countries in fig. 1.8b except **Czech Republic, Turkey, Slovakia and Greece.**

Fig. 1.8b : Broadband speed
(Grade 8, country and EU level, 2011-12)

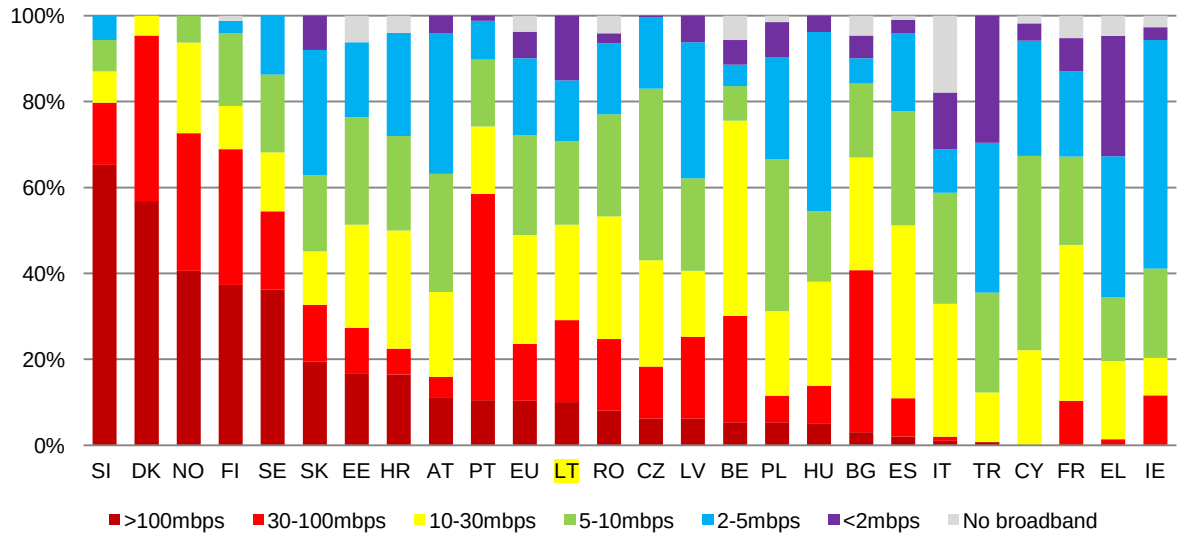


There are significant positive correlations between the population size of the school's locality and broadband speed in seven countries at grade 8 (**Belgium, Bulgaria, Estonia, Hungary, Latvia, Romania** and **Spain**).

GRADE 11 GENERAL

At grade 11 general, high speed internet is available to the highest numbers (over 50% over 30mbps) of students in **Denmark, Finland, Norway, Portugal, Slovenia** and **Sweden**.

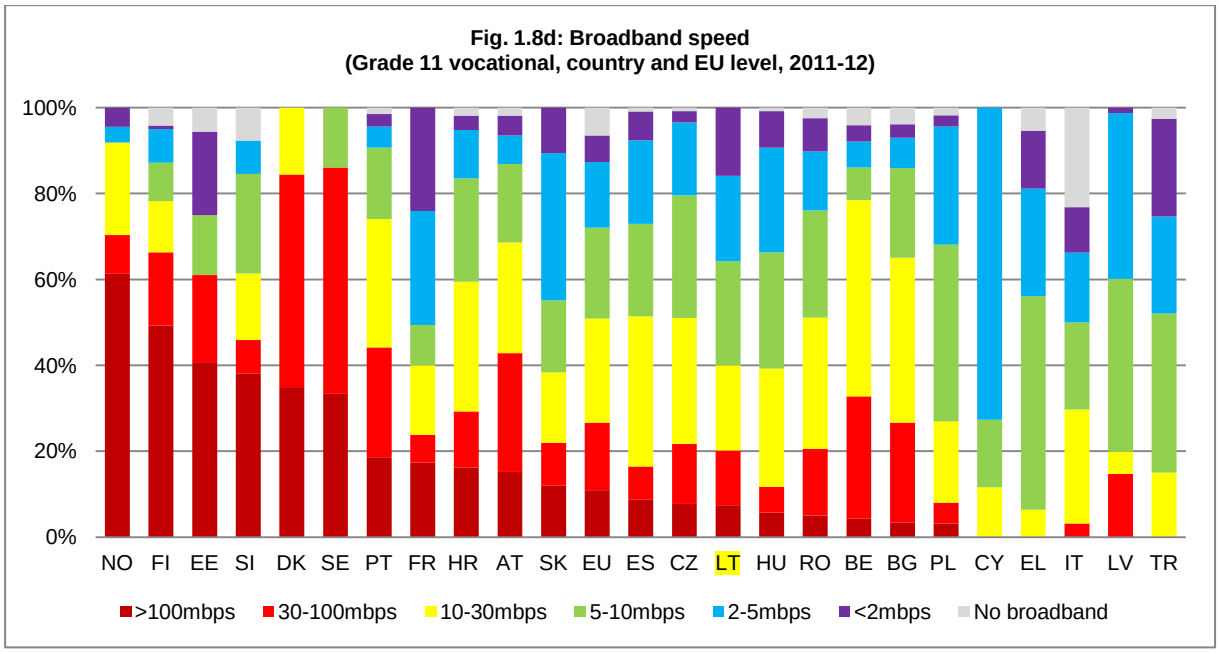
Fig. 1.8c: Broadband speed
(Grade 11 general, country and EU level, 2011-12)



There are significant positive correlations between the population size of the school's locality and broadband speed in Estonia, Latvia and Slovakia at grade 11 general.

GRADE 11 VOCATIONAL

In vocational schools high speed internet is available to the highest numbers (over 50% over 30mbps) of students only in the four **Scandinavian** countries, plus **Estonia** and **Luxembourg**.



There are significant positive correlations between the population size of the school's locality and broadband speed in the **Czech Republic, Romania, Slovakia** and **Spain** in vocational schools.

However, between 4 and 8 per cent of students in Europe on average, depending on level, are in schools with *no* broadband at all, as figures 1.9 show (data are in FIG1_6a-d). At grade 4, an EU average of 8% of students are in schools with no broadband, dropping to 5% at grade 8, 4% at grade 11 general and rising again to 7% in vocational schools.

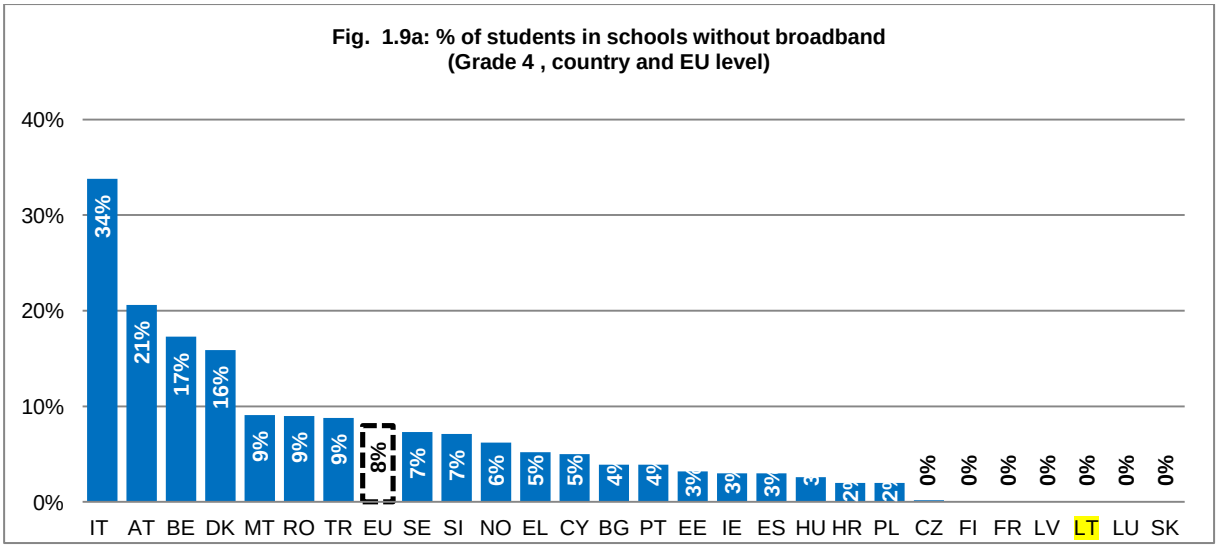


Fig. 1.9b: % of students in schools without broadband (Grade 8, country and EU level)

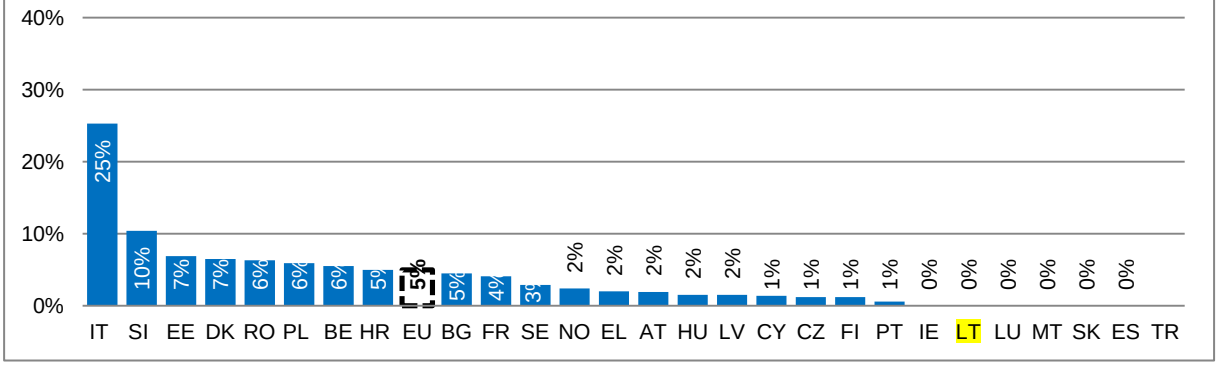


Fig. 1.9c: % of students in schools without broadband (Grade 11 general, country and EU level, 2011-12)

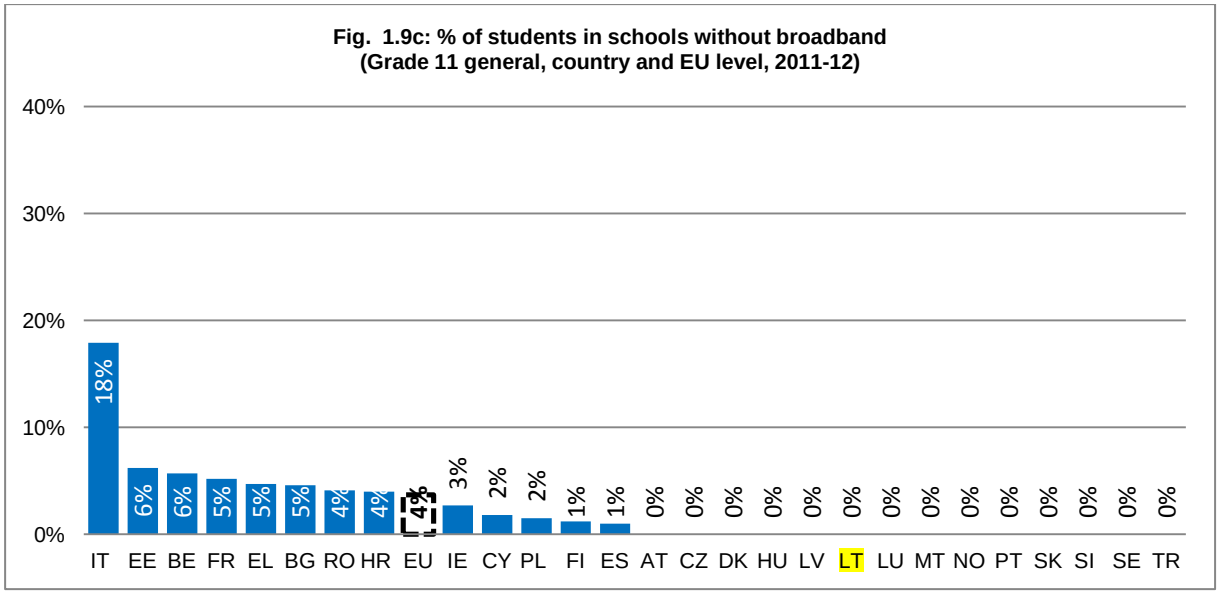
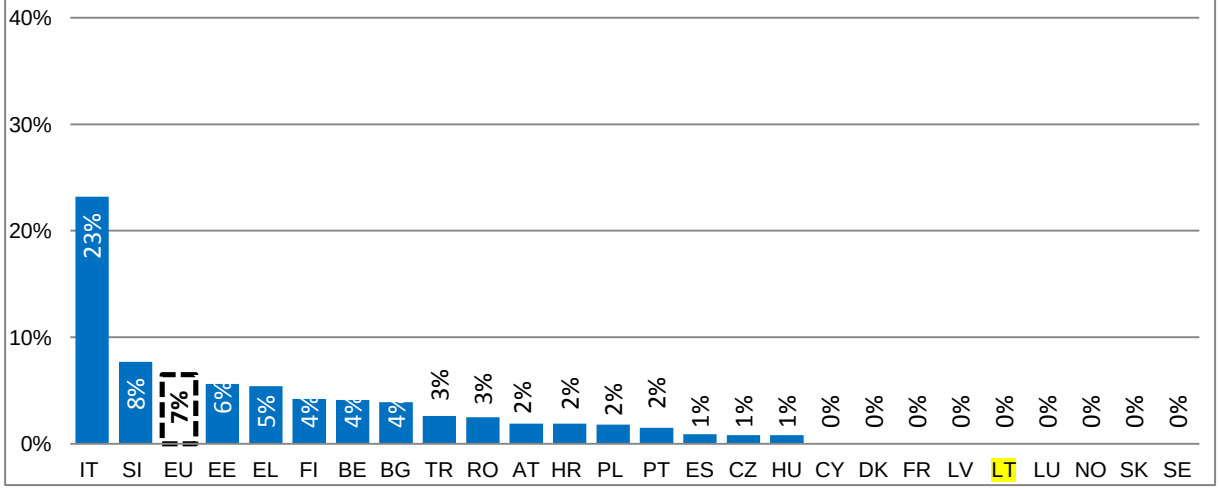


Fig. 1.9d : % of students in schools without broadband (Grade 11 vocational, country and EU level, 2011-12)



CONNECTEDNESS

The great majority of Europe's schools can be said to be 'connected', that is having facilities such as a web site, external email addresses for teachers and students, a local area network (LAN) or a virtual learning environment (see following section). Data for both sections can be found in FIG1_7a-d.

A school web site is the most frequently found feature, between 72 (grade 4) and 92 per cent (grade 11 vocational) of students are in schools which have one. Between 57 (grade 8) and 66 per cent (Grade 11) of students are in schools which have email addresses for more than half the teachers. This figure is much lower for students: from 23 per cent (grade 4) to 33 per cent (grade 11 general). Over two thirds of students at all levels are in schools with a wireless local area network, with almost as many wireless as fixed LANs.

However, significant percentages of students are in schools with none of these 'connected' features, as many as 15% on average in the EU (at grade 4).

GRADE 4

Almost three-quarters of grade 4 students are in schools with a web site, and one in four in schools in which more than 50% of students have email.

At grade 4 every school has a web site in **Estonia** and **Norway**, and in five countries more than 90% of students are in schools with web sites. There are students in all countries in schools with none of these features (15% on average in the EU), most in **Poland** (38%) and **Romania** (30%) and least (1-4%) in **Portugal, Ireland, Latvia, Luxembourg** and **Hungary**.

GRADE 8

On average in the EU, 86% of grade 8s are in a school with a web site.

All grade 8 students in **Belgium** and **Luxembourg** are in schools with a web site, and in 15 countries more than 90 per cent of students are in schools with web sites. The picture is not so positive in **Turkey** (54%) and **Romania** (58%).

All schools in **Luxembourg** and **Norway** have email for more than 50 per cent of teachers, but few in **Romania** (15%). Students in **Denmark** are highly likely to be in a school with student email for (91%), well ahead of **Sweden** (73%) and **Croatia** (67%). Low percentages of students have school email in **Romania** (5%) and **Turkey** (7%).

Both wired and wireless LANs are universal in **Luxembourg's** schools at this level, and over 90% of students are in schools with a wired LAN in **Portugal** (98%), **Denmark, Cyprus, Belgium, Norway, Czech Republic** and **Ireland**. Wireless LANs are most frequently to be found in **Luxembourg, Portugal, Denmark** (97%), **Norway, Malta, Spain** and **Turkey**. **Romania** is the only country where fewer than 50% of students are in schools with either a wired or a wireless LAN.

Turkey has most (42%) grade 8 students in schools with no 'connectedness', followed by **Romania** (32%) and **Poland** (30%). The lowest numbers of students at such schools are in **Slovenia** and **Finland** (both 1%).

GRADE 11 GENERAL

Over nine out of ten grade 11 general students are in schools with a web site, the lowest percentages being in **Greece, Poland** and **Turkey** (where nonetheless 72% of students are in schools with a web site).

As regards email, over 95% of grade 11 general students are in schools with email for more than half the teachers in **Czech Republic, Denmark, Finland, Luxembourg, Norway** and **Sweden**. Relatively few are in such schools in **Romania** (15%) and **Poland** (38%). Student email access is lower everywhere except in **Luxembourg** and **Sweden** where it is 100% in both cases. Very few (4%) students are in **Romanian** schools where student email addresses are provided.

Over three quarters of grade 11 general students are in schools with a LAN, every student in **Denmark, Luxembourg, Malta, Norway, Slovenia** and **Sweden. France, Greece** and **Lithuania** have relatively low percentages of students in schools with wireless LANs, with less than 40%.

At this level the highest levels of students in schools with no 'connectedness' are to be found in **Poland** (28%) and the lowest in **Estonia**.

GRADE 11 VOCATIONAL

93% of grade 11 vocational students are in schools with a web site. 41% of vocational students are in schools which can be accessed via email by teachers.

Over 95% of vocational students are in schools with a web site in 14 countries, the fewest in **Poland** and **Turkey**.

Only in five countries (**Denmark, Finland, Luxembourg, Norway,** and **Sweden**) are more than 95% of students in schools with email for teachers, and in only three countries (**Denmark, Luxembourg, Sweden**, all with 100%) is this the case for student email.

LANs are pervasive in schools at this level with over 95% of students in schools with either type of LAN in ten countries. Only **Lithuania** is below 55% of students in schools with wireless LANs.

It is in **Poland** where there are most (28%) vocational students in schools with no connectedness, the least in **Spain** (1%).

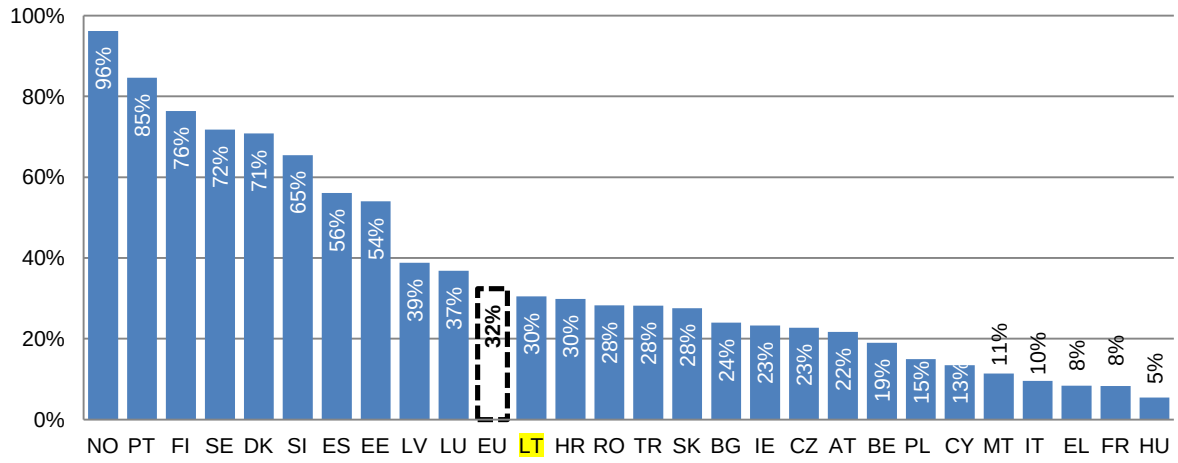
Over one in 20 grade 11 vocational students are in schools with no connectedness.

VIRTUAL LEARNING ENVIRONMENT

A VLE or learning platform is arguably the strongest indicator of connectedness. As can be seen in fig. 1.19, across the EU, one grade 4 student in three is in a school with a VLE. This figure is considerably higher in secondary schools, where more than one in two students are in schools with VLEs (56% of grade 8, 61% of grade 11 general and 63% of grade 11 vocational students). Curiously, and consistently across the grades surveyed (8 and 11), more students than head teachers report the presence of a VLE in their school. 68 per cent of grade 8 students are in a school that has a VLE, 74% of grade 11 general and 69% of vocational students.

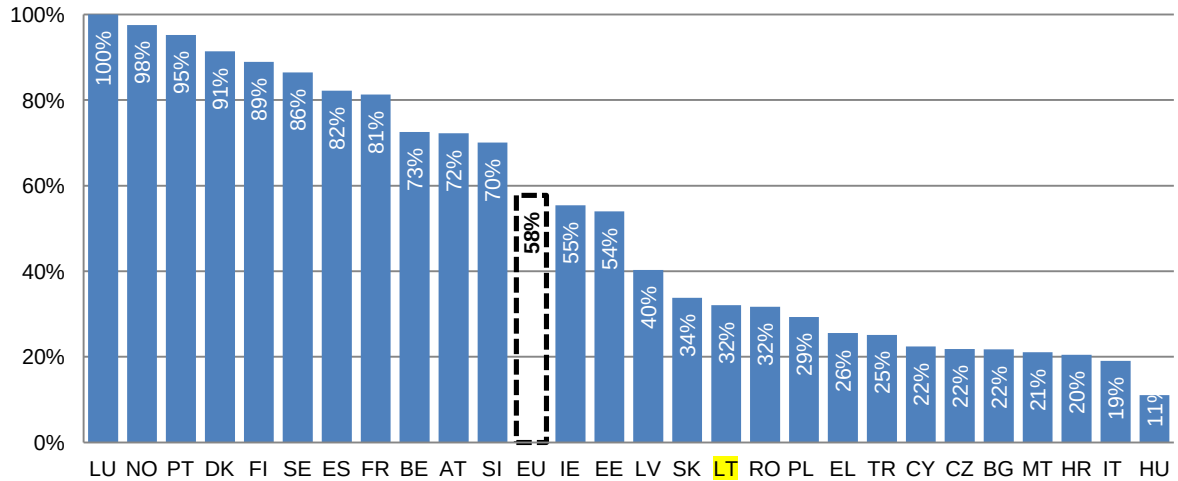
At grade 4, there are relatively high numbers of schools with VLEs in **Norway** (in particular, with 96% of students in schools with a VLE), **Portugal** (85%), **Finland** (76%), **Sweden** (72%) and **Denmark** (71%). They are considerably more unusual in **Hungary, France, Greece** and **Italy** where 6 to 10% of students are in schools with a VLE.

Fig. 1. 10a: % of students in schools with a virtual learning environment (Grade 4; country and EU level, 2011-12)



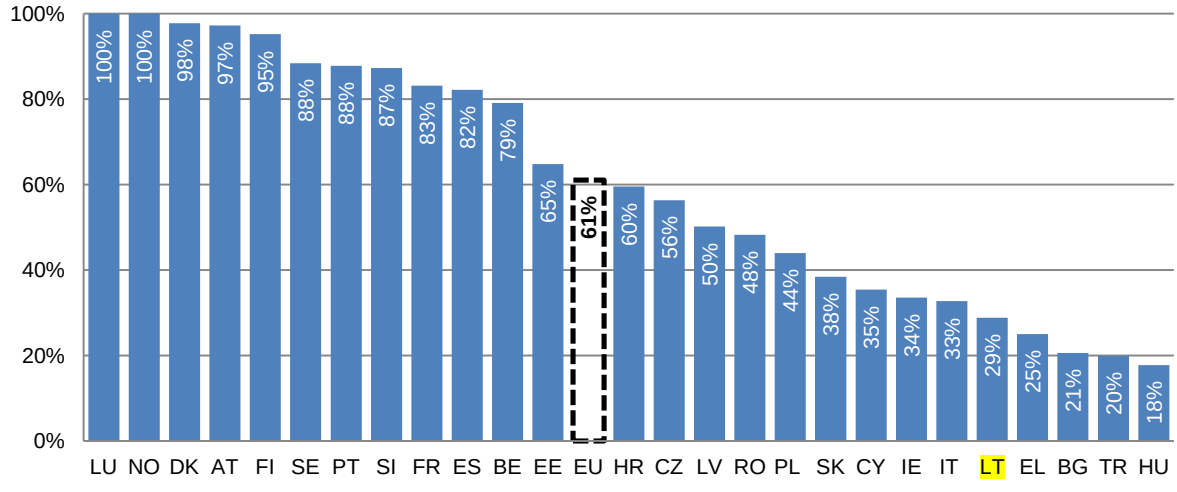
The percentage of grade 8 students in schools with VLEs ranges from 11 (**Hungary**) to 100 (**Luxembourg**). In eight countries, more than 80 per cent of students are in schools with VLEs.

Fig. 1.10b : % of students in schools with a virtual learning environment (Grade 8; country and EU level, 2011-12)



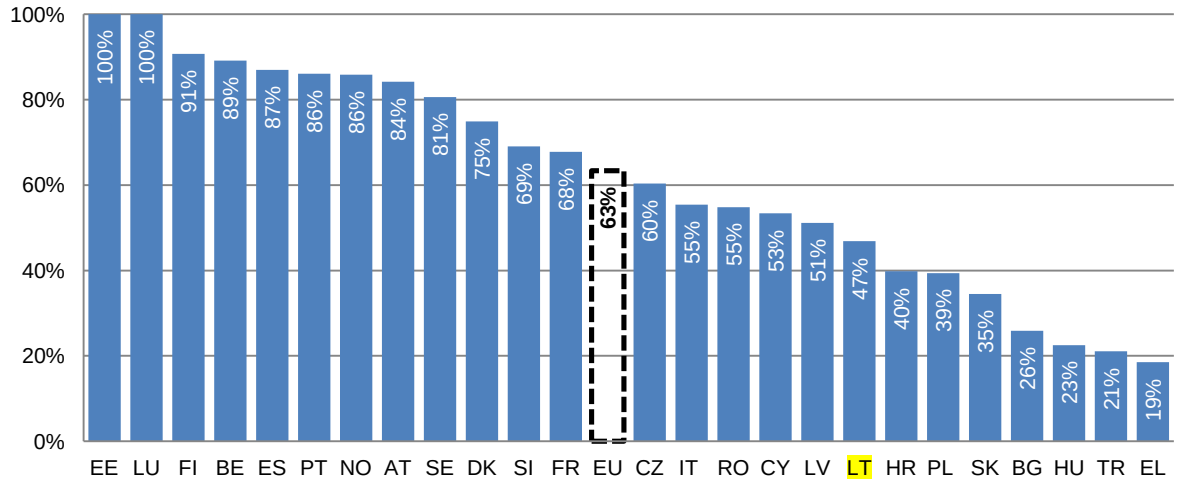
There is a wide range of percentages of students in schools with VLEs at grade 11 general level: from 18% in **Hungary** to 100% in **Luxembourg** and **Norway**. Over four in five students are in schools with VLEs in **Austria, Denmark, Finland, France, Luxembourg** and **Norway** (both 100%)**, Portugal, Slovenia, Spain** and **Sweden**.

Fig. 1.10c : % of students in schools with a virtual learning environment (Grade 11 general; country and EU level, 2011-12)



Over 95% of vocational students are in schools with a VLE in **Estonia** and **Luxembourg,** with **Turkey, Hungary** and **Bulgaria** having the fewest.

Fig. 1. 10d: % of students in schools with a virtual learning environment (Grade 11 vocational; country and EU level, 2011-12)

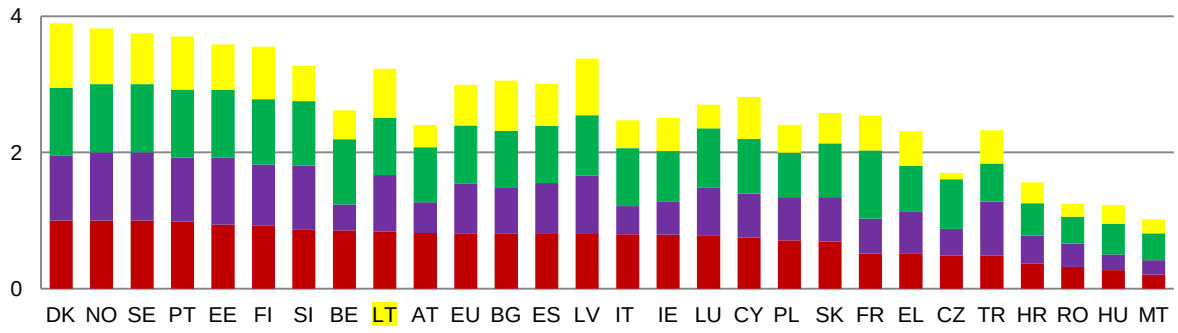


ACCESS TO THE VLE OUTSIDE SCHOOL

Of the schools with VLEs, on average in the EU four in five **grade 4** students are in schools where the head teacher reports that these learning platforms are accessible outside school hours, and by teachers outside school, 74% are in schools where the VLE can be accessed by students and 60% by parents outside school.

Over 85% of grade 4 students in **Denmark, Estonia, Finland, Latvia, Norway, Portugal, Slovenia** and **Sweden** are in schools whose VLE can be accessed outside school hours. In all countries except **Turkey**, there is more teacher access than student access, the difference being most marked (around twice the percentage) in **Belgium, Czech Republic, France, Hungary, Italy**, and **Malta**.

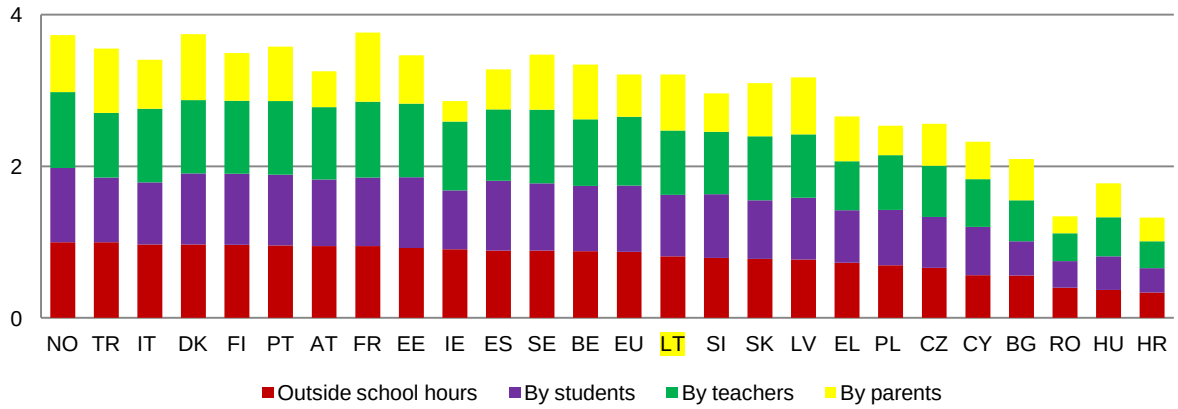
Fig. 1. 11a: % of students in a school with VLE offering external access (Grade 4; country and EU level, 2011-12, cumulative maximum 4, ranked by 'outside school hours')



Nearly 9 out of ten **grade 8** students on average in the EU are in schools with VLEs where these learning platforms are accessible outside school hours, accessible by teachers outside school, by students, but only 56% are in schools where parents can access the VLE. About 70% of *students* said that they can access the VLE outside school hours.

Percentages for student and teacher access are close to each other (within 10%) in all countries except **Ireland** and **Italy** where student access is lower. Over four in five students are in schools whose VLE is accessible by parents in **Denmark, France, Malta** and **Turkey**, but below one in four in **Romania**.

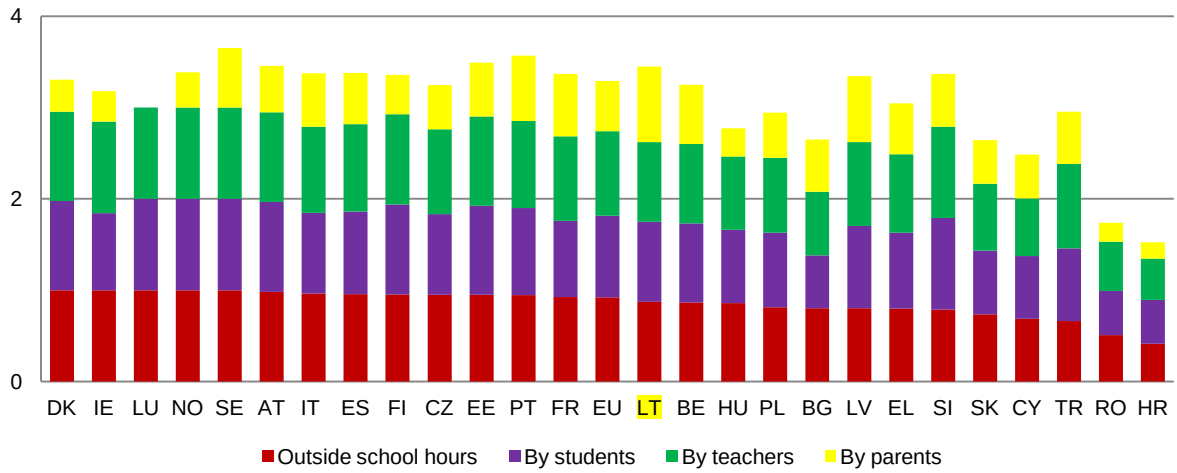
Fig. 1. 11b: % of students in a school with VLE offering external access (Grade 8; country and EU level), 2011-12, cumulative, ranked by 'outside school hours')



At **grade 11 general**, over 9 out of ten students on average in the EU are in a school whose learning platform is accessible outside school hours, by teachers and by students outside school. 55% are in a school whose VLE is accessible externally by parents. 71% of students at this grade said that they can access the VLE outside school hours.

Percentages for student and teacher access are close to each other (within 10%) in all countries except **Bulgaria** and **Turkey** where student access is lower. Over four out of five students are in schools with external parental access to their VLE only in **Lithuania**, but below one in four in **Croatia** and **Romania**.

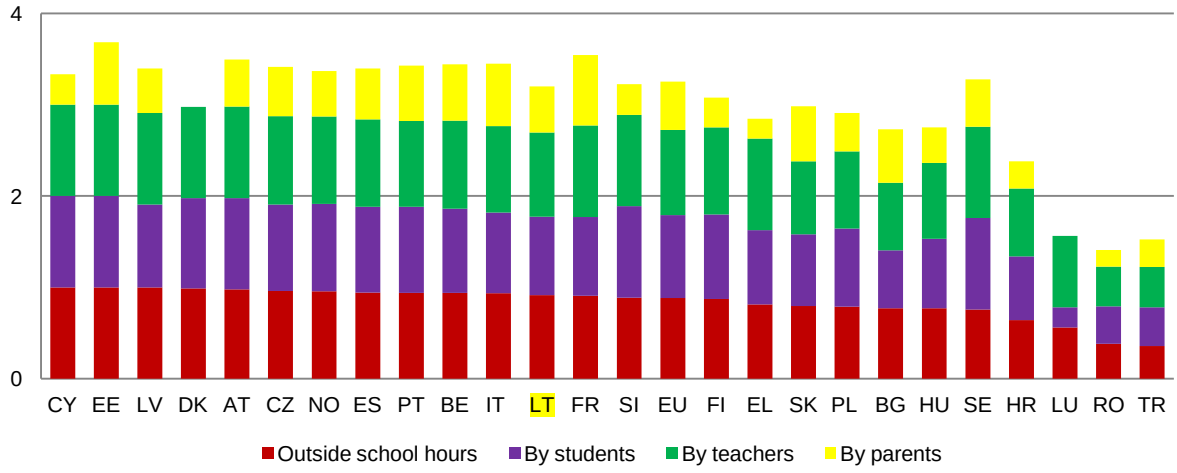
Fig. 1. 11c: % of students in a school with VLE offering external access (Grade 11 general; country and EU level), 2011-12, cumulative, ranked by 'outside school hours')



At **grade 11 vocational**, more than nine out of ten students on average in the EU are in schools with VLEs where these learning platforms are accessible outside school hours, by teachers outside school, by students. 53% are in schools where parents have external access. 73% of vocational level students said that they can access the VLE outside school hours, that is, and as at other levels, fewer than reported by head teachers.

Over 85% of vocational level students in 17 countries are in schools whose VLE can be accessed by students outside school. Percentages for student and teacher access are close to each other (within 10%) in all countries except **Luxembourg** where student access is significantly lower. Percentages of students in schools with VLEs which can be accessed by parents are below 25% in **Greece** and **Romania.**

Fig. 1. 11d: % of students in a school with VLE offering external access (Grade 11 vocational; country and EU level), 2011-12, cumulative, ranked by 'outside school hours')



TECHNICAL SUPPORT

Maintaining educational technology equipment is clearly an in-school task (either by teaching staff or technicians), rather than undertaken by an external organisation (public or private sector) in most of Europe's schools between 87% (grade 4) and 94%[9] (grade 8 general) of students are in schools where the school personnel maintain equipment. The private sector is involved to some extent in maintaining computer systems in every country. In most schools a mix of types of support is reported; respondents could tick yes or no for each type of support available in the school. For the underlying data, see FIG1_8a-b.

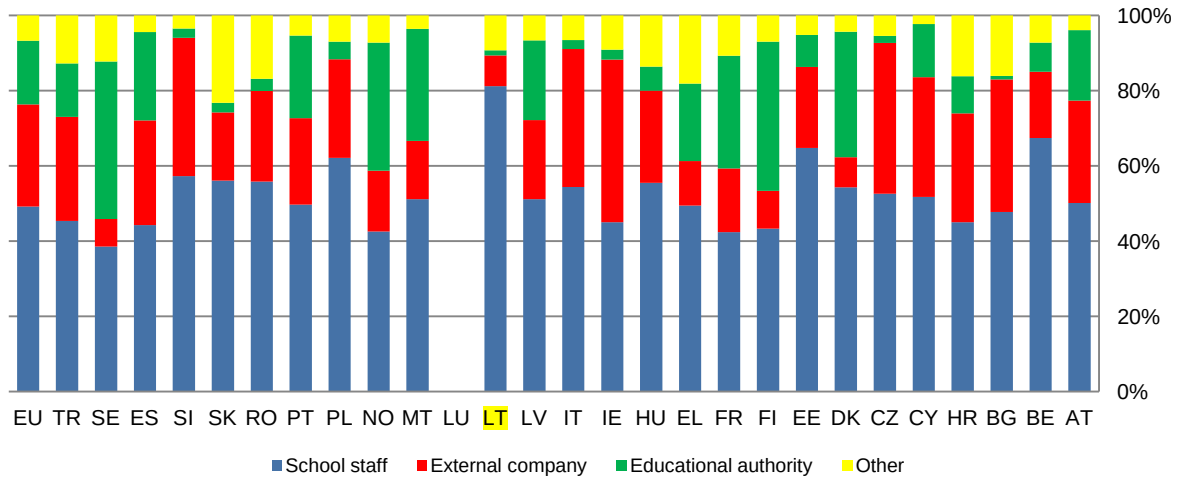
One in three grade 4 students on average in the EU is in a school where an external unit run by the educational authority (e.g. the municipality).

Over 95% of students in **Denmark** and **Slovenia** attend schools where school staff maintain equipment, the percentage being lowest in **France** (38%). Maintenance by the local municipality is highest in **Sweden**, where this is the case in every primary school, and in **Malta**, **Finland** and **Denmark** where more than nine out of ten students are in such schools. Fewer than 5% of grade 4 students are in schools where maintenance is provided by such units in **Bulgaria, Czech Republic, Hungary Lithuania,** and **Slovakia**. In **Belgium, Hungary, Romania** and particularly **Lithuania** and **Slovakia**, schools appear to be very much on their own in terms of maintaining equipment with low levels of use of either an external company or public sector provider. Outsourcing to the private sector is highest than average at grade 4 in the **Czech Republic** and **Ireland,** and lowest in **Belgium, Finland, France, Lithuania, Norway** and **Sweden.**

Figure 1.12 shows the proportionate split for each country and the EU average, at grade 8.

At grade 8, outsourcing maintenance to a commercial company features in all countries except **Luxembourg** and is highest in the **Czech Republic** and **Ireland**. Maintenance by the municipality is common in **Denmark, Finland, France, Norway** and **Sweden**, and infrequent in **Bulgaria, Czech Republic, Italy, Lithuania, Romania,** and **Slovakia**. Schools appear to have little external support for maintenance in **Belgium, Estonia,** and **Slovakia**; in **Lithuania** only 10% of students are in schools with external maintenance arrangements proved by a commercial provider and 2% by a public sector provider.

Fig. 1.12: Maintenance of equipment
(Grade 8, compiled; country and EU level)



Grade 11 students, particularly general, are more frequently in schools where the school staff take care of maintenance, with less reliance on external maintenance providers than lower secondary or primary schools.

[9] Note: these percentages are taken from the underlying frequency table

In only **Austria, Cyprus, Ireland, Italy, Malta, Spain** and **Turkey** do more than one in two students in upper secondary general schools benefit from commercially-provided maintenance. More than one in two students in **France, Greece, Malta, Norway** and **Spain** are in schools where there is externally provided maintenance by a municipal unit. In eight countries (**Belgium, Czech Republic, Estonia, Hungary, Poland, Slovenia and particularly in Lithuania** and **Slovakia**), schools appear to rely on internal staff and have relatively less external maintenance support.

Upper secondary vocational schools make extensive use of their own staff for maintenance.

However, at least one in two students are in schools in **Cyprus, Denmark, France, Latvia, Slovenia** and **Spain** where external commercial support is provided, and only in **Cyprus** and **France** are more than 50% of students in schools where an external unit provides support.

THE DIGITALLY EQUIPPED SCHOOL

The questionnaire to head teachers investigates, among other issues, equipment provision (numbers of desktop and laptop computers, e-readers, mobile phones, interactive whiteboards, digital cameras and data projectors), the proportion of fully operational equipment, broadband speed (above or below 10mbps), type of broadband access (ADSL, cable etc.), maintenance and support and indicators of connectedness (a web site, email addresses for teachers and students, a LAN, a virtual learning environment, or none of these). High levels of such elements comprise the digitally equipped school.

Cluster analysis was carried out on these data and three school profiles emerged (see data in FIG1_9a-b) that can be summarised as follows:

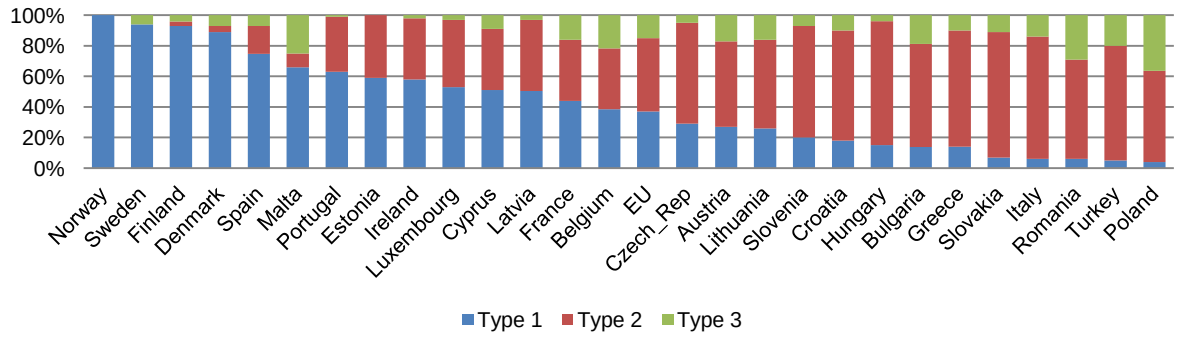
- High equipment levels / Fast broadband (10mbps or more) / High connectedness (type 1)
- Lower equipment levels / Slow (less than 10mbps) or no broadband / Some connectedness (type 2)
- Low equipment levels / Slow (less than 10mbps) or no broadband / No connectedness (type 3)

Separating no broadband from less than 10mbps did not create a fourth cluster. The only clear difference between profile 2 and profile 3 is the connectedness.

At all levels there are wide variations between countries from those with almost all schools in type 1 to those with most schools in type 2, but in all countries percentages of students in type 3 are in a minority. The Scandanavian countries have the highest percentages of students in type 1 schools at all levels, never falling below 75% and in most cases approaching 100%.

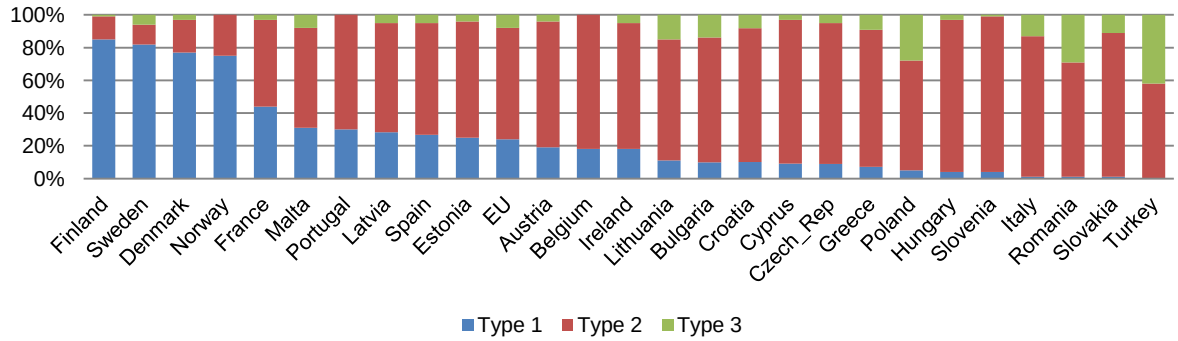
On average in the EU, 37 percent of grade 4 students are in the first group of digitally equipped schools, 48 percent are in type 2 schools, and 15 percent in type 3, as can be seen in fig. 1.13a. In 12 countries over one in two students is in a type 1 school.

Fig. 1.13a: Percentages of students by school type in terms of equipment (Grade 4, country and EU level)



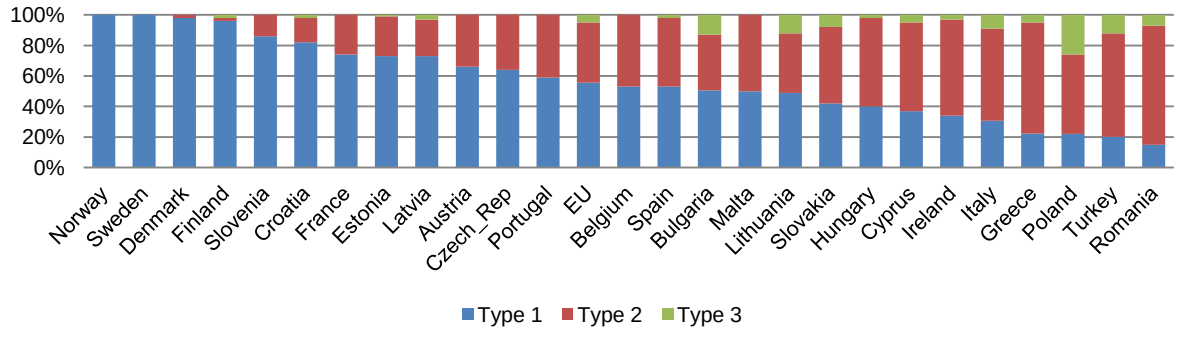
At grade 8, the EU average[10], as seen in fig. 1.13b, is 24% of students are in profile 1 schools – considerably fewer than at other levels – and 68% in profile 2 and 8% in type 3. In only the four Scandanavian countries are more than one in two students in a type 1 school.

Fig. 1.13b: Percentages of students by school type in terms of equipment (Grade 8, country and EU level)



At grade 11 general, 55% of students are in profile 1 schools, 39% in profile 2 and 5% in profile 3 on average in Europe[11], as can be seen in fig. 1.13c. In 17 countries more than half of students are in type 1 schools – many more than at grade 8.

Fig. 1.13c: Percentages of students by school type in terms of equipment (Grade 11 general, country and EU level)



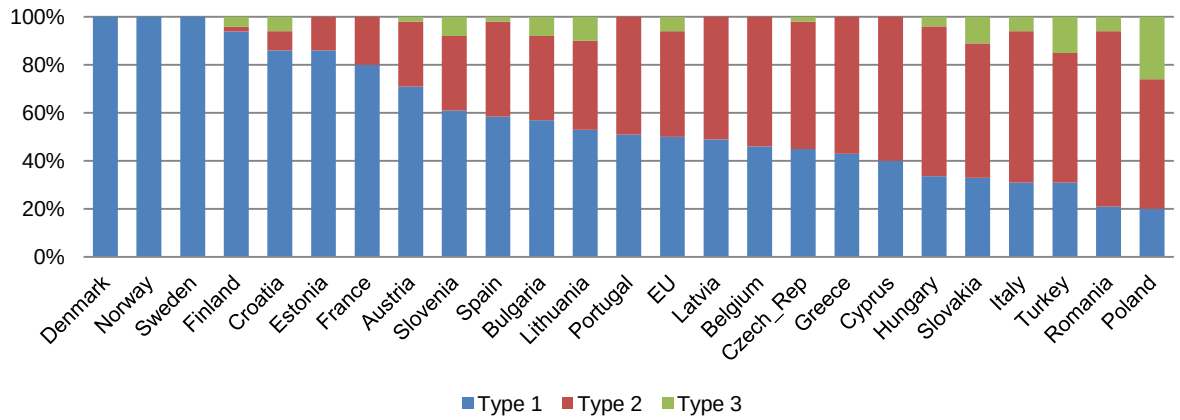
Half of the EU[12]'s vocational students are in type 1 schools, 44% in type 2 schools (fig. 1.13d) and 6% in type 3.

[10] As there is insufficient data for some countries they are excluded.

[11] As there is insufficient data for some countries they are excluded.

[12] As there is insufficient data for some countries they are excluded.

Fig. 1.13d: Percentages of students by school type in terms of equipment (Grade 11 vocational, country and EU level)



The concept of the e-mature school has been much discussed and in this study we attempted to explore the data in order better to be able to say if such schools are widespread in Europe. The e-mature school as defined in the UK[13] comprises components such as connectivity, ICT policy, ICT planning, staff development, and management information. Such a school could therefore be conceived as one with high levels of equipment, good technical and pedagogical support, fast broadband connections, high frequencies of ICT use in lessons, motivated and digitally competent staff and students, and well-articulated ICT and innovation policies and strategies.

We therefore undertook various cluster analyses of sets of items in questionnaire responses on infrastructure, use, competences and school strategies to discover any emerging patterns that support the concept. It emerged that the concept of the e-mature school is not supported by the data. The only clusters that emerged related to equipment, connectivity and connectedness, not to use by students or teachers related to such clusters. At grade 11, there was a large standard error at EU level, indicating that variance between countries is greater than the variance within countries, making interpretation difficult. Unlike the three other cluster analyses no relationship emerges between these clusters and students' confidence, ICT activities, attitudes and opinions. One can therefore conclude provisionally that there is no overall relationship between high levels of ICT provision and student and teacher confidence, use and attitudes. Rather, other factors as described elsewhere, e.g. practical support to teachers, have an effect on them. Further work is recommended to explore this area.

[13] See for example Underwood, J., et al (2007), Impact 2007: Personalising learning with technology and Underwood, J and Dillon, G (2004), 'Maturity Modelling: A Framework for Capturing the Effects of Technology', Technology, Pedagogy and Education, 13(2), 213-224

2: USE OF INFRASTRUCTURE

The provision, deployment and technical support of ICT equipment, as described in Section 1 provide the underlying conditions for the use and potential added value of ICT in teaching and learning. In this section, survey evidence is examined concerning the use of ICT in teaching and learning of this infrastructure – and barriers to its use. To complete the picture, a later section examines teachers' use of ICT tools and applications in lessons.

SUMMARY OF FINDINGS:

- Grade 11 vocational students are more than twice as likely than those at other grades to be in a school where the teacher uses ICT equipment in more than half of lessons. At other levels, one in five grade 8 students in the EU never or almost never use a computer and one in two grade 8 and 11 students never use an interactive whiteboard, and one in four students is in a school where the teacher uses ICT in *fewer* than one in 20 lessons.
    - High teacher use levels at grade 4 are in Malta, Turkey, Slovenia, Ireland, Estonia, Cyprus and France and at grade 8 in Turkey, Portugal, Ireland and Estonia.
- On average in the EU more than half of secondary school students use desktop computers at least once a week, one in three grade 8 students using an interactive whiteboard at least weekly.
- Between 28 and 46 percent of students say they use their own mobile phone for learning purposes in schools at least once a week.
- There is no correlation at EU level between level of computer provision in schools and frequency of use by students.
- Insufficient ICT equipment is considered more of an obstacle to ICT use than pedagogical issues by head teachers and teachers, equipment more of a concern the younger the students. Teachers are more concerned about pedagogical inhibitors than head teachers. Insufficient laptop computers and interactive whiteboards are of more concern than other items of equipment, and one in five students is in a school where head teachers report insufficient technical support as a major inhibitor, particularly at grade 4.
    - Higher than average levels of concern about equipment can be seen in Turkey, Romania and Greece by both head teachers and teachers, and about pedagogy in Greece by both.

TEACHERS' USE OF EQUIPMENT

INTENSITY OF USE

Between 95 and 97 per cent (EU average) of students are in schools at the four levels where teachers have used computers and/or the internet for preparing lessons in the last 12 months (see FIG2_1a-d for the underlying data). The percentage of students in schools where teachers have used computers and/or the internet in class with students in the last 12 months is lower: from 81 to 87 per cent, as seen in fig. 2.1., with a slight dip at grade 8 and 11 general.

Fig. 2.1: % of students in schools in which teachers report ICT use in the last 12 months (all grades, EU level)

Such figures can of course mask extremely low intensity of use, so the present survey asked teachers in what proportion of lessons they use. Figures 2.2 (FIG2_2a-d for the data table) show high intensity (ICT used in more than one in four lessons) and low intensity (less than one in 20 lessons) ICT use by teachers in the past year excluding 'Don't knows'. The standard error in most countries is relatively high, suggesting that there are wide variations. Looking across the grades, students in vocational schools are twice as likely as in other grades to be in a class where the teacher uses ICT in more than one in two lessons. Conversely, approximately one in four students is in a school where the teacher uses ICT in fewer than one in 20 lessons, except in vocational schools where one in six students is in such a situation.

At grade 4, the underlying data reveals that one in eight grade 4 students in the EU is in a school where teachers report using computers and/or the internet in more than half of their lessons but 29% are in schools where teachers use ICT in fewer than one in 20 lessons.

Relatively intensive-use countries (students in schools where more than half of lessons use ICT) are **Malta, Turkey, Slovakia, Ireland, Estonia, Cyprus** and **France**. **France** is also one of the three low-use countries (fewer than 5%), with **Luxembourg** and **Hungary**, suggesting a polarisation of ICT use in that country.

Fig. 2.2a: Intensity of use of ICT in lessons by teachers over 12 months (Grade 4, country and EU level)

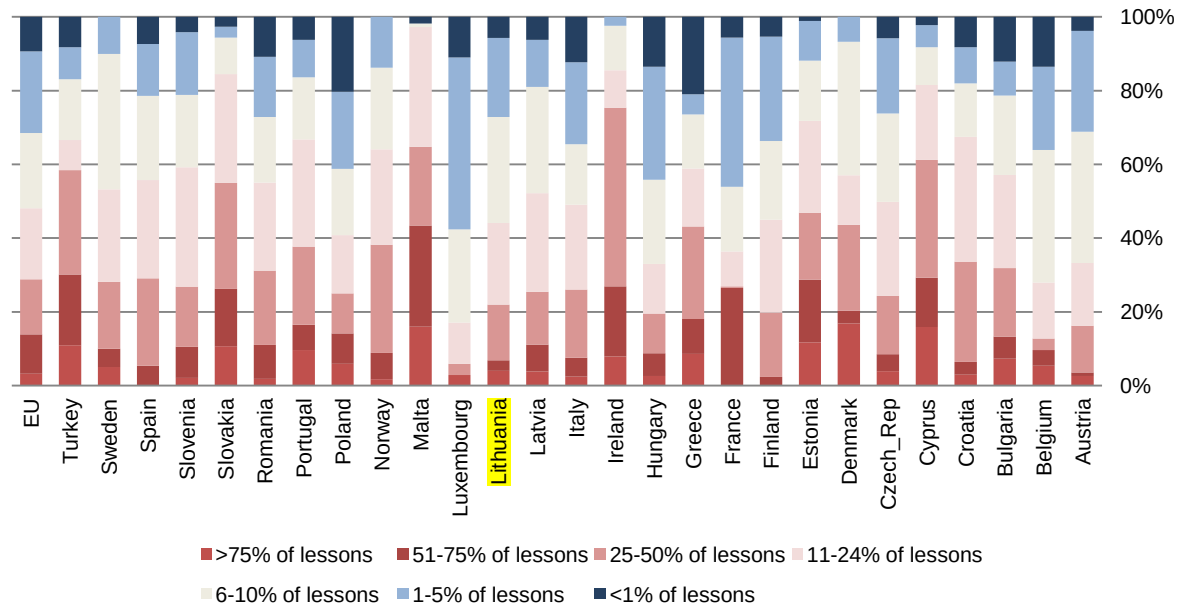
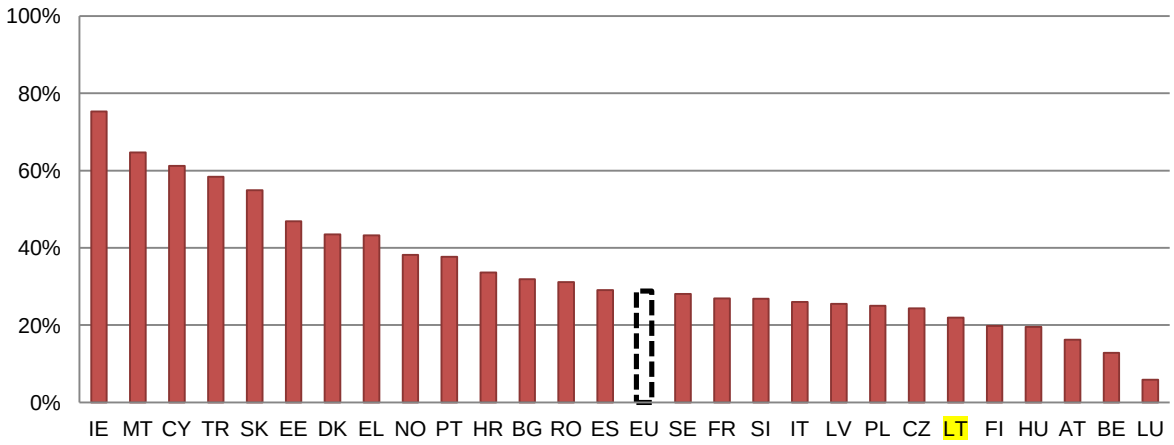


Fig. 2.2b shows the same data in terms of teachers' use of ICT in more than one in four lessons[14].

Fig. 2.2b: Teachers' use of ICT in more than 25% of lessons (Grade 4, EU and country level)



At grade 8 (fig. 2.2c), 14% of students are in schools where teachers report using ICT in more than half of their lessons and 25% in under one in 20 lessons.

[14] There are slight differences in percentages between the two charts owing to the method of calculation. In the first analysis (chart 2.2a), all categories including 'Don't know' are included, while in the second analysis (chart 2.2b), 'Don't knows' are excluded because the data are divided into values above and below the 25% threshold.

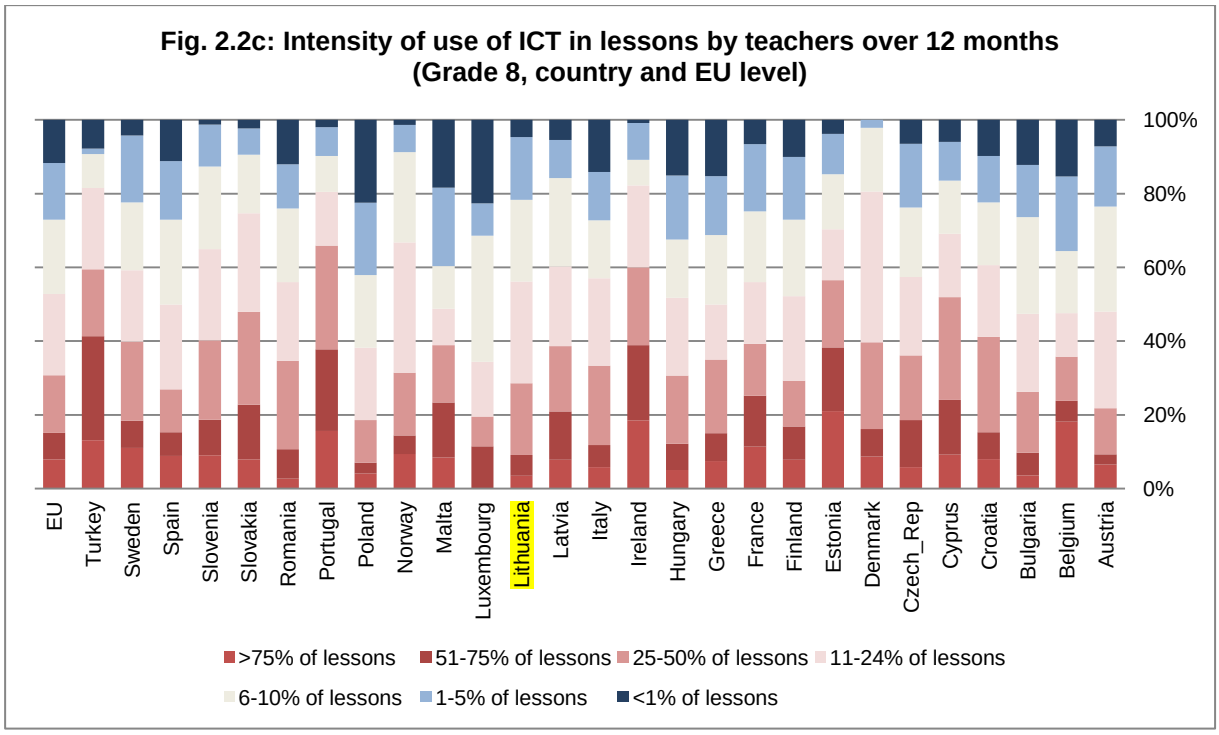
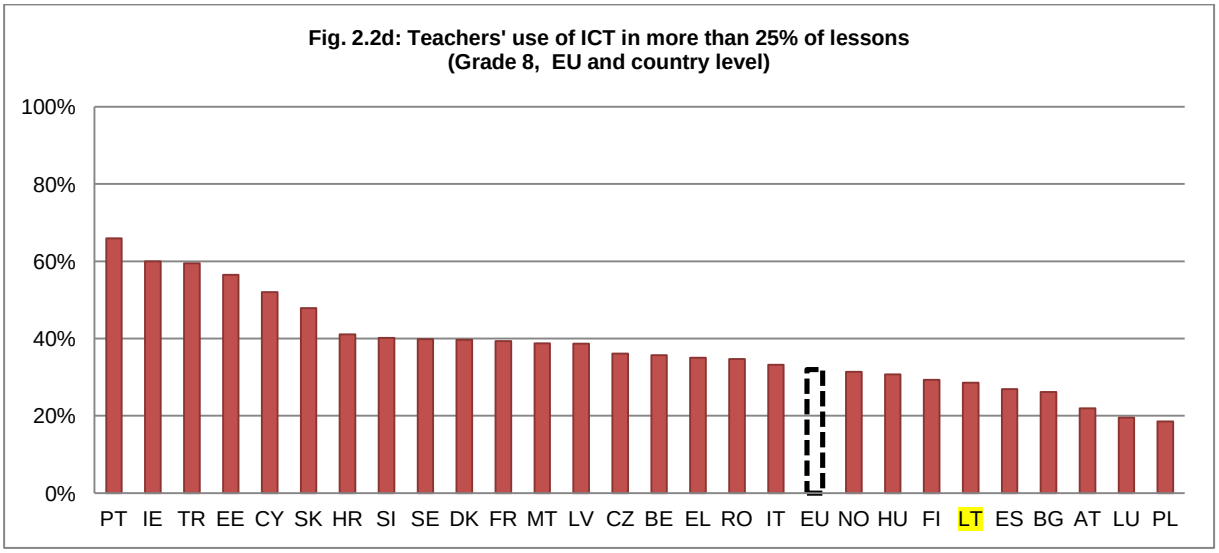


Fig. 2.2d shows that high use countries at grade 8 are **Portugal, Ireland, Turkey** and **Estonia**. Both Ireland and Turkey have high use at grade 4 as well



At grade 11 general (fig. 2.2e), these percentages are similar to grade 8: 15% of students are in schools where teachers report using ICT in more than half of their lessons and 24% in fewer than one in 20 lessons.

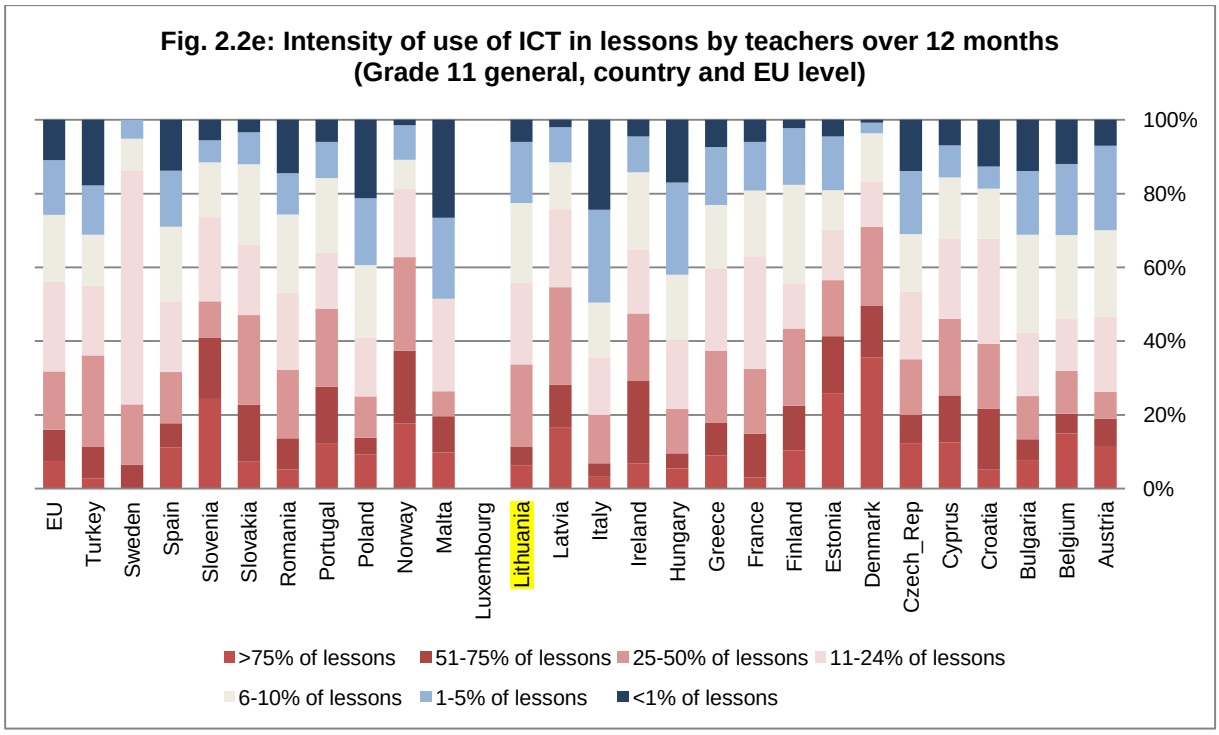
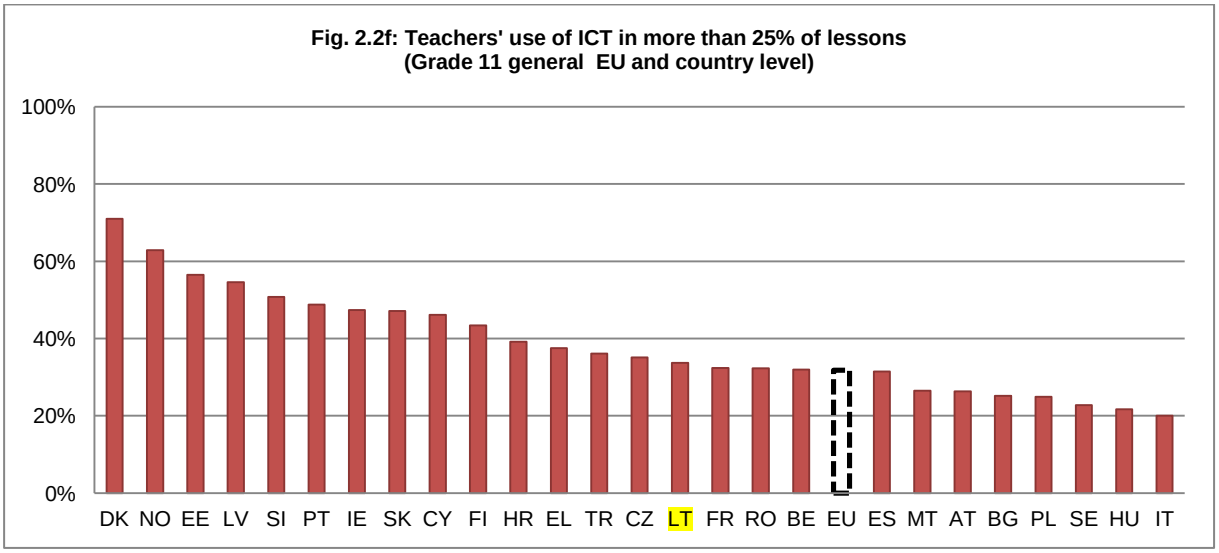
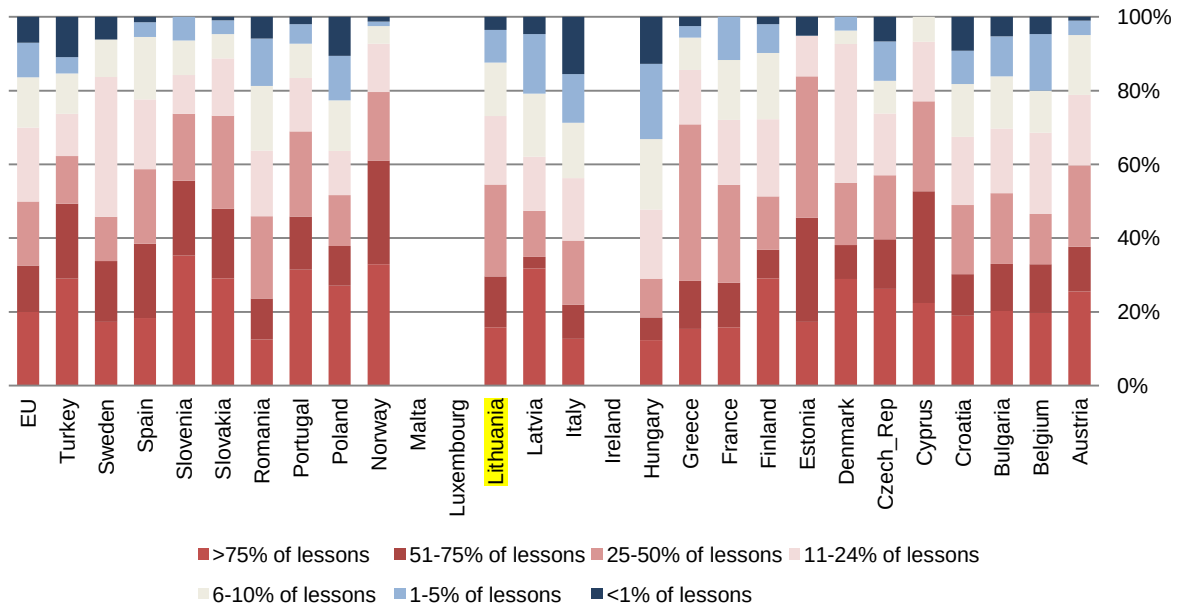


Fig. 2.2f ranks countries by the percentage of students in schools where grade 11 teachers use ICT in more than one in four lessons.



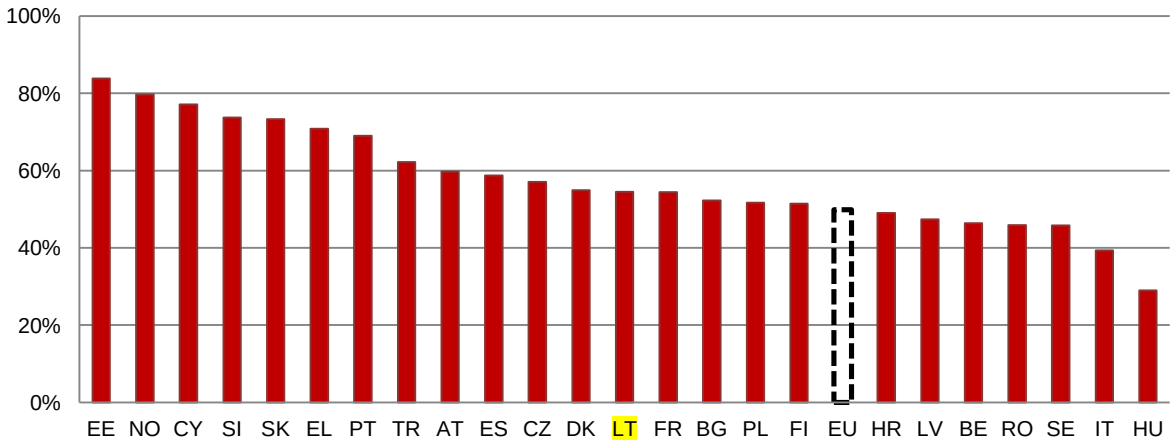
At grade 11 vocational (fig.2.2g), the percentage doubles from grades 8 and 11 to 31 for use in over 50% of lessons, while 16 per cent of students are in schools where ICT is used in one in 20 or fewer lessons. However, patterns of use vary between countries more than at other levels.

Fig. 2.2g: Intensity of use of ICT in lessons by teachers over 12 months (Grade 11 vocational, country and EU level)



Estonia and **Norway** are high use countries at both types of grade 11 school.

Fig. 2.2h: Teachers' use of ICT in more than 25% of lessons (Grade 11 vocational, EU and country level)



These results on frequency of use of ICT form one element of a cluster analysis of the digitally supportive teacher, described in section 8 below.

AVAILABILITY OF ICT

At grade 4, on average in the EU, 75% of students are in schools where both teachers and students use ICT equipment in lessons using ICT, as shown in fig. 2.3a. 46% of students are in schools where ICT is available only to the teacher and 50% where only students have ICT (see FIG2_3a-b).

Fig. 2.3a: Availability of ICT to students as well as teachers in lessons (Grade 4; country and EU level)

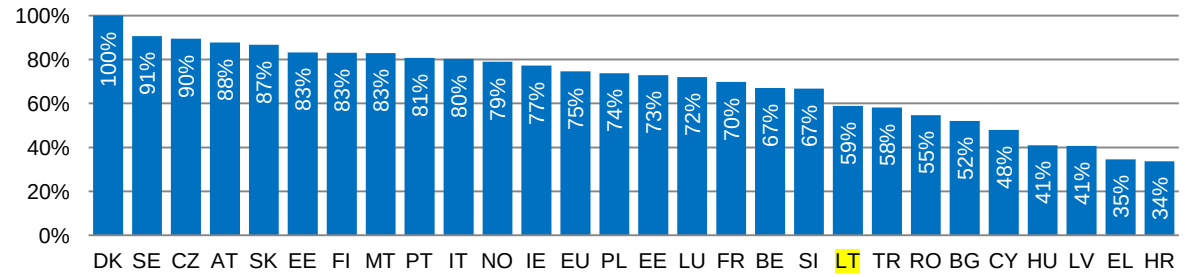
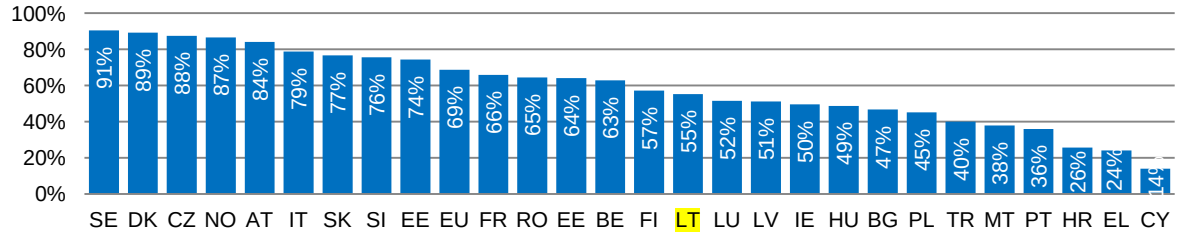


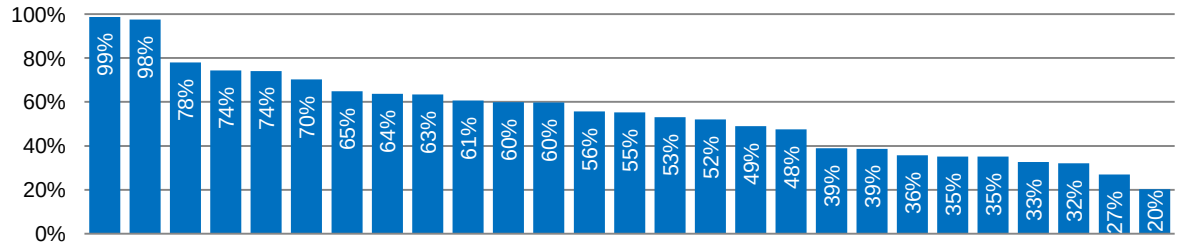
Fig. 2.3b shows that at grade 8, fewer (69%) of students are in schools where both teachers and students use ICT equipment in lessons using ICT, and slightly more (54%) of students are in schools where ICT is available only to the teacher; 52% are in schools where only students have ICT.

Fig. 2.3b: Availability of ICT to students as well as teachers in lessons (Grade 8; country and EU level)

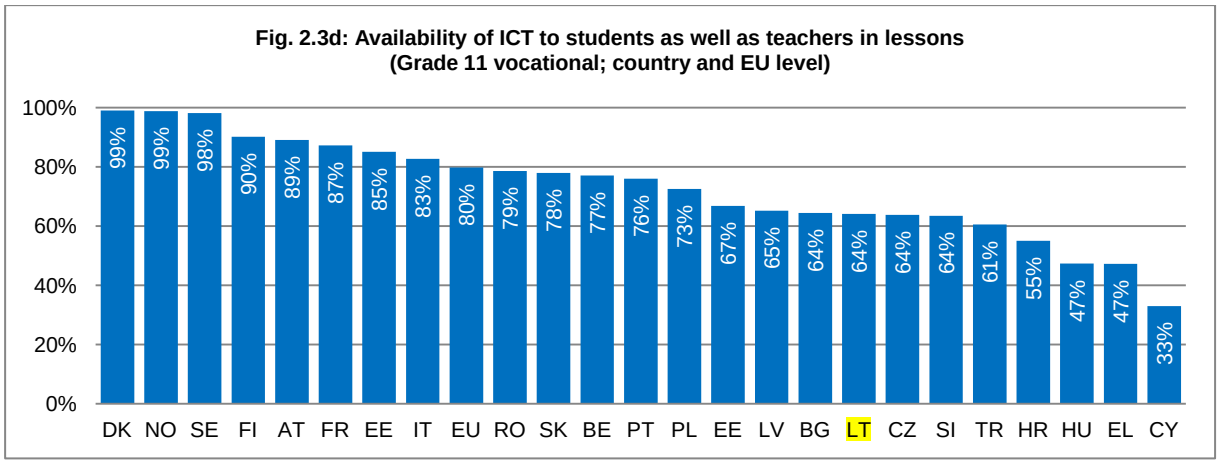


At grade 11 general, still fewer - 60% - of students are in schools where both teachers and students use ICT equipment in lessons using ICT, and more (64%) of students are in schools where ICT is available only to the teacher; 42% are in schools where only students have ICT.

Fig. 2.3c: Availability of ICT to students as well as teachers in lessons (Grade 11 general; country and EU level)



At grade 11 (fig. 2.3d), vocational, 80% of students are in schools where both teachers and students use ICT equipment in lessons using ICT, and only 39% of students are in schools where ICT is available only to the teacher; 68% are in schools where only students have ICT. In all but three countries more than one student in two is in a school where technology is available to both teachers and students in lessons.



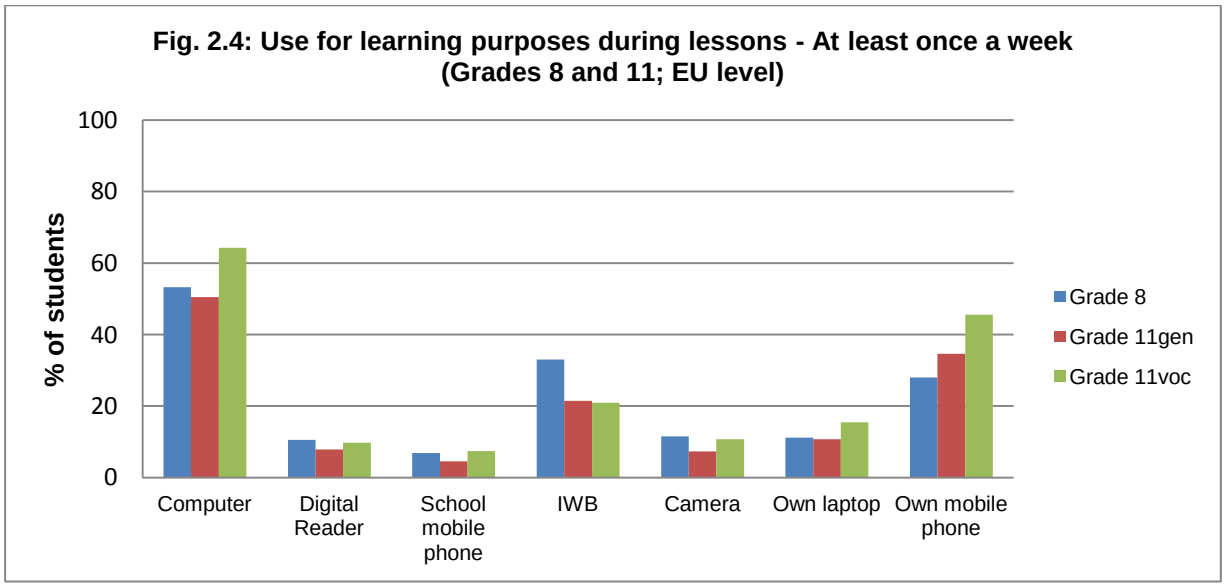
STUDENT USE OF EDUCATIONAL TECHNOLOGY

From over 150,000 responses to the student surveys at grades 8 and 11, a picture emerges of their use of key items of ICT equipment, from a learner's point of view.

INTENSITY OF USE OF EQUIPMENT

Across the EU, more than one in two students in secondary schools use desktop computers for learning purposes at least once a week, as shown in fig. 2.4 (data are in FIG2_4a-c).

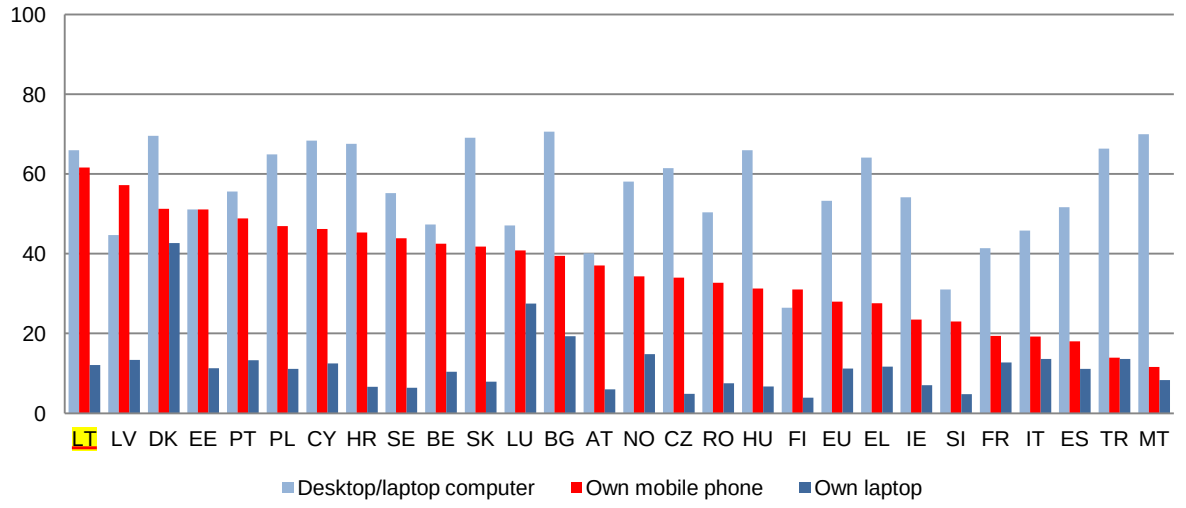
Somewhat surprisingly, no correlation at EU or country level is observed (see FIG2_4d) between the level of computer provision (whether desktop or laptop, on- or offline) and frequency of use (use a computer at least once a week versus use less than weekly) reported by students in the responding class. This absence of any strong relationship between the level of equipment in a school and frequent computer use as declared by students suggests that the focus of policy attention regarding the integration of ICT should focus on learning management, not on provision.



One in three grade 8 students use an interactive whiteboard at least once a week, declining to one in five at grade 11. Some ten per cent of students report using their own laptop at least weekly. Highly interesting to observe is that students declare that they use their own mobile phones for learning purposes at least once a week: 28% at grade 8, 35% at grade 11 general and 46% at grade 11 vocational. It appears that young people consider that their own mobile phone, whether or not allowed in school, is a learning tool, the older they are the more so.

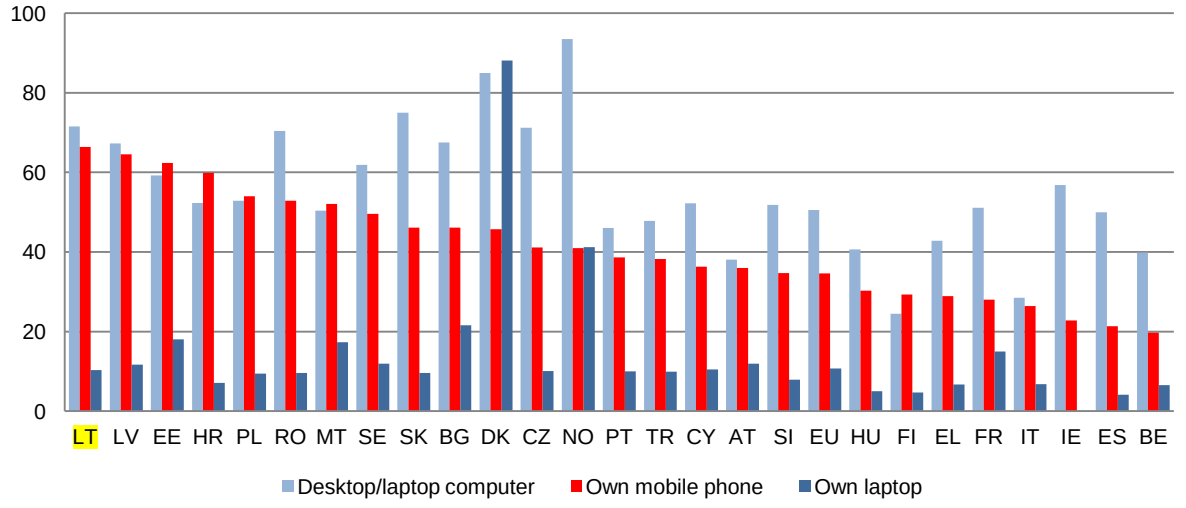
Figure 2.5a shows grade 8 students' declared use of their use of mobile phone (countries are ranked by use of own mobile phone), their own laptop and a school computer/laptop for learning purposes during lessons. Data for figs. 2.5a-c are also in FIG2.4a-c.

Fig. 2.5a Use of school desktop/laptop, own mobile phone for learning purposes at least weekly (Grade 8, country and EU level)



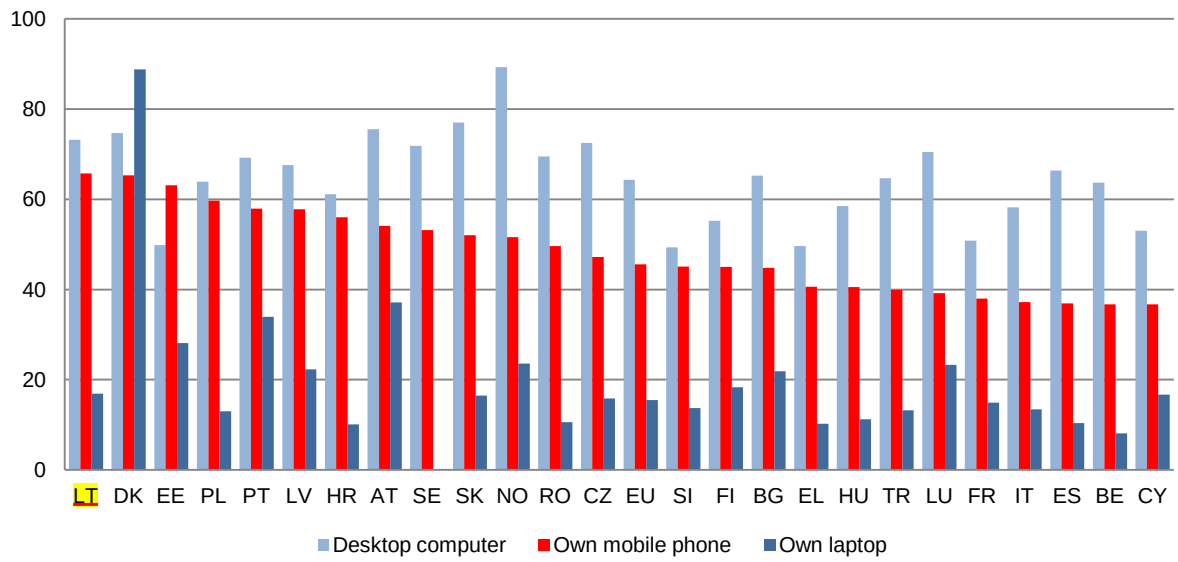
At grade 11 general (fig. 2.5b) on average in the EU, the computer is most used and use of students' own mobile phone increases (over one in three reporting daily use in lessons), compared to grade 8. Denmark is very much the country of 'Bring your own laptop' and the Baltic states are again the heavy users of mobile phones. Students in Finland, at this and other levels, are less intensive users of technology than those elsewhere in Scandanavia.

Fig. 2.5b: Use of school desktop/laptop, own mobile phone for learning purposes at least weekly (Grade 11 general, country and EU level)



The same pattern appears at grade 11 vocational (fig. 2.5c), where on average in the EU[15], the online computer is most used and use of students' own mobile phone increases (36% reporting daily use in lessons).

Fig. 2.5c: Use of school desktop/laptop, own mobile phone for learning purposes at least weekly (Grade 11 vocational, country and EU level)



INTERACTIVE WHITEBOARDS

Students' use of interactive whiteboards at least weekly is shown in fig. 2.6 (data in FIG2.4a-c). As with computers, patterns of use seem only loosely connected to levels of provision, as seen above and to be explored in later sections.

On average in the EU, one in three grade 8 students and one in five grade 11 students use interactive whiteboards in lessons at least weekly, students in the Czech Republic being the most frequent users at this grade, and heavy users at other grades.

[15] Excluding Malta and Ireland, with insufficient data, and Sweden (own laptop).

Fig. 2.6a: % students using interactive whiteboard at least weekly (Grade 8 , country and EU level, 2011-12)

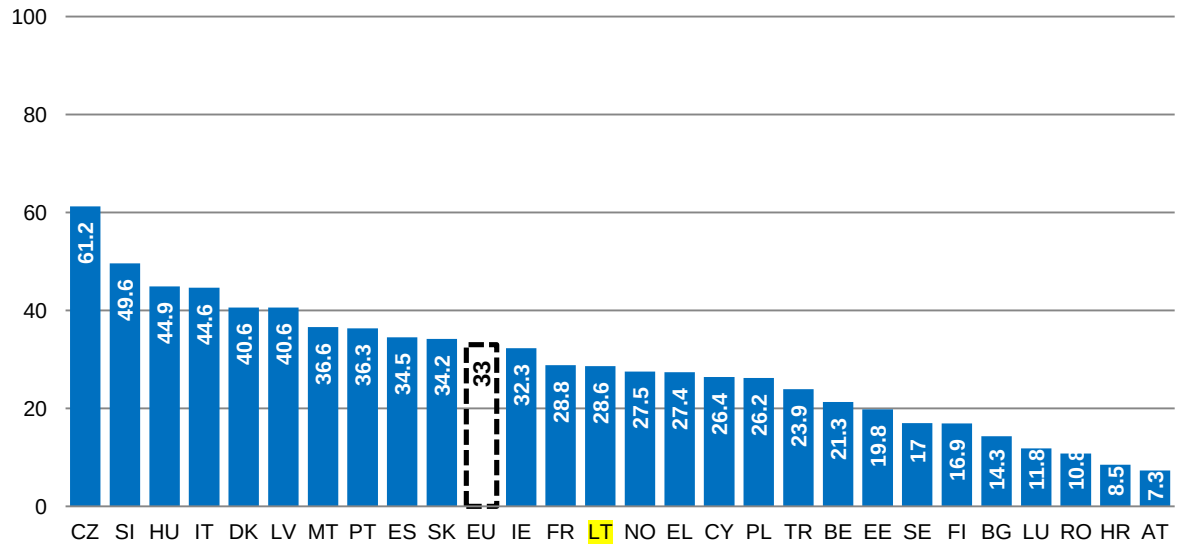
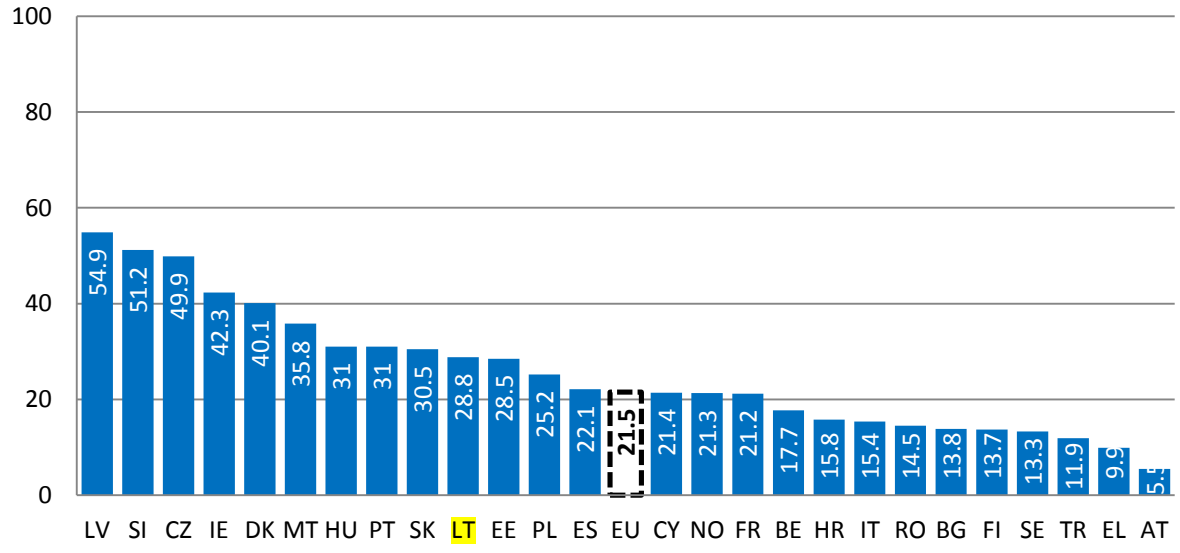
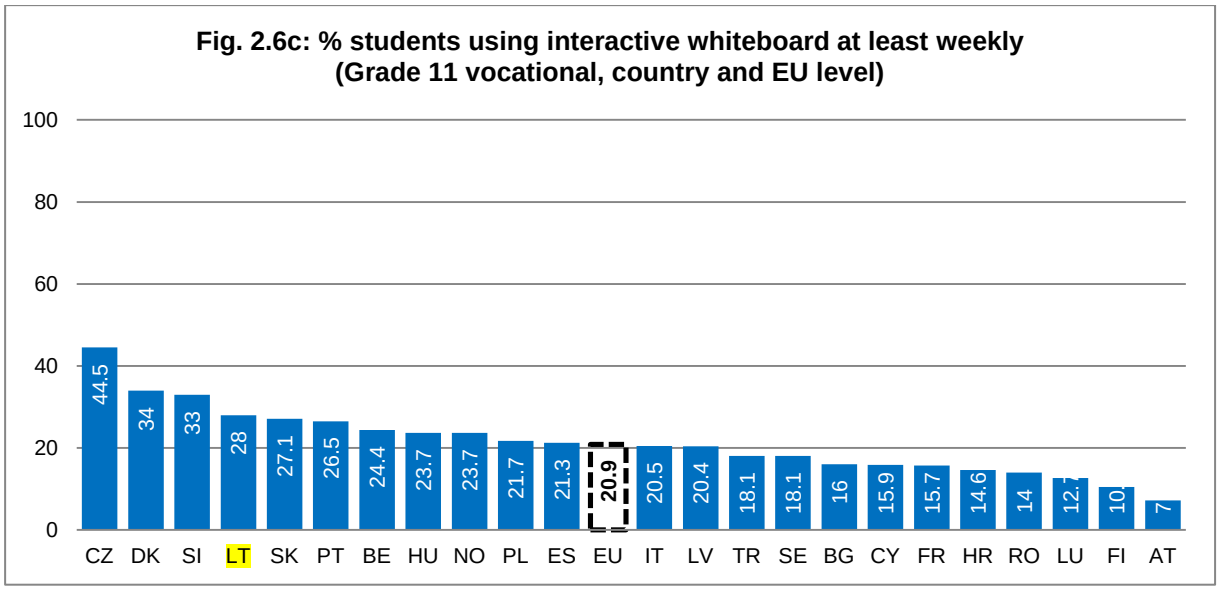


Fig. 2.6b: % students using interactive whiteboard at least weekly (Grade 11 general, country and EU level)





NON-USE OF ICT

Against this backdrop of relatively intense ICT use by students, there are students who never or almost never use ICT. As can be seen from fig. 2.7 (data in FIG2.5a-c), approximately one in five grade 8 students in the EU never or almost never use a computer and one in two grade 8 and 11 students never use an interactive whiteboard.

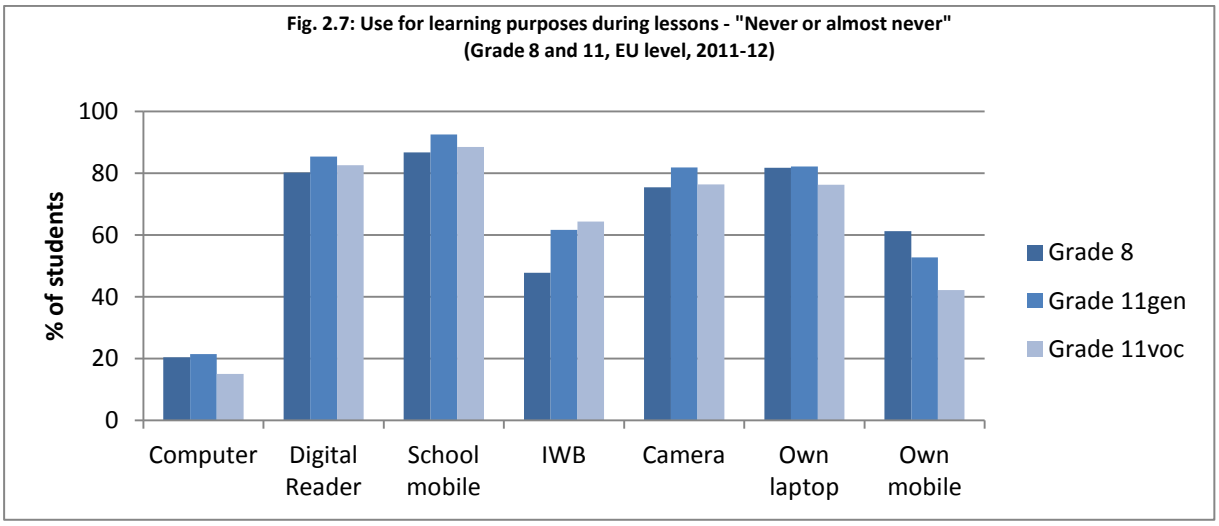


Figure 2.8 shows the results at country level. Despite having similarly high levels of equipment in classrooms, students in Finland stand out as those least likely to use technology in lessons and those in Denmark and Norway among the countries where students are most likely to use ICT. At all levels, there are relatively high percentages of Italian students who never or almost never use ICT in lessons.

Fig. 2.8a: % students 'never or almost never' using a computer in lessons in the last year (Grade 8; country and EU level, 2011-12)

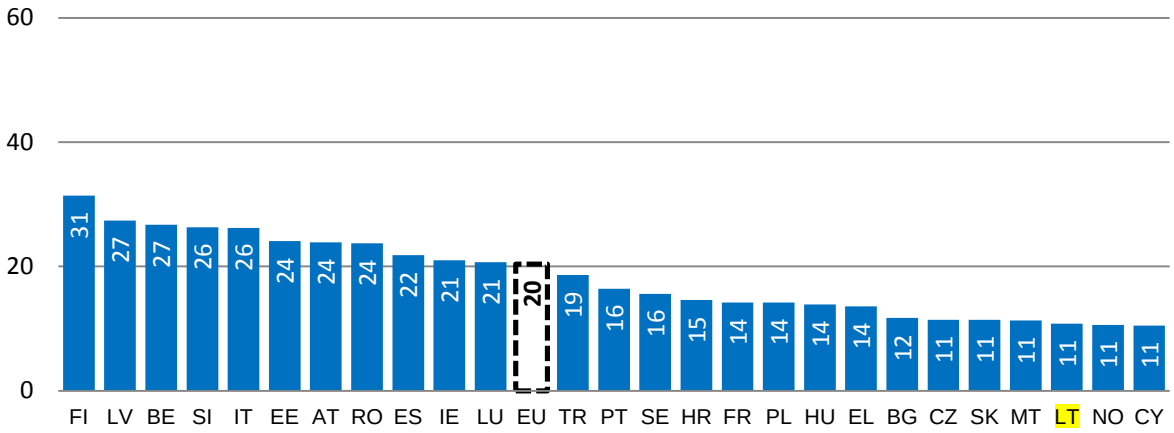


Fig. 2.8b: % students 'never or almost never' using a computer in lessons in the last year (Grade 11 general; country and EU level, 2011-12)

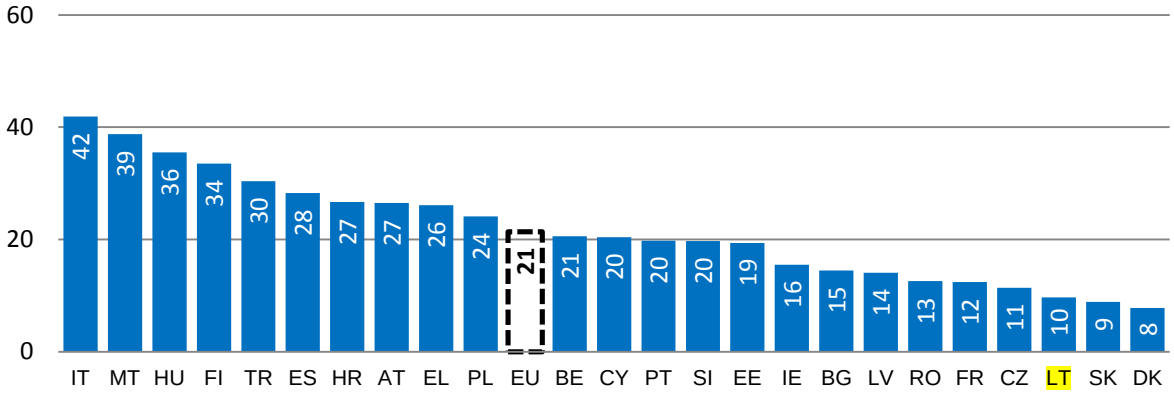
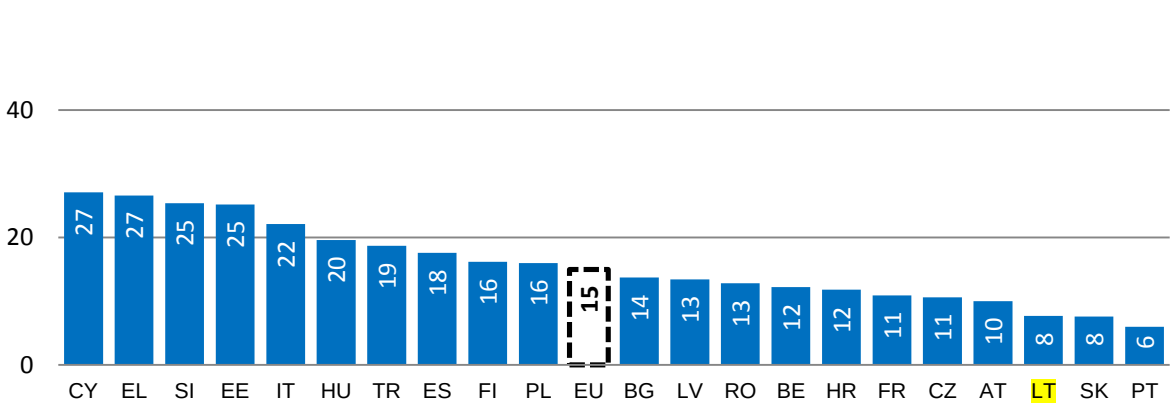


Fig. 2.8c: % students 'never or almost never' using a computer in lessons in the last year (Grade 11 vocational; country and EU level, 2011-12)



These results on student use of ICT are further explored in the cluster analysis of the digitally supportive student, described in section 8 below.

OBSTACLES TO THE USE OF ICT

Given the provision and use of ICT outlined above, why do patterns of use vary between people, schools and countries? In the survey, both head teachers and teachers were asked to think about the inhibiting factors behind under-use of ICT.

HEAD TEACHERS' PERCEPTION

TYPES OF INHIBITORS

To investigate inhibiting factors to ICT use, head teachers were asked which among 20 factors affected the school's capacity to provide ICT teaching and learning 'a lot', somewhat', 'a little', 'not at all', factor analysis revealed three sets of obstacles, for each of which scales were generated:

1. 'Equipment': insufficient or out of date / faulty computers, laptops, interactive whiteboards and slow internet connection

2. 'Pedagogy': lack of teacher skills, technical and pedagogical support, content (including in the local language), difficulty of integration of ICT and lack of models for using ICT in teaching

3. 'Goal': parental and teacher opposition to the use of ICT, benefits of ICT not clear and the use of ICT not being a goal in the school.

Three items did not fall into any of these scales (school time organisation, space organisation, and pressure to prepare students for tests) and they are reported separately below.

Across the EU, shortage or inadequacy of equipment is the biggest inhibiting factor, followed closely by pedagogical concerns and, lower, issues related to goals. 'Equipment' scaling is consistent across all four levels, ranging from a value of 2.2 (1 being not at all, 2 a little, 3 somewhat and 4 a lot) at grade 11 vocational to 2.7 at grade 4.

Fig. 2.9 shows the extent to which head teachers agree that equipment is a barrier to ICT use (FIG2_6a). On average in the EU, the younger the students the more this is perceived as an obstacle. Higher than average concern is expressed in **Turkey, Romania, Latvia, Greece** and **Italy** (at grade 4 and 8).

Fig. 2.9a: Extent to which insufficient or inoperative equipment inhibits use of ICT for teaching and learning
(Grade 4, country and EU level, 2011-12)

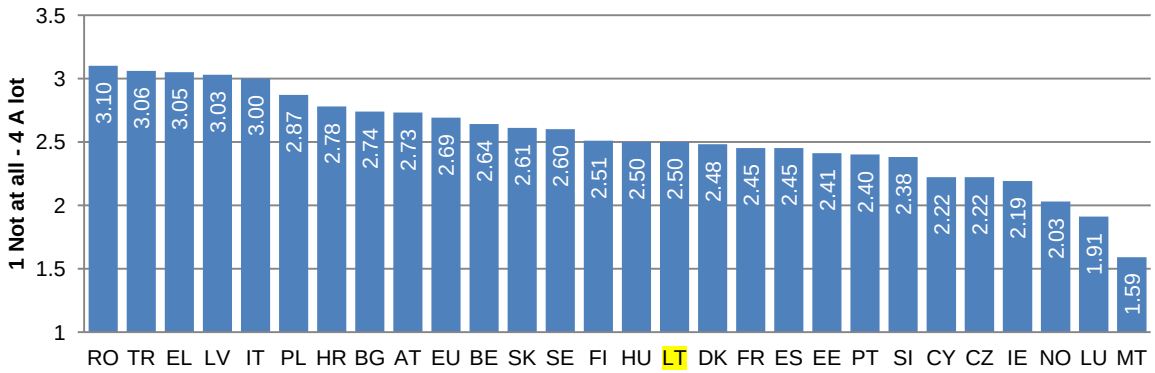


Fig. 2.9b: Extent to which insufficient or inoperative equipment inhibits use of ICT for teaching and learning (Grade 8, country and EU level)

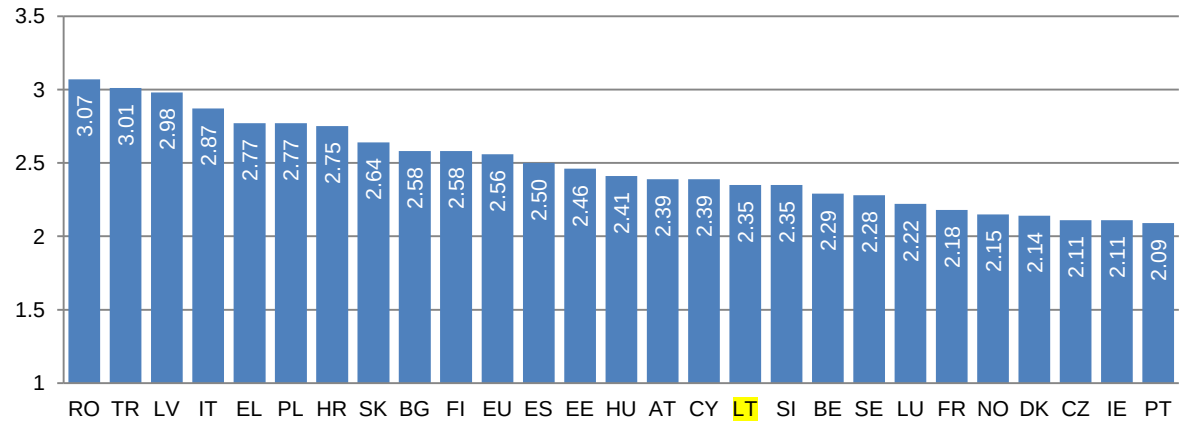


Fig. 2.9c: Extent to which insufficient or inoperative equipment inhibits use of ICT for teaching and learning (Grade 11 general, country and EU level)

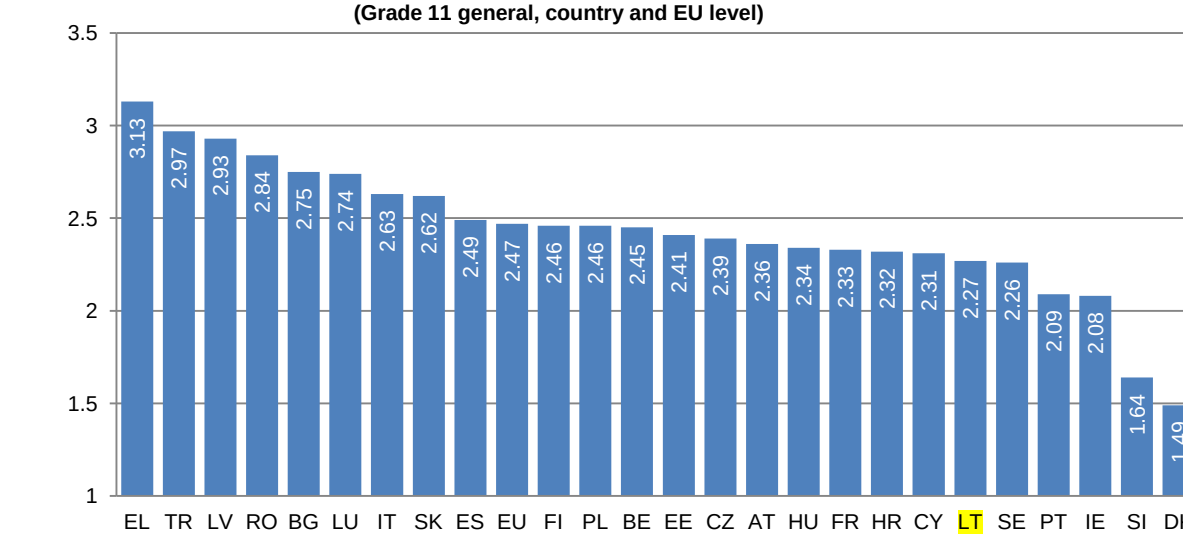
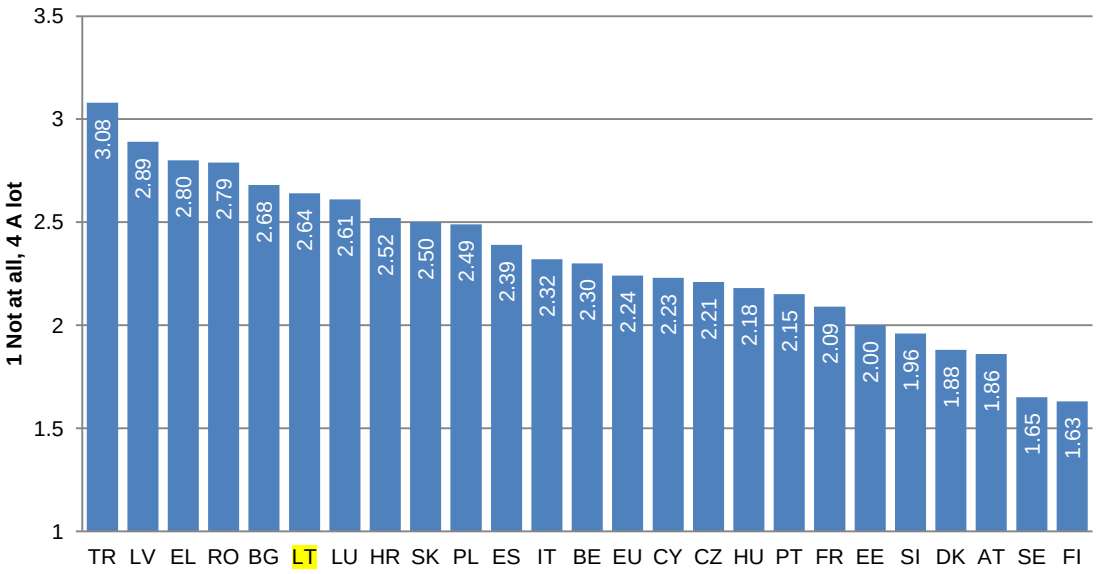


Fig. 2.9d: Extent to which insufficient or inoperative equipment inhibits use of ICT for teaching and learning (Grade 11 vocational, country and EU level)



At EU level, no significant (>.20) correlation is observed between students from poor backgrounds and any of the three obstacles (FIG2_7), but some positive and negative correlations are observed at country level concerning equipment provision.

> The higher the levels of home poverty, the more head teachers tend to complain about insufficient or inoperative equipment in **Croatia, Cyprus** and **Finland** at grade 4, in **Austria, Bulgaria, Cyprus** and **Romania** at grades 8 and 11 general, and in vocational schools in **Romania**. Conversely in **Hungary** at grade 4 and **Finland** at grades 8 and 11 general, the greater the home poverty level the less the head teacher reports that insufficient or inoperative equipment is an obstacle to the use of ICT.

'Pedagogical' scaling values range from 2.4 (grade 11 vocational) to 2.5 (grade 8); they can be seen in FIG2_6b. Head teachers in **Luxembourg** and **Greece** more than other countries (e.g. **Norway**) appear to consider these factors affect ICT use adversely.

Fig. 2.10a: Extent to which pedagogical factors inhibit use of ICT for teaching and learning (Grade 4, country and EU level)

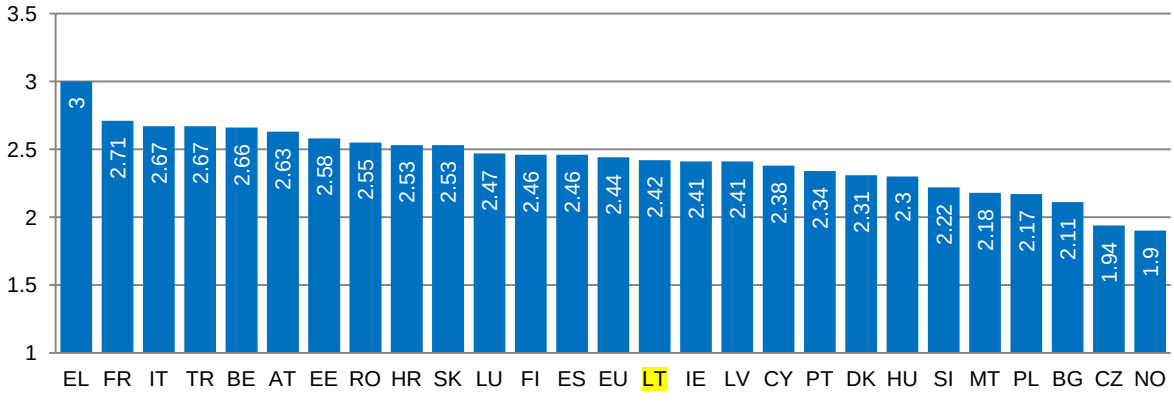


Fig. 2.10b: Extent to which pedagogical factors inhibit use of ICT for teaching and learning (Grade 8, country and EU level)

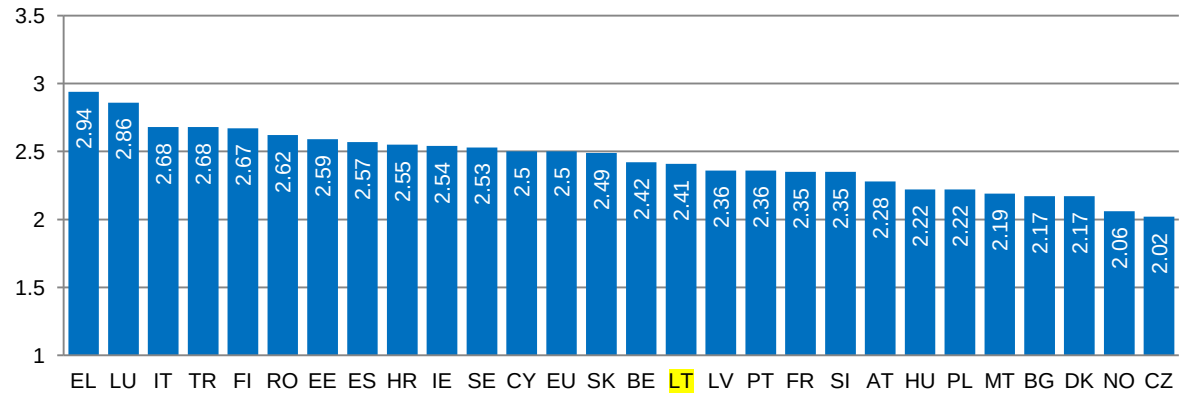


Fig. 2.10c: Extent to which pedagogical factors inhibit use of ICT for teaching and learning (Grade 11 general, country and EU level)

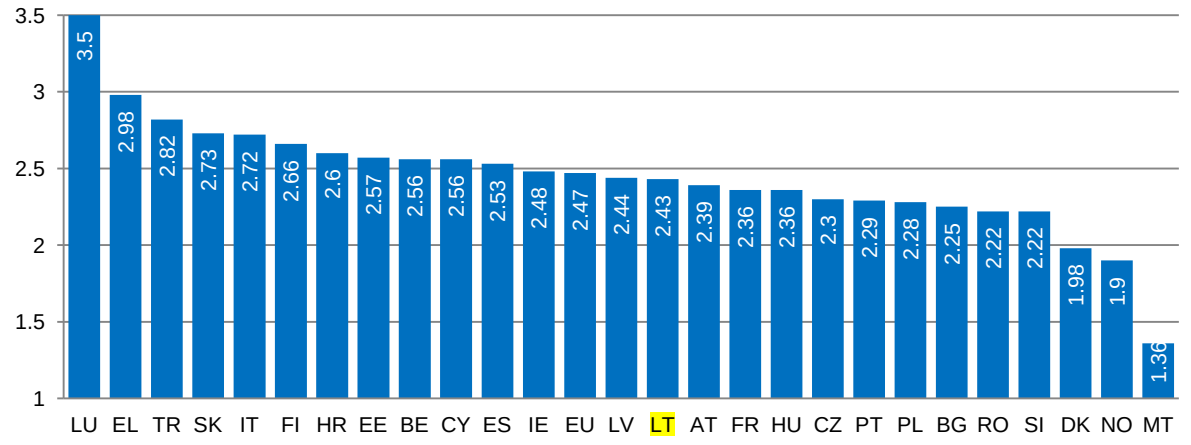
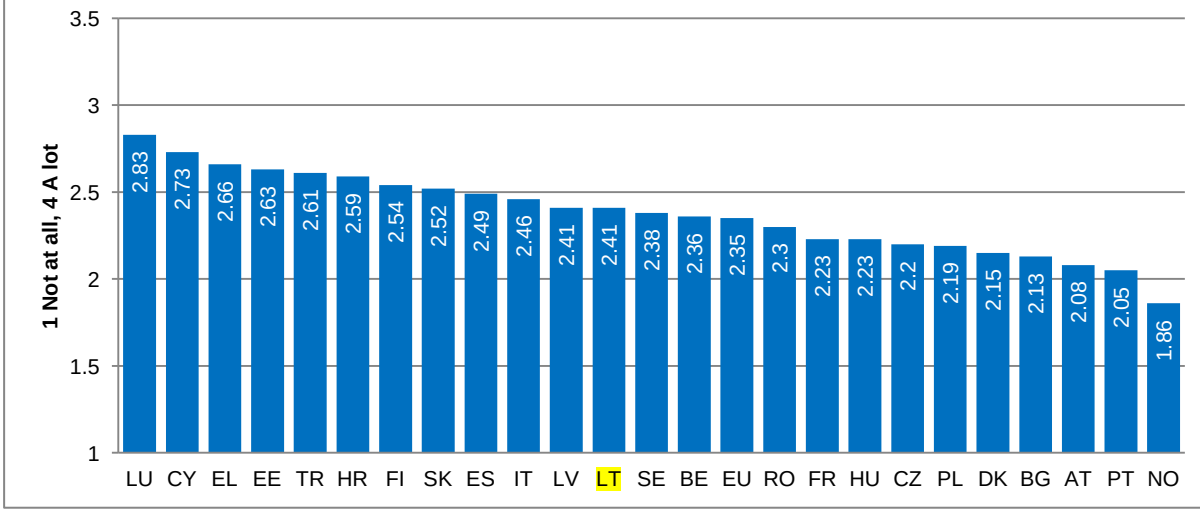


Fig. 2.10d: Extent to which pedagogical factors inhibit use of ICT for teaching and learning (Grade 11 vocational, country and EU level)



'Goal' scaling is less strong, with close values across the four levels (between 1.6 and 1.7 – see FIG2_9c).

GRADE 4

In the EU generally, over one third of grade 4 students are in schools where principals report that shortage or inadequacy of interactive whiteboards (36%) and laptops (35%) affects its capacity to provide ICT teaching and learning, more so than desktop computers (17%). These figures are to be seen in FIG2.6d. Old or faulty computers are third highest concern (27%) at this level. Insufficient bandwidth is reported in schools attended by 19% of students.

> Shortage or inadequacy of internet connected PCs is of most concern in Greece (35%), Romania and Turkey (both 31%), and not reported as a major concern by any principal in Luxembourg and Malta. Insufficient broadband is most frequently mentioned a lot in Turkey (57%), followed well behind by Hungary (32%), Spain (27%) and Greece (26%). Not a single respondent mentioned bandwidth as a concern in Norway, and frequencies are low in the Czech Republic, Finland (both 5%), and Sweden (6%). It is in Romania where the highest percentage of students (70%)are in schools where principals most frequently report that lack of interactive whiteboards affects a lot, slightly ahead of Greece (66%) and Turkey (62%), whereas in Malta only 9% are in schools where principals consider such an issue to affect the school's capacity in ICT. Lack of laptops is affecting ICT capacity 'a lot' in more than 50% of schools attended by grade 4 students in Romania, Italy (both 57%), Turkey (53%) and Greece (51%). The issue of old or faulty computers affects more than one in two students in Greece (54%), Turkey and Latvia (both 51%), but is of little concern in Malta and Norway.

One in five of the EU's students are in schools reporting insufficient technical support for teachers. This is the pedagogical issue of most concern to school principals (see FIG2_6e). Around one in ten students are in schools with major concerns about lack of teacher skills, pedagogical support for teachers (12%), content (9%) and pedagogical models on how to use ICT for teaching (10%). Overall concerns about lack of content in the local language (4%) and ICT being too difficult to integrate (6%) appear less of a major worry.

> Teachers' lack of digital competence is an issue ('a lot') in schools attended by more than 20% of students in Greece (26%), Turkey (24%), Austria (23%) and Belgium (22%), but is not mentioned as much in Cyprus and Portugal (both 3%). Concern about technical support is significantly higher in Greece (57%), but also relatively high in Ireland, Austria and France (all 35%). Pedagogical support is a major concern (over 20% of grade 4 students in schools where this is reported by head teachers) only in Greece (41%), Ireland (26%), Belgium and France. The issue of lack of content appears to matter most in Turkey (32%), and Greece (33%), and lack of content in the national language is a problem in Malta (25%) and Ireland (20%), but not at all in Denmark, Luxembourg (but here a lack of content in general is regarded by principals of schools attended by 20% of grade 4s as a key issue) and Sweden. That ICT is too difficult to integrate into the curriculum is considered to matter a lot in Luxembourg (33%), France (25%) and Greece (20%). In Greece (35%), France (30%) and Luxembourg (29%), grade 4s are most often in schools where the principal reports that a lack of pedagogical models is an obstacle.

Factors related to goals do not appear to be a major concern generally, and well behind the other two, with under 2% of students in schools where the principal has major concerns about any of the four factors, the highest figure (2%) being that ICT for teaching and learning is not a goal in their school (FIG2_6c).

> This figure is highest in Luxembourg (6%), Greece (6%) and Romania (5%). In Turkey, 7% of students are in schools where parents are not in favour of the use of ICT in school; only in Bulgaria (2%) and Romania (4%) is this concern shared to any extent at all. Teacher resistance to ICT use is highest in Luxembourg where 10% of students are in schools where the principal reports this as a major obstacle, and it is also relatively high in Greece (7%) and Turkey (9%). Only in Greece (8%) and – to a lesser extent – in Austria (3%), Latvia (3%) and Romania (4%) are students in schools reporting no or unclear benefits of ICT as a major inhibitor. Note that 'goals' did not reach significance levels in many countries however.

GRADE 8

At grade 8, Shortage or inadequacy of interactive whiteboards (29% of students are in schools where the principal considers this to affect 'a lot') and laptops (27%) head the list of equipment-related factors inhibiting the capacity

of schools to provide ICT teaching and learning (see FIG2.6g). More than one in five students are in schools where the principal considers that out of date or faulty (20%) and bandwidth (22%) affect it a lot. Complaints about insufficient numbers of computers are lower (around 15%).

> Shortage of desktop computers (whether or not connected to the internet) is a major obstacle relative to other countries in Latvia, Poland and Romania (over 20%). Lack of bandwidth matters a lot in schools attended by more than 20% of students in Greece, Hungary, Ireland, Malta, Slovakia, Spain and Turkey. Insufficient interactive whiteboards is signalled as a major concern (more than 20% of students in schools reporting it as mattering 'a lot') in all countries except Czech Republic, Denmark, France, Ireland, Luxembourg, Slovenia and Spain. Lack of laptops and tablets is said to affect over 50% of students in Italy and Romania. The issue of old or faulty computers affects students particularly (over 50%) in Latvia.

As regards teaching and learning factors, 16% of students are in schools reporting major concerns about technical support for teachers (FIG2.6h). Around one in ten are in schools where lack of pedagogical support and of pedagogical models affects ICT teaching and learning a lot. There were fewer major concerns about lack of content (9%), teacher skills (8%), ICT being difficult to integrate (7%), and lack of local content (6%).

> Teachers' lack of skills is an issue ('a lot') in schools attended by more than 20% of students in Greece (21%). Concern about technical support is relatively higher in Greece (42%), Ireland (39%), and Romania (31%). Insufficient pedagogical support is a major concern (over 20% of grade 8 students in schools where this is reported by head teachers) only in Belgium, Greece, Ireland and Sweden. The issue of lack of content appears to matter most in Greece and Turkey (around 30%), while insufficient local content is reported in Malta (25%). That ICT is too difficult to integrate into the curriculum is considered to matter a lot in Greece (27%) above all. It is in Greece (44%), Turkey (23%) and Estonia (22%), where grade 8s are relatively more often in schools where the principal reports that a lack of pedagogical models is an obstacle.

Few principals considered goal factors to affect ICT teaching and learning a lot (FIG2_6i), with between up to 2% of students in schools where the principal rated them as major obstacles. However, one in four students in Turkey are in schools where ICT is not a goal (but note that the standard error is high).

GRADE 11 GENERAL

Lack of interactive whiteboards is the equipment issue where most (27%) students are in schools where principals report it as affecting capacity for ICT teaching and learning a lot, followed by insufficient laptops and out of date or faulty computers (see FIG2_6j).

> Shortage of desktop computers (whether or not connected to the internet) is a major obstacle relative to other countries in Finland[16] and Greece. Lack of bandwidth matters a lot in schools attended by more than 20% of students in Greece, Hungary, Ireland, Malta, Spain and Turkey. Insufficient interactive whiteboards is signalled as a major concern (more than 20% of students in schools reporting it as mattering 'a lot') in all countries except Czech Republic, Denmark, Finland, Ireland, Luxembourg, Malta, Norway Slovenia and Spain. Lack of laptops and tablets is said to affect over 50% of students in Greece. The issue of old or faulty computers affects students particularly (over 50%) in Latvia.

Of the pedagogical inhibitors, the lack of technical support (15%), of models on how to use ICT for learning and of pedagogical support (both 13%) matter a lot (FIG2.6k.

> Teachers' lack of skills is an issue ('a lot') in schools attended by more than 20% of grade 11 general students in Ireland (23%). Concern about technical support is highest in Greece (36%) and Ireland (35%). Insufficient pedagogical support is a major concern (over 20% of students in schools where this is reported by head teachers) only in Belgium, Greece, Ireland and Slovakia. The issue of lack of content

[16] Note high standard error

appears to matter most in Greece and Turkey (34/36%), and insufficient local content does not show above 20% in any country at this level. That ICT is too difficult to integrate into the curriculum is again considered to matter a lot in Greece (35%) above all, but also to some extent in Belgium, Italy and Turkey. At this level there are six countries where more than 20% of students are in schools where the principal reports that a lack of pedagogical models is a major obstacle: Croatia, Cyprus, Greece, Malta, Slovakia and Turkey[17].

On average in the European Union, the goal factors are rarely considered to matter a lot, with percentages ranging below 3% at all levels. In Croatia however, some 15% of students are in schools where the head teacher reports that parental and teacher opposition to ICT mattered a lot (FIG2.6l).

GRADE 11 VOCATIONAL

As at grade 11 general, a lack of interactive whiteboards and laptops are the equipment items which most frequently considered to matter a lot on average, with 22% and 19% of vocational students in schools where this is the case (FIG2.6m).

A lack of computers appears most acutely felt by principals in Greece, Latvia and Turkey. In some countries the lack of offline rather than online computers is highlighted, e.g. Greece and Lithuania. Bandwidth issues appear to be most problematic in Turkey (41%), Spain, Hungary and France. Lack of interactive whiteboards is considered a major issue in Greece (84%), Turkey (74%), Latvia and Romania. Insufficient laptops is relatively frequently highlighted in Greece (69%) and Turkey. Out of date or faulty equipment is regarded a most problematic in Latvia (51%) and Lithuania (49%).

Of the seven pedagogical issues, the lack of pedagogical models matters a lot in schools where this is true for more than 10% of students (11%) – see FIG2.6n.

In Cyprus (31%) and Estonia (29%), teachers' skills are an issue causing a lot of concern. Principals in Croatia (20%), Sweden and Turkey more than in other countries consider the lack of technical support to be a major inhibitor. In Estonia (22%), Sweden and Cyprus lack of pedagogical support is relatively more frequently than in other countries identified as having a major effect. It is in Cyprus (45%) that lack of content stands out from other countries as an obstacle, only Estonia, Turkey and Slovakia coming close. A lack of local content is an issue highlighted more than elsewhere in Estonia (22%), Lithuania and Greece. Complaints that ICT is too difficult to integrate seem to be more frequent in Sweden (19%) and Greece, and a lack of pedagogical models matters a lot in Greece (37%) and Lithuania (23%).

Relatively few principals on average in the EU report goals as being a major inhibitor, the highest being the lack of benefits for using ICT (2%) – see FIG2.6o.

Hostility of parents to ICT is more of an issue in Greece and Turkey (both 5%) than other countries. There appears to be a high level of teacher antipathy towards ICT and issues around the lack of benefits of ICT in Estonia, where in both cases 22% of students are in schools where the principal reports these issues as mattering a lot. To some extent the lack of benefits is also an issue in Finland, 11% of students in schools where principals say this affects the school's capacity for ICT teaching and learning[18].

OTHER FACTORS: TIME, SPACE AND EXAM PRESSURE

On average between 8 and 10 per cent of students are in schools where the principal reports timetable constraints to be a major obstacle.

[17] But standard error is high in some cases at this level.

[18] but note the high standard error of 7.32.

At grade 4 this figure is over 20% in Cyprus, France, Greece, Luxembourg, and Romania, at grade 8, in Croatia and Greece, at grade 11 general in Austria, Croatia, Greece, Ireland and Italy, and at grade 11 vocational in Croatia, Finland and Luxembourg[19].

On average between 12 and 14 per cent of students are in schools where the principal reports space constraints (e.g. classroom size, layout of tables, building design) to be a major obstacle, slightly more than timetabling.

At grade 4 this figure is over 20% in eight countries (highest in France (46%) and Austria (36%)), at grade 8 in Croatia and Greece (43%), Luxembourg and Romania, at grade 11 general in ten countries, and at grade 11 vocational in Croatia, Greece, Luxembourg and Turkey[20].

Not surprisingly the percentage of students in schools where the principal reports pressure to prepare students for examinations and tests to be a major obstacle varies according to age: on average in the EU the percentage is 8 at grade 4, 9 at grade 8, rising to 16 at grade 11 general and falling back to 9 for vocational students.

At grade 4 this figure is over 20% in Croatia, Malta, and Turkey (highest, at 47%), at grade 8 in Croatia Greece, Ireland (40%), and Turkey, at grade 11 general in ten countries (Greece having a very high 72% of students in schools where this matters a lot), and at grade 11 vocational in Croatia and Turkey[21].

The data relating to head teachers' perception of obstacles to the use of ICT form one element of cluster analyses reported in section 8 (the digitally supportive school)

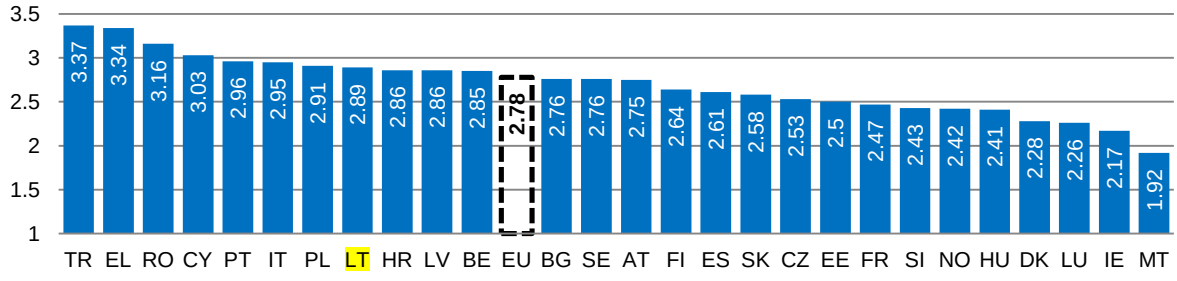
TEACHERS' PERCEPTION OF OBSTACLES TO ICT USE

As with head teachers, equipment is the biggest obstacle, followed by pedagogical factors, which, generally speaking, teachers find as much an inhibitor as equipment issues, particularly in some countries. Goal factors do not feature strongly (between 1.6 and 1.7 depending on grade, EU average on a range from 1 Not at all to 4 A lot).

EQUIPMENT

Teachers' use of ICT in teaching and learning is most adversely affected by equipment factors. Figure 2.11 (using data in FIG2_9a) shows that in the EU generally equipment problems are greater at grade 4 than at other grades and in some countries (notably **Turkey, Greece, Cyprus** and **Romania**) more than others (e.g. **Ireland**), the scale running from 1: Not at all to 4: A lot.

Fig. 2.11a : Extent of teachers' perception of equipment inhibitors (Grade 4, country and EU level)



[19] but note the high standard error.

[20] but note the high standard error in some cases.

[21] but note the high standard error in some cases.

Fig. 2.11b : Extent of teachers' perception of equipment inhibitors (Grade 8, country and EU level)

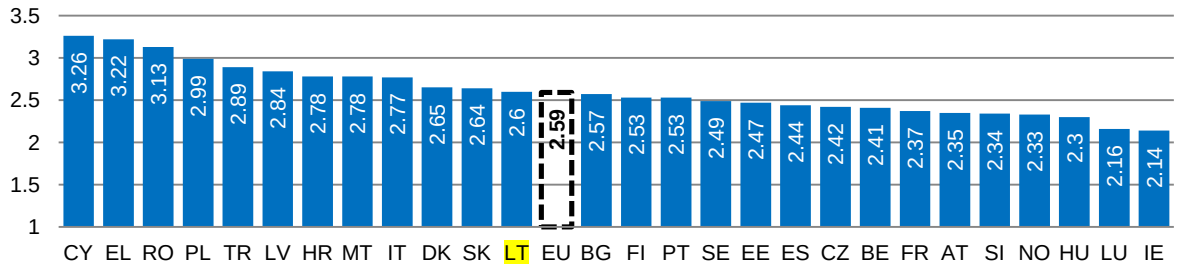


Fig. 2.11c : Extent of teachers' perception of equipment inhibitors (Grade 11 general, country and EU level)

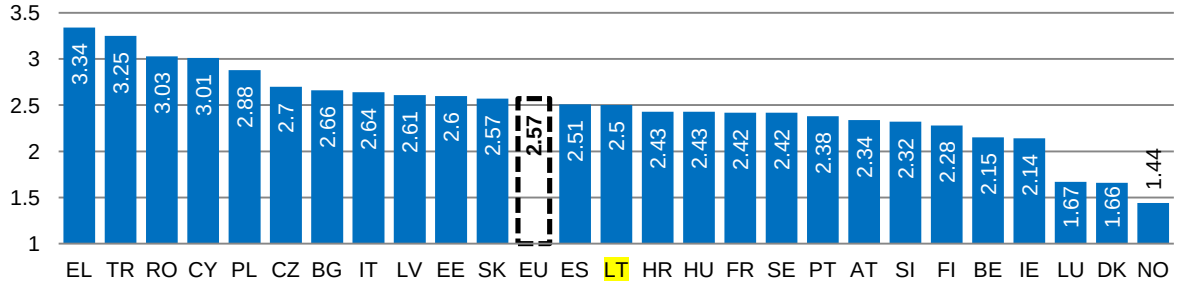
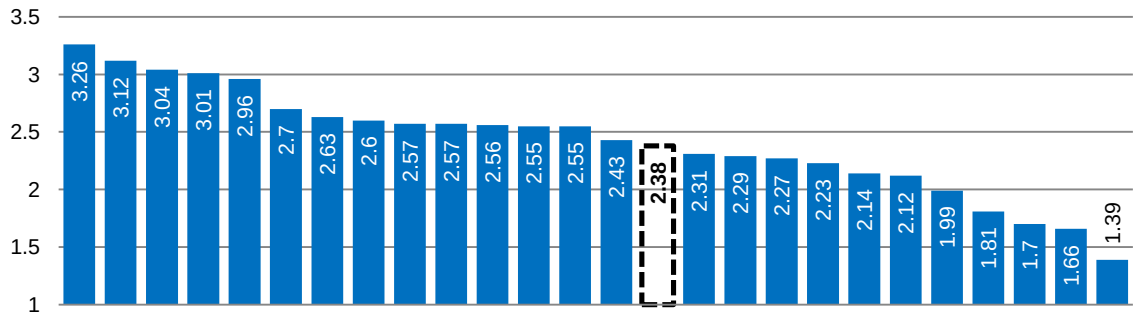


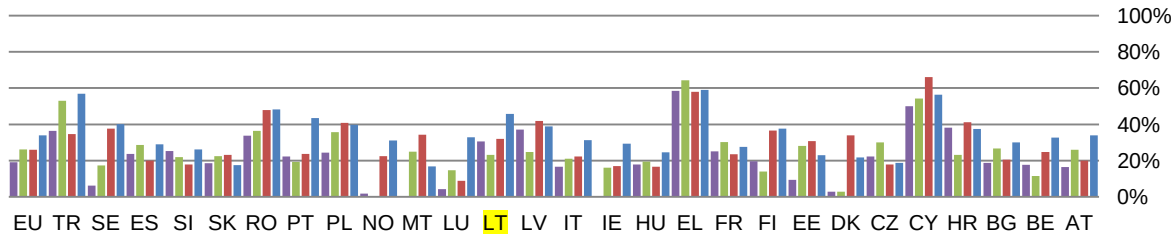
Fig. 2.11d : Extent of teachers' perception of equipment inhibitors (Grade 11 vocational, country and EU level)



But, insufficient numbers of which particular items of equipment are considered by teachers to be an obstacle to the use of ICT in teaching and learning?

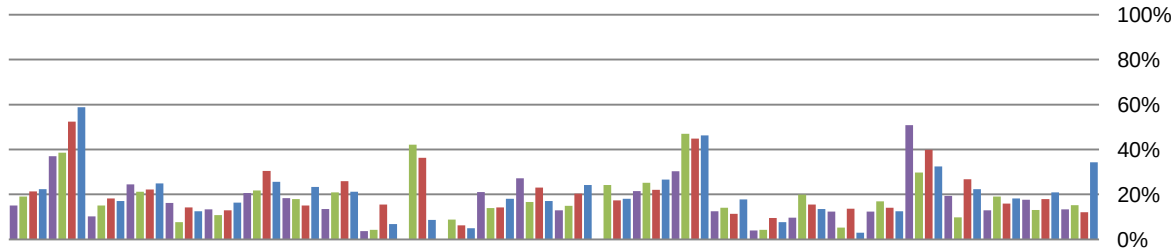
The extent to which insufficient numbers of computers is considered to be an obstacle is shown in fig. 2.12 (data in FIG2_8a-b). On average in the EU the older the student, the less this is a concern.

Fig. 2.12: Insufficient computers adversely affect ICT use
(% teachers agreeing 'A lot'; all grades, country and EU level)



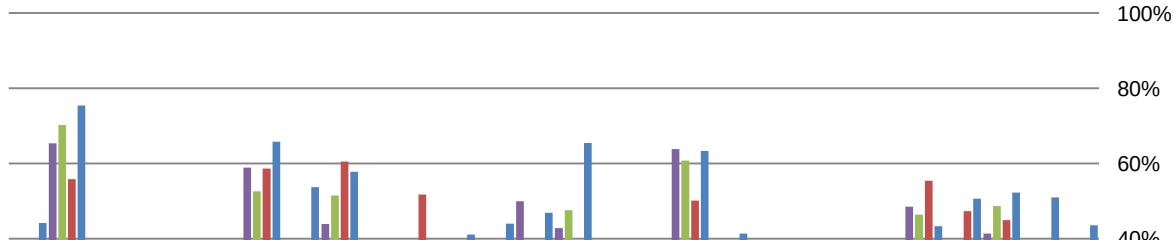
Broadband speed is also a concern, much more some in some countries than others, as shown in fig. 2.13 (FIG2_8c-d for the data).

Fig. 2.13: Insufficient bandwidth adversely affects ICT use
(% teachers agreeing 'A lot'; all grades, country and EU level)



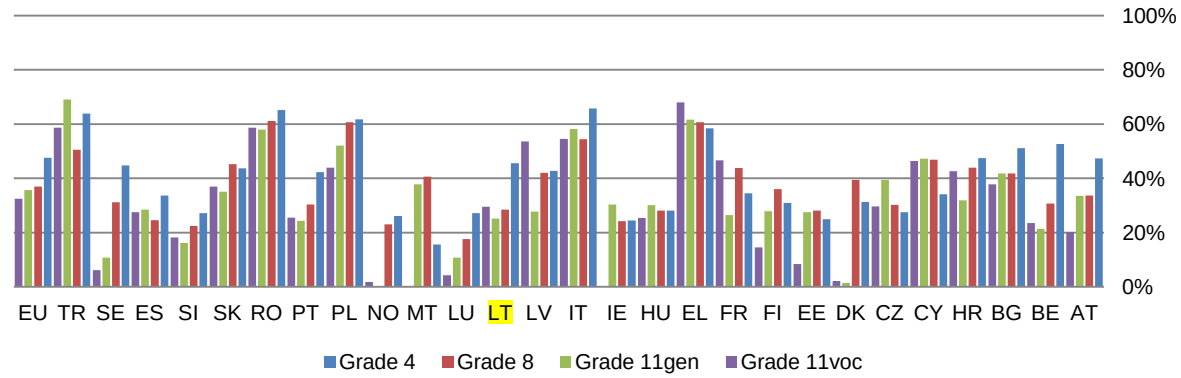
Insufficient interactive whiteboards is rated to affect ICT adversely 'a lot' by 44% of EU grade 4 teachers as can be seen in fig. 2.14 (FIG2.8e-f for the data) and by over 60% of teachers at that grade in four countries.

Fig. 2.14: Insufficient IWBs adversely affects ICT use
(% teachers agreeing 'A lot'; all grades, country and EU level)



Many teachers, particularly in primary schools also consider that insufficient numbers of laptops and notebooks inhibit ICT use 'a lot', as seen in fig. 2.15 (using data in FIG2.8g-h), 48% of grade 4 teachers on average in the EU.

Fig. 2.15.: Insufficient laptops adversely affects ICT use
(% teachers agreeing 'A lot'; all grades, country and EU level)



PEDAGOGICAL

Fig. 2.16 shows the extent to which teachers in the survey perceive pedagogical factors to inhibit the use of ICT in teaching and learning (FIG2_9b for the data). Teachers in **Turkey, Greece, Cyprus** and **Romania** more than in other countries (e.g. **Ireland, Portugal** and **Norway)** find this set of factors to adversely affect ICT use.

Fig. 2.16a: Extent of teachers' perception of pedagogical inhibitors
(1 A lot, to 4 Not at all; grade 4, country and EU level)

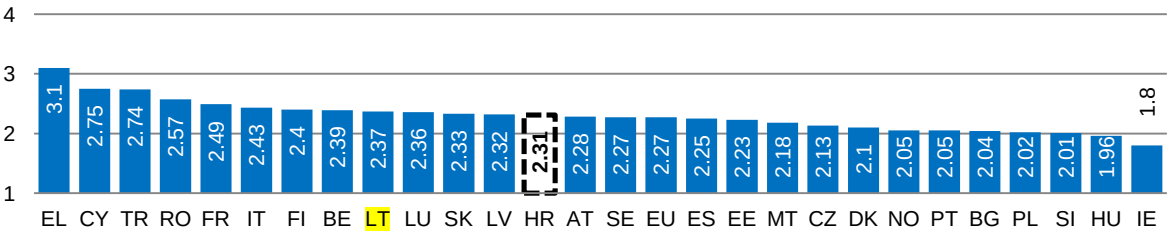


Fig. 2.16b: Extent of teachers' perception of pedagogical inhibitors
(1 A lot, to 4 Not at all; grade 8, country and EU level)

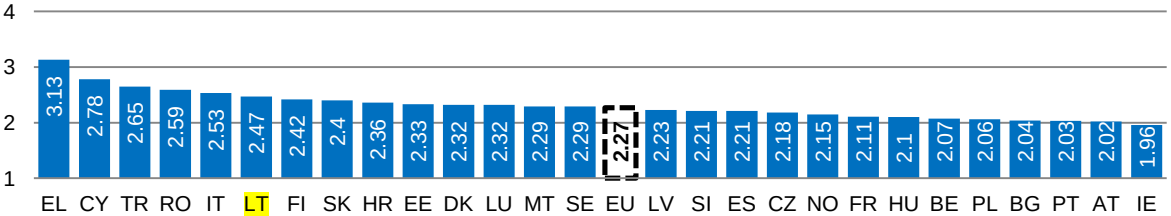


Fig. 2.16c: Extent of teachers' perception of pedagogical inhibitors
(1 A lot, to 4 Not at all; grade 11 general, country and EU level)

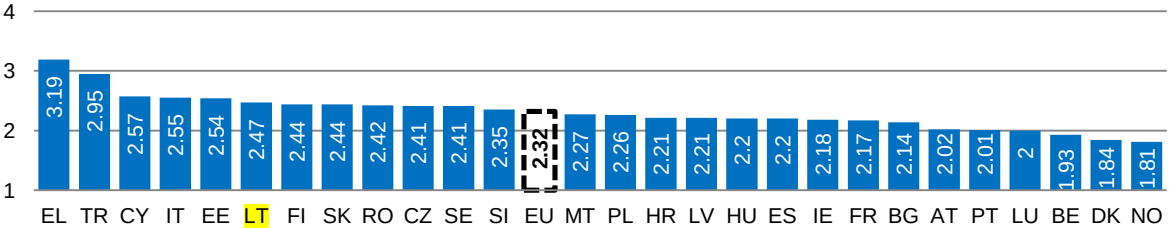
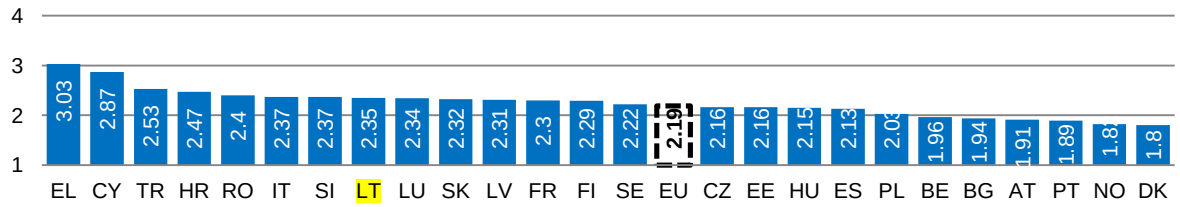


Fig. 2.16d: Extent of teachers' perception of pedagogical inhibitors (1 A lot, to 4 Not at all; grade 11 vocational, country and EU level)



Of the various pedagogical factors, it is lack of technical and pedagogical support and lack of pedagogical models that are more frequently cited as affecting ICT adversely 'a lot 'at all levels.

These results on teacher perceptions of obstacles to the use of ICT form one element of a cluster analysis of the digitally supportive teacher, described in section 8 below.

3- ICT BASED ACTIVITIES

This section reviews the current state of the art about teacher's and students' ICT based activities throughout the countries covered by the survey, as reported by each of these two target groups. Only activities related to teaching at school are covered when it concerns the teachers. Activities at home and at school are investigated when it concerns the students.

SUMMARY OF FINDINGS:

- The experience of teachers in using computers/internet at school can always increase but **at EU level around 75% of students at all grades** are **taught by teachers declaring more than four years of such a use at school.** In addition, teachers with less than one year of experience are extremely rare (around 3% of students having such teachers). Highly experienced teachers are found in Spain, Czech Republic, Denmark, Finland, Latvia and Portugal; lowest levels of experience in Greece.

  The most frequent ICT based activities developed by teachers at EU level remains related to **lessons preparation**: around 40-45% of students are taught by teachers declaring they do it every day or almost, or at least once a week. **Browsing internet in the classroom is as frequent**. **Creating digital resources**, and **being on the school website or virtual learning environment** also happen every day or almost, or at least once a week, for teachers of respectively 25%, and 20% of students.

  But **between 60% and 85% of students** are **taught by teachers declaring they never or almost never communicate online with parents, assess students using ICT, evaluate digital resources nor post home work for their students**.

  When looking at different types of ICT based activities all together to focus on frequency, teachers appear to implement ICT based activities **several times a month** (i.e. far from 'at least once a week'). **Even in countries where such frequency is higher** as Spain, Latvia, Lithuania, Norway, Slovakia, Turkey, it remains closer to several times a month, and not up to at least once a week. Lowest frequencies are declared in Greece and Italy.

- **Student's experience with computer** is **still longer at home compared to school**. Between 40 and 60% of students have more than six years of experience at home compared to 20-30% of students in this situation at school.

  The **low frequency of use of digital resources and tools seems alerting**. Digital text books at grade 8 and multimedia tools at grade 11 are the resources most frequently used. Nevertheless, around 30% of students use them once a week or every day or almost, but **more than 50% of students at all grades never or almost never use such resources**.

  When looking at different types of ICT based activities all together to focus on frequency, students appear to implement ICT based activities **between several times a month** and never or almost never. Such frequency is lower compared to teacher's ICT based activities frequency. Only at grade 11 in Denmark and Norway, two countries where such frequency is the highest compared to other countries, the frequency corresponds to several times a month.

  Student- and teacher- centered teaching and learning activities are both present at EU level up to a similar extent: from teacher's answers, student-centered approach seems a little bit more frequent; but student's answers shows the opposite, i.e. slightly more frequent activities being teacher-centered.

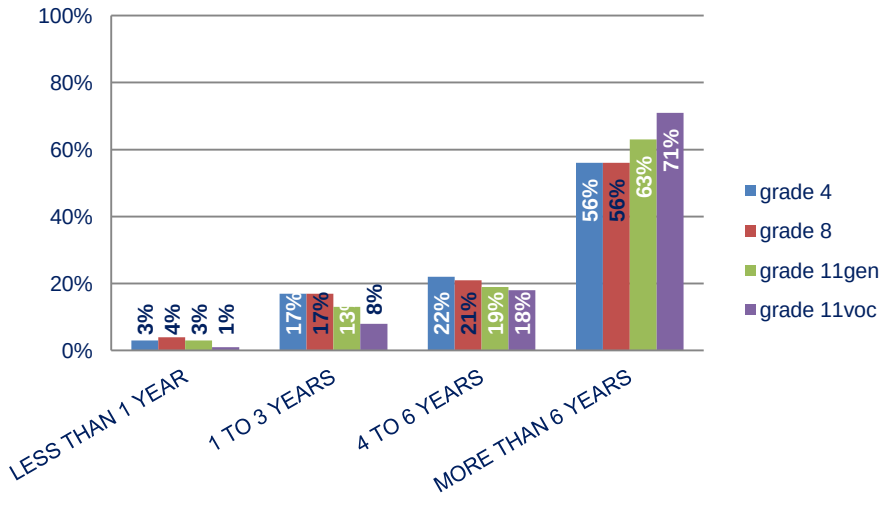
❖ Teacher's experience in using computers/internet at school

The teacher questionnaire contains a question (TE06) about the number of years using computers/internet at any school, offering four possible answers: less than one year, between one to three years, between four to six years and more than six years.

At EU level and according to what teachers report, **more than 75% of students** at each grade are taught by teachers who have **four or more years of experience** in using computers/internet at school, out of which the majority of teachers have more than six years of experience (see fig. 3.1); within this last group, the more grades increase, the more teachers have experience. At grades 4 and 8, **around 55% of students** are **taught by teachers with more than 6 years of experience**; such percentages increase at grade 11, up to around **70% in vocational education**.

At all grades, percentages of students taught by teachers with less than one year of computers/internet use at school are negligeable (around 3%).

Fig. 3.1: Teacher's experience in using computers/internet at school by grade (in % of students; EU level; 2011-12)



Looking at the situation by country, differences appear (see Fig. 3.2a to 3.2d).

Around 80% of students at all grades are taught by teachers using computers/internet for more than 6 years in Estonia, at grade 11 in Czech Republic, and at least at one grade in Denmark, Finland, Latvia and Portugal.

Conversely, only around 25% of students at grade 4 are taught by teachers using computers/internet for more than 6 years in Greece. But in this country, as well in a few others in a close situation at grade 4 or 8, the percentages of students taught by experienced teachers increase with grades up to around 35% at grade 11. In many countries and at all grades, the less a country has teachers with 6 or more years of experience the more it has teachers with four to six years of experience.

Fig. 3.2a: Teacher's experience in using computers/internet at school, at grade 4
(in % of students, by country, 2011-12)

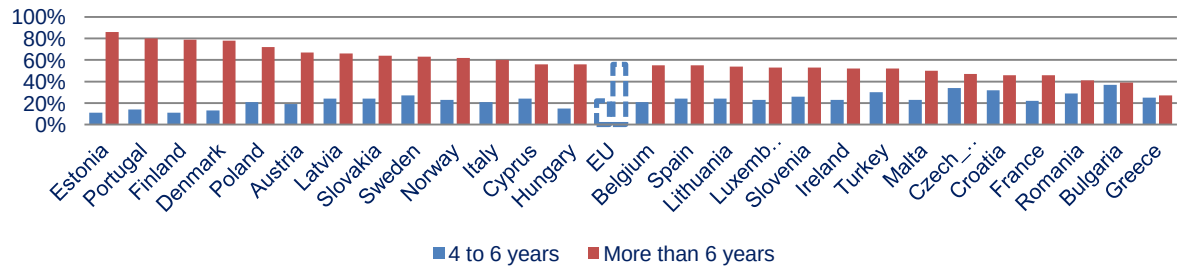


Fig. 3.2b: Teacher's experience in using computers/internet at school, at grade 8 (in % of students, by country, 2011-12)

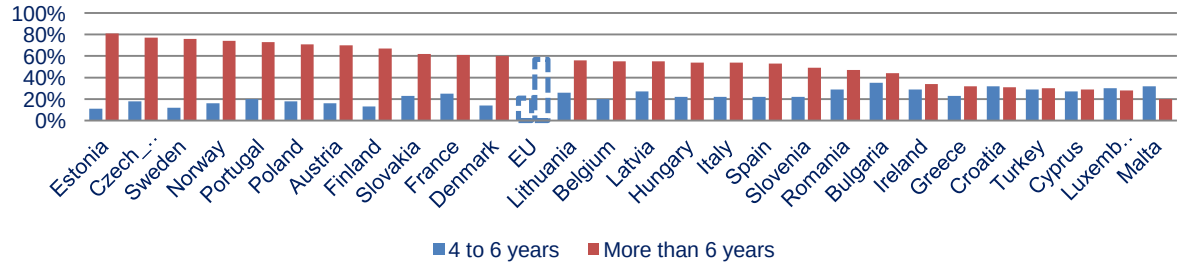


Fig. 3.2c: Teacher's experience in using computers/internet at school, at grade 11 in general education (in % of students, by country, 2011-12)

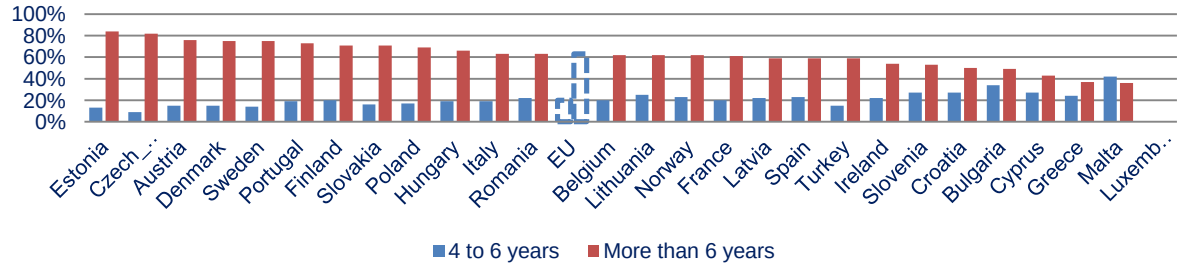
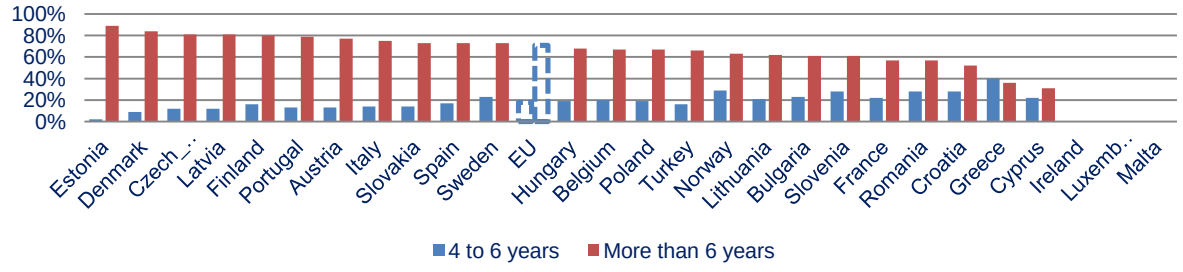


Fig. 3.2d: Teacher's experience in using computers/internet at school, at grade 11 in vocational education (in % of students, by country, 2011-12)



❖ Teacher's ICT based activities with the class

The teacher questionnaire contains a question (TE18) asking about the frequency of a set of ICT based activities related to teaching preparation (browsing internet, preparing presentations or tasks for students), browsing internet during lessons, creation and evaluation of digital resources, communication with parents, being on school website and/or virtual learning environment, etc. For each activity, the respondent has to specify how often it is implemented out of a four-level scale (never or almost never; several times a month; at least once a week; every day or almost every day).

At EU level, looking at teacher's ICT based activities, it appears (see Fig. 3.3a to 3.3d) that **preparing activities for teaching** (browsing to prepare lessons, preparing tasks for students, preparing presentations) **remains -** underlined by evidence already available from several sources- **the most frequent teacher's ICT based activities at all grades**. **Around 20% of students** are taught by teachers declaring **browsing to prepare lessons** and **preparing tasks for students every day or almost**, and around **an additional 25% at least once a week;** preparing presentations is less frequent (around 10% every day or almost, and around 20% once a week).

Browsing internet during lessons is as frequent: **between 15 and 20% of students** are taught by teachers declaring they do it **every day or almost**, and **around a**n additional **25% at least once a week.**

Creating digital resources and being on the school website/virtual learning environment are the next frequent activities. **Around 10% of students** at all grades are **taught by teachers declaring creating digital resources every day or almost** and **around an additional 15% at least once a week**. **Around 10% of students** are taught by teachers declaring being on the school website/virtual learning environment **every day or almost** and **a slightly higher percentage at least once a week**.

Conversely, **communicate online with parents, assessing students, evaluating digital resources and posting home work are never or almost never practiced**, at all grades: **between 60 and 85% of students** are taught by teachers declaring they never or almost never develop such activities.

Fig. 3.3a: Frequency of teachers' activities with ICT with the class AT GRADE 4 (in % of students; EU level; 2011-12)

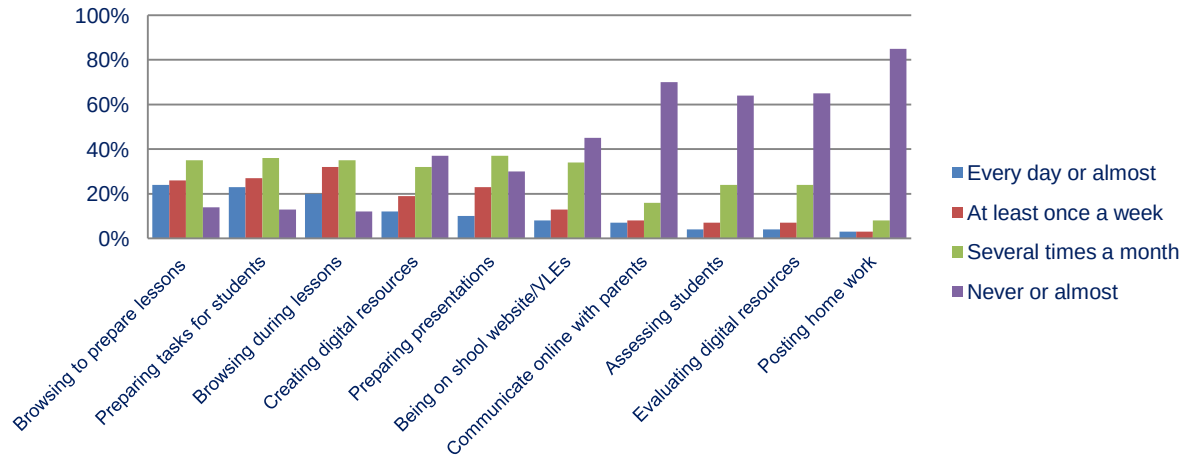


Fig. 3.3b: Frequency of teachers' activities with ICT with the class AT GRADE 8 (in % of students; EU level; 2011-12)

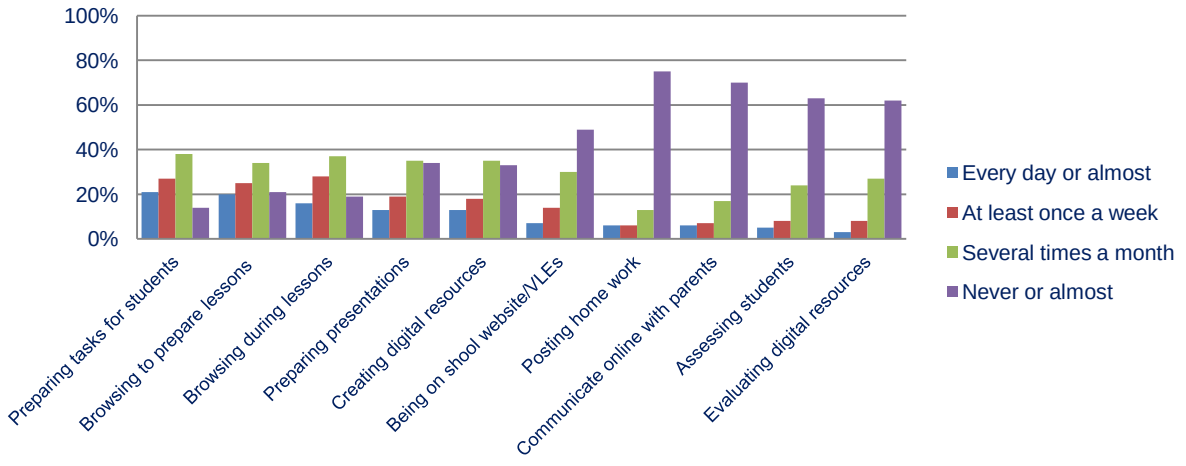


Fig. 3.3c: Frequency of teachers' activities with ICT with the class AT GRADE 11 in general education (in % of students; EU level; 2011-12)

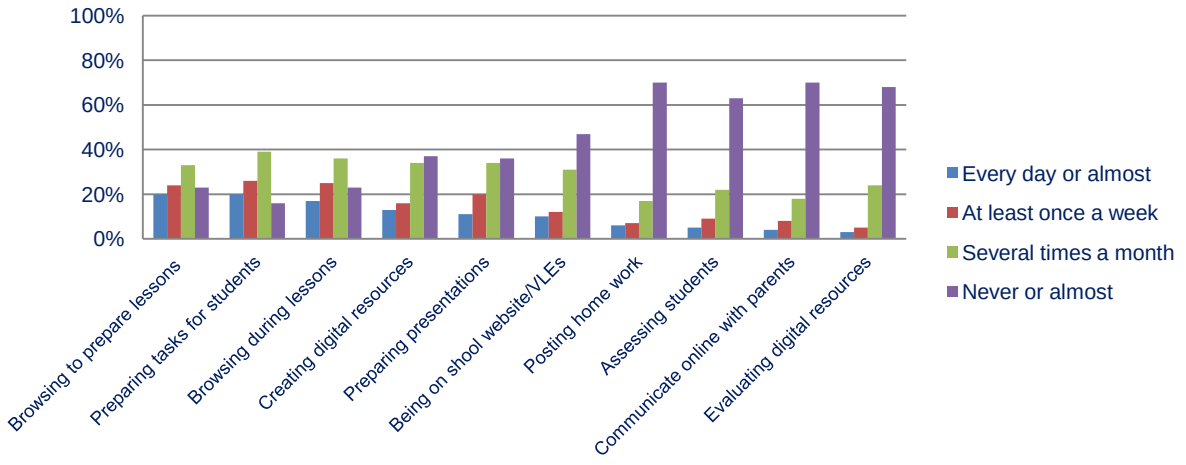
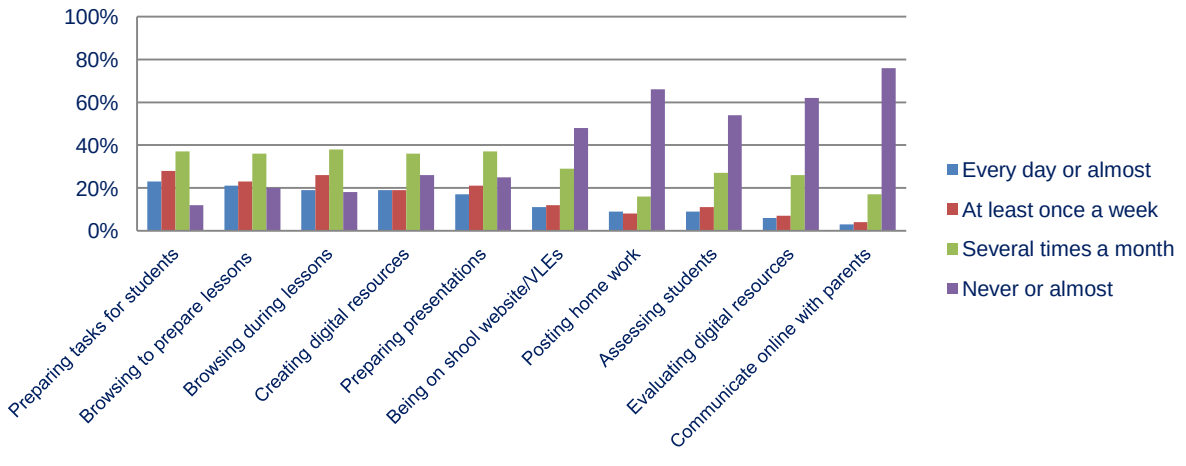


Fig. 3.3d: Frequency of teachers' activities with ICT with the class AT GRADE 11 in vocational education (in % of students; EU level; 2011-12)



After a factorial analysis of the frequency of the set of activities just described out of which one scale has emerged from 1 to 4 (1 meaning never or almost never; 2: several times a month; 3: at least once a week; and 4: every day or almost every day), it appears that at EU level **on average such frequency of ICT based activities is close to 'several times a month'** as the mean scores vary between 1,89 and 2,01, depending the grade (see Fig. 3.4a to 3.4d).

When looking at differences between countries (and depending grade), it appears that the **highest frequency of teacher's ICT based activities** are found in the same countries at all grades, i.e. in **Estonia**, **Latvia**, **Lithuania**, **Norway** and, except at grade 11 in general education, in **Slovakia** and **Turkey**. Highest frequencies, as well as larger differences between countries, are also found at grade 11, compared to grades 4 and 8. Conversely, lowest frequencies are found in Greece at all grades, joined by Italy at grades 8 and 11 in general education.

Fig. 3.4a: Teacher's ICT based activities frequency with the class at GRADE 4
(mean scores on a scale from 1 to 4; by country, 2011-12)

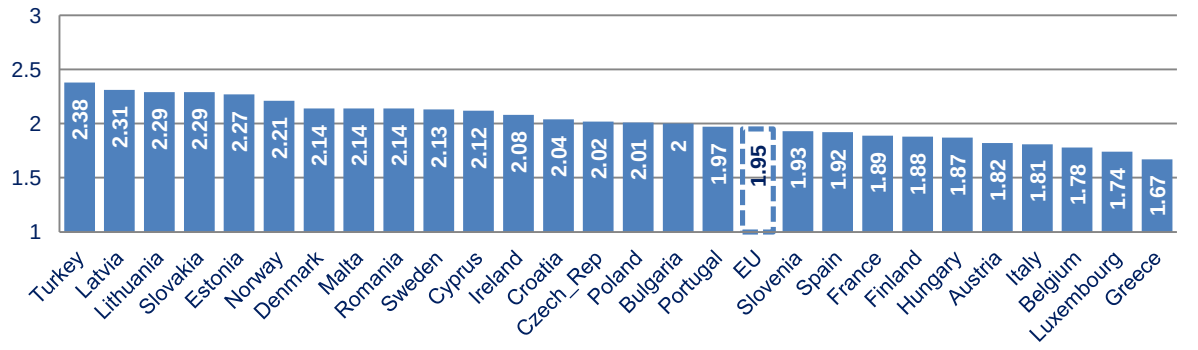


Fig. 3.4b: Teacher's ICT based activities frequency with the class at GRADE 8
(mean scores on a scale from 1 to 4; by country, 2011-12)

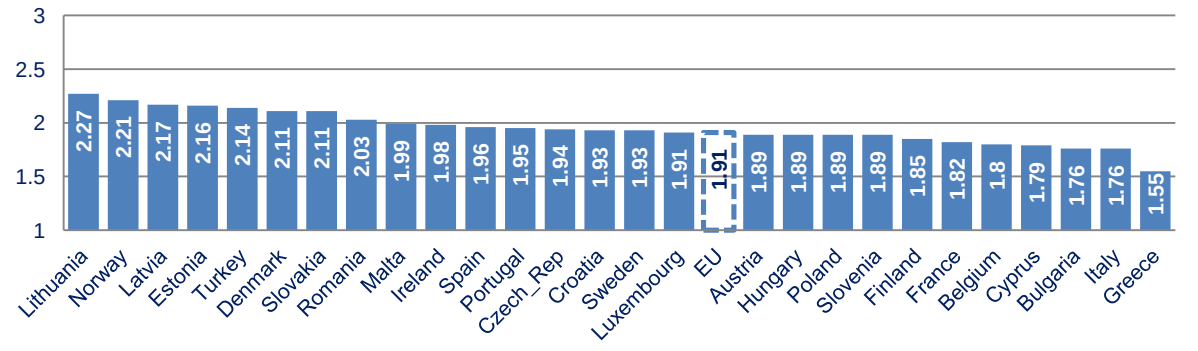


Fig. 3.4c: Teacher's ICT based activities frequency with the class at GRADE 11 in general education (mean scores on a scale from 1 to 4; by country, 2011-12)

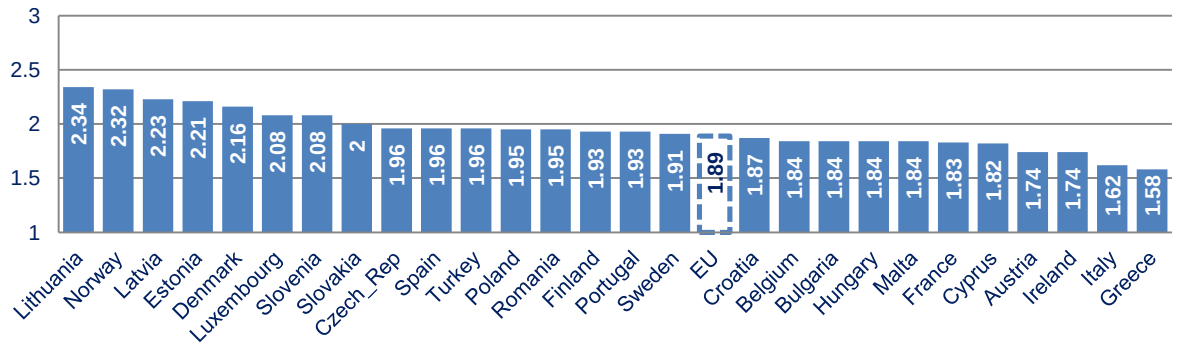
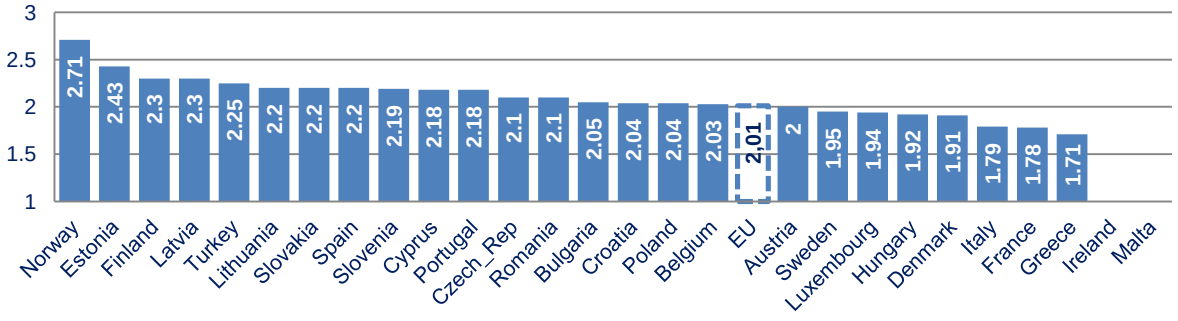


Fig. 3.4d: Teacher's ICT based activities frequency with the class at GRADE 11 in vocational education
(mean scores on a scale from 1 to 4; by country, 2011-12)



❖ Student *versus* teacher-centered teaching (with or without ICT)

Innovation in teaching and learning is often associated with student-centered instead of teacher-centered teaching and learning.

The teacher questionnaire contains a specific question (TE21) asking about teaching activities implemented by the teacher with the students in the classroom, with or without using ICT, as the teacher presenting to the whole class, explaining things to individual students, students reflecting on their learning, students working in groups, etc. The answer to each situation has to be chosen out of a four-level scale about the extent of its implementation starting from 'none', 'a little', 'sometimes', to 'a lot'.

As the result of a factorial analysis of all the items part of question TE21, Fig. 3.5a to 3.5d present the division of class activities according to these two approaches.

At all grades and in all countries, student-centered activities appear to be implemented up to a higher extent compared to teacher-centered activities. At EU level, the mean scores vary from 3,23 to 3,39 concerning student-centered approach compared from 2,75 to 3, depending the grade.

When looking at differences by country, at grade 4, 8 and 11 in general education, student-centered approach appears to be implemented up to a higher extent in Hungary compared to other countries, and conversely to France where such an approach is shown down to the lower extent at grade 4 and 8, compared to other countries. To be noticed that at some grades in a few countries, the number of schools with students concerned by student-centered activities are too low to be taken into account in the analysis and are not represented on the graphs.

Fig. 3.5a: Student and teacher-centered activities implemented by teachers at grade 4 (mean scores on a scale from 1 to 4; by country; 2011-12)

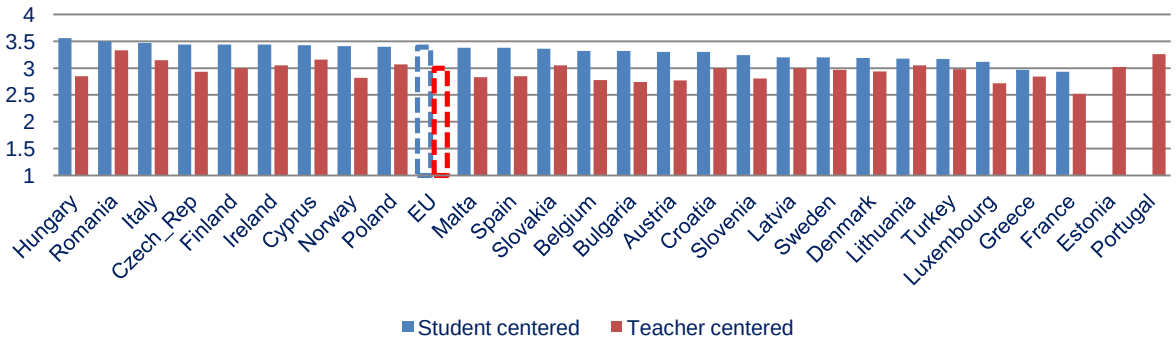


Fig. 3.5b: Student and teacher -centered activities implemented by teachers at grade 8 (mean scores on a scale from 1 to 4; by country; 2011-12)

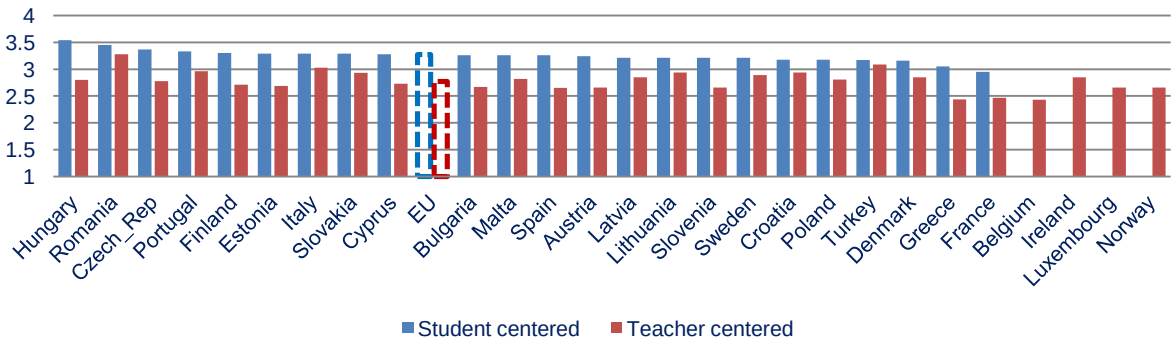


Fig. 3.5c: Student and teacher -centered activities implemented by teachers at grade 11 in general education (mean scores on a scale from 1 to 4; by country; 2011-12)

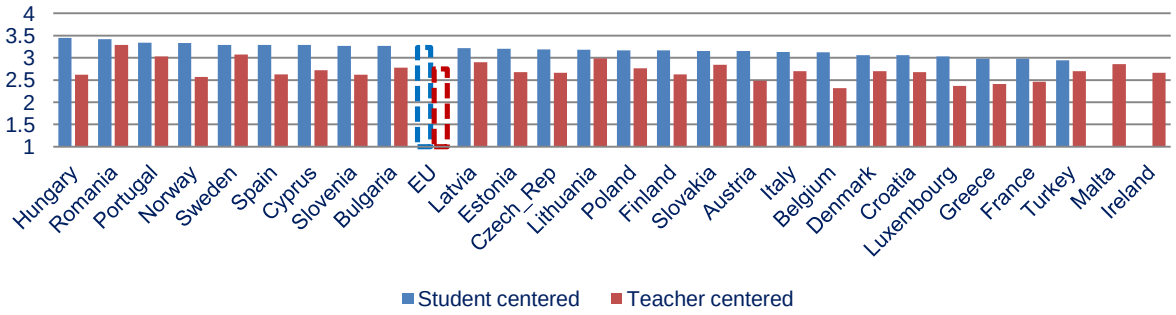
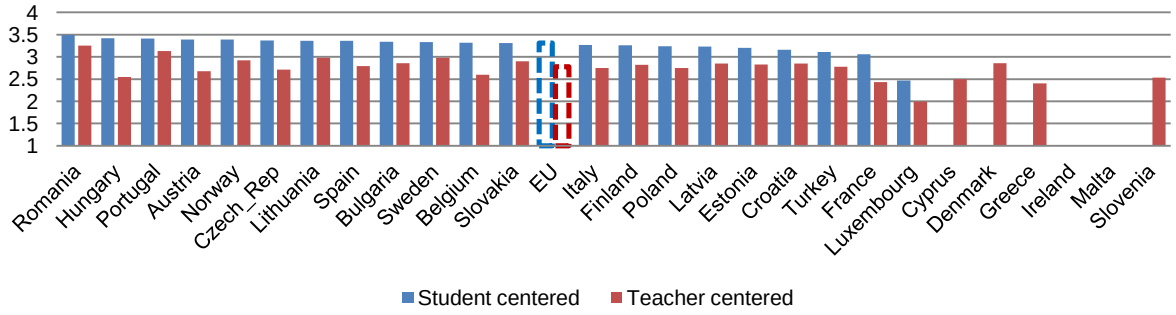


Fig. 3.5d: Student and teacher -centered activities implemented by teachers at grade 11 in vocational education (mean scores on a scale from 1 to 4; by country; 2011-12)



❖ Student's experience in using computers at home and at school

The student questionnaire contains two questions about number of years using computers at home on the one hand (ST04) and at school on the other (ST10). In both cases, the possible answers are the same: less than one year, between one to three years, between four to six years and more than six years

At EU level, with no surprise, experience with computers at home is longer than experience at school: **around 40% of students at grade 8** and **60% at grade 11** use computers **at home for more than 6 years**, compared to **respectively around 20% of students** and **30% at school**

Around 20% of students at grade 8 and **10% at grade 11** are still using **computers at school since less than one year**.

Fig. 3.6: Student's experience in using computers at school by grade (in % of students, EU level, 2011-12)

Fig. 3.6a: at grade 8

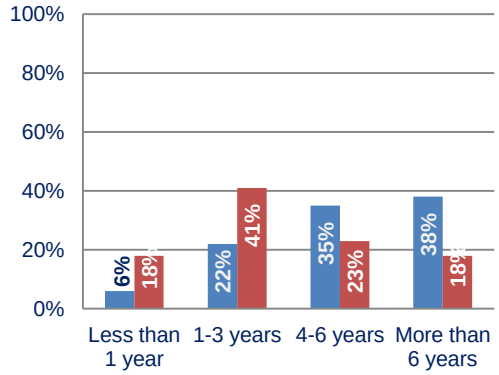


Fig. 3.6b: at grade 11 in general education

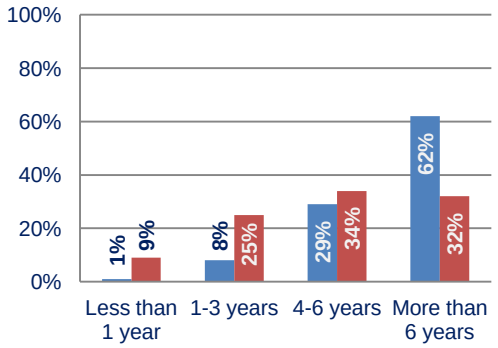
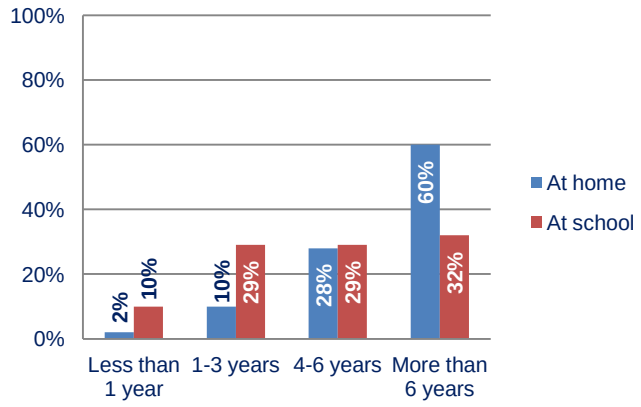


Fig. 3.6c: at grade 11 in vocational education



❖ Student's use of digital resources and tools during lessons

The student questionnaire contains a question (ST12) about different digital resources and tools that can be used in teaching and learning, questioning students about the frequency of their potential use: never or almost never; several times a month; at least once a week; every day or almost every day.

At EU level, **more than 50% of students at all grades never use** digital textbooks, exercise software, multimedia tools, broadcast/postcast, datalogging tools, simulations nor learning games/video games.

Digital resources and tools are **more frequently used at grade 8** compared to grade 11 in general education. **Digital text books** are the most frequently used resources at grade 8: more than 30% of students use them daily or more than once a week. **Multimedia tools** are the most frequently used resources at grade at grade 11 .

Fig. 3.7a : Use of resources and tools during lessons at grade 8
(in % of students, EU level, 2011-12)

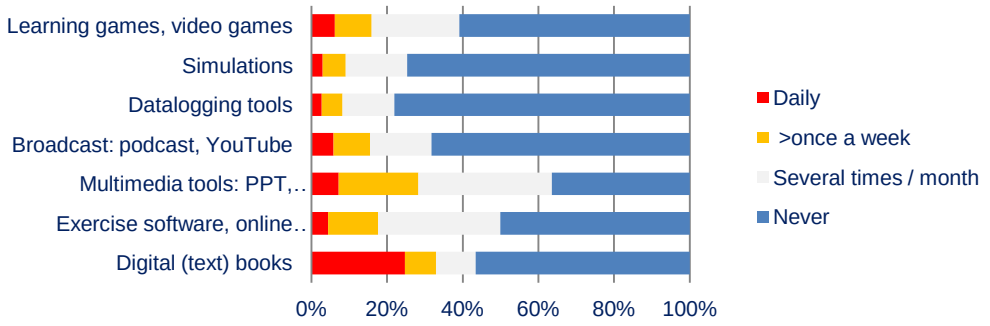


Fig. 3.7b : % Use of resources and tools during lessons at grade 11 in general education (in % of students, , EU level, 2011-12)

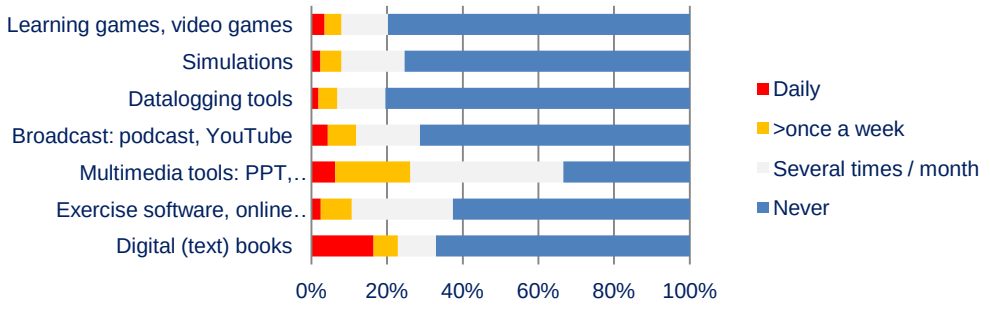
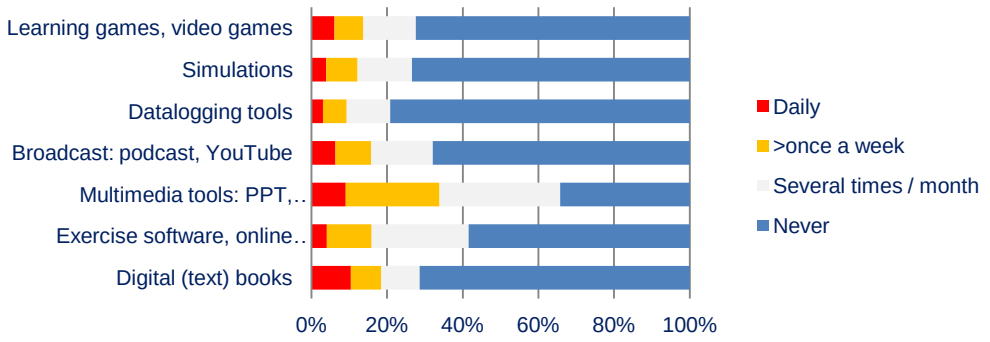


Fig. 3.7c : % Use of resources and tools during lessons at grade 11 in general education (in % of students, , EU level, 2011-12)



❖ Student's ICT based activities during lessons

The student questionnaire contains a question proposing a list of several ICT based activities to be possibly done during lessons (question 13) as searching internet, chatting online, posting home work on the school website, using computers to conduct experiments etc.

A factorial analysis of a large set of ICT based activities declared by the students has been processed, out of which one frequency scale emerged from 1 to 4 (1 meaning never or almost never; 2: several times a month; 3: at least once a week; and 4: every day or almost every day).

It appears that at EU level **on average student's frequency of ICT based activities is closer to 'several times a month' than to 'never or almost never';** the mean scores vary between 1,62 and 1,65, depending the grade (see Fig. 3.8a to 3.8c).

These activities at student level appears then to be less frequent compared to the ones identified at teacher level of which the **average** at EU level **is closer to 'several times a month'** as the mean scores vary between 1,89 and 2,01, depending the grade (see Fig. 3.4a to 3.4d presented before).

When looking at differences between countries and depending grade, it appears that the **highest frequencies** of student's ICT based activities are found **at grade 11 in general education in Denmark and Norway** respectively with mean scores of 2,62 and 2,46, i.e. between **'several times a month'** and **'at least once a week'.** Highest frequencies at all grades are found in Denmark, as well as in Norway at grade 11 (and also showing high frequency at grade 8), and to a lesser extent and depending the grade in Bulgaria, Lithuania and Sweden.

Fig. 3.8a: Student's ICT based activities frequency during lessons at GRADE 8
(mean scores on a scale from 1 to 4; by country, 2011-12)

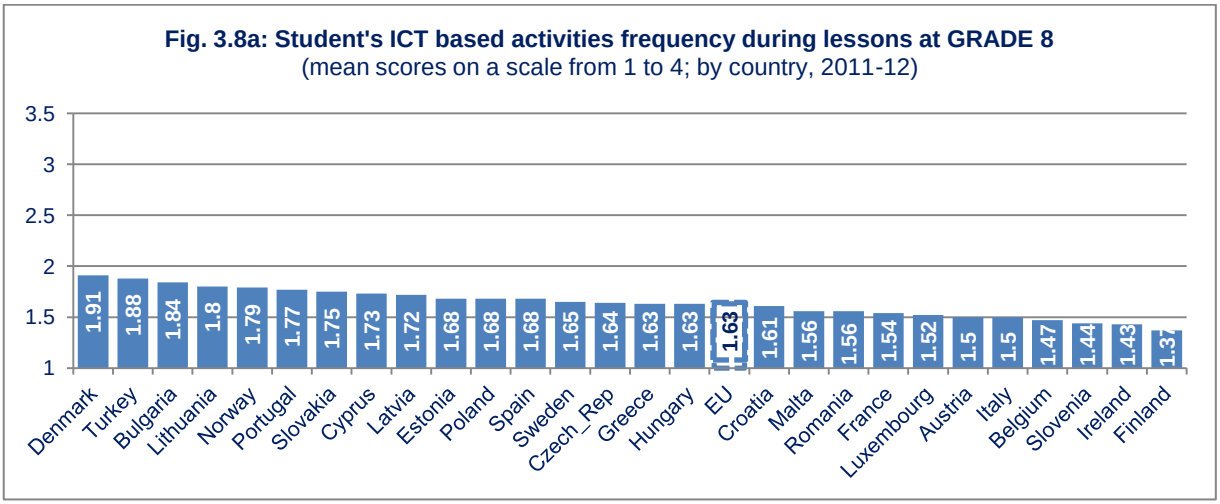


Fig. 3.8b: Student's ICT based activities frequency during lessons at GRADE 11 in general education (mean scores on a scale from 1 to 4; by country, 2011-12)

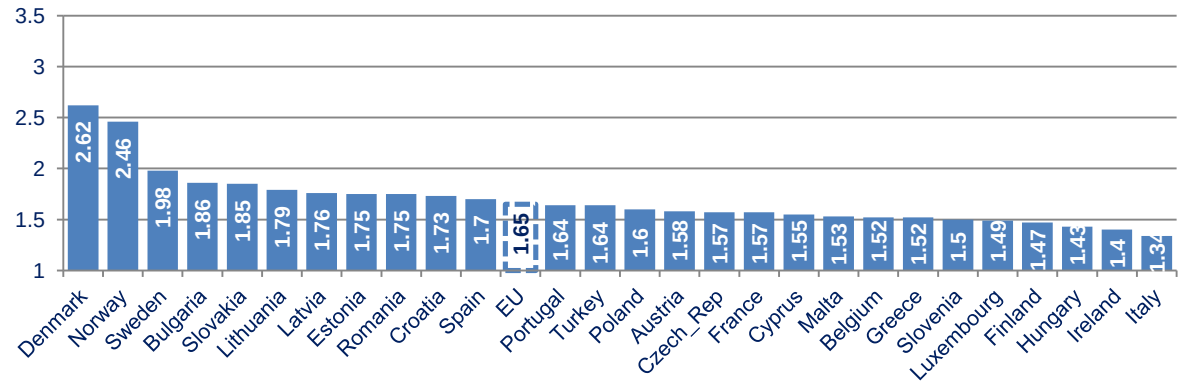
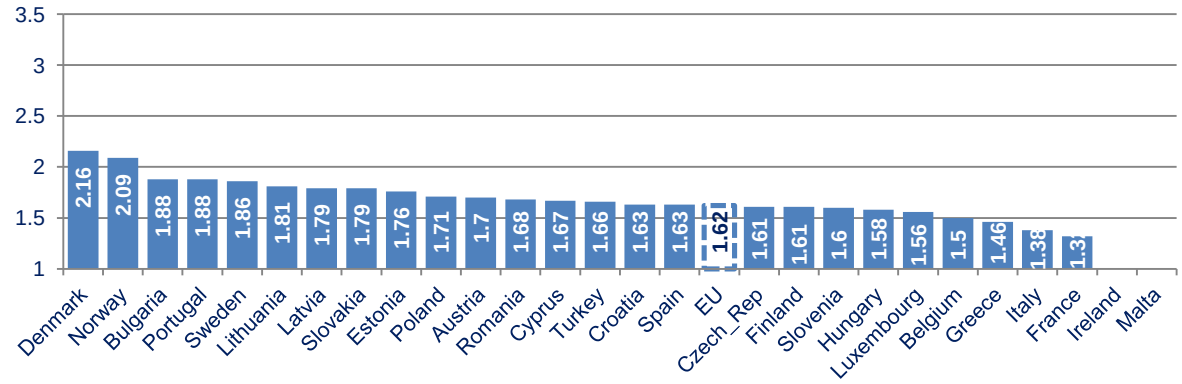


Fig. 3.8c: Student's ICT based activities frequency during lessons at GRADE 11 in vocational education (mean scores on a scale from 1 to 4; by country, 2011-12)



❖ Student *versus* teacher-centered learning (with or without ICT)

Similarly to what has been done for teachers ICT based activities, a factorial analysis of the items part of question ST14 investigating the issue students versus teacher-centered learning has been processed. This question proposes a list of student or teacher -centered activities and asks the students to specify to which extent each activity is implemented.

Fig. 3.9a to 3.9c present the division of class activities declared by students according to these two approaches, on a scale from 1 to 4 (1 none; 2: a little; 3: sometimes; and 4: a lot) representing the extent of their implementation.

At all grades and in all countries, teacher-centered activities declared by students are implemented up to a higher extent compared to student-centered activities. At EU level, the mean scores vary from 2,63 to 2,75 concerning teacher-centered approach compared to 2,36 to 2,42 concerning student-centered approach, depending the grade. Conversely to what comes out of the teachers answers declaring student-centered activities ore frequent, students consider the opposite.

When looking at differences by country, at grade 4, 8 and 11 in general education, student-centered approach appears to be implemented up to a higher extent in group of countries composed by Sweden, Estonia, Spain, Norway and Turkey.

Fig. 3.9a: Student and teacher-centered activities declared by students at grade 8
(mean scores on a scale from 1 to 4; by country; 2011-12)

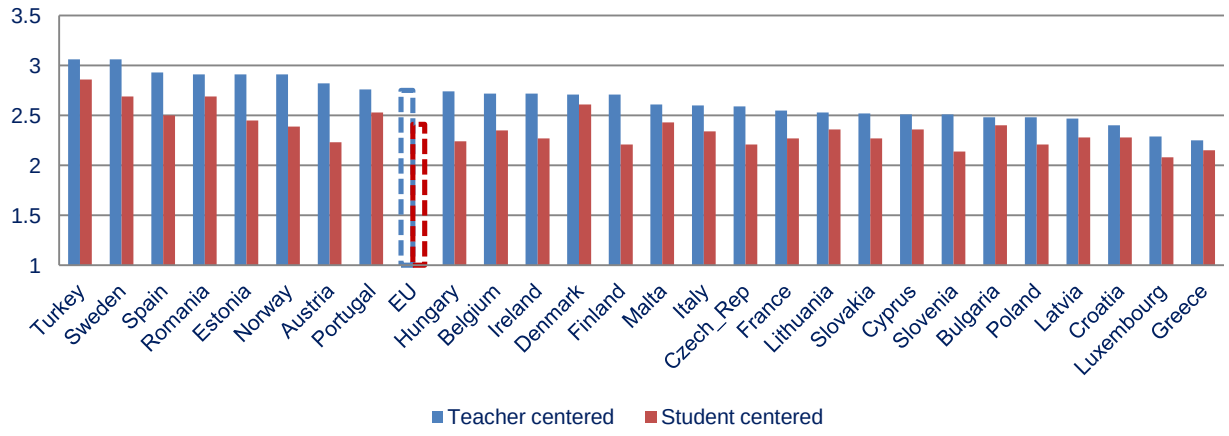


Fig. 3.9b: Student and teacher-centered activities declared by students at grade 11 in general education (mean scores on a scale from 1 to 4; by country; 2011-12)

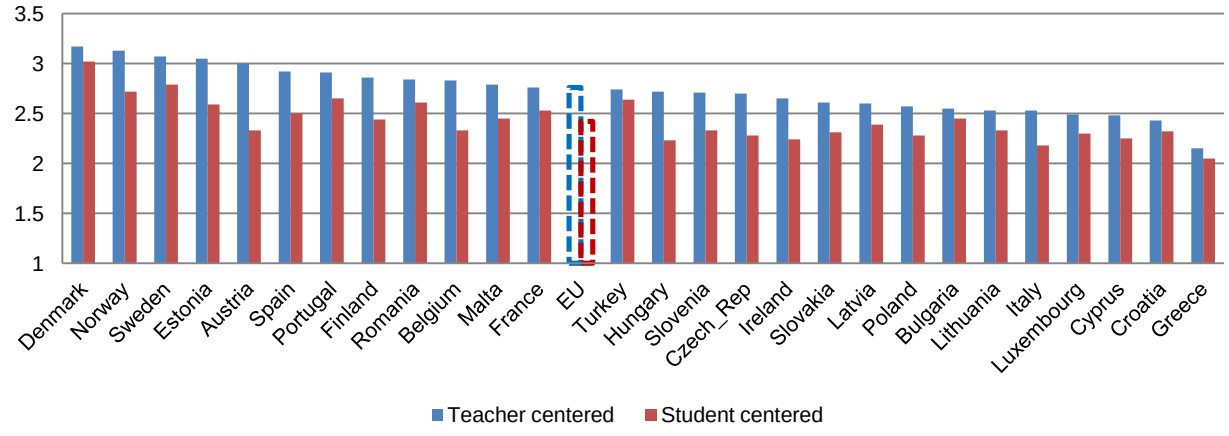
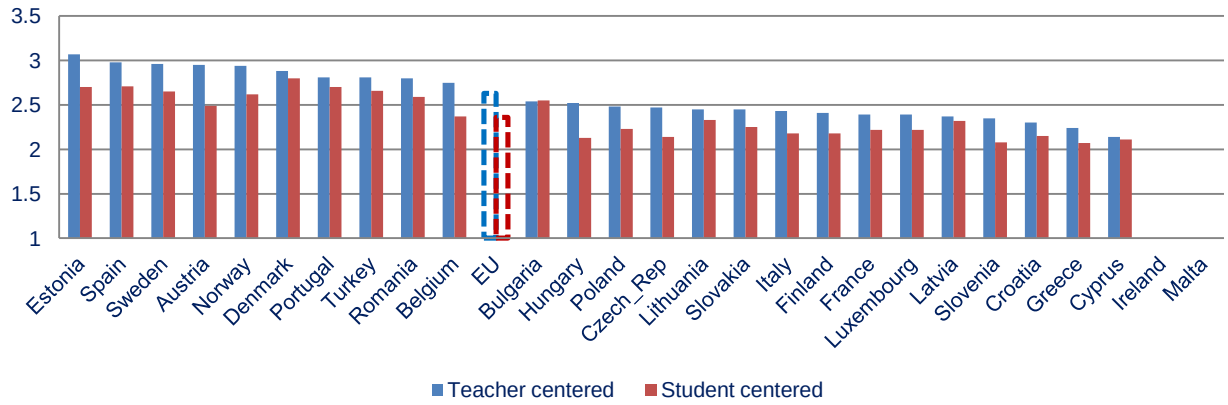


Fig. 3.9c: Student and teacher-centered activities declared by students at grade 11 in vocational education (mean scores on a scale from 1 to 4; by country; 2011-12)



4: COMPETENCE AND SKILLS

It is important for all teachers to have the necessary knowledge and skills to integrate ICT into their daily teaching practice, as we know from research that ICT can improve the effectiveness of learning and learning outcomes, when appropriate approaches are used. Research informs us that there is a relationship between teachers' digital competence and their use of ICT in the classroom. Consequently, participation in professional development activities can significantly influence teachers' ICT use. Informal methods of training, blended training and training that relates to real classroom settings are favoured by teachers. Incoming teachers have not been sufficiently trained in the pedagogical use of ICT, and teachers generally are more traditional users of the internet and lack knowledge in how far to exploit social media tools for learning.

We know from research undertaken in this area that more experience in using technologies is positively related to the acquisition of students' digital skills and to their confidence in using these tools. Despite the increased use of social networking by students, the wider learning potential that these services can provide in terms of collaboration and co-construction of knowledge are rarely exploited by students. Few national curricula refer to internet safety issues, the critical use of ICT, and ICT as a collaborative tool for learning at primary level. At secondary level, these issues appear more frequently in national curricula, with the aim of students becoming active, creative and critical content producers.

This section explores teachers' professional development in the area of ICT, as well as teachers' and students' confidence in using various ICT skills, as reported by them.

SUMMARY OF FINDINGS:

- **Concerning teachers' professional development:** At EU level, only around 25% of students at grade 8 and 11 (general and vocational education) and 30% at grade 4 are taught by teachers for whom ICT training is compulsory.

  In **Lithuania** around 75% and in **Romania** around 65% of students at all grades are taught by teachers for whom it is compulsory to participate in ICT training, while 13% or less of students are taught by such teachers in **Luxembourg, Austria** and **Italy**.

  Although ICT training is included in initial teacher education in over half of all EU countries, implementation varies according to the higher education institutions providing the training, and a large portion of EU countries still have complete institutional autonomy in this area. In view of today's need for all teachers to integrate ICT into their daily teaching practice because of the known associated benefits when appropriate approaches are used, countries might be wise to ensure that ICT training is made a compulsory component of all initial teacher education programmes.

  At EU level, around 75% of students at all grades are taught by teachers who have engaged in personal learning about ICT in their own time. Other ways of teachers engaging in ICT professional development include ICT training provided by school staff, which around 50% of students at all grades benefit from, and participation in online communities, benefitting around 30% of students across grades.

  In **Norway** around 80% of students at all grades are taught by teachers who have undertaken ICT training provided by school staff, while only around 10% of students in **France** (at grade 4), **Luxembourg** (at grades 4 and 8), and **Turkey** (at grade 11 vocational education) are taught by such teachers. **Slovenia** stands out as the only country which has around 50% of students across all grades who are taught by teachers who have participated in online communities for professional exchanges with other teachers, during the last two years. Conversely, only 10% or less of students at grades 4 and 8 in the **Czech Republic** and **Luxembourg,** in **Belgium** (particularly at grades 8 and 11 general education), and in **France** at grade 11 (vocational education) are taught by teachers who actively participate in online learning communities.
  We know that teachers often have difficulty in implementing ICT into T&L, despite having access

and positive attitudes towards it, and therefore require support not only from the technical point of view but also from the pedagogical perspective. Increasing the training provided by school staff and others to teachers of all disciplines should therefore be encouraged. Moreover, we know that online professional collaboration between teaches can lead to effective changes in their practice, and a deeper awareness of their own professional development needs. Although centrally managed online resources such as blogs, forums or other social networking sites facilitating professional exchanges between teachers are widely available in Europe, they are a relatively new way for teachers to engage in professional development, and as our survey results show, only a minority are actually using them and exploiting their benefits. There is a need therefore to further promote such online platforms and the opportunities they can afford to the European teaching community.

At EU level, around 60% of students at most grades are taught by teachers who have participated in equipment-specific training, and around 50% of students at most grades are taught by teachers who have undertaken courses on the pedagogical use of ICT in the past two school years. Subject-specific training is less commonly participated in by teachers, rating at around 30% across all grades, and only around 20% of students are taught by teachers who have participated in advanced courses on applications or the internet, and multimedia training.

In **Lithuania** around 70% of students across all grades are taught by teachers who have undertaken courses on the pedagogical use of ICT, while this is the case for only around 20% of students in **Turkey**. **Estonia** stands out as the country with around 55% of students at most grades being taught by teachers who have participated in subject-specific training on learning applications, such as tutorials and simulations, in the past two years. In **France, Portugal, Denmark, Sweden, Luxembourg** and **Belgium**, 15% or less of students at two grades or more are taught by such teachers.

While training teachers how to use specific ICT equipment, the internet and general applications is important, we know that without feeling competent in how to integrate ICT into teaching appropriately, both from the pedagogical perspective as well as the specific view point of the subject being taught, teachers are less likely to use ICT in the classroom for T&L. The need therefore for more professional development opportunities on the pedagogical use of ICT and particularly subject-specific training on learning applications, currently pursued by fewer teachers, deserves underlining.

- **Concerning teachers' confidence in using ICT skills:** Teachers and students were asked to rate their level of confidence in their ability to perform a list of ICT related tasks (later categorized as operational skills, social media skills, and additionally for students, the ability to use the internet safely and responsibly, after subjecting the data to factorial analysis) according to a Likert scale ranging from 'none' to 'a lot'.

  At EU level, the mean score across grades of students taught by teachers declaring confidence in using social media skills is consistently substantially lower than that of students taught by teachers declaring confidence in their operational skills.

  At country level, the mean score of students taught by teachers declaring confidence in their operational skills is high across almost all grades in **Portugal** and **Austria**. Students in **Belgium** and **Croatia** across most grades however, are taught by teachers who have a relatively lower level of confidence in their ability to perform operational tasks using ICT. **Estonia and Finland** stand out as countries where a relatively high mean score of students at all grades are taught by teachers who express a certain degree of confidence in their social media skills, while the mean scores of students across almost all grades is rather low in **Latvia,** the **Czech Republic** and **Belgium**.

  Although measuring teachers' confidence in relation to various ICT skills as this survey does, says nothing about teachers' actual competence in these areas, it is nevertheless important as it can be said to have some potential influence on the frequency with which teachers use ICT based activities for T&L within the classroom. This is confirmed by the positive correlation found in the data of this survey between teachers' confidence in their operational skills and social media skills

and the frequency with which they use ICT based activities across all grades. Correlation analysis also shows that participation in professional development, and to a lesser extent, the amount of time spent on such training, is also positively correlated to teachers' confidence in both their operational and social media skills.

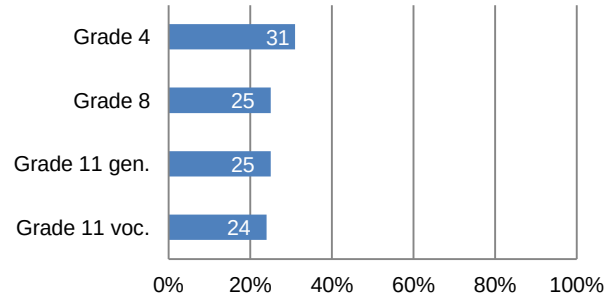
- **Concerning students' confidence in using ICT skills:** At EU level, students across all grades have a higher mean score in their confidence to use the internet safely and a lower mean score in their confidence to use social media skills than in any other ICT skill they were asked to express their level of confidence in. Regardless of the type of ICT skill in question, grade 11 (general education) students' mean score in their confidence to use them is consistently higher, while grade 8 students' mean score is consistently lower.

  Generally speaking, students at all grades across countries declare a rather high level of confidence in their ability to use the internet safely, with students across all grades in **Portugal, Poland, Norway, Lithuania, Slovakia, Estonia** and the **Czech Republic** scoring particularly highly. Conversely, students across all grades in **Bulgaria, Greece, Latvia, Cyprus** and **Luxembourg** have relatively low mean scores in their confidence to use the internet safely.

  Students across all grades in **Poland** have a high mean score with regards their confidence in using the internet responsibly, while in **Luxembourg** at grade 8 students have a particularly low mean score, as do students in **Cyprus** at grade 11 (vocational education).

TEACHERS' PROFESSIONAL DEVELOPMENT

Fig. 4.1: Teachers' compulsory participation in ICT training (in % of students; EU level; 2011-12)



According to Eurydice's 2011 Key Data report on learning and innovation through ICT at school in Europe, ICT training is included in initial teacher education in over half of EU countries. However, it is noted that in practice implementation may vary in these countries according to the higher education institutions providing the training, and the EU's remaining countries have complete institutional autonomy in this area. The current survey shows that at EU level, according to what teachers report (see Fig. 4.1), only around 25% of students are taught by teachers for whom ICT training is compulsory, with this being the case for a slightly higher percentage of students at grade 4.

Figure 4.2 shows that countries vary to some degree regarding the percentage of students taught by teachers for whom participation in ICT training is compulsory, and differences are also apparent within countries between the various grades. Interestingly, more than half of the countries surveyed show the highest percentage at grade 4. It is noteworthy that in Lithuania around 75% of students and in Romania around 65% at all grades are taught by teachers for whom it is compulsory to participate in ICT training. At the other extreme, the percentage of students being taught by teachers for whom it is compulsory to participate in ICT training is particularly low at grades 4 and 8 in Luxembourg, and is also very low in Austria and Italy across grades.

Fig. 4.2 - grade 4: Teachers' compulsory participation in ICT training (in % of students; by country; 2011-12)

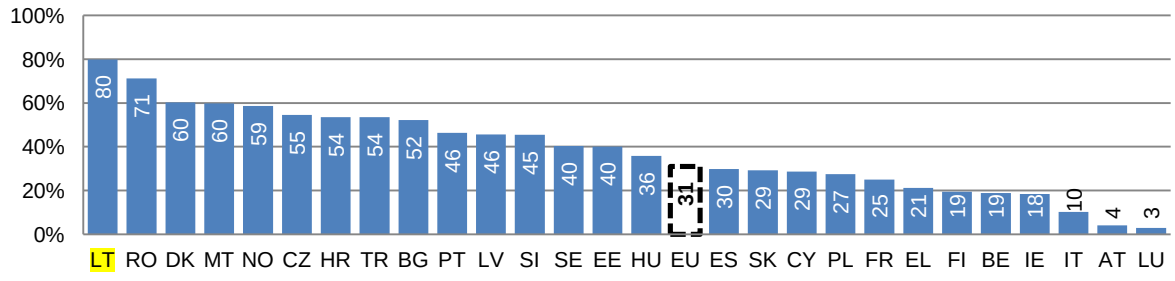


Fig. 4.2 - grade 8

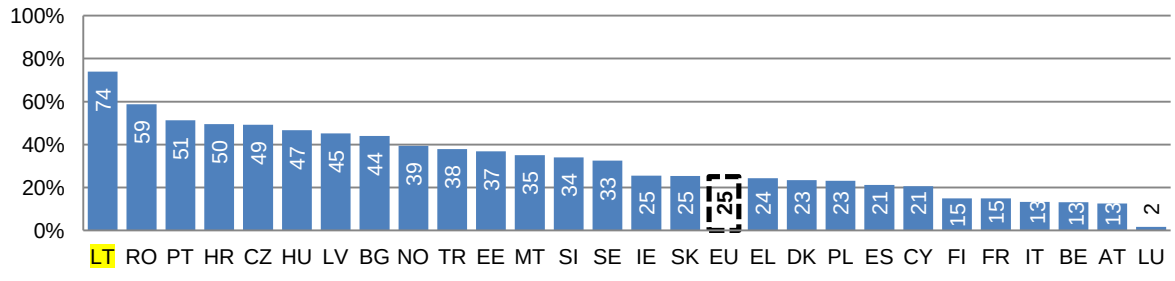


Fig. 4.2 - grade 11 (general education)

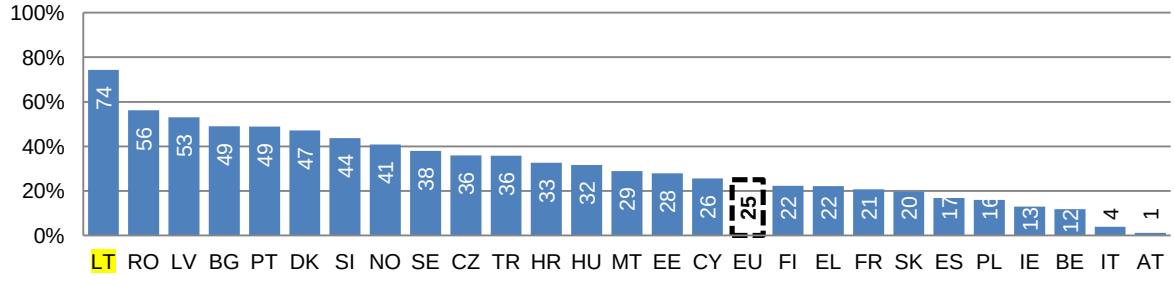
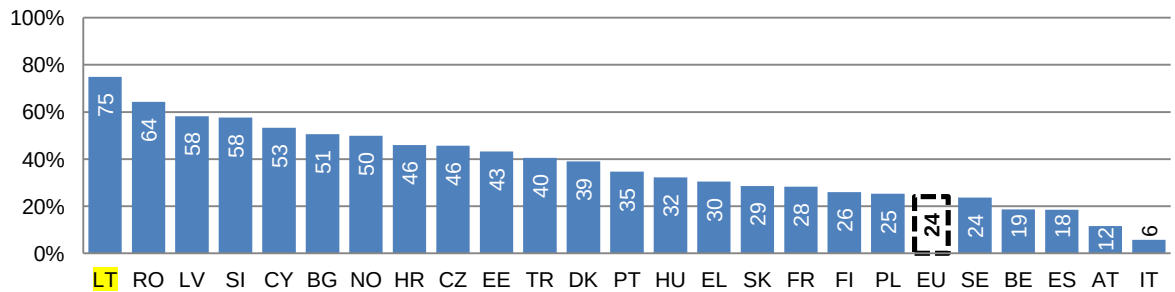


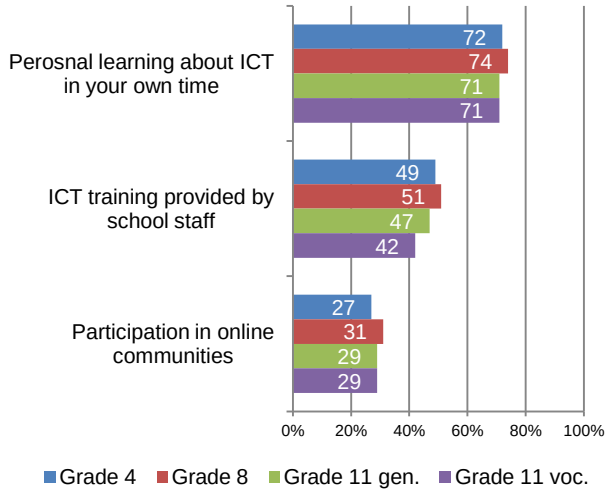
Fig. 4.2 - grade 11 (vocational education)



As illustrated by Figure 4.3a, around 75% of students at all grades are taught by teachers who have engaged in personal learning about ICT in their own time. This personal, informal learning taking place voluntarily and during teachers' own time appears to account for a significant portion of teachers' professional development in ICT, considering that compulsory ICT training is only undertaken by teachers of around 25% students at almost all grades (as shown in Figure 4.1), and similarly low results are observed for many of the formally organized ICT training courses asked about (see Figure 4.3b).

A study on indicators of ICT in primary and secondary education (Pelgrum, 2009) has shown that teachers often have difficulty in implementing ICT in the teaching and learning process and require support in this. According to the TIMMS 2007 international survey, support staff available to help teachers not only from the technical point of view but also in the pedagogical use of ICT, are widely available in European schools. The results of the current survey show that around 50% of students at grades 4, 8 and 11 (general education) are taught by teachers who have participated in ICT training provided by school staff, while the percentage slips slightly to around 40% at grade 11 (vocational education).

Fig. 4.3a: Means through which teachers have engaged in ICT related professional development during the past two years (in % of students; EU level; 2011-12)

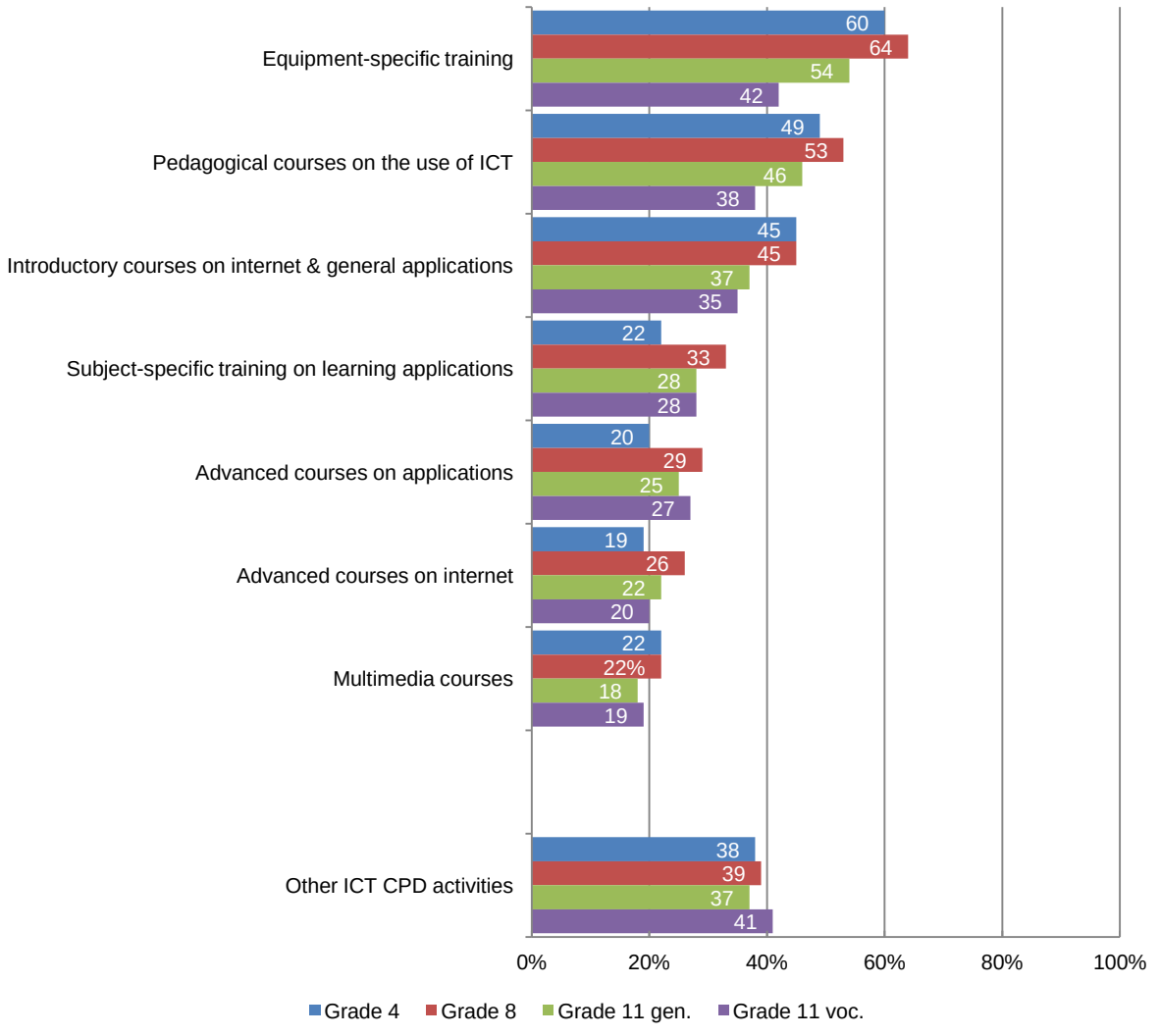


The analysis of teachers' professional development in the OECD's TALIS report emphasizes the importance of professional collaboration, as it often leads to a change in teachers' practice and further awareness of their own development needs, leading to participation in appropriate professional development activities. Eurydice's 2011 Key Data report on learning and innovation through ICT illustrates that centrally promoted online resources are widely available to support teachers in their use of ICT for innovative teaching and learning in the classroom. The majority of European countries have online platforms, blogs, forums or other social networking sites that facilitate the sharing of experience and exchange of materials between teachers. Our current survey shows that around 30% of students at all grades are taught by teachers claiming they have participated in online communities to exchange professionally with other teachers.

Eurydice's Key Data report states that where regulations concerning the curriculum for initial teacher education exist, they usually require teachers to develop the skills needed for the pedagogical use of ICT in the teaching and learning process, as well as for the effective use of the internet, and the application of ICT to the teaching of specific subjects. These are also areas commonly treated by continuing professional development courses attended by teachers, as shown in Figure 4.3b. Interestingly however, when it comes to formally organized training courses for teachers, more students at EU level are taught by teachers that have participated in equipment-specific training, than any other type of professional development related to ICT (see Fig. 4.3b). Around 60% of students at all grades (except for grade 11 vocational education where the number is lower) are taught by teachers who have participated in this type of training, which might include how to use an interactive whiteboard or laptop etc.

At EU level, around 50% of students at grades 4, 8 and 11 (general education) and around 40% at grade 11 (vocational education) are taught by teachers who in the past two school years have undertaken courses on the pedagogical use of ICT for teaching and learning purposes. With regards to introductory training courses on the use of the internet and general applications (e.g. basic word processing, spreadsheets, presentations etc.), roughly 40% of students across all grades are taught by teachers who have participated in this type of training in the past two school years. Subject-specific training is less commonly participated in by teachers, rating at around 30% across all grades, and advanced courses on applications or the internet, and multimedia training even less so.

Fig. 4.3b: Types of ICT related professional development undertaken by teachers during the past two years (in % of students; EU level; 2011-12)



Figures 4.4 to 4.6 illustrate how countries compare with regards to teachers' modes of engagement in ICT related professional development, during the past two years. In Estonia, Bulgaria, Lithuania and Latvia as many as around 90% of students at all grades are taught by teachers who have used their own time to engage in personal learning about ICT during the past two school years (see Fig. 4.4). By contrast, only around 40% of Finnish students are taught by teachers who have engaged in personal ICT learning in their own time during the past two academic years.

Fig. 4.4 - grade 4: Teachers' involvement in personal learning about ICT in their own time (in % of students; by country; 2011-12)

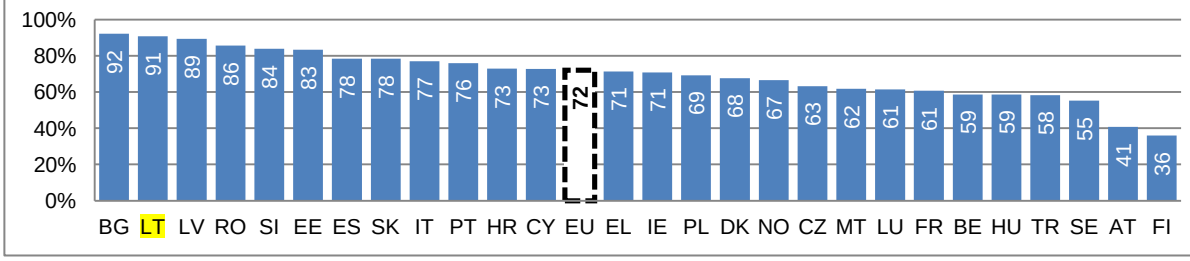


Fig. 4.4 - grade 8

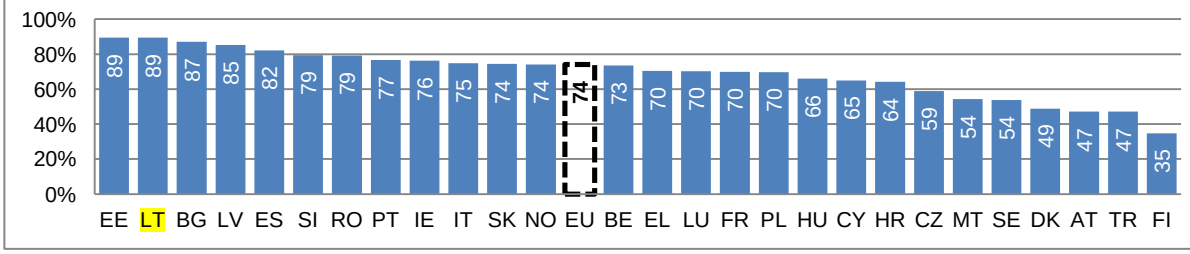


Fig. 4.4 - grade 11 (general education)

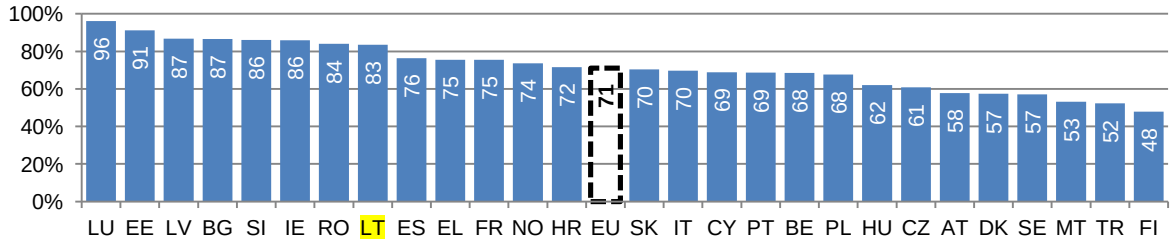
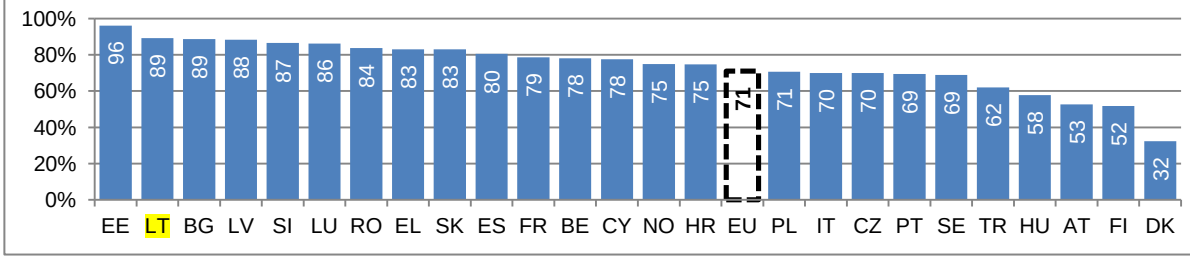


Fig. 4.4 - grade 11 (vocational education)



In Norway around 80% of students at all grades are taught by teachers who have undertaken ICT training provided by school staff (see Fig. 4.5). In Croatia, Slovenia, Ireland, Spain and Estonia around 75% of students at one grade or more are taught by teachers in this situation. Conversely, only around 20% of students are taught by teachers who have been trained to use ICT by school staff in Greece and Turkey at grade 11 (general education), and Italy at grade 11 (vocational education), and even fewer in France (at grade 4), Luxembourg (at grades 4 and 8), and Turkey (at grade 11 vocational education), where only around 10% of students are taught by such teachers.

Fig. 4.5 - grade 4: Teachers' participation in ICT training provided by school staff (in % of students; by country; 2011-12)

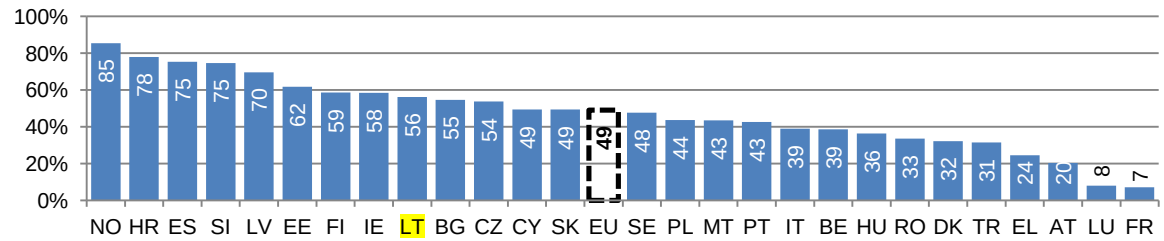


Fig. 4.5 - grade 8

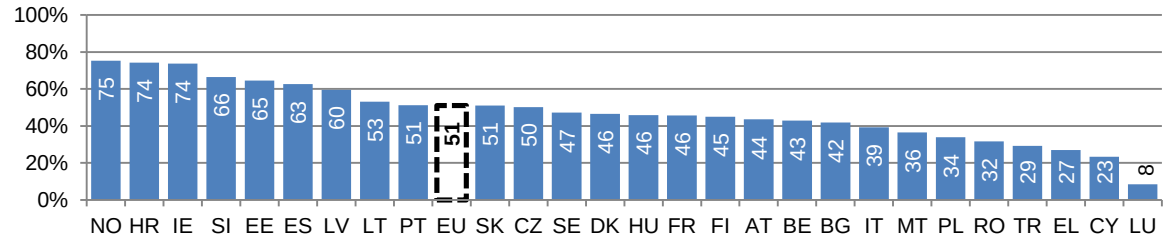


Fig. 4.5 - grade 11 (general education)

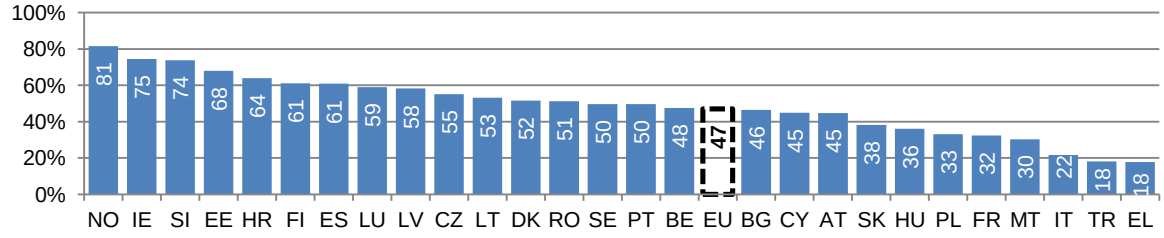


Fig. 4.5 - grade 11 (vocational education)

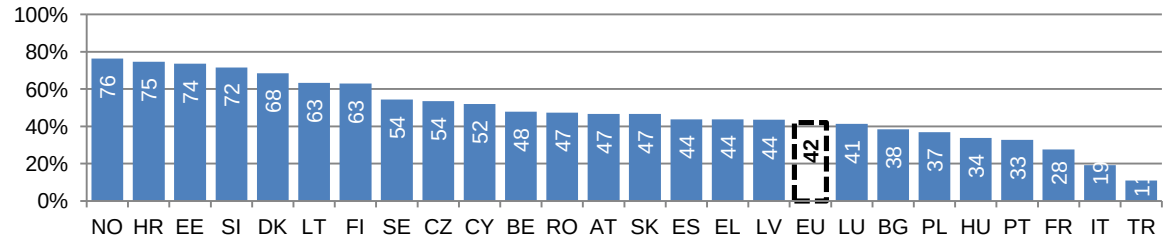


Figure 4.6 shows that Slovenia is the only country which has around 50% of students across all grades who are taught by teachers who have participated in online communities for professional exchanges with other teachers, during the last two years. Denmark has an equally high percentage of students in this situation at grade 11 (general education), and as many as 78% of students at grade 11 (vocational education).

Conversely, only 10% or less of students at grades 4 and 8 in the Czech Republic and Luxembourg are taught by teachers who actively participate in professional forums and blogs or other online learning communities. This low percentage is also evident in Belgium, particularly at grades 8 and 11 (general education), and in France at grade 11 (vocational education).

Fig. 4.6 - grade 4: Teachers' participation in online communities for professional discussions with other teachers (in % of students; by country; 2011-12)

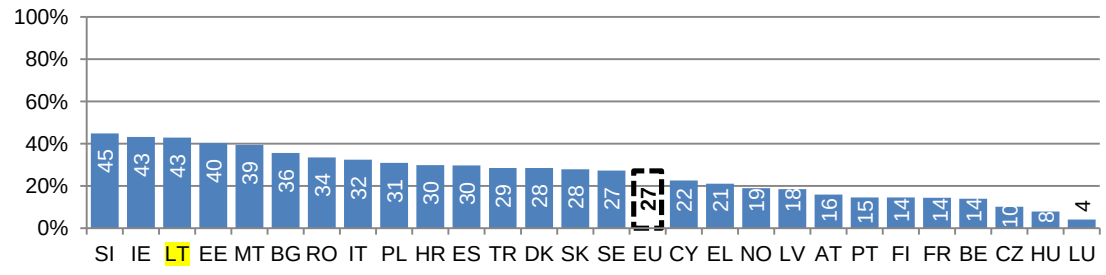


Fig. 4.6 - grade 8

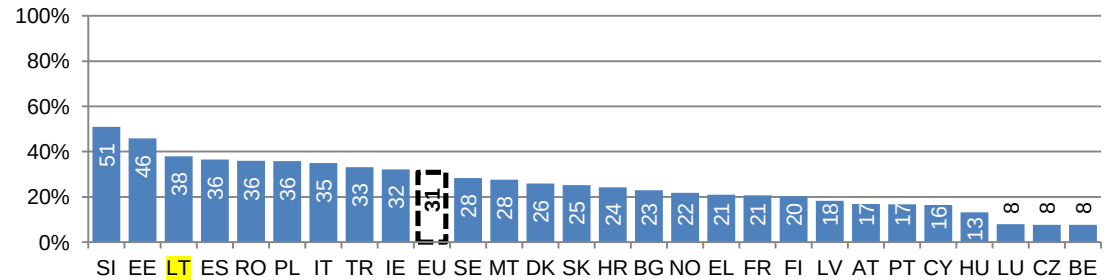


Fig. 4.6 - grade 11 (general education)

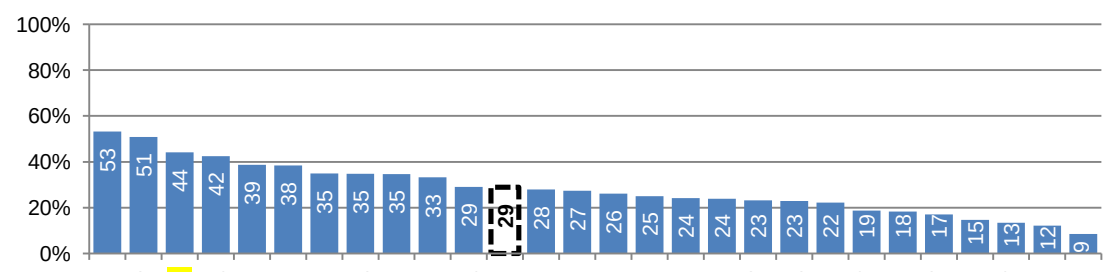
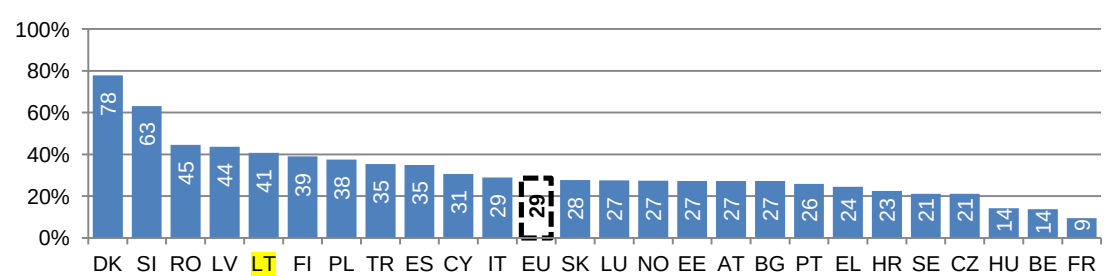


Fig. 4.6 - grade 11 (vocational education)



In Lithuania around 70% or more of students across all grades are taught by teachers who have undertaken courses on the pedagogical use of ICT (see Figure 4.7). Roughly the same percentage of students are in this situation in Spain and Estonia at grade 4, Slovenia at grade 11 (general and vocational education) and Latvia at grade 11 (general education). By contrast, only around 20% of students at all grades in Turkey are taught by teachers who have participated in professional development courses on the pedagogical use of ICT.

Fig. 4.7 - grade 4: Teachers' participation in courses on the pedagogical use of ICT in teaching and learning (in % of students; by country; 2011-12)

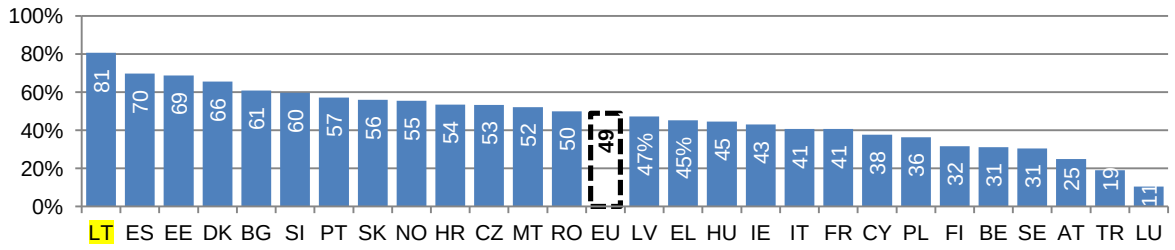


Fig. 4.7 - grade 8

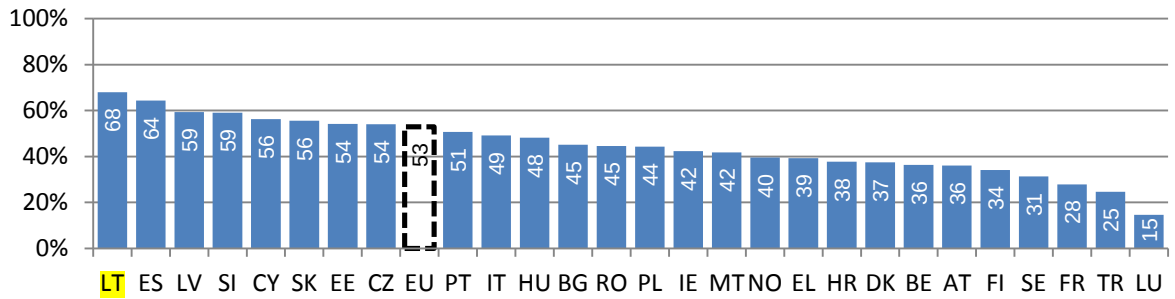


Fig. 4.7 - grade 11 (general education)

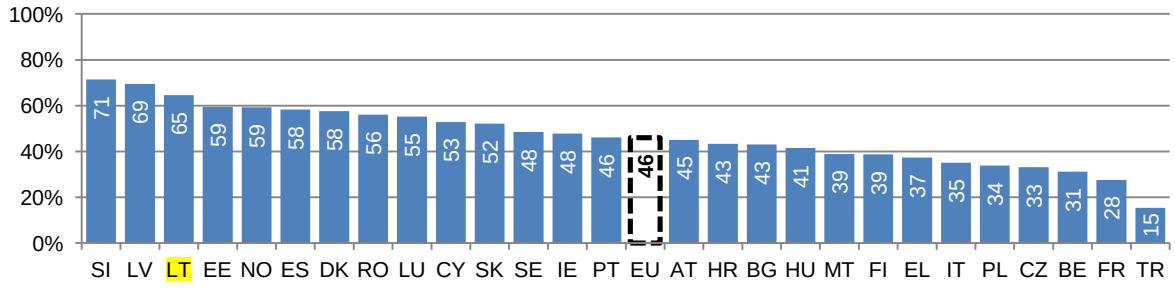
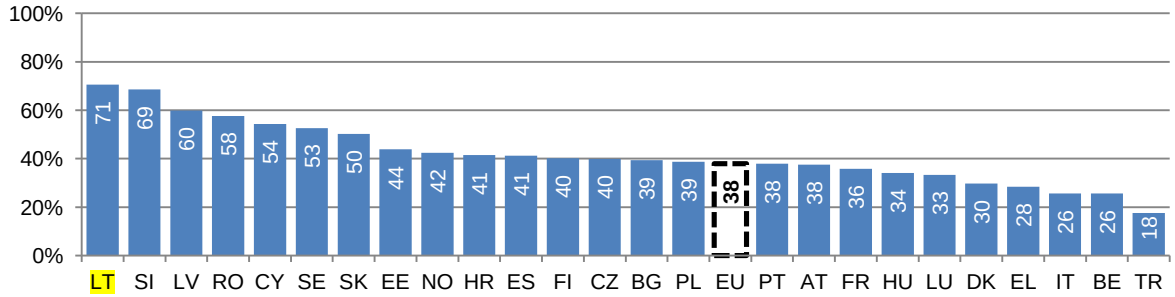


Fig. 4.7 - grade 11 (vocational education)



Estonia stands out in Figure 4.8 as the country with around 55% of students across all grades (excluding grade 11 vocational education, where only 14% are concerned) who are taught by teachers who have participated in subject-specific training on learning applications, such as tutorials and simulations, in the past two years. Around 50% of students in Ireland and Slovenia are also in this situation at grade 11 (general education). Countries where there are 15% or less of students at the minimum of two grades taught by teachers who have engaged in subject-specific training to integrate ICT into their teaching include: France, Portugal, Denmark, Sweden, Luxembourg and Belgium.

Fig. 4.8 - grade 4: Teachers' participation in subject-specific training on learning applications (in % of students; by country; 2011-12)

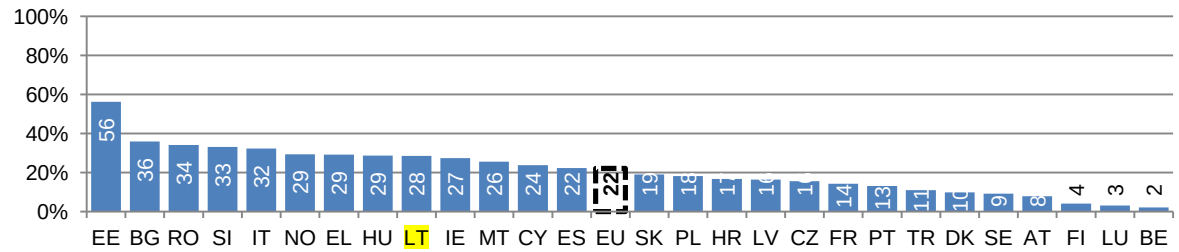


Fig. 4.8 - grade 8

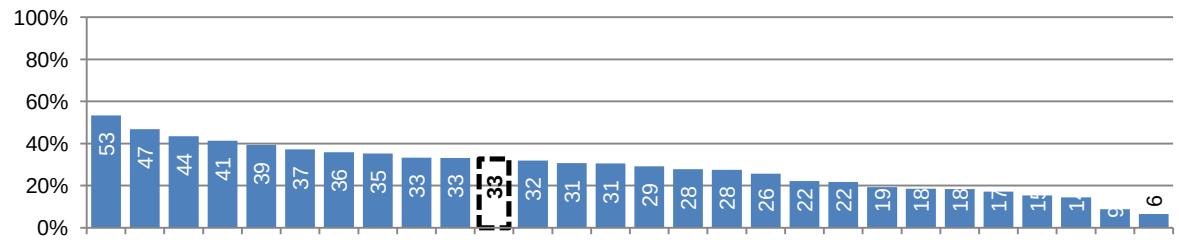


Fig. 4.8 - grade 11 (general education)

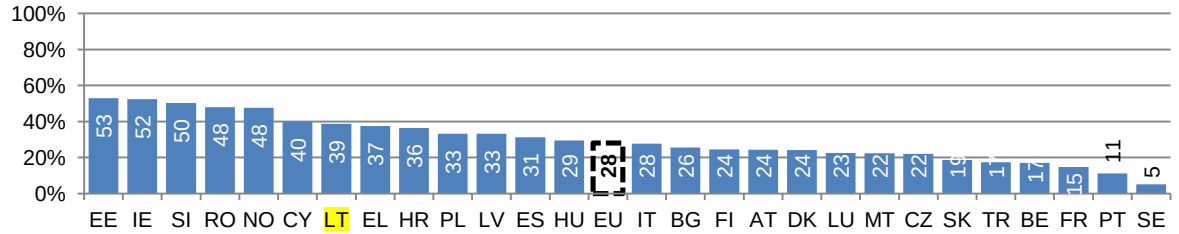


Fig. 4.8 - grade 11 (vocational education)

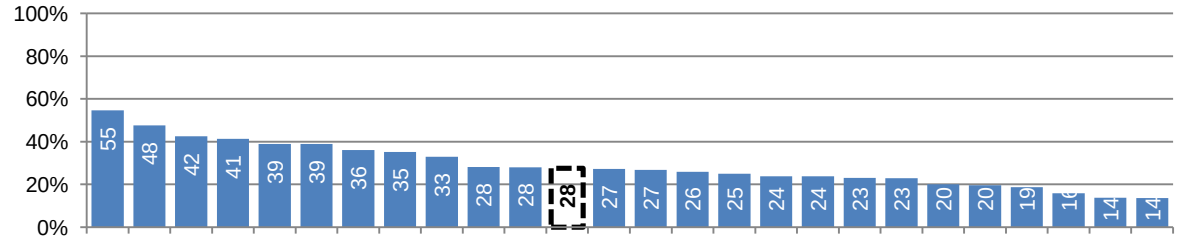
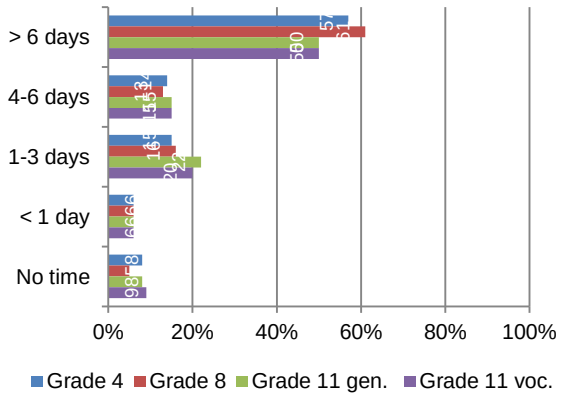


Fig. 4.9: Time invested by teachers in professional development activities during the past two years (in % of students; EU level; 2011-12)



According to Figure 4.9, at EU level around 60% of students at grades 4 and 8 are taught by teachers who report having spent more than six days engaged in any of the professional development activities mentioned in Figure 4.3, during the past two years. For students at grade 11 (both in general and vocational education) the result is a little lower with around 50% of students being in this situation. Roughly only 10% of students at all grades are taught by teachers who have spent less than one day or no time at all in the past two years on any of the professional development activities described above.

At country level, around 75% of students at grades 4, 8 and 11 (general education) in Spain and Portugal are taught by teachers who reported having spent more than 6 days on professional development activities related to ICT (see Fig. 4.10).

Nearly as many students are taught by teachers reporting the same in Poland (at grades 4 and 8), Romania (grades 4 and 11 vocational education), Slovakia and the Czech Republic (at grade 11 vocational education). Conversely, only around 10% of students in Finland and Luxembourg at grades 4 and 8, and in France at grade 4, are taught by teachers in this situation.

Fig. 4.10 - Teachers reporting having spent more than 6 days on ICT related professional development activities during the past two years (in % of students; by country; 2011-12)

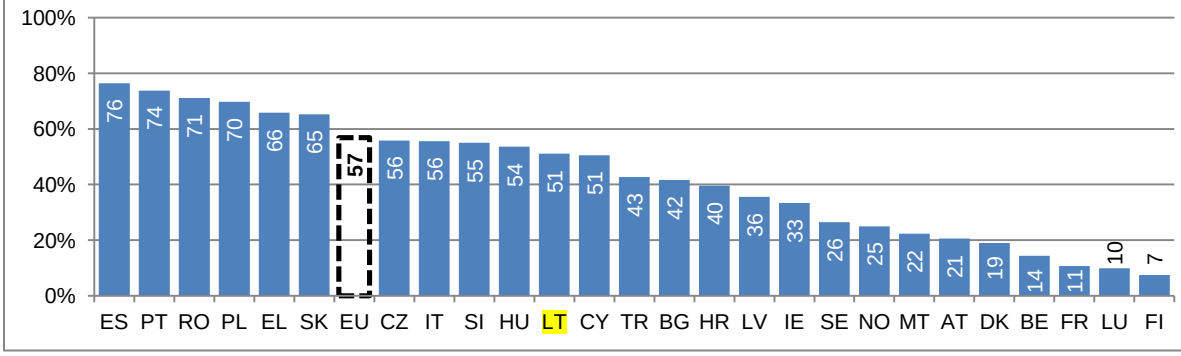
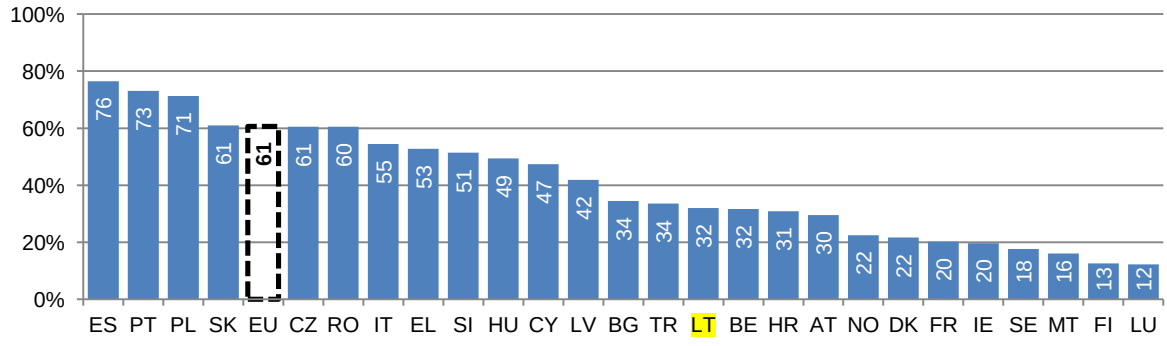


Fig. 4.10 - grade 8



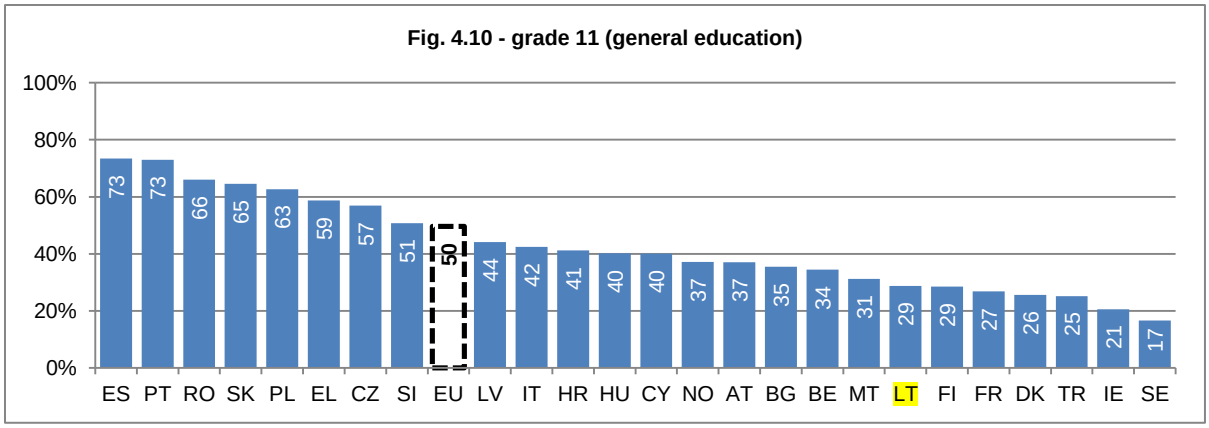


Fig. 4.10 - grade 11 (general education)
100%
80%
60%
40%
20%
0%
73 73 66 65 63 59 57 51 50 44 42 41 40 40 37 37 35 34 31 29 29 27 26 25 21 17
ES PT RO SK PL EL CZ SI EU LV IT HR HU CY NO AT BG BE MT LT FI FR DK TR IE SE

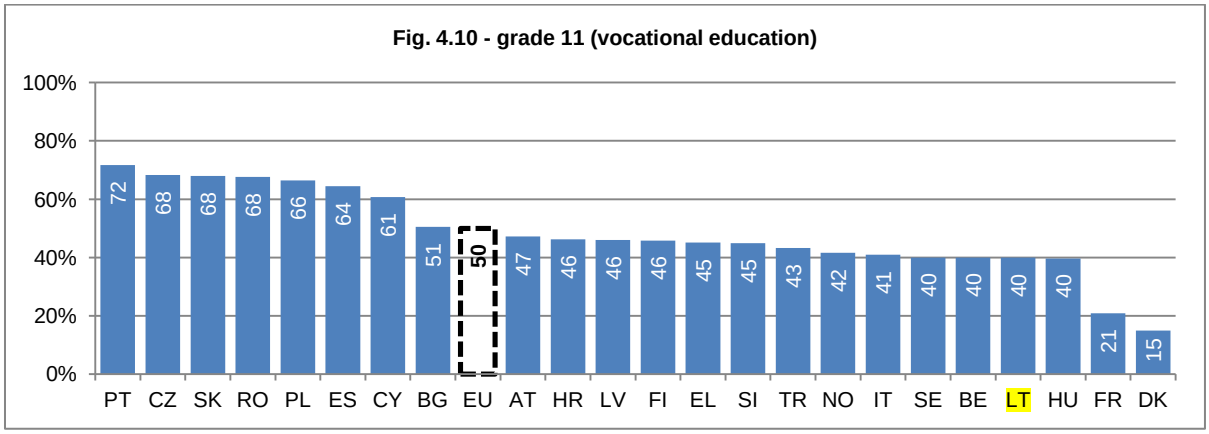


Fig. 4.10 - grade 11 (vocational education)
100%
80%
60%
40%
20%
0%
72 68 68 68 66 64 61 51 50 47 46 46 46 45 45 43 42 41 40 40 40 40 21 15
PT CZ SK RO PL ES CY BG EU AT HR LV FI EL SI TR NO IT SE BE LT HU FR DK

Turkey stands out for having around 35% of students across all grades being taught by teachers who have had no ICT training at all during the past two school years (see Fig. 4.11). Roughly 30% of students at grade 4 in Luxembourg, Belgium and France are in this situation, and around 25% of students in Malta, at grades 8 and 11 general education, and in Italy at grade 11 (vocational education).

Fig. 4.11 - grade 4: Teachers reporting having spent no time at all on ICT related professional development activities during the past two years (in % of students; by country; 2011-12)

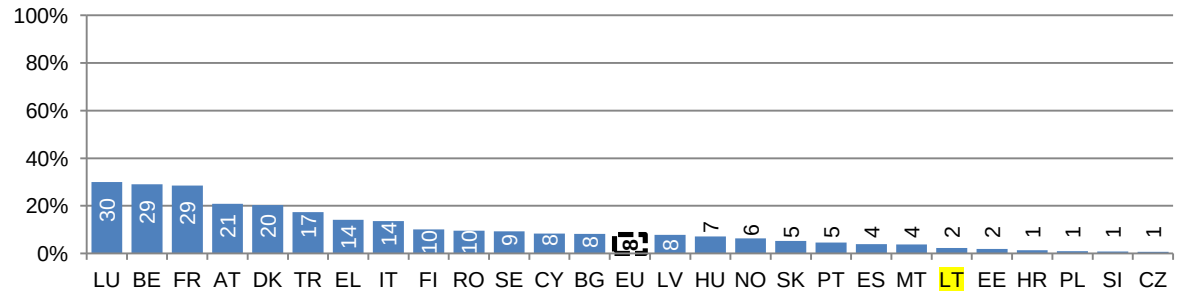


Fig. 4.11 - grade 8

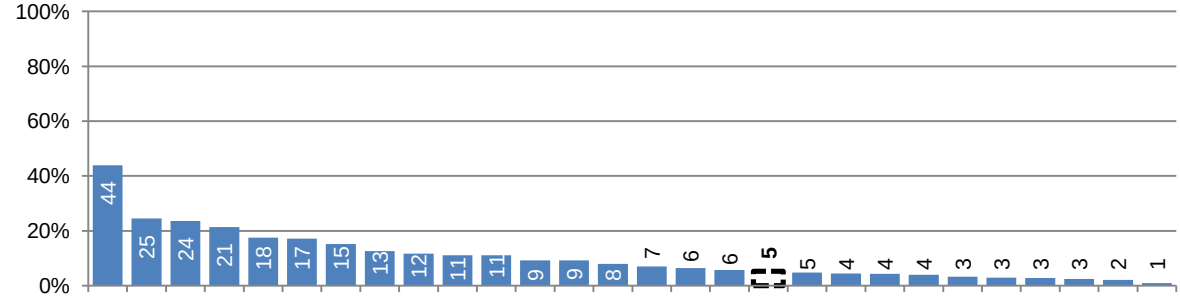


Fig. 4.11 - grade 11 (general education)

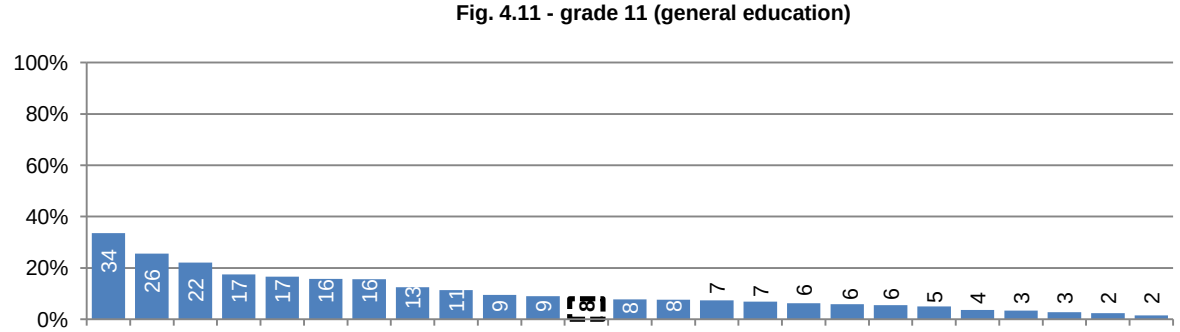
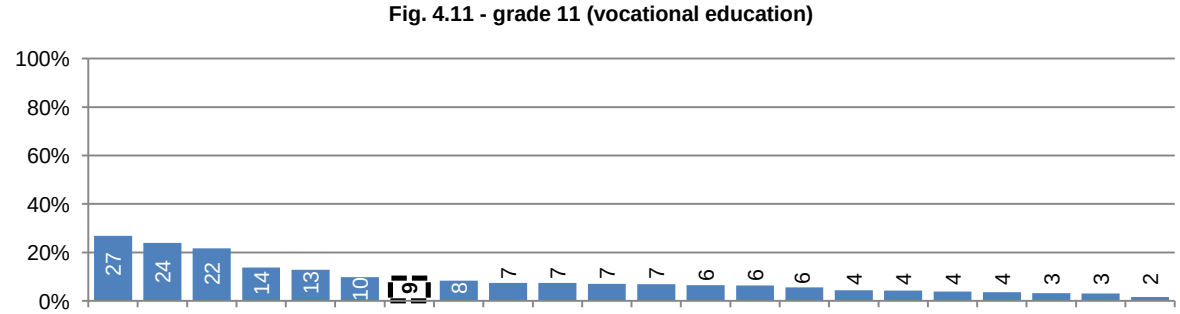


Fig. 4.11 - grade 11 (vocational education)



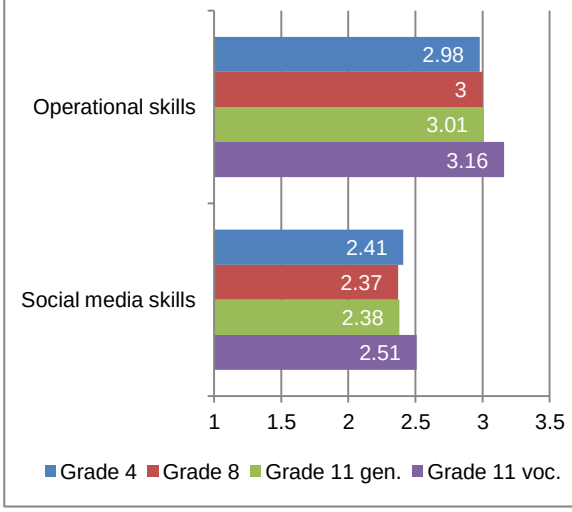
TEACHERS' CONFIDENCE IN USING ICT SKILLS

Teachers were asked to rate their level of confidence in their ability to perform twenty ICT related tasks according to a Likert scale ranging from 'none' to 'a lot'. By subjecting the data to factorial analysis two scales emerged from the twenty items. These included what we categorized as operational skills and social media skills.

For the purposes of this survey, teachers' operational skills are defined to comprise the following: production of text using a word processing programme; capturing and editing digital photos, movies or other graphics; editing online text containing internet links and images; creating a database; editing a questionnaire online; emailing a file to someone/another student or teacher; organizing computer files in folders and sub-folders; using a spreadsheet; using a spreadsheet to plot a graph; creating a presentation with simple animation functions; creating a presentation with video or audio clips; and downloading and installing software onto a computer. Teachers' social media skills are defined as consisting in the following: the ability to participate in an online discussion forum; the ability to create and maintain blogs or websites; and the ability to participate in social networks.

Figures 4.12 to 4.19 present results in terms of mean scores on a scale from 1 to 4 (1 being 'none' and 4 being 'a lot').

Fig. 4.12 - Teachers' confidence in their operational and social media skills (mean score of students; EU level, 2011-12)



As Figure 4.12 illustrates, the mean score across grades of students taught by teachers declaring confidence in using social media skills is consistently substantially lower than that of students taught by teachers declaring confidence in their operational skills.

The mean scores of students at grade 11 (vocational education) taught by teachers expressing confidence in their operational skills as well as social media skills is higher compared to the confidence rating in these areas at any other grade in general education.

We observe that the mean score of students being taught by teachers declaring confidence in their operational skills slightly increases as students' age increases, while the mean score of students taught by teachers confident in their social media skills decreases at grade 4, and further still at grades 8 and 11 (general education).

As illustrated in Figure 4.13 below, the mean score of students taught by teachers declaring confidence in their operational skills is high across all grades in Portugal and Austria (except for grade 4 where the mean score is below the EU average). High mean scores are also observed in Luxembourg and Malta at grades 8 and 11 (general education), and in Poland and Ireland, only at grade 4. Conversely, students in Belgium and Croatia across most grades are taught by teachers who have a relatively lower level of confidence in their ability to perform operational tasks using ICT. The situation is similar in Turkey and Lithuania at grade 11 (general education).

Fig. 4.13 - grade 4: Teachers' confidence in their operational skills (mean score of students; by country; 2011-12)

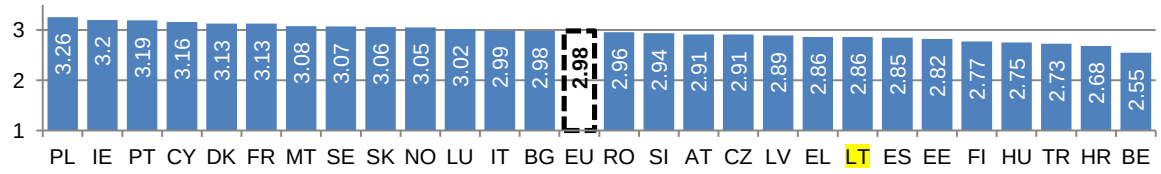


Fig. 4.13 - grade 8

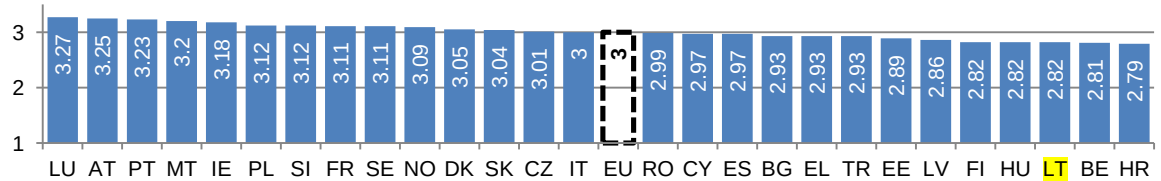


Fig. 4.13 - grade 11 (general education)

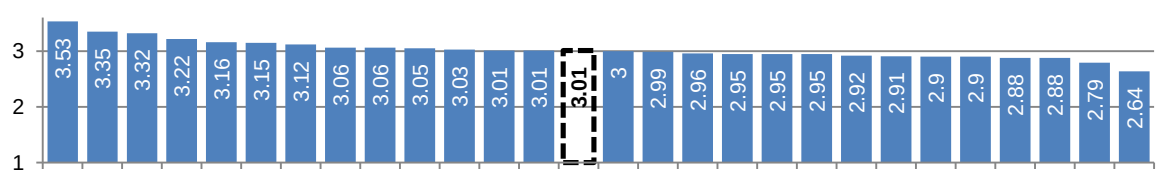
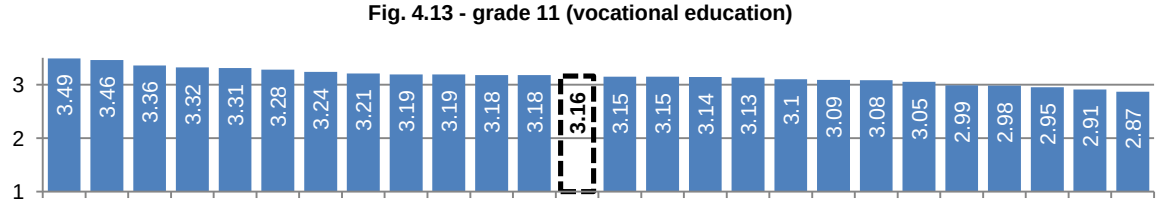


Fig. 4.13 - grade 11 (vocational education)



Estonia and Finland stand out as countries where a relatively high mean score of students at all grades are taught by teachers who express a certain degree of confidence in their social media skills (see Fig. 4.14). The mean score of students at grade 8 and 11 (vocational education) is also rather high in Turkey, as it is at grades 8 and 11 (general education) in Sweden. Particularly high mean scores of students are observed in Portugal and Luxembourg at grade 11 (vocational education), and are also rather high at this grade in Slovakia, Norway and Poland. The mean score of students at grade 11 (general education) taught by teachers who declare confidence in their social media skills is rather high in Malta, as it is at grade 4 in Ireland and Norway.

The situation is different in Latvia, the Czech Republic and Belgium, where the mean score of students across almost all grades is rather low. A similarly low figure is observed at grade 4 in Austria.

Fig. 4.14 - grade 4: Teachers' confidence in their social media skills (mean score by students; by country; 2011-12)

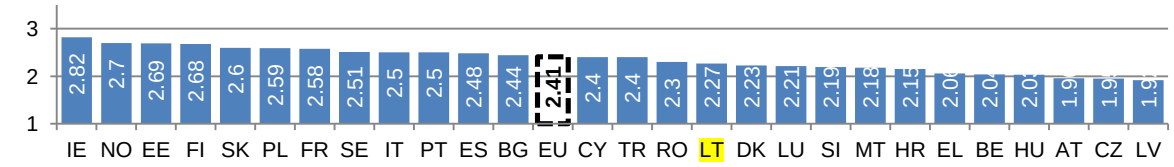


Fig. 4.14 - grade 8

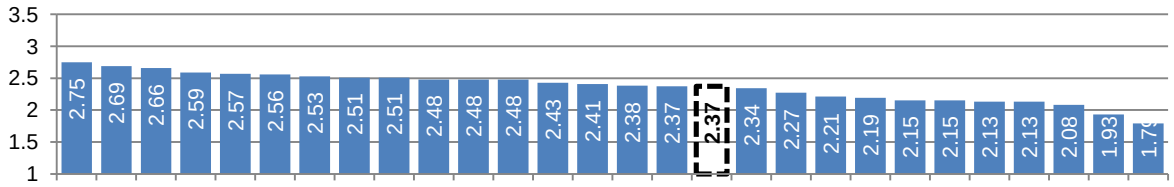


Fig. 4.14 - grade 11 (general education)

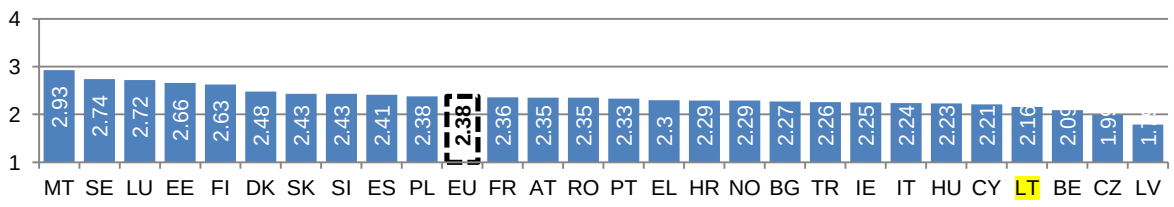
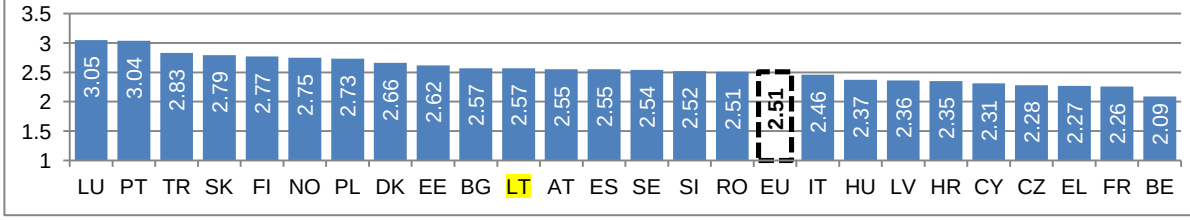


Fig. 4.14 - grade 11 (vocational education)



CORRELATIONS FOUND CONCERNING TEACHERS' CONFIDENCE IN USING ICT SKILLS

In line with the majority of educational research, the current survey considers a correlation amounting to 0.2 or above as a positive correlation.

There is a positive correlation at all grades between teachers' confidence in their operational skills and their participation in professional development (ranging from 0.32 to 0.38), as well as between their confidence in their social media skills and participation in professional development (ranging from 0.22 to 0.36). Likewise, there is a positive correlation albeit to a lesser extent noted at most grades between teachers' confidence in their operational skills and the amount of time spent on professional development activities during the past two years (ranging from 0.24 to 0.31), and between teachers' confidence in their social media skills and time spent on professional development activities at grade 11 (vocational education; 0.21).

Lastly, substantially positive correlations were also interestingly found at all grades between teachers' confidence in their operational skills and the frequency of use of ICT based activities with the target class (ranging from 0.4 to 0.47), as well as between teachers' confidence in their social media skills and the frequency of use of ICT based activities with the target class (ranging from 0.35 to 0.42).

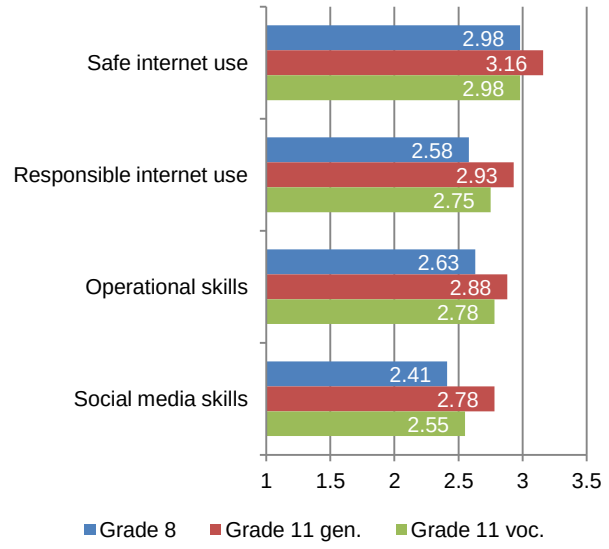
STUDENTS' CONFIDENCE IN USING ICT SKILLS

Students were asked to rate their level of confidence in their ability to perform twenty-four (twenty-eight at grade 11 vocational education) ICT related tasks according to a Likert scale ranging from 'not at all' to 'a lot'. By subjecting the data to factorial analysis four scales emerged from the list of items. These included operational skills and social media skills (as found in the teachers' data and comprising the same groups of items) and two additional scales related to students' ability to use the internet safely and responsibly.

For the purposes of this survey, the definition of the safe use of the internet includes students' confidence in their ability to protect their privacy and online reputation, as well as respect the privacy and online reputation of others. It also includes their confidence in their ability to use the internet to protect themselves against online bullying, spam and junk mail.

Students' confidence in their ability to use the internet responsibly is defined as the ability to judge the reliability of information found on the internet; to identify online sources of reliable information; and to use information found on the internet without plagiarizing.

Fig. 4.15: Students' confidence in their ICT skills (mean score of students; EU level; 2011-12)



As is clear from Figure 4.15, at EU level, students across all grades have a higher mean score in their confidence to use the internet safely, than in any other ICT skill they were asked to express their level of confidence in. Conversely, students across all grades have a lower mean score in their confidence to use social media skills, compared to any other ICT skill, particularly at grade 8. Regardless of the type of ICT skill in question, grade 11 (general education) students' mean score in their confidence to use them is consistently higher, while grade 8 students' mean score is consistently lower.

As Figure 4.16 shows, generally speaking, students at all grades across countries declare a rather high level of confidence in their ability to use the internet safely. Students across all grades in Portugal, Poland, Norway, Lithuania, Slovakia, Estonia and the Czech Republic have particularly high mean scores in their confidence in this area.

Conversely, students across all grades in Bulgaria, Greece, Latvia, Cyprus and Luxembourg have relatively low mean scores in their confidence to use the internet safely.

Fig. 4.16 - grade 8: Students' confidence in their ability to use the internet safely (mean score of students; by country; 2011-12)

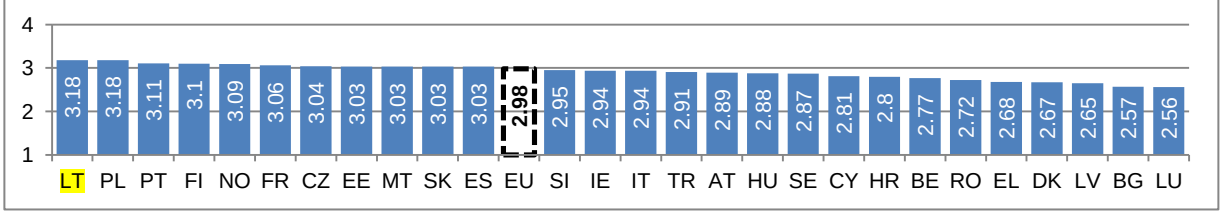


Fig. 4.16 - grade 11 (general education)

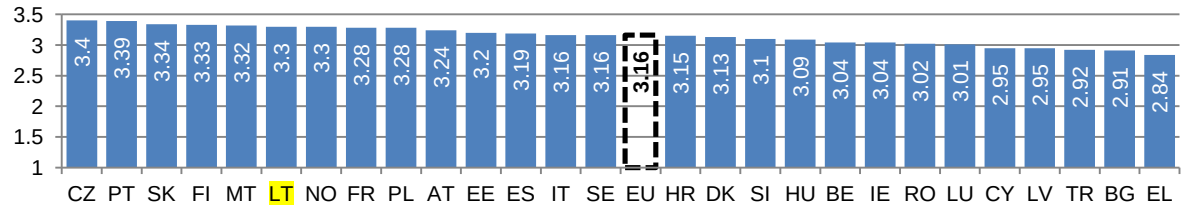
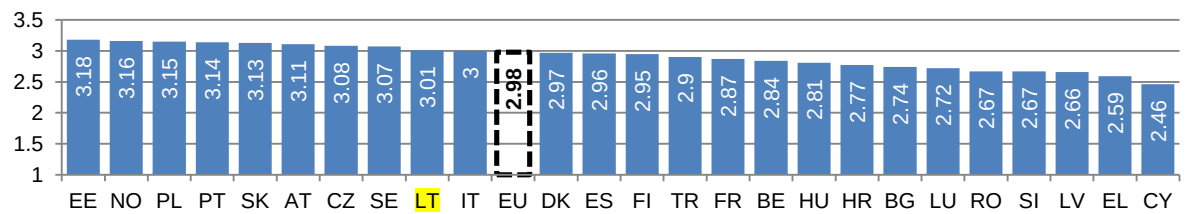


Fig. 4.16 - grade 11 (vocational education)



Students across all grades in Poland have a high mean score with regards their confidence in using the internet responsibly (see Fig. 4.17). Swedish and Norwegian students also have a rather high mean score at grade 11 (general and vocational education). Countries which stand out because students show a high mean score in this area at one particular grade include Hungary at grade 8, and especially Finland at grade 11 (vocational education).

The situation is different in Luxembourg at grade 8 where students have a particularly low mean score in their confidence to use the internet responsibly, as do students in Cyprus at grade 11 (vocational education).

Fig. 4.17 - grade 8: Students' confidence in their ability to use the internet responsibly (mean score of students; by country; 2011-12)

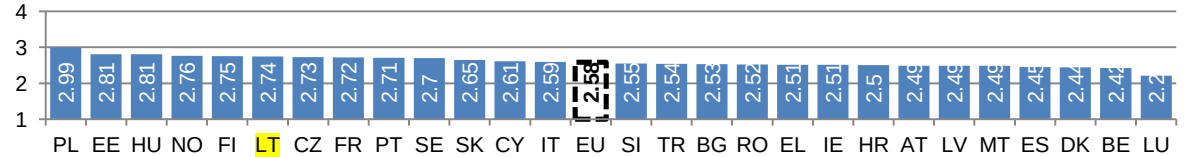


Fig. 4.17 - grade 11 (general education)

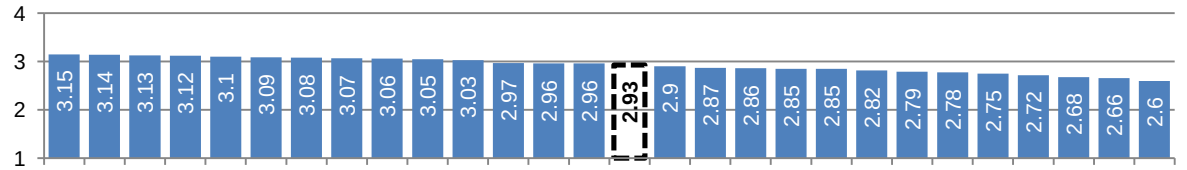
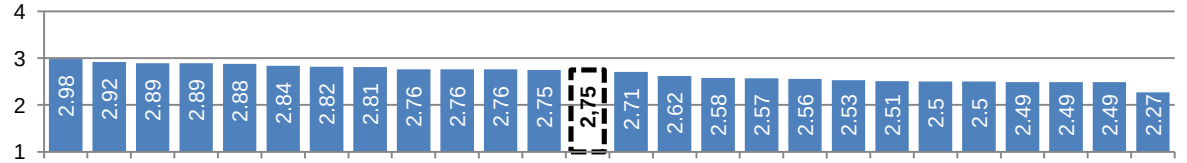


Fig. 4.17 - grade 11 (vocational education)



As illustrated in Figure 4.18 below, students across all grades in Poland and Portugal have a high mean score in their confidence to perform operational tasks related to ICT use. In Austria students at grade 11 (both general and particularly vocational education) have a high mean score, while in France, students at grade 8 and grade 11 (general education) also have rather high mean scores. Grade 11 students (general education) in Malta, the Czech Republic and Denmark also declare a high level of confidence in their operational skills.

The situation is different in Turkey, Greece, Belgium and Ireland where students across all grades have a rather low mean score in their confidence in using operational skills. Particularly low mean scores are observable in Luxembourg at grade 8, in Cyprus and to a slightly lesser extent in Slovenia at grade 11 (vocational education).

Fig. 4.18 - grade 8: Students' confidence in their operational skills (mean score of students; by country; 2011-12)

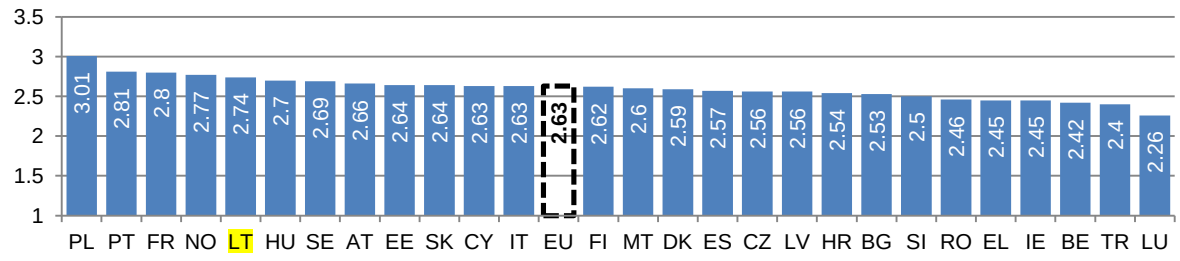


Fig. 4.18 - grade 11 (general education)

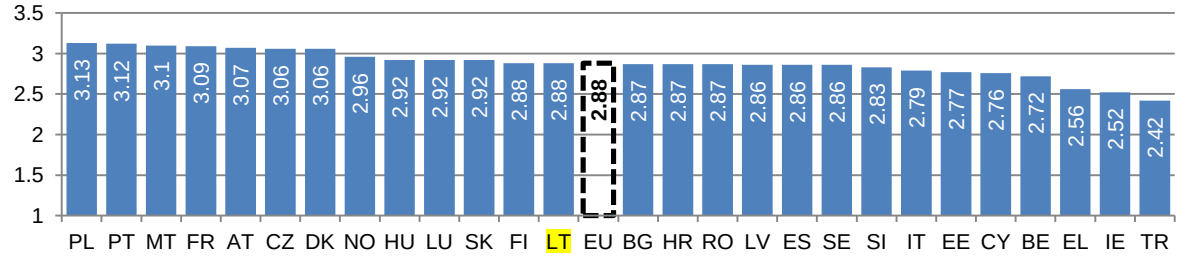
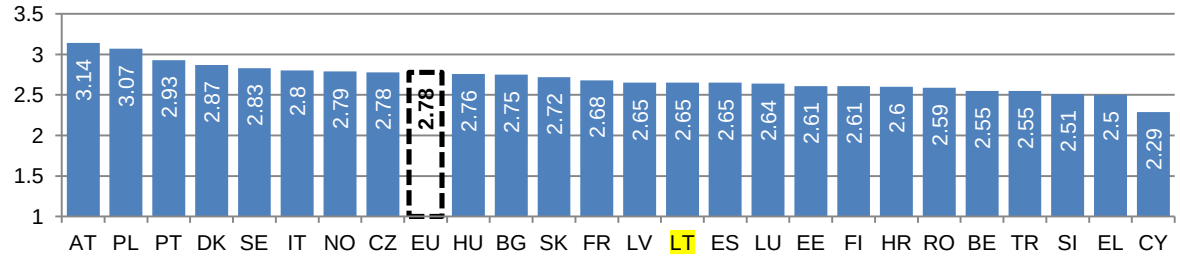


Fig. 4.18 - grade 11 (vocational education)



In Poland students across all grades stand out as having the highest mean score with regards their confidence in their social media skills (see Fig. 4.19). Other countries with high mean scores for students across all grades include Estonia, Sweden and Portugal. Finnish students also declare a high level of confidence at grades 8 and 11 (general education), but their mean score slips to below the EU average at grade 11 (vocational education). Relatively high mean scores are also observed in Austria and Norway at grade 11 (vocational education).

Conversely, students across all grades in Turkey, Luxembourg, Belgium, Greece, Cyprus and Malta (particularly at grade 8), have a low mean score with regards to their confidence in using web 2.0 skills.

Fig. 4.19 - grade 8: Students' confidence in their social media skills (mean score of students; by country; 2011-12)

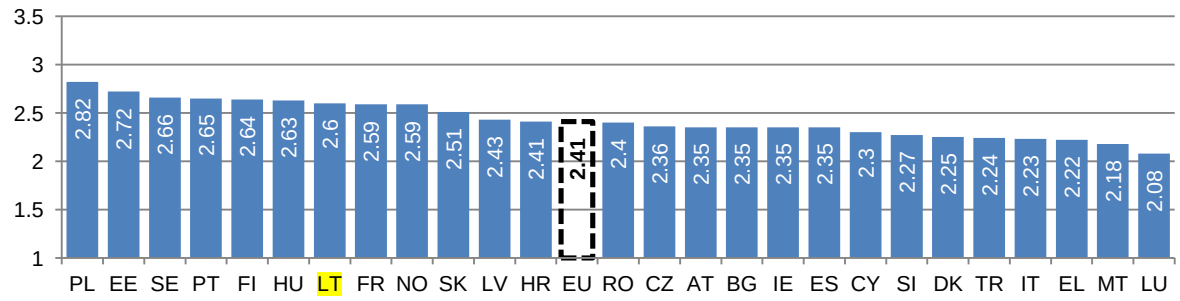


Fig. 4.19 - grade 11 (general education)

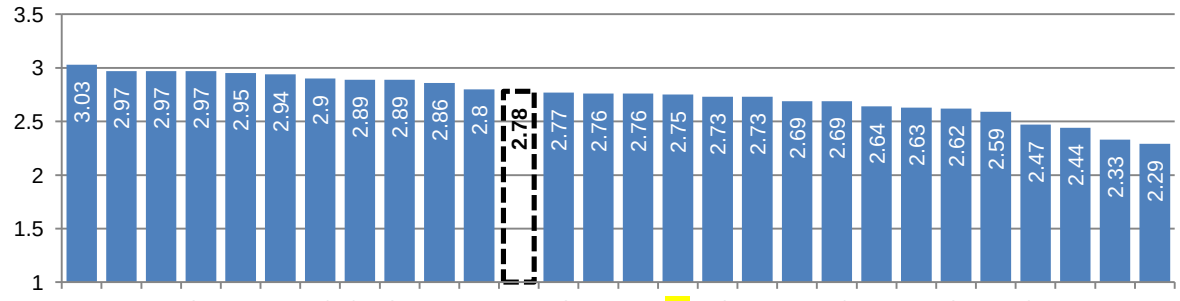
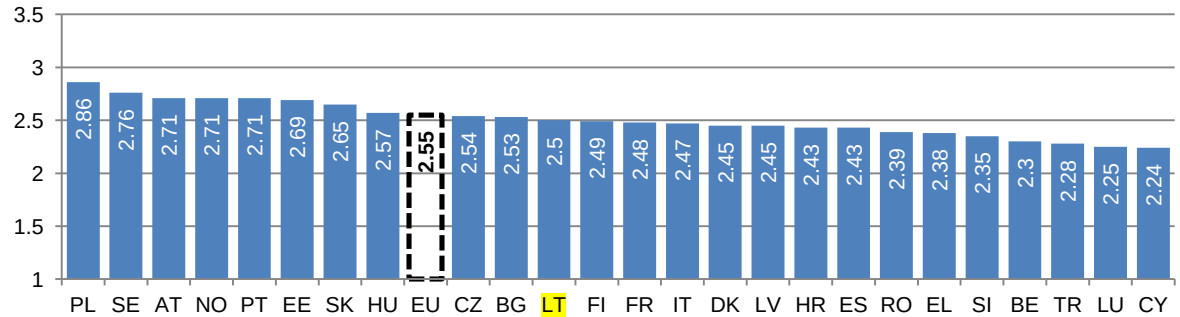


Fig. 4.19 - grade 11 (vocational education)



5- SCHOOL VISION, STRATEGIES, INCENTIVES AND SUPPORT

Evidence form research shows that for ICT to be properly used for the benefit of teaching and learning, such use has to be part of the school vision and supported by specific strategies. More importantly, the vision has to be defined around educational goals and shared at the whole school level; the strategy has to go beyond the existence of formal statements and be implemented through different types of specific measures as incentives and available support to ICT use during lessons.

This section reviews the current state of the art about these issues throughout the countries covered by the survey, scrutinizing general and specific strategies, incentives and support, as reported mostly by school heads and in some cases by teachers as well.

SUMMARY OF FINDINGS:

- Formalised policies (written statements) about using ICT precisely in T&L, or in subjects exist in schools frequented by 50% of the students at all grades. Such a percentage decreases to 20-30% of students concerned when considering policies and strategies covering ICT use in general, as well as precisely in T&L and in subjects. Higher percentages of students are in this situation in Denmark, Turkey, and Slovenia, conversely to Austria, Croatia, Italy and Greece.

- Around 50% of students are in schools where time is scheduled for teachers to share, evaluate or develop instructional material and approaches. The percentage decreases to around 35% in such schools developing as well ad hoc policies in favour of collaboration amongst teachers. In Romania and Italy, the percentages are higher, conversely to Austria where such approach is much less frequent.

- 60% of students are in schools where the school head declares that there is a policy about responsible internet use, and 30-45% of students in schools where a policy about safe internet use exists. Such a European survey can't investigate in details what it really means and it is certainly an issue to be investigated further. Slovakia, Croatia and Austria have the highest percentages of students going to schools having both.

- The two most frequent incentives used to boost ITC use in T&L are additional ICT material for the class and additional training hours for the teachers; Between 35 and 45% of students are in schools implementing one or the other, and between 20 and 25% having both. Competitions and prizes, as well as financial incentives are less frequent; between 15 and 20% of students are in schools using them. The situation is nevertheless different in the Eastern countries where percentages of students going to schools using these incentives, in addition to others already mentioned are much higher. Reduction of teaching hours is almost never used as an incentive.

- Around 75% of students are in schools where the school head declare that initiatives to support innovation, not necessarily related to ICT, are implemented. When looking more concretely at the existence of change management training programme organised, between 45 and 50% of students are in schools having them. Such programmes are particularly frequent in Estonia, Slovenia, Romania and Poland. Slovakia, Croatia and Austria have the highest percentages of students going to schools having both. Here again, a European survey like the present one can't investigate in details what it really means and it is certainly an issue to be investigated further.

- Between 60 and 80% of students are in schools where an ICT coordinator is available, on average full time in only one case out of three, rewarded in around one case out of two and providing pedagogical support in three cases out of four.

SCHOOL VISION AND STRATEGIES

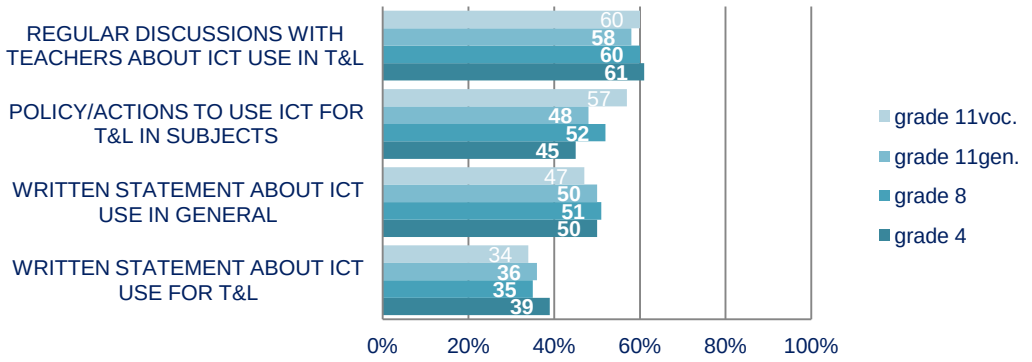
Depending national governance in education, informal discussion about ICT use in T&L and/or implementation of support measures and/or the existence of written statements about it, are important elements to support ICT integration into lessons.

The questionnaire to school heads contains a question (SC18) about different general and more specific policies and strategies implemented within their school (written statement about ICT use for pedagogical purposes or in subjects, programmes to prepare students for internet responsible use, scheduled time for teachers to meet to share and develop approaches, responsible internet and social networks policies, etc.), with a 'yes/no' type of answer.

At EU level and according to what school heads report (see fig. 5.1):

- around **60% of students** are in schools where regular discussions between school leaders and teachers about ICT in T&L take place;
- around **50% of students** are in schools where a written statement about ICT use in general or for T&L in subjects exists;
- around **35% of students** are in schools where a written statement about ICT use for T&L exists.

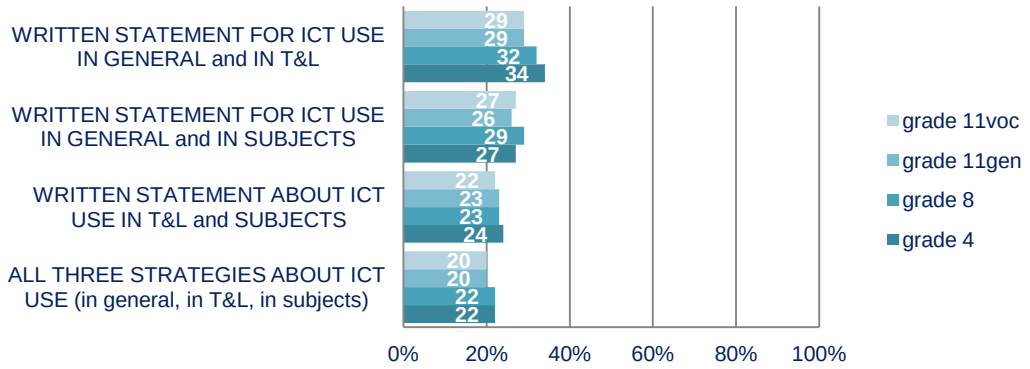
Fig. 5.1: School general strategies to support ICT use in T&L
(in % of students; EU level; 2011-12)



When looking at the co-existence of these strategies within a school (see fig. 5.2):

- around **30% of students** are in schools where there is a written statement about ICT use in general AND specifically in T&L, or about ICT use in general AND in subjects;
- around **20% of students** are in schools where there is a written statement about ICT use in general, as well as in T&L AND in subjects.

Fig. 5.2: General strategies combined
(in % of students; EU level; 2011-12)



Figures 5.3a to 5.3d illustrate the extent to which situation varies depending the country. The figure shows the percentages of students in schools having a written statement about ICT use in general, as well as specifically in T&L AND in subjects.

Compared to the EU level where around 20% of students are in schools where there are such statement about ICT use in general, as well as in T&L AND in subjects (see fig.5.2 above), around 40% of students are in such schools in Denmark and Turkey at grades 4 and 8 and around 55% in Slovenia at grade 11; conversely, at all or several grades between 5% and 10% of students are in such schools in Austria, Croatia, Italy and Greece.

Fig. 5.3a - Grade 4: All three strategies about ICT use (in general, in T&L and in subjects) implemented within the school (in % of students; by country; 2011-12)

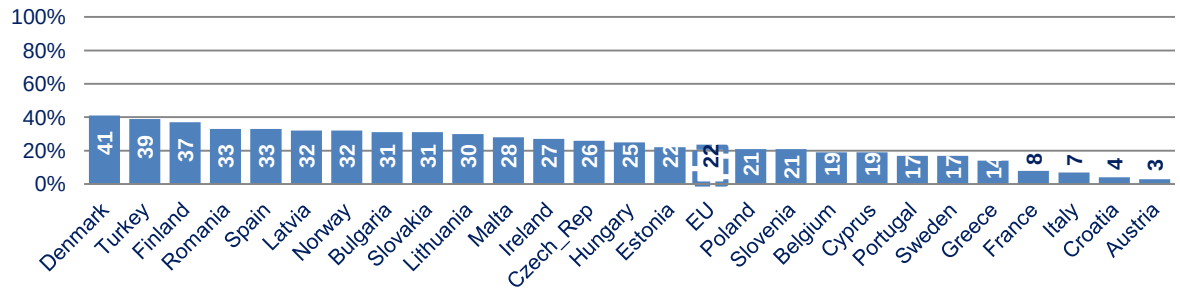


Fig. 5.3b - Grade 8: All three strategies about ICT use (in general, in T&L and in subjects) implemented within the school (in % of students; by country; 2011-12)

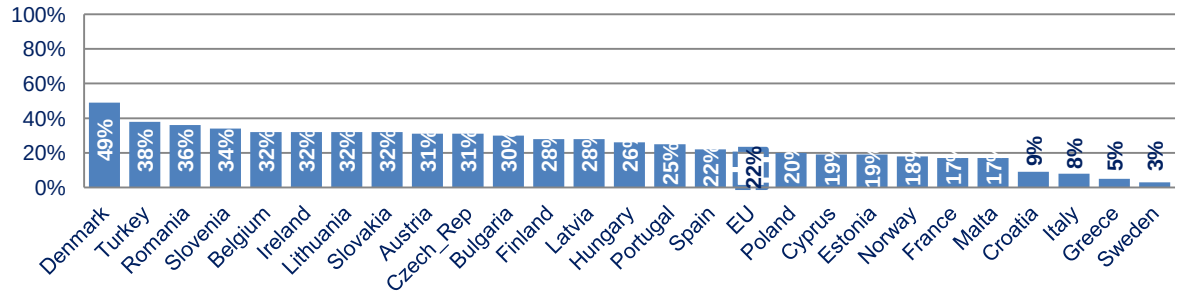


Fig. 5.3c - Grade 11 in general education: All three strategies about ICT use (in general, in T&L and in subjects) implemented within the school (in % of students; by country; 2011-12)

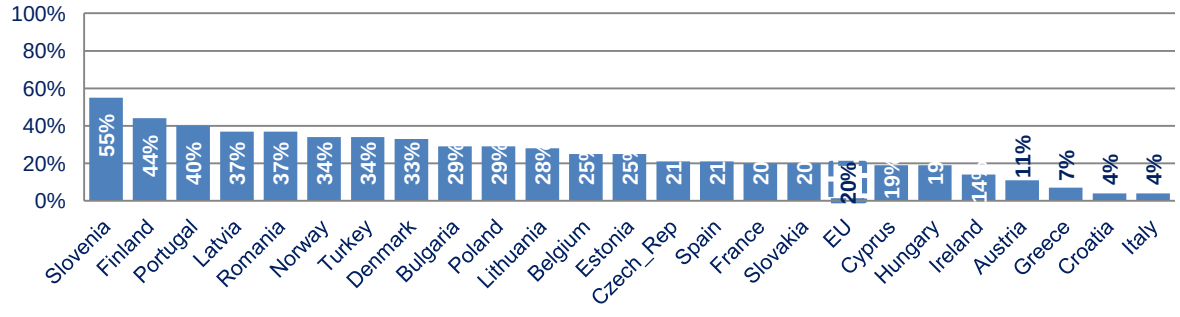
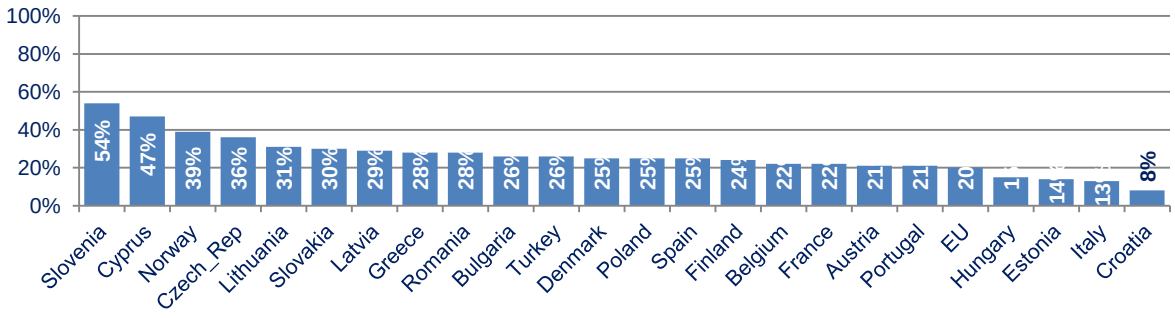


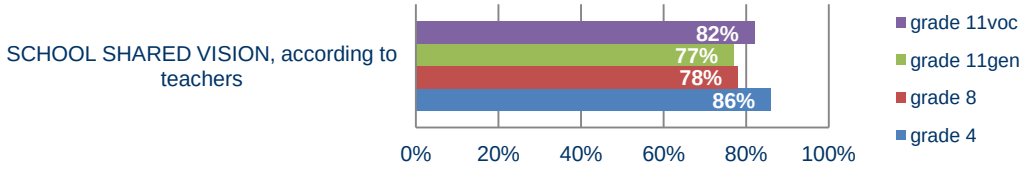
Fig. 5.3d - Grade 11 in vocational education: All three strategies about ICT use (in general, in T&L and in subjects) implemented within the school (in % of students; by country; 2011-12)



- As shown in the previous Fig. 5.1, school heads often report regular discussions with teachers about ICT use in T&L.

  It's interesting to notice that according this time to what teachers report at EU level (see fig. 5.4), around **80% students** go to a school where teachers declare that there is a shared vision at the whole school level about ICT use. The teacher questionnaire asks them indeed if they share with colleagues, the school head and other staff a common vision about integrating ICT in T&L at their school (question TE17).

Fig. 5.4: SCHOOL SHARED VISION ABOUT ICT USE, according to teachers (in % of students; EU level; 2011-12)



- Implementing vision and strategies to support ICT use in T&L as well as in subjects requires to adapt ways of teaching, a challenge that can be can usefully supported by specific strategies at the whole school level to allow teachers to cooperate and/or having time planned for it.

  At EU level an according to what school heads report (still under question SC18):
  - around **50% of student** go to a school where one of the two strategies is implemented (see fig. 5.5);
  - around **35% of student** go to a school where the two strategies are combined (see fig. 5.6).

Fig. 5.5: Specific strategies to support ICT use through collaboration among teachers (in % of students; EU level; 2011-12)

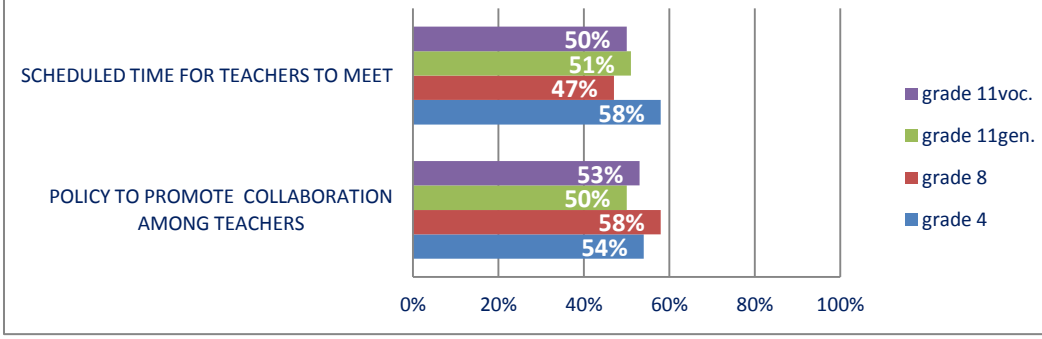
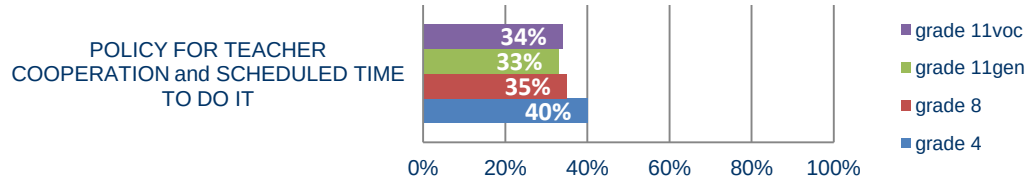


Fig. 5.6: Specific strategies to support collaboration among teachers combined (in % of students; EU level; 2011-12)



Figures 5.7a to 5.7d illustrate the diversity between country, and in some countries between grades, about this issue. In Romania, around 60-65% of students at all grades, and around 50% in Italy at grades 4 and 8, go to a school where there is a specific strategy to support teachers collaboration as well as time planned for it; conversely, in Austria at grades 4, 8 and 11 in general education, only between 5 and 10% of students are in this case.

Fig. 5.7a- Grade 4: Specific strategies to support collaboration among teachers combined (in % of students; EU level; 2011-12)

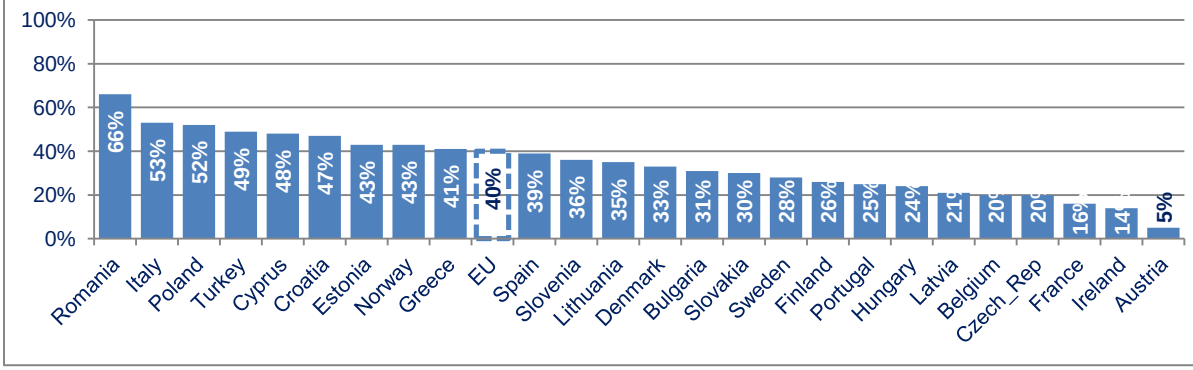


Fig. 5.7b- Grade 8: Specific strategies to support collaboration among teachers combined (in % of students; EU level; 2011-12)

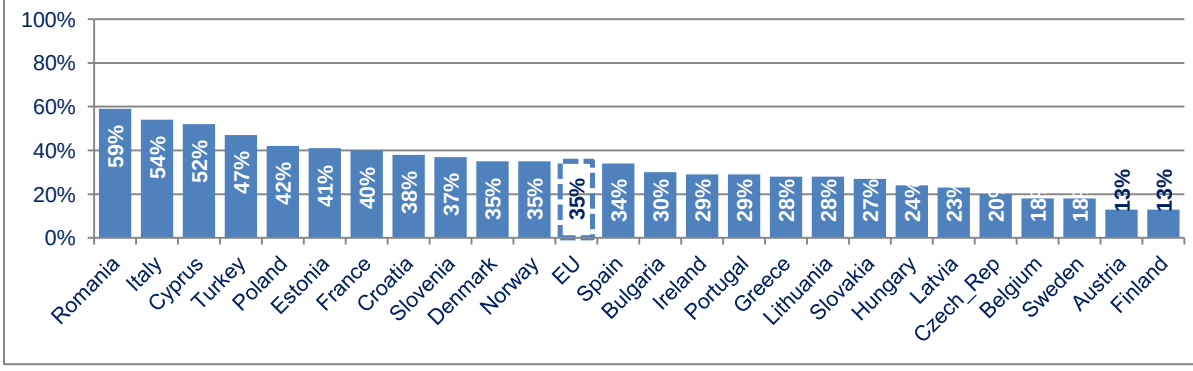


Fig. 5.7c- Grade 11 in general education: Specific strategies to support collaboration among teachers combined (in % of students; EU level; 2011-12)

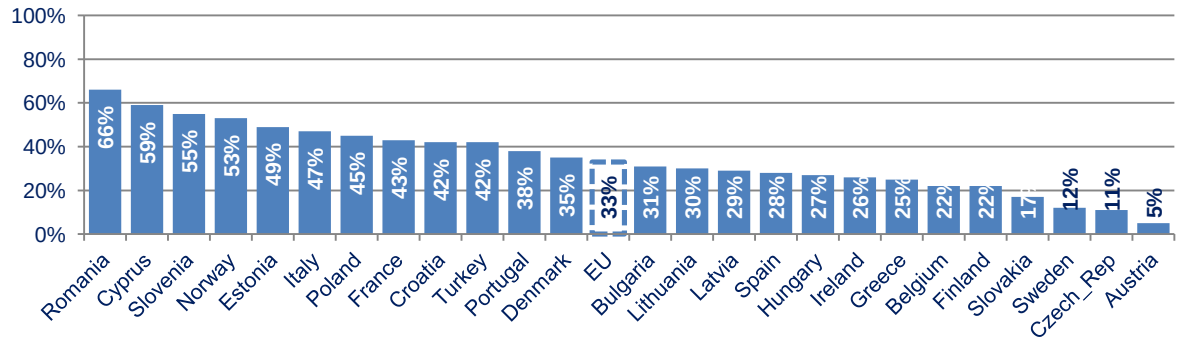
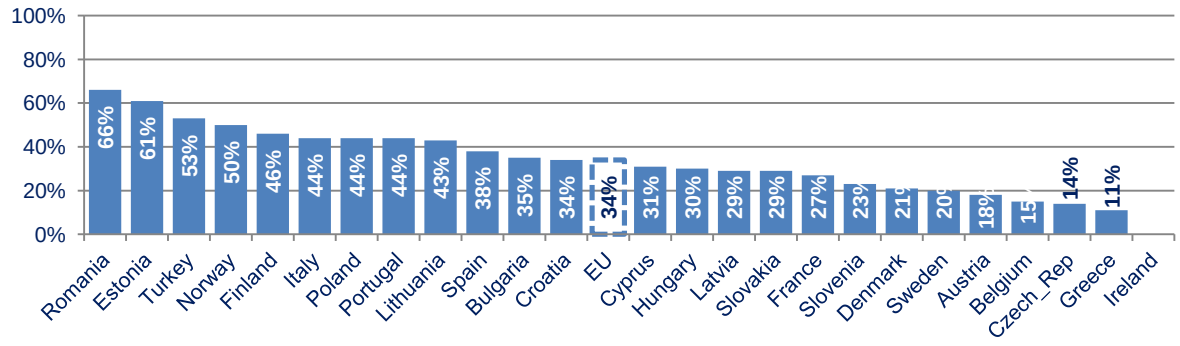


Fig. 5.7d- Grade 11 in vocational education: Specific strategies to support collaboration among teachers combined (in % of students; EU level; 2011-12)



- Another type of specific strategies that could reveal an integration of ICT use in T&L, is the existence of a specific policy concerning a responsible use of internet and/or social networks.

  At EU level:

  - around **65% of students** go to a school having a specific policy about responsible use of internet; **between 30% and 45% of students** goes to a school having a specific policy about social networks use (see fig. 5.8);
  - around **30% of students** goes to a school having both (see fig. 5.9).

Fig. 5.8: Specific strategies about responsible internet and social networks (in % of students; EU level; 2011-12)

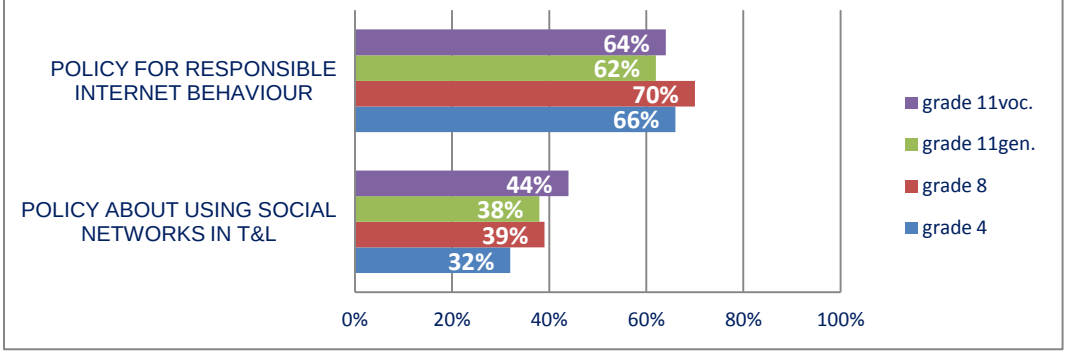
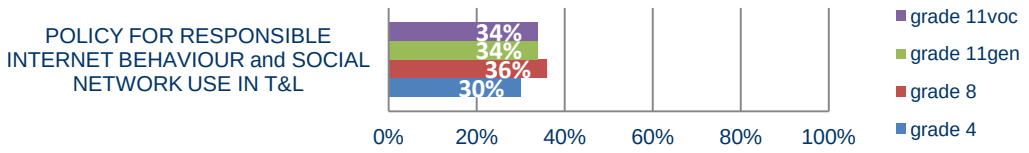


Fig. 5.9: Specific strategies about responsible internet and social networks combined
(in % of students; EU level; 2011-12)



Figures 5.10a to 5.10d illustrates again the diversity between countries, and in some countries between grades, about this issue. In Slovakia, at all grades, between 60% and 75% of students, as well as between 60% and 65% of students in Croatia at grades 4 and 8, and in Austria at grade 8, go to school having both a specific policy about responsible use of internet and social networks; conversely, in Lithuania at all grades, only between 5% and 10% of students go to such a school.

Fig. 5.10a - Grade 4: Specific strategies about responsible internet and social networks (in % of students; EU level; 2011-12)

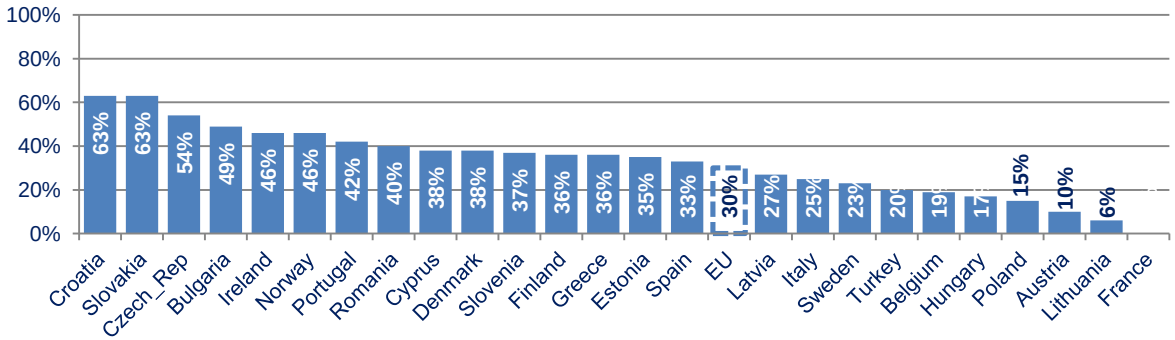


Fig. 5.10b - Grade 8: Specific strategies about responsible internet and social networks (in % of students; EU level; 2011-12)

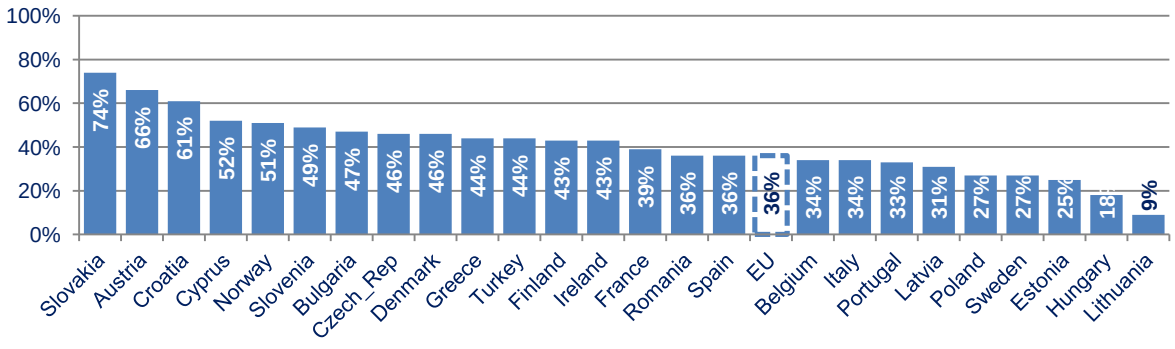


Fig. 5.10c - Grade 11 in general education: Specific strategies about responsible internet and social networks (in % of students; EU level; 2011-12)

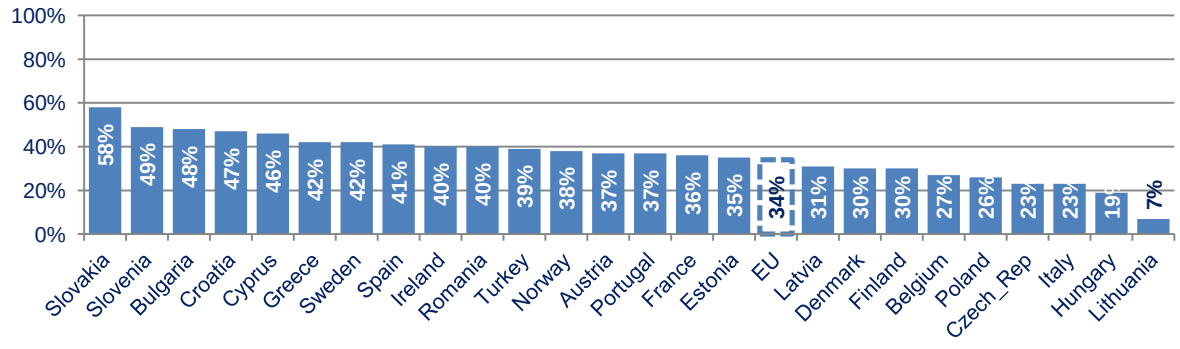
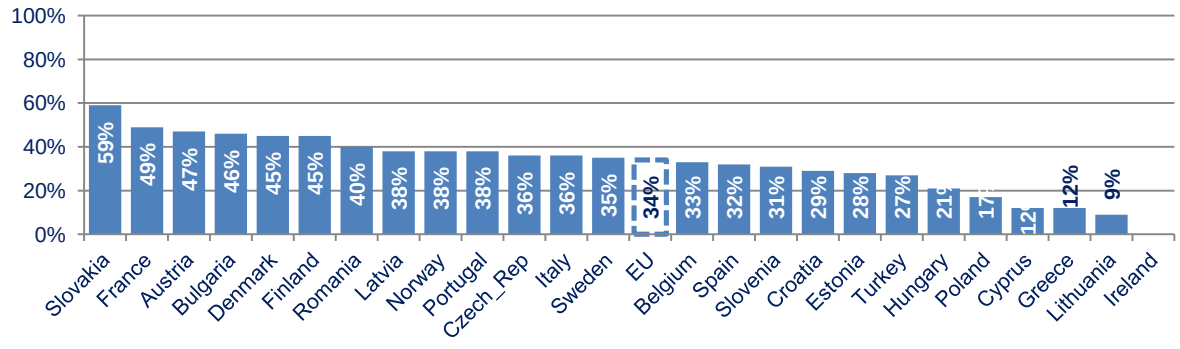


Fig. 5.10d - Grade 11 in vocational education: Specific strategies about responsible internet and social networks (in % of students; EU level; 2011-12)



INCENTIVES TO REWARD TEACHERS

Because of the differences between governance and regulation tools used according to national education systems, written statements can be implemented and complemented by incentives in some cases, or even replaced by them in systems not using formal statements. As a consequence, the existence of incentives to reward teachers' use of ICT in T&L is another interesting issue to look at when scrutinizing strategies to support ICT use in T&L.

The questionnaire to school heads contains a question (SC19) about different incentives used to reward teachers using ICT in T&L: financial incentives, reduced number of teaching hours, competitions and prizes, additional training hours, and additional ICT equipment for the classroom. The question asks for a 'yes/no' type of answer.

At EU level and according to what school heads report (see fig. 5.11 and 5.12), the two most frequently used incentives are additional equipment for the classroom and additional training hours. **Between 35% and 45% of students** go to a school using one or the other; **around 20-25% of students** go to a school using both. Competitions and prizes, as well as financial incentives are much less frequently encountered, and reduction of teaching hours even more rarely.

Fig. 5.11: Incentives to reward teacher's use of ICT in T&L
(in % of students; EU level; 2011-12)

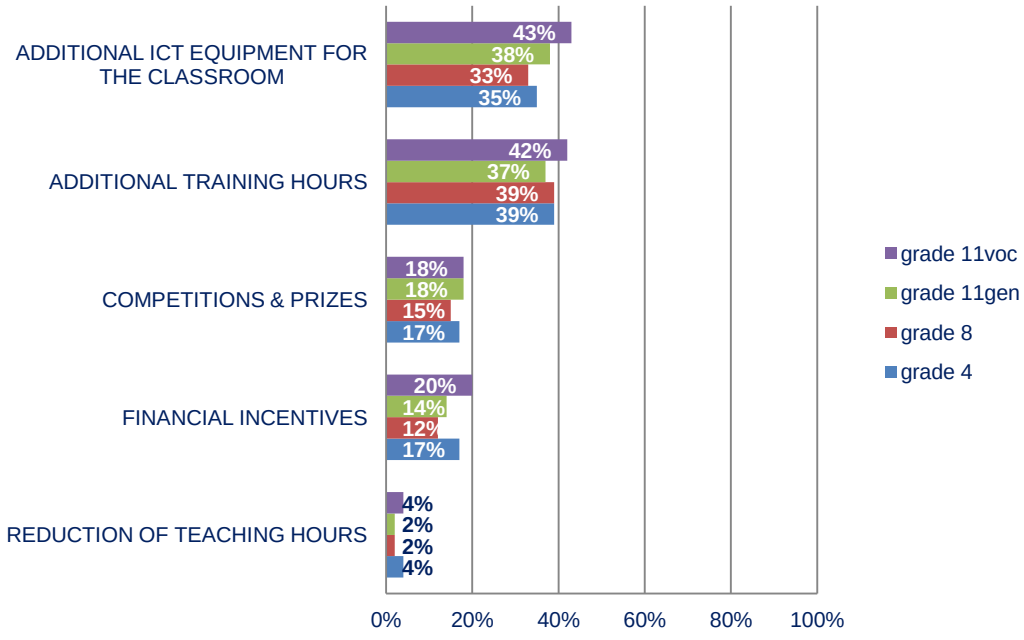
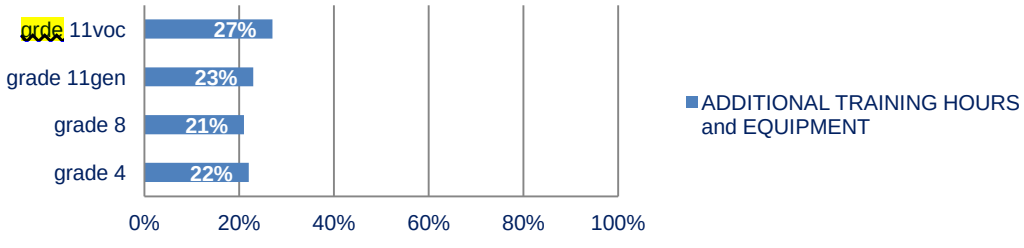


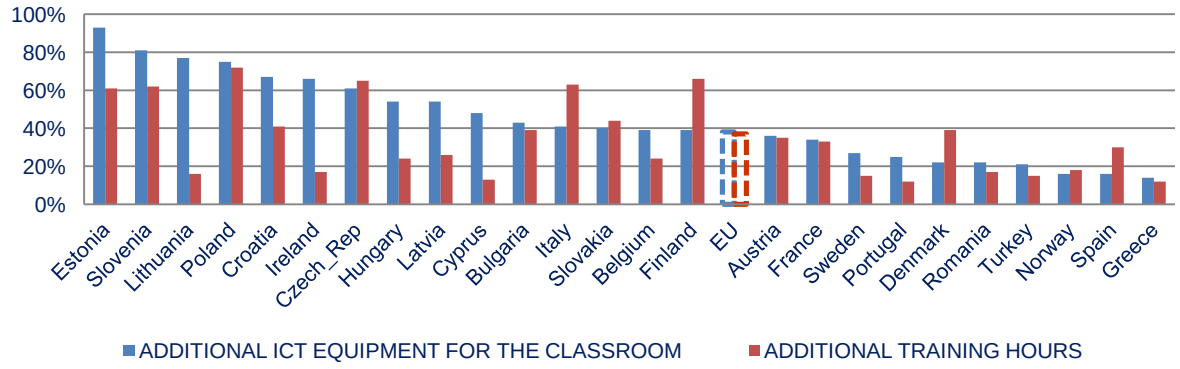
Fig. 5.12: Incentives combined to reward teacher's use of ICT in T&L
(in % of students; EU level; 2011-12)



Again, because of specificities of each education system, the situation in this area varies a lot between countries as shown by figures 5.13a and 5.13b illustrating the situation specifically at grade 11 in general education.

In Estonia, Slovenia, Lithuania and Poland, between 75% and 90% of students go to a school using additional ICT equipment for the classroom as an incentive to reward teachers using ICT in T&L. Additional training hours are also frequently used in these countries, except in Lithuania; they are also frequently used in Italy and Finland.

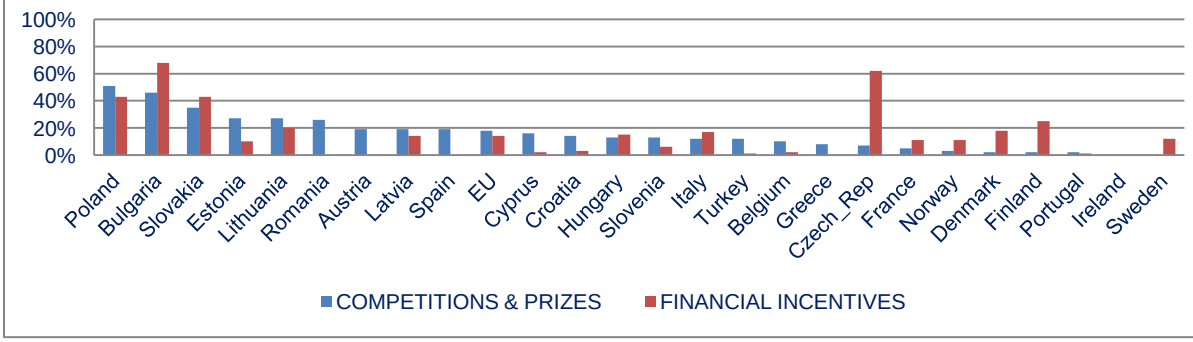
Fig. 5.13a - grade 11 in general education: Additional ICT equipment or training hours as incentives to reward teacher's use of ICT in T&L (in % of students; by country; 2011-12)



Very few countries use financial incentives and, even less, competitions & prizes. The use of financial incentives mostly concentrate Bulgaria, Czech Republic, Poland and Slovakia, all of them already noticed as using rather frequently additional equipment and additional training hours. The use of competitions and prizes is more frequently used in Poland, Bulgaria and Slovakia compared to other countries.

It seems that incentives to reward teachers – and several of them used in parallel - are particularly more frequent in Eastern education systems.

Fig. 5.13 b - grade 11 in general education: Competitions & prizes or financial incentives to reward teacher's use of ICT in T&L (in % of students; by country; 2011-12)



INNOVATION POLICY

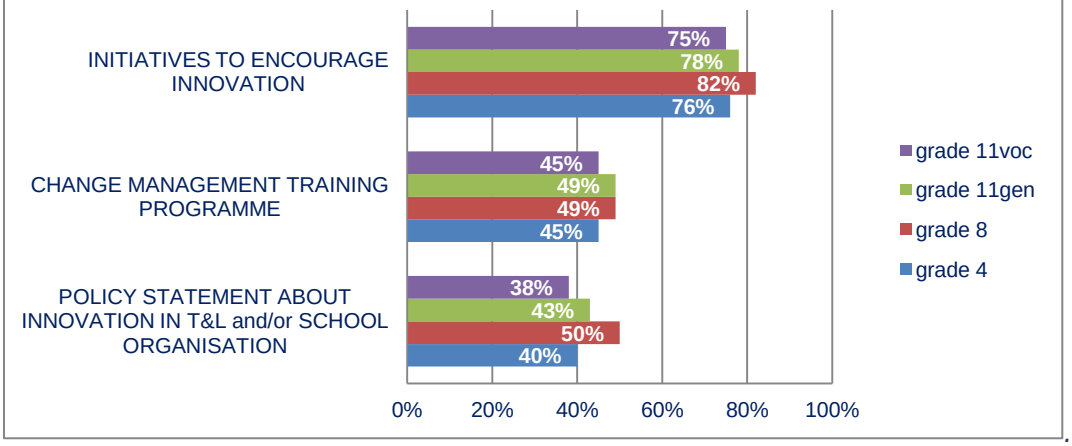
Strategies and incentives to support ICT use in T&L can usefully be accompanied by more overarching policies in favour of innovation in teaching and learning methods and/or school organisation more generally, without being necessarily focused on ICT use.

For this reason, a question (SC20) about innovation is part of the school head questionnaire, and investigates about initiatives at school level encouraging innovation, change management training programme and policy statement about innovation in T&L and/or at school organisation level. It is a 'yes/no' type of question.

At EU level and according to what school heads report (see Fig. 5.14):

- **between 75% and 80% of students** go to a school where initiatives to encourage innovation are reported;
- **around 45-50% of students** go to a school where there is a change management training programme;
- **between 40% and 50% of students** go to a school where there is a policy statement about innovation in T&L.

Fig. 5.14: School innovation policy
(in % of students; EU level, 2011-12)



This very surprising but encouraging situation differs between countries, especially concerning change management training programme. Fig. 5.14a to 5.14d reveal that in Estonia and Slovenia at all grades, more than 80% of students (around 90% at grade 11 in general education) are in schools where there is a change management training programme. A similar situation is observed in Romania and Poland with between 65% and 75% of students concerned. Conversely, at several grades, less than 15% of students are in such schools in Denmark, Slovakia and Greece.

Fig. 5.14a-Grade 4: Change management training programme at school (in % of students; by country; 2011-12)

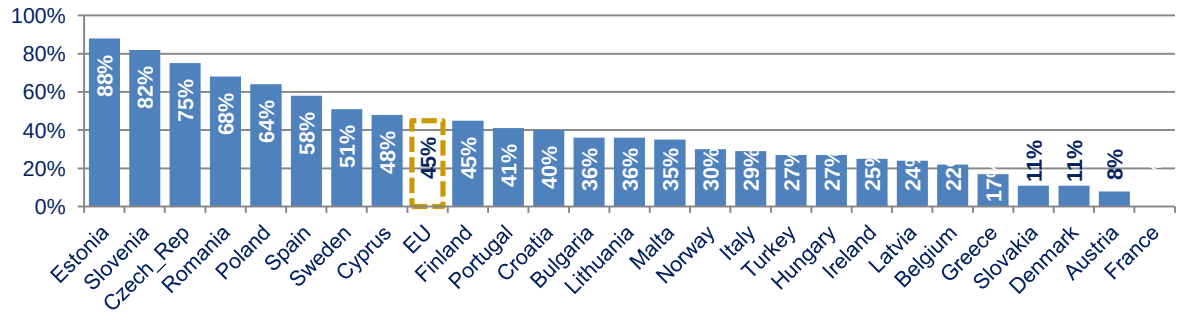


Fig. 5.14b-Grade 8: Change management training programme at school (in % of students; by country; 2011-12)

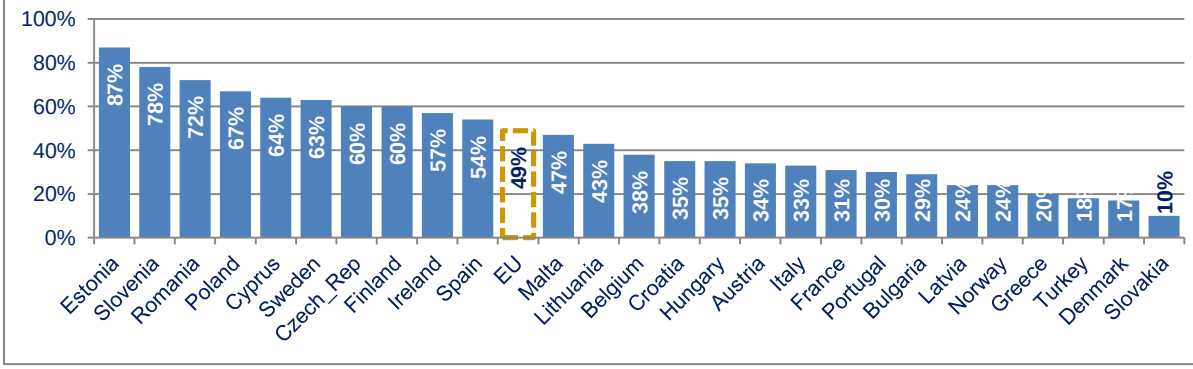


Fig. 5.14c-Grade 11 in general education: Change management training programme at school (in % of students; by country; 2011-12)

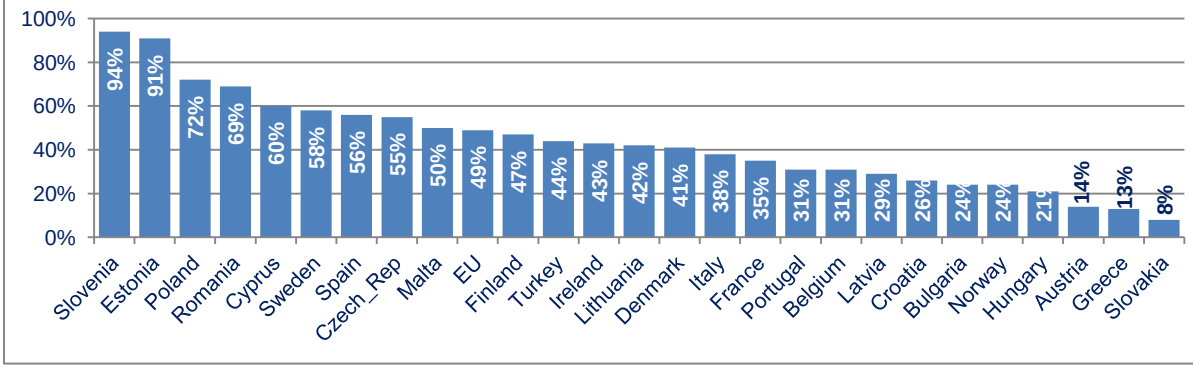
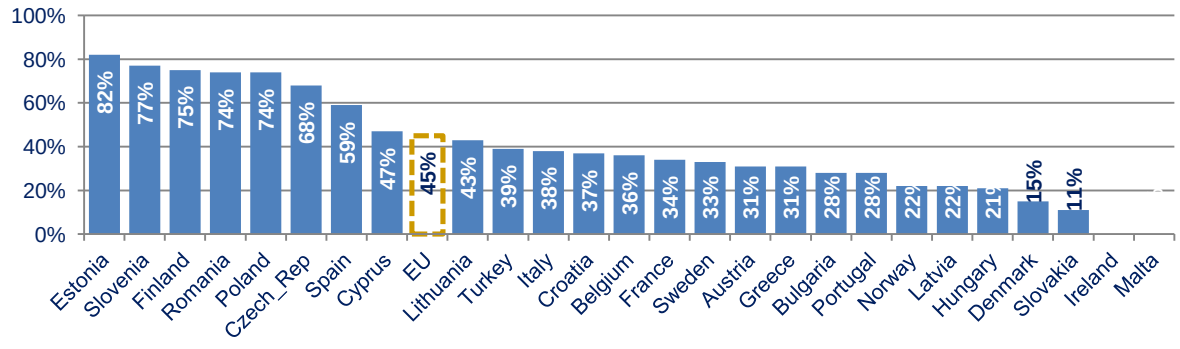


Fig. 5.14d-Grade 11 in vocational education: Change management training programme at school (in % of students; by country; 2011-12)



ICT COORDINATOR

In addition to the existence of the school vision, general and specific strategies, incentives and innovation policies to support ICT use in T&L, the support provided to teachers through an ICT coordinator in their regular T&L is a component identified as being key.

The school head questionnaire contains a question (SC16) about the provision and availability at school level of such ICT coordinator, whether the function is rewarded and pedagogical support provided. It is a 'yes/no' type of question.

At EU level, and according to what school heads report:

- **around 80% of students at grade 11 in general education** are in schools where an ICT coordinator is provided (see Fig. 5.15), available full time on average in one case out of three (a little bit less at grades 4 and 8), rewarded in two cases out of three (again less at grade 4), and providing pedagogical support in three cases out of four (see Fig. 5.16);
- **between 60% and 70%** of students at the other grades are in schools where an ICT coordinator is provided, available full time on average in around one case out of two, rewarded and providing pedagogical support in three cases out of four.

Fig. 5.15: Provision of an ICT coordinator
(in % of students; EU level; 2011-12)

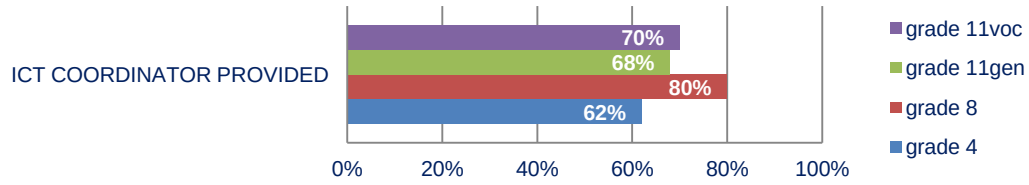
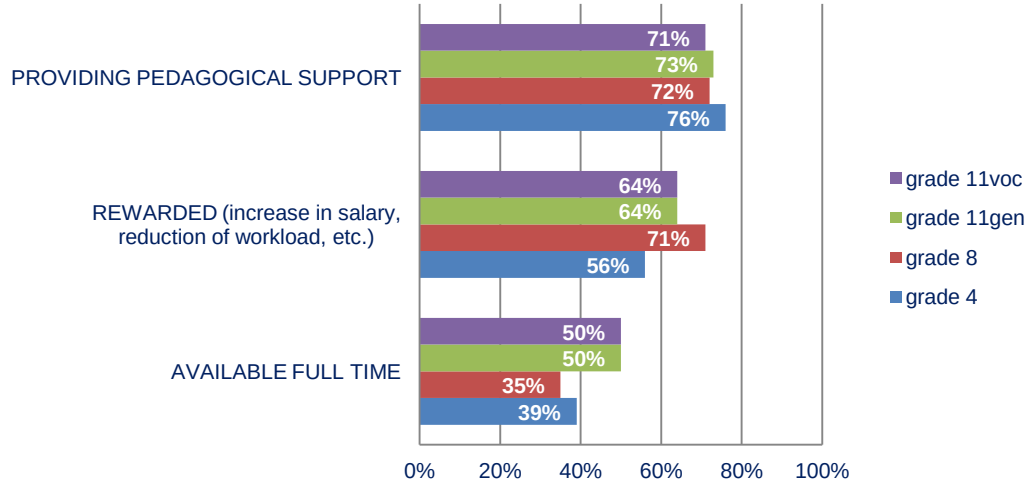


Fig. 5.16: ICT coordinator support
(in % of students; EU level; 2011-12)



The situation differs between countries (see Fig. 5.17) but less compared to other issues addressed in this survey. At all grades, in a large number of countries, minimum 75% of students – and sometimes up to 90% or more - go to a school where an ICT coordinator is provided. In a few countries, only less than 50% of students are in a school providing an ICT coordinator; it's the case at several grades, in Hungary, Poland and Greece. To be noticed that in these countries, the ICT coordinator full time availability is more frequent compared to the EU average (see Fig. 5.18).

Fig. 5.17a- grade 4: Provision of an ICT coordinator
(in % of students; by country; 2011-12)

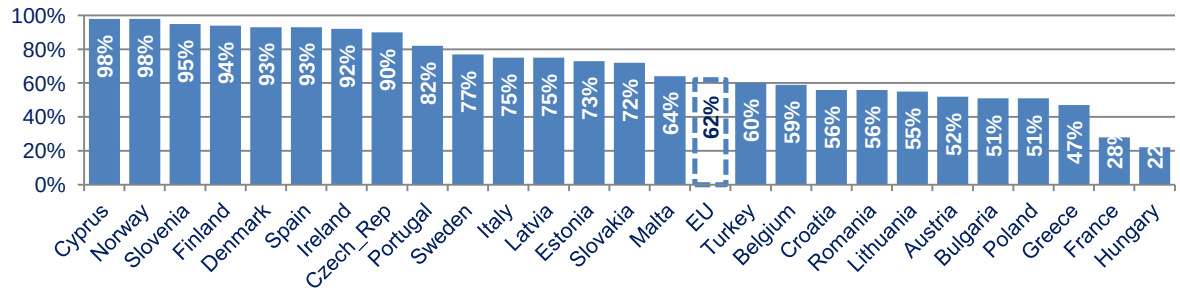


Fig. 5.17b- grade 8: Provision of an ICT coordinator
(in % of students; by country; 2011-12)

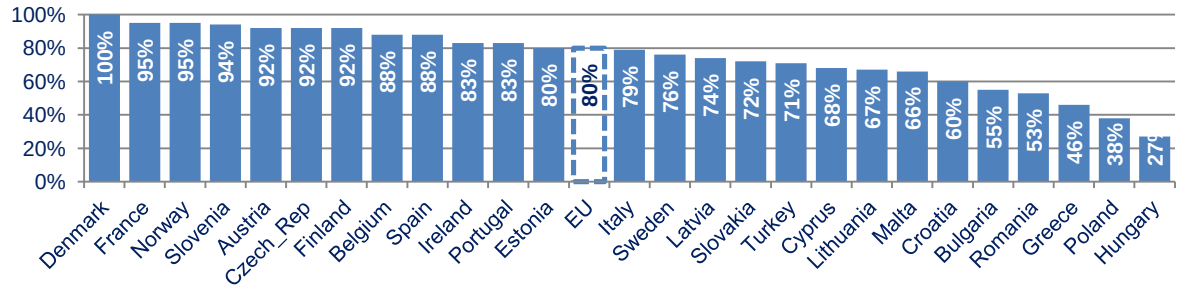


Fig. 5.17c- grade 11 in general education: Provision of an ICT coordinator
(in % of students; by country; 2011-12)

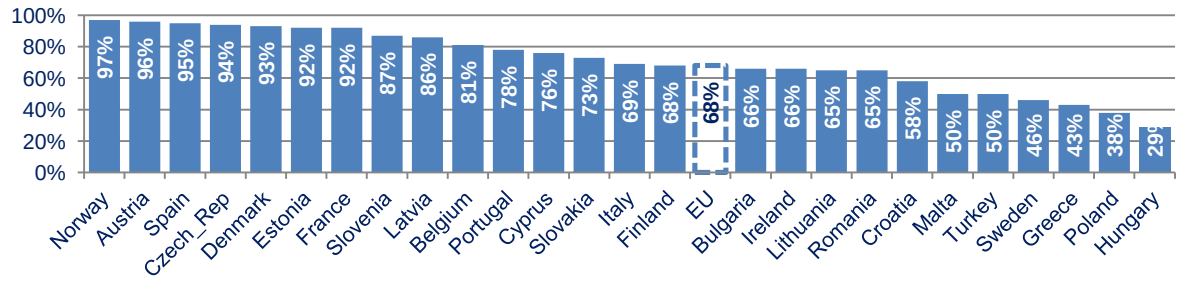


Fig. 5.17c- grade 11 in vocational education: Provision of an ICT coordinator
(in % of students; by country; 2011-12)

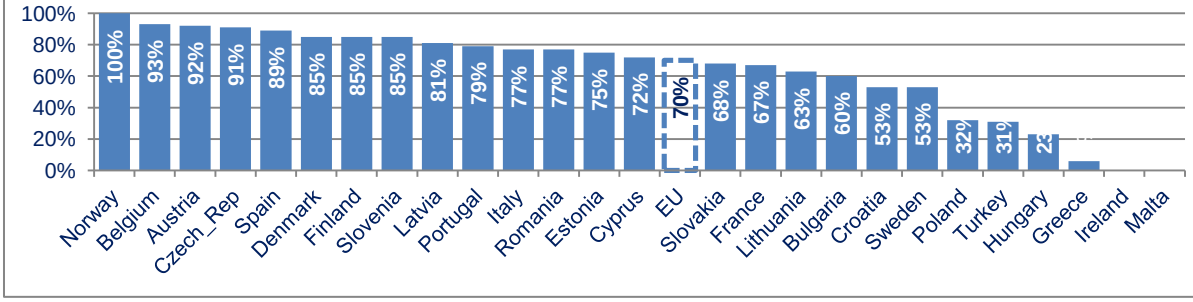


Fig. 5.18a - grade 4: ICT coordinator available full time
(in % of students; by country; 2011-12)

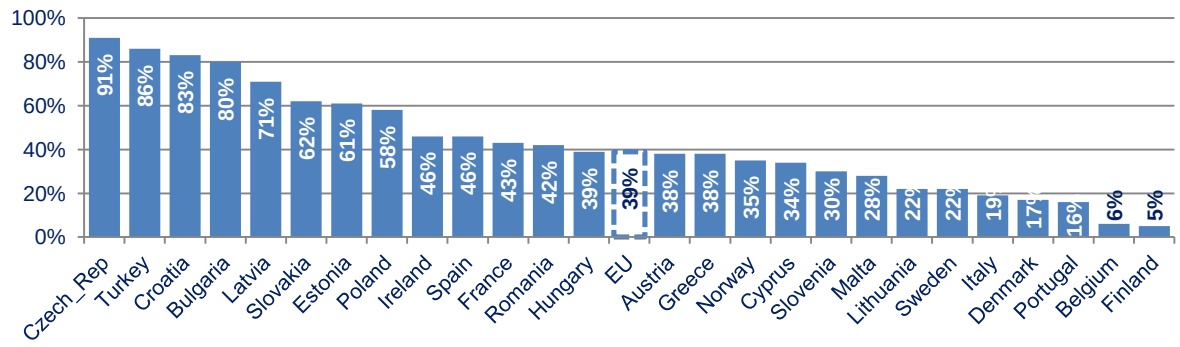


Fig. 5.18b - grade 8: ICT coordinator available full time
(in % of students; by country; 2011-12)

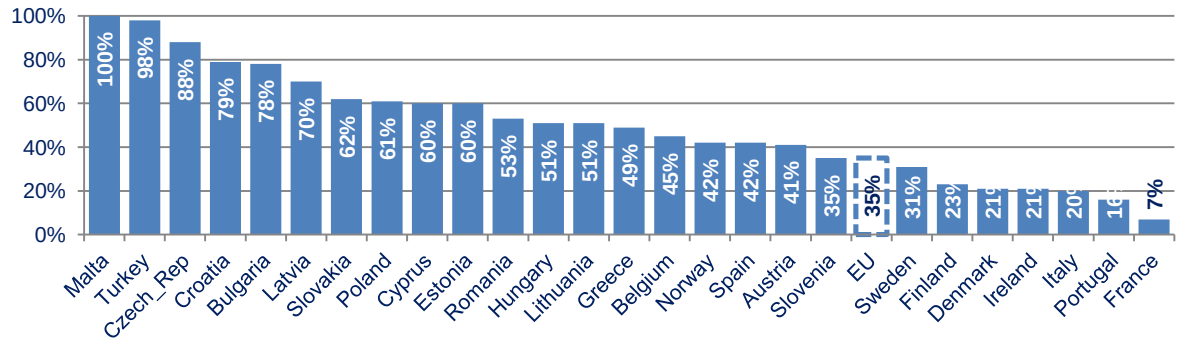


Fig. 5.18c - grade 11 in general education: ICT coordinator available full time
(in % of students; by country; 2011-12)

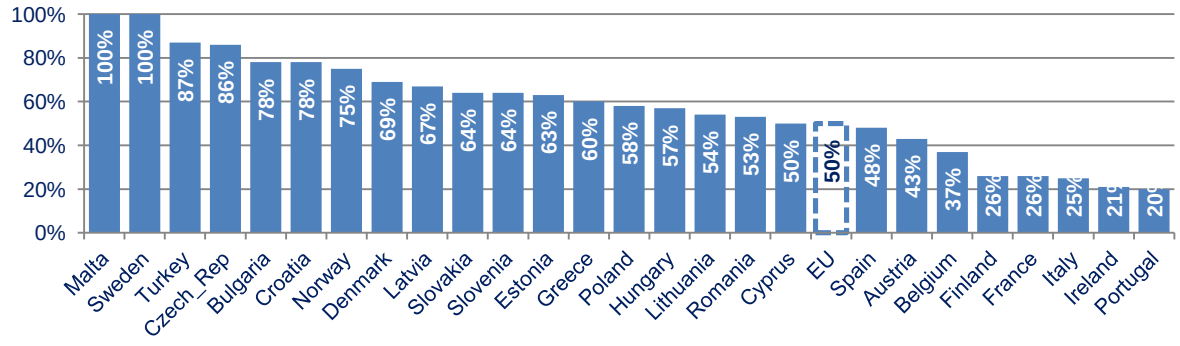
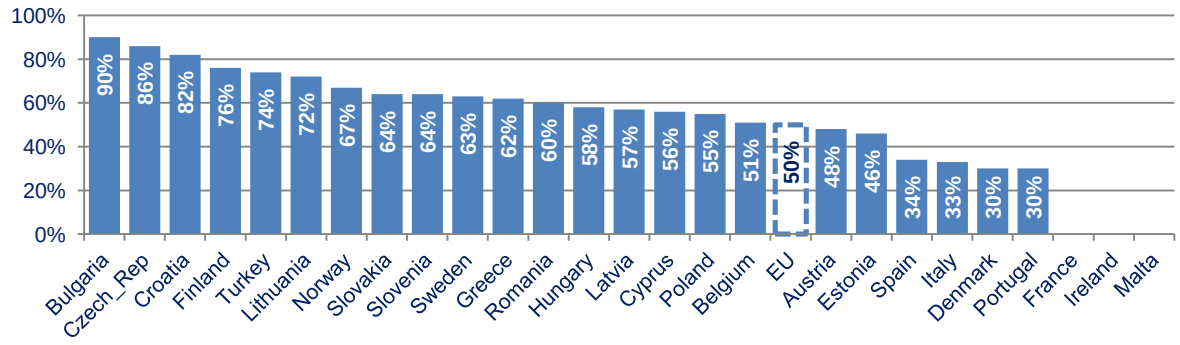


Fig. 5.18d - grade 11 in vocational education : ICT coordinator available full time
(in % of students; by country; 2011-12)



6- ATTITUDES AND OPINIONS

This section presents opinions of school heads and teachers about ICT use in T&L, ICT impact on learning and some more general issues, and compare them between the two groups. It also presents opinions of students about ICT impact on their learning as well as their attitudes towards computers, at EU level and by country.

SUMMARY OF FINDINGS:

- **School head's opinions** are **largely positive or very positive** about the use of ICT to retrieve information, do exercise, and learn in an autonomous and collaborative way, about the positive impact on transversal skills, achievement, higher order skills and above all student's motivation. **Above 80% of students**, and sometimes up to 95% on some issue, at all grades are in schools where school heads think so. **Teachers share this positive opinion** but just slightly less frequently.

- **School heads and teachers** are **both as frequently convinced** about the fact that ICT use in T&L is essential for students in the 21st century. **Around 95% of students** are schools where school heads think so and the same proportion of students are taught by teachers thinking the same.

- Interestingly, **school heads** - and teachers even more – **agree or strongly agree about a radical change needed for ICT to be fully exploited in T&L. Between 80% and 85% of students** are in schools where the school head have this opinion, and the same proportion I taught by teachers sharing these views.

- School heads in Denmark, Bulgaria and Estonia are particularly frequently convinced about the general positive impact of using ICT in T&L; the highest frequencies of students benefitting from such digitally positive leadership are found in these countries.

- **Students are very positive as well**, especially about the **positive impact of ICT use on the classroom atmosphere**. Highest percentages of students being generally positive about ICT use in T&L are found in Romania, Portugal, and Italy; the lowest in Finland and Croatia.

- **Students** express their **interest for ICT use in T&L** more frequently **because of its 'fun' aspect, as well as for its usefulness in their future life**. They do so particularly in Portugal, Bulgaria, Italy and Turkey; to be noticed that students in Poland express the lowest positive attitude throughout all grades.

SCHOOL HEADS AND TEACHERS

The school head and the teacher questionnaires (questions SC21 and TE24) investigate both, precisely along the same lines, their respective opinions about the impact of using ICT in T&L. In addition to general issues about 21st century education challenges and the readiness of schools to face it, it questions the relevance of ICT use specifically in different learning processes, as well as on student's skills, motivation and achievement. The question has to be answered on a four-level Likert scale from 'strongly disagree', 'disagree', 'agree' to 'strongly agree'.

Generally speaking, at EU level, both school heads and teachers are positive about ICT use and impact.

- **Between 90% and 95% of students** or more, depending the learning activity concerned and without large difference between grades, are in schools where the school head agrees or strongly agrees about ICT use to retrieve information, do exercise and practice, learn in an autonomous and collaborative way; a similar proportion of students is taught by teachers sharing such opinion, again at all grades (see Fig. 6.1 and 6.2)

Fig; 6.1: School heads agreeing or strongly agreeing about ICT use in T&L (in % of students; EU level; 2011-12)

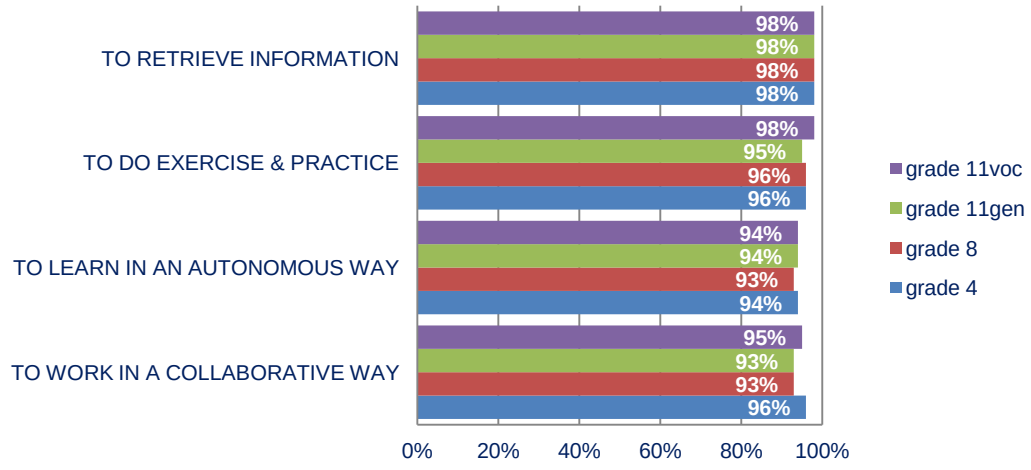
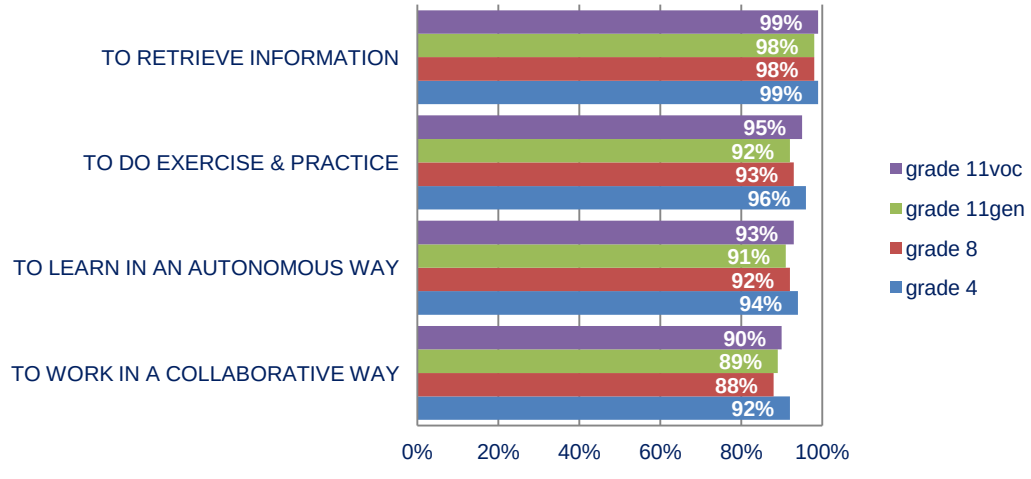


Fig. 6.2: Teachers agreeing or strongly agreeing about ICT use in T&L
(in % of students; EU level; 2011-12)



- **Almost all students**, without large difference between grades, are in schools where the **school head** agrees or strongly agrees about the **positive impact of ICT use on motivation**; **around 85%** of students are in schools where the school head agrees or strongly agrees about such a positive impact on **achievement**, **transversal skills** and to a slightly smaller extent on **higher order thinking skills**; teachers share the same opinion pattern, but are nevertheless a little bit more critical on all aspects even if they remain largely positive (see Fig. 6.3 and 6.4).

Fig 6.3: School heads agreeing or strongly agreeing about positive impact of ICT use on... (in % of students; EU level; 2011-12)

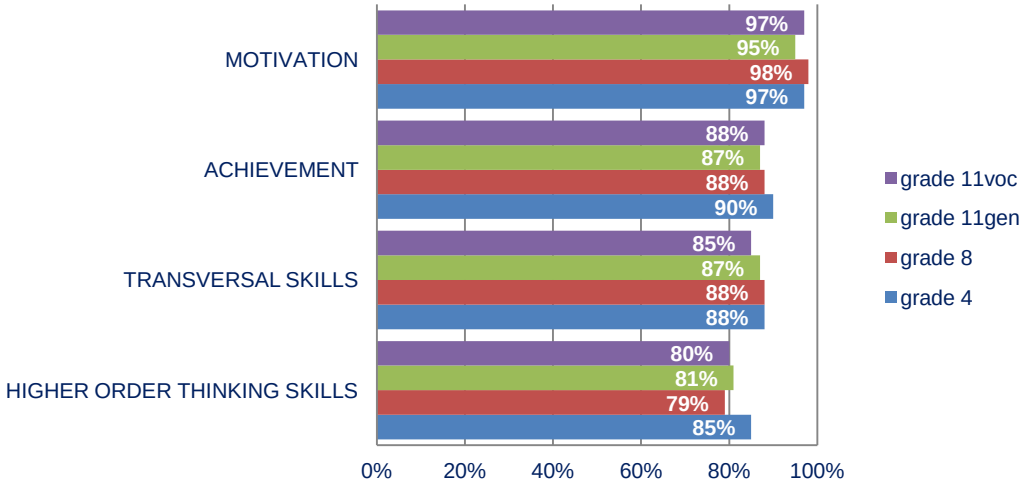
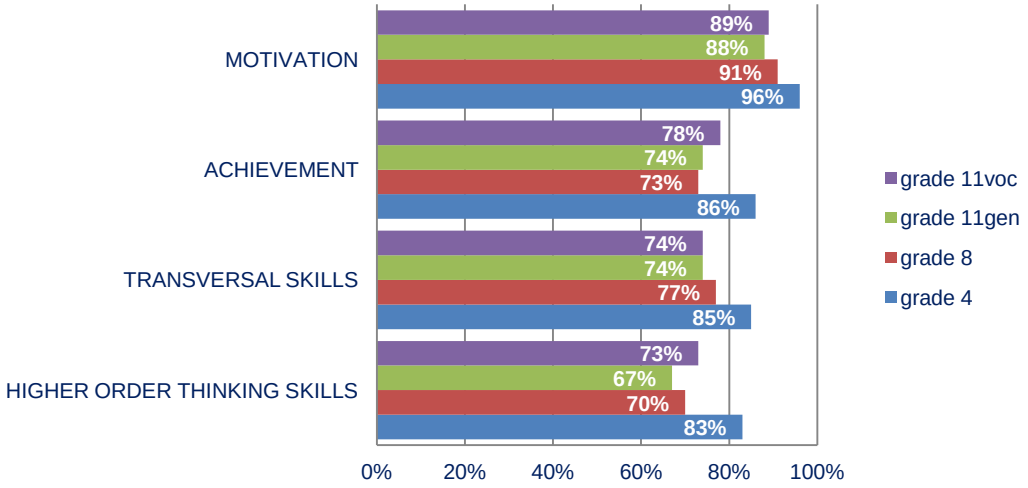


Fig. 6.4: Teachers agreeing or strongly agreeing about positive impact of ICT use on... (in % of students; EU level; 2011-12)



- Around **95% of students** are in schools where the school head agrees or strongly agrees about ICT use in T&L being essential for students in the 21st century; the same proportion of students is taught by teachers sharing the same opinion; in both cases, no important differences to be noticed between grades; (see Fig. 6.5 and 6.6)

Between 80% and 85% of students, at all grades but slightly less in vocational education, are in schools where the school head agrees or strongly agrees about the need for a radical change at school level for ICT to be fully exploited in T&L; a similar proportion of students, slightly higher at grade 4 and in vocational education, is taught by teachers sharing this opinion; (see Fig. 6.5 and 6.6)

Fig. 6.5: School heads agreeing or strongly agreeing about...
(in % of students; EU level; 2011-12)

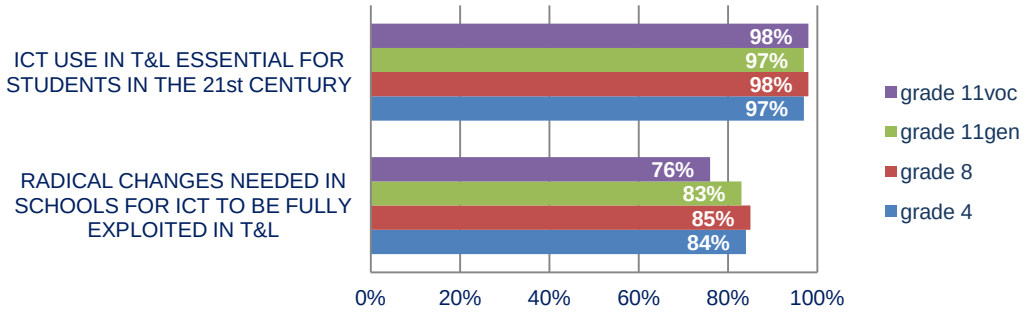
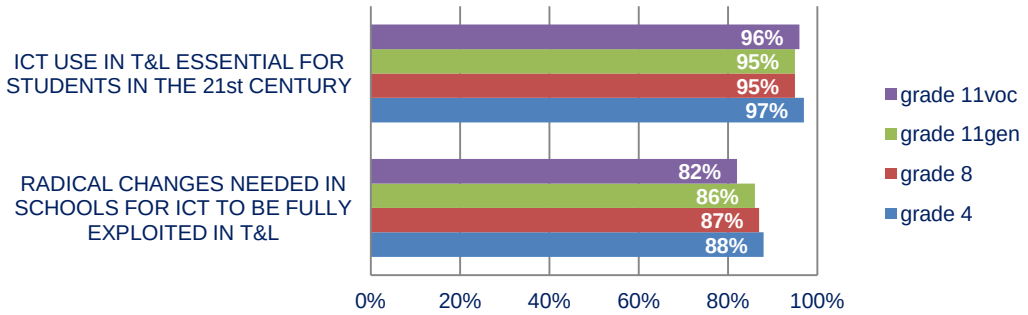


Fig. 6.6: Teachers agreeing or strongly agreeing about...
(in % of students; EU level; 2011-12)



To look at differences between countries, a factorial analysis has been processed about all the above mentioned items out of which one scale has emerged still moving from 'strongly disagree', 'disagree', 'agree' to 'strongly agree'.

At grade 4, 8 and 11 in general education, school heads are more convinced about the positive impact of ICT use in T&L in Denmark, Bulgaria and Estonia, conversely to the Czech Republic for example at the same three grades (see Fig. 5.7a to 5.7d).

Fig. 6.7a - grade 4: School head's attitudes towards ICT use in teaching and learning (in % of students, by country; 2011-12)

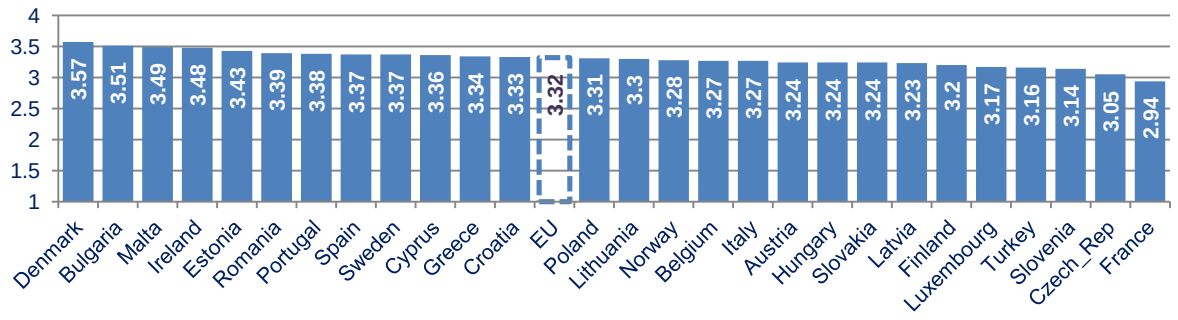


Fig. 6.7b - grade 8: School head's attitudes towards ICT use in teaching and learning (in % of students, by country; 2011-12)

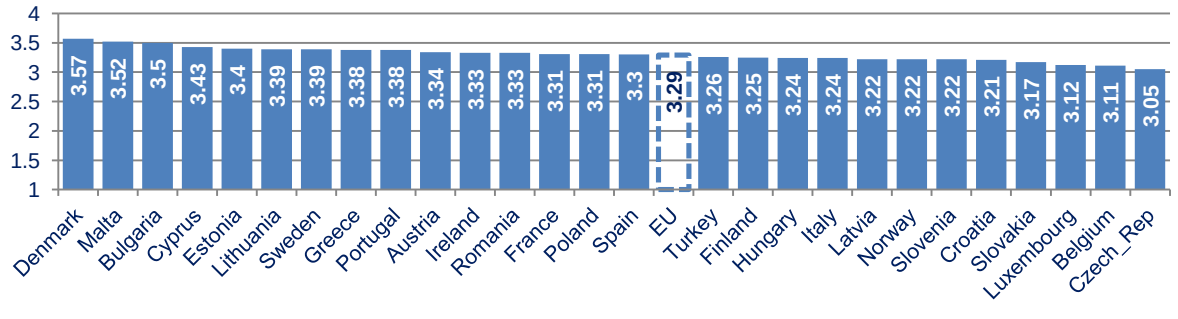


Fig. 6.7c - grade 11 in general education: School head's attitudes towards ICT use in teaching and learning (in % of students, by country; 2011-12)

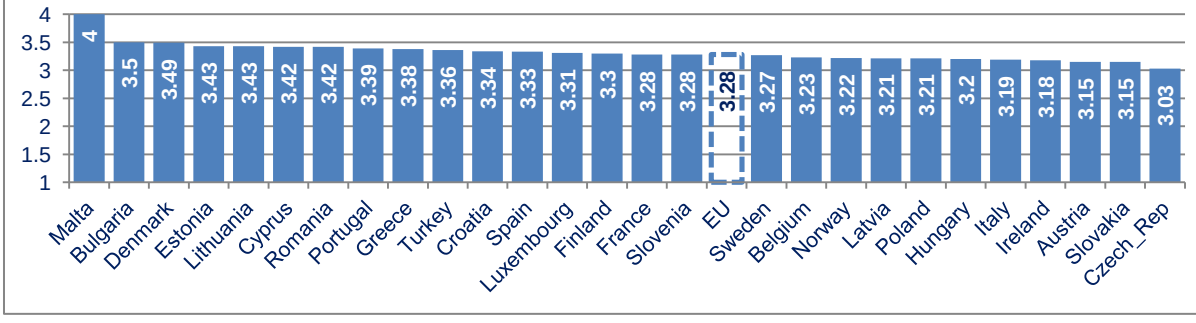
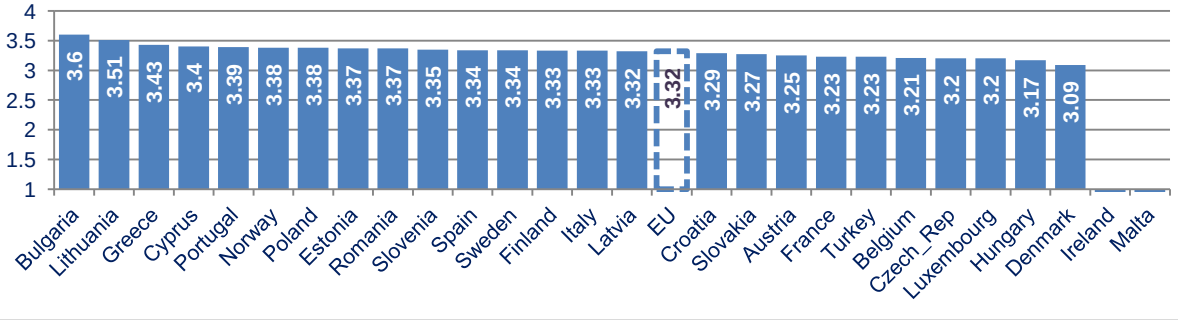


Fig. 6.7d - grade 11 in vocational education: School head's attitudes towards ICT use in teaching and learning (in % of students, by country; 2011-12)



- No particular correlation at EU level has to be mentioned concerning school heads, nor at school nor at personal level.

  Concerning teachers, positive (but tenuous) correlations at EU level are observed between their opinions about ICT use, as detailed above, and the following characteristics:

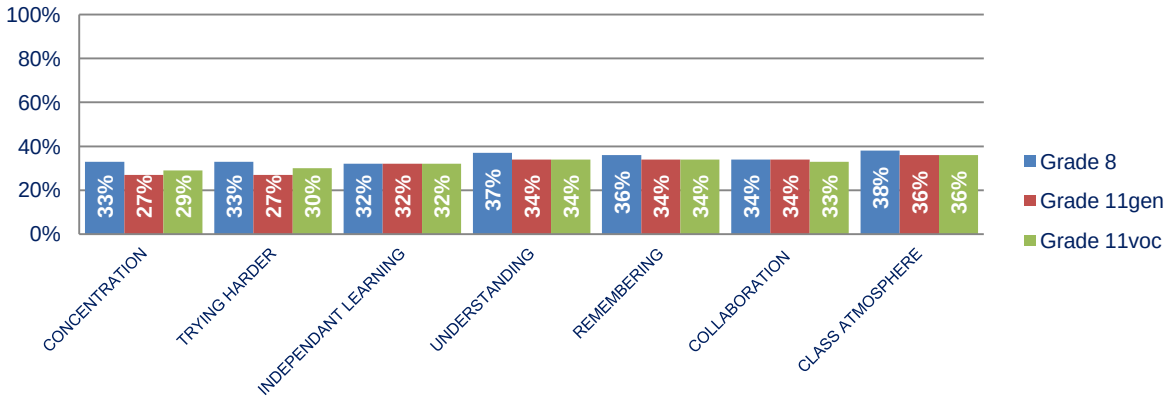
  - the number of years they use ICT
  - the number of ICT related training days they have participated to
  - the % of their time using ICT in lessons/classroom (clearly at grade 11general)
  - the frequency of their activities using ICT
  - the self confidence in their ICT related skills
  - the length of their professional experience as a teacher
  - the fact that they teach in a school where there is a shared vision about ICT use (mostly at grades 8 and 11 general).

STUDENTS

The questionnaire to students (question ST16) investigates their opinion about the impact of ICT use on their own learning on specific issues as concentration, trying harder, understanding, remembering, autonomy, and collaboration. It also addresses the impact of ICT use on the class climate. Students were invited to express their opinion about positive impact on a four levels Likert scale from 'not at all', 'a little', 'somewhat', to 'a lot'.

At EU level, **around 30% of students**, with no important differences between grades, strongly agrees about the use of ICT having a positive impact to a similar extent whatever the area concerned, even if slightly more frequently on the positive impact of ICT use on the class atmosphere. (see Fig. 6.7)

Fig. 6.8: Students strongly agreeing about ICT use during lessons having a positive impact on different learning issues (in % of students; EU level; 2011-12)



To get an overview by country, the student's answers to all items have been processed together in a factorial analysis out of which one scale has emerged. As shown by Fig. 6.8a to 6.8C, opinions of students in Romania, Portugal and Italy are the most positive ones, while student's opinions in Finland and Croatia are part of the less positive ones at all grades (even if still positive, i.e. on the 'agreeing' side as above 2.5).

Fig. 6.9a- grade 8: Student's opinions about ICT use impact on learning (means scores on a scale from 1 to 4; by country; 2011-12)

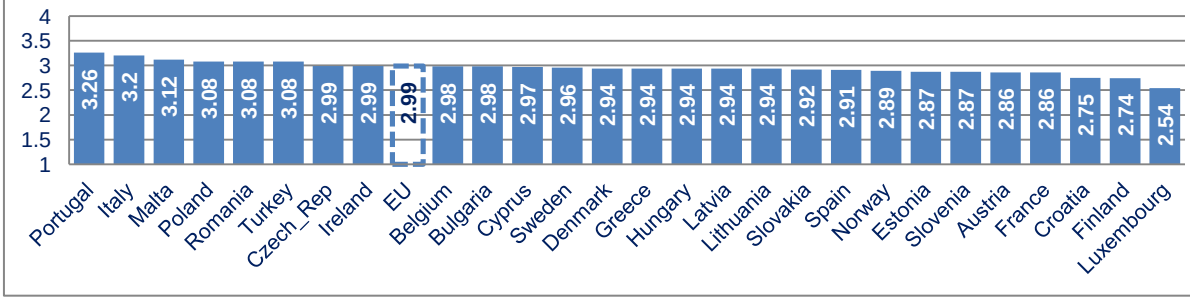


Fig. 6.9b- grade 11 in general education: Student's opinions about ICT use impact on learning (means scores on a scale from 1 to 4; by country; 2011-12)

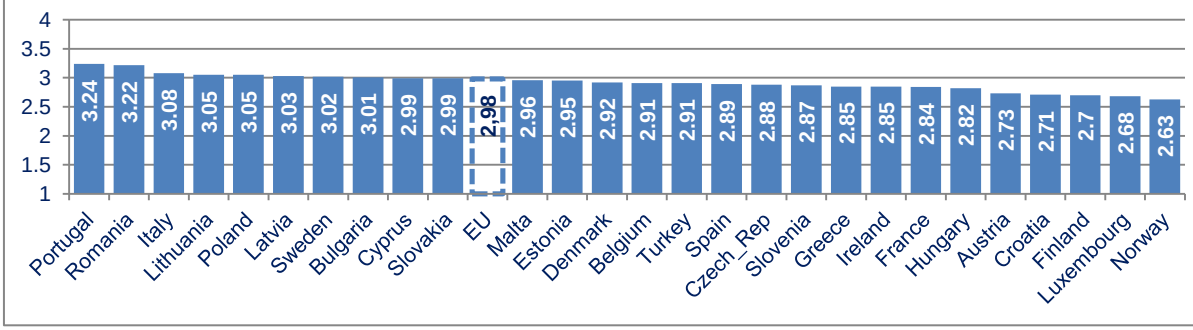
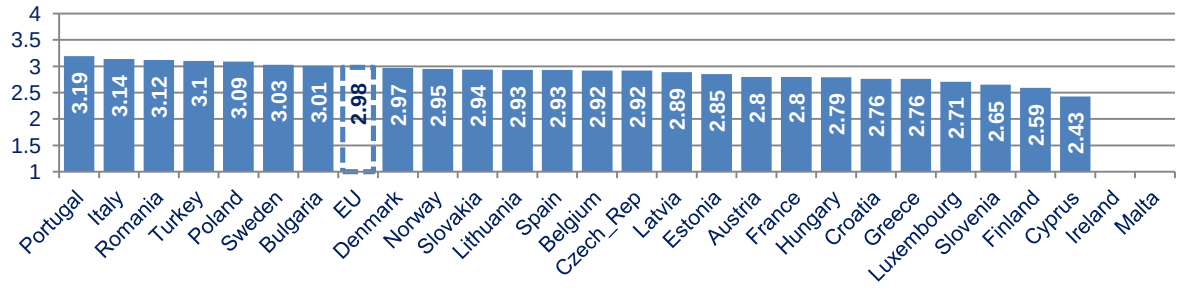


Fig. 6.9c- grade 11 in vocational education: Student's opinions about ICT use impact on learning (means scores on a scale from 1 to 4; by country; 2011-12)



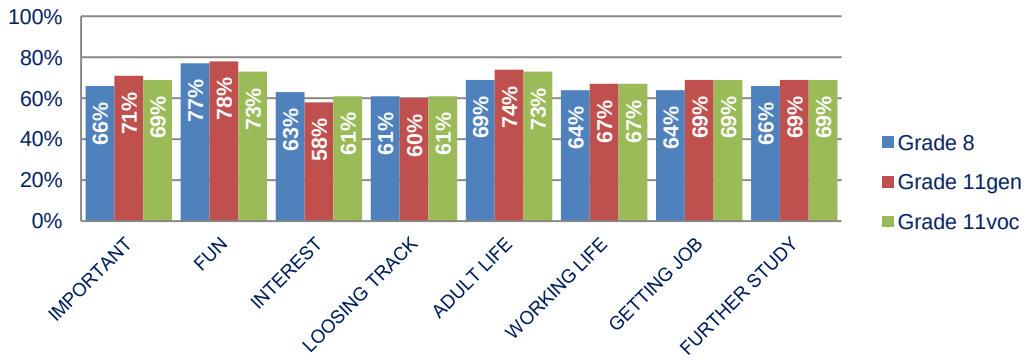
To be noticed that at EU level, positive (but tenuous) correlation is observed between student opinions about ICT impact on their learning and their confidence in ICT related skills (all skills addressed as one scale).

- The questionnaire to students (question ST17) also investigates their attitude towards computers around issues like the importance of learning with a computer presently as well as for their future studies or work, for getting a job or for their adult life, as well as the fun side of it, their intrinsic interest for it, etc. Students were invited to express their opinion on a four levels Likert scale from 'strongly disagree', 'disagree', 'agree' and to 'strongly agree').

  Around 75% of students agree or strongly agree about the fact that using a computer is really fun and almost the same proportion about the fact that it will help them in their future life as an adult.

  Interestingly, **lower percentages of students**, i.e. around **60% of students,** agree or strongly agree about the fact that **they lose track of time** when they are learning with a computer; the same proportion is observed concerning the use of a computer for learning because of an **interest in computers** as such.(see Fig. 6.9).

Fig. 6.10: Student's agreeing or strongly agreeing about statements concerning attitudes towards computers (in % of students; EU level; 2011-12)



Here again, to get an overview by country, the student's answers to all items have been processed together using a factorial analysis out of which one scale has emerged from the eight items. As shown by Fig. 6.10, opinions of students at all grades in Portugal and Bulgaria, as well as in Italy and Turkey at some grades, are the most positive ones, while student's opinions in Poland, Slovenia, Austria and Finland are much less positive at all or several grades (even negative in Poland, i.e. not being any more on the 'agreeing' side with a mean score around 2 meaning that they rather disagree about the statements concerned).

Fig. 6.11a - grade 8: Student's attitudes towards computers
(means scores on a scale from 1 to 4; by country; 2011-12)

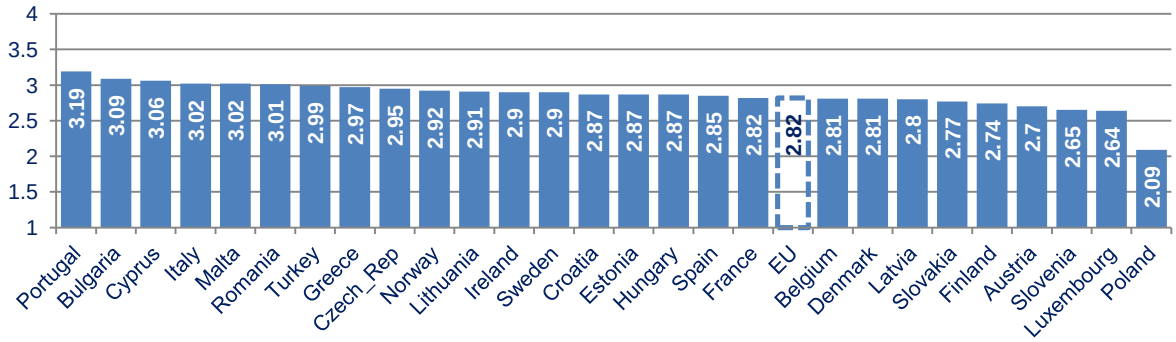


Fig. 6.11b - grade 11 in general education: Student's attitudes towards computers
(means scores on a scale from 1 to 4; by country; 2011-12)

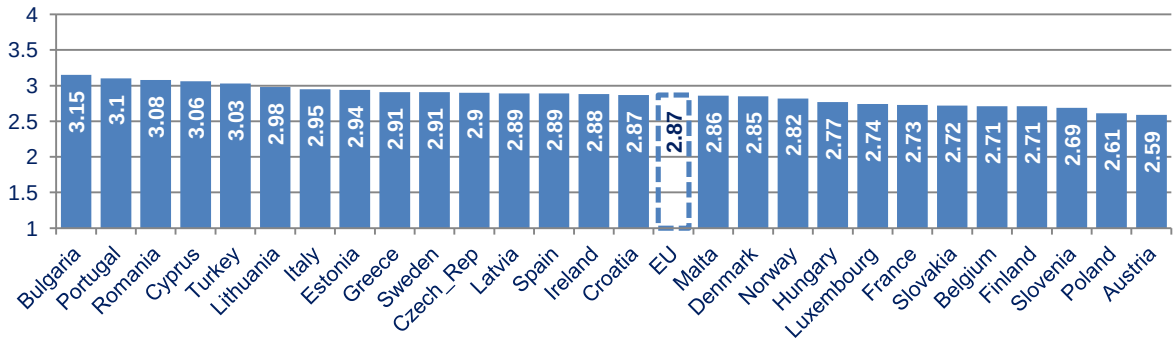
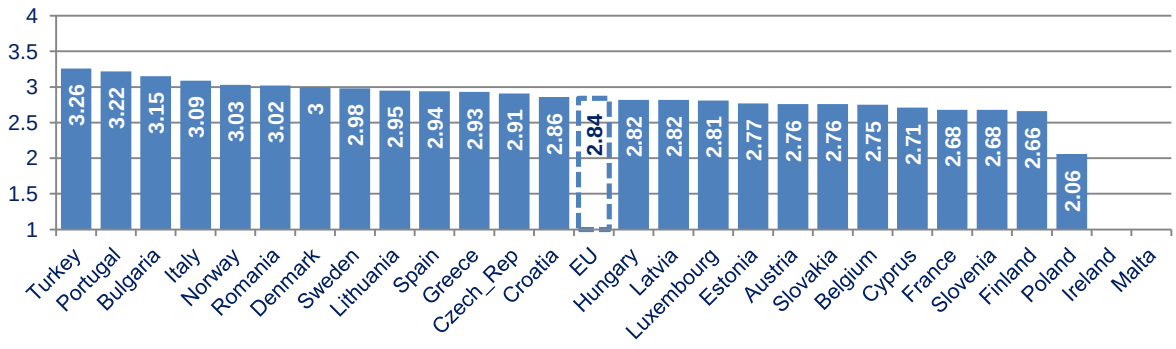


Fig. 6.11c - grade 11 in vocational education: Student's attitudes towards computers (means scores on a scale from 1 to 4; by country; 2011-12)



- At EU level, positive (but tenuous) correlations are observed between students' attitudes towards computers and the number of years they use ICT as well as gender at grade 11 in general education.

7: TRENDS

This section presents changes and trends over time by looking at indicators common to EU surveys of ICT in schools in this and the 2006[22] surveys. It is important to note that the survey methodologies in the two reports are not identical (e.g. sampling, questionnaire design, data collection) and so figures should be interpreted with caution. No useful comparisons can be made with data from preceding surveys.

SUMMARY OF FINDINGS:

- Comparing like for like as far as possible, there are around twice as many computers per 100 students in secondary schools as in 2006 but the large variations between countries reported in 2006 persist.
- Laptops and interactive whiteboards are now extensively found but not reported in 2006. There is a trend towards smaller and portable computers, from a focus on desktop computers in 2006 to laptops and personally owned devices such as mobile phones in 2011.
- In 2011 broadband is almost ubiquitous in schools, but in 2006 was in less than three-quarters of schools.
- More computers are located in places other than dedicated computer rooms compared to 2006.
- Percentages of schools with web sites, email for teachers and students, a local area network have increased at all grades.
- Almost all teachers at all grades have used ICT to prepare lessons and more than four out of five have used ICT in class in the past year, an increase since 2006. However, the percentages of teachers using ICT in more than 25% of lessons has remained fairly stable since 2006, either stable of in decline at all grades.
- Yet percentages of teachers reporting resource or pedagogical obstacles to the use of ICT has declined, particularly those stating that the benefits of ICT are unclear.
- Teachers' self-declared confidence levels in ICT skills such as word processing, using email, preparing a multimedia presentation and downloading and installing software have increased in most cases.

PROVISION OF ICT

The table below (FIG7_1 for more detail) summarise comparable EU level figures as regards provision of infrastructure and connectedness.

All indicators suggest strong growth in the availability of ICT in Europe's schools since 2006: there are more computers in schools, more schools with broadband, and more with online facilities such as a web site and email.

	Grade 4 2011	Grade 4 2006	Grade 8 2011	Grade 8 2006	Grade 11gen 2011	Grade 11gen 2006	Grade 11voc 2011	Grade 11voc 2006
Infrastructure								
Computers per 100 students	16	10	20	11	24	13	33	16
Computers connected to the internet per 100 students	15	8	19	10	23	12	31	14
% computers in labs	53%	74%	67%	96%	67%	97%	66%	93%

[22] Empirica Gesellschaft für Kommunikations- und Technologieforschung mbH (Empirica 2006), *Benchmarking Access and Use of ICT in European Schools 2006: Final Report from Head Teacher and Classroom Teacher Surveys in 27 European Countries*, August 2006

% schools with broadband	92%	65%	95%	71%	96%	75%	94%	75%
% schools with broadband via ADSL	53%	42%	52%	51%	52%	51%	51%	54%
% schools having a support or maintenance contract with a service provider	44%	48%	45%	46%	45%	47%	42%	46%
% of schools with a web site	72%	55%	88%	76%	90%	88%	92%	85%
Email for >50% of teachers	60%	67%	57%	64%	66%	62%	66%	64%
Email for >50% of students	23%	21%	29%	28%	33%	28%	31%	29%
% schools with a local area network	64%	50%	69%	68%	82%	75%	86%	72%

Note that the basis of calculation for 2011 ratios is aligned with the school-based calculation used in 2006 and is different from that used elsewhere in this report, which is student based. Moreover, the nature and significance of some indicators has changed. For example it is arguable that the email indicator matters less now than in 2006 given the rise in use of social media, virtual learning environments, texting and alternative means of communication and community-building. Likewise the broadband via ADSL benchmark does not tell the whole story as many schools are now connected via faster means (see Section 1) which were not included in the 2006 survey.

In the following charts, countries listed are those for which comparable data exist.

COMPUTERS PER 100 STUDENTS

Figure 7.1a shows the numbers of computers (all types) per 100 students at grade 4 in 2006 and 2011, ranked by 2011 figures. In most – but not all – countries there is a large increase in the number of computers available to learners. Data can be seen in FIG7_2.

Fig. 7.1a: Computers per 100 students (Grade 4, 2006 and 2011, Country and EU level)

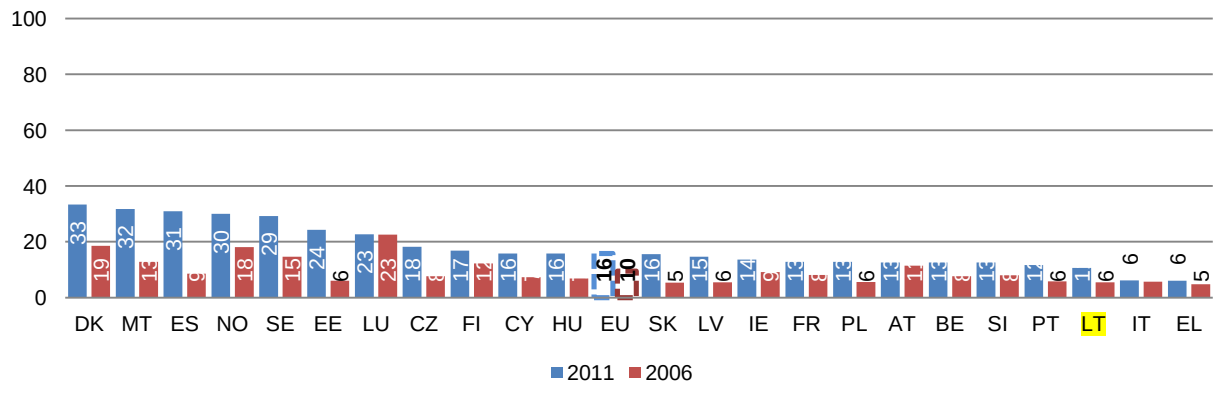
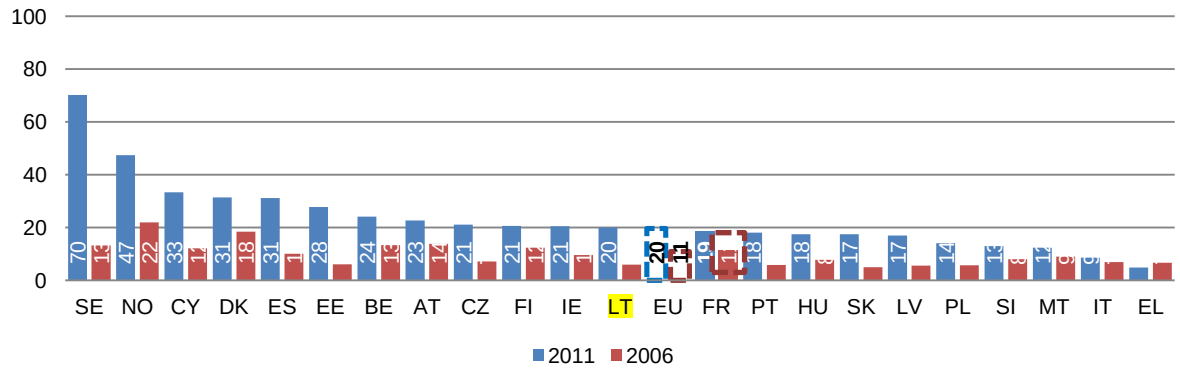


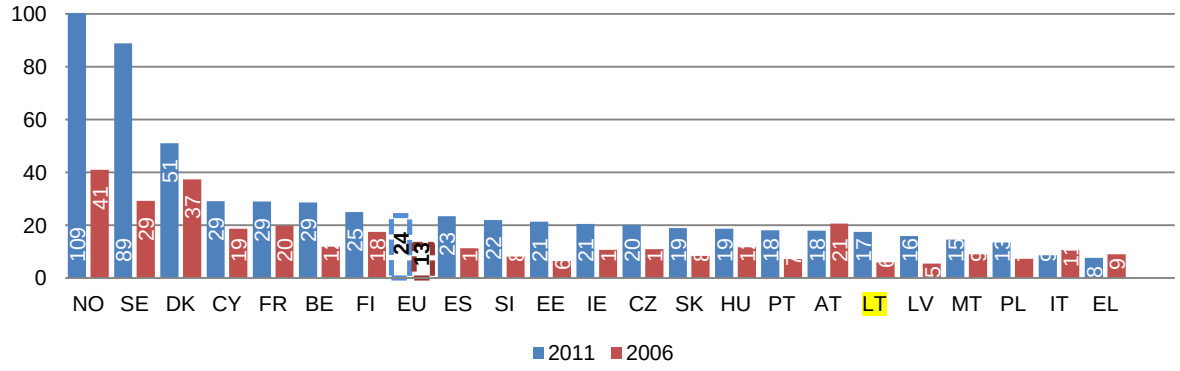
Fig. 7.1b shows the numbers of computers (all types) per 100 students at grade 8 in 2006 and 2011, ranked by 2011 figures, again showing a big increase in most countries for which there are comparable data.

Fig. 7.1b: Computers per 100 students
(Grade 8, 2006 and 2011, Country and EU level)



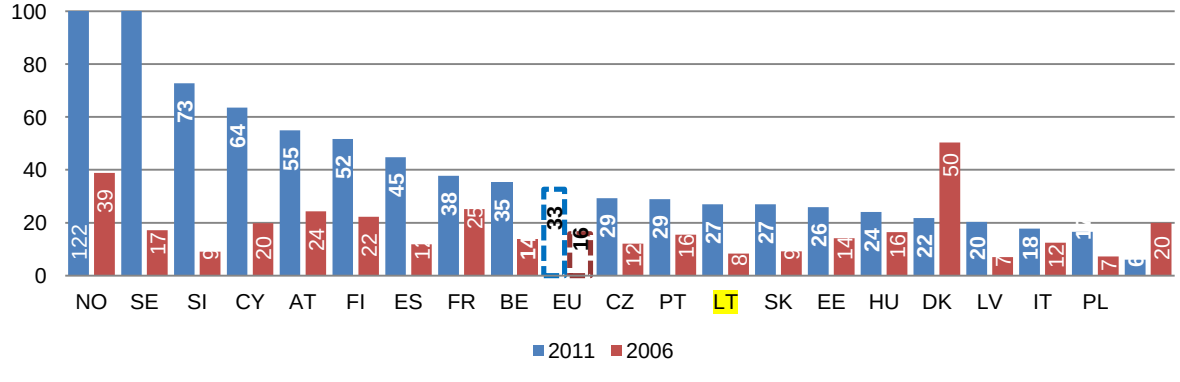
At grade 11 general the same pattern emerges, although there is a decline in one or two countries.

Fig. 7.1c: Computers per 100 students
(Grade 11 general, 2006 and 2011, Country and EU level)



Finally, at grade 11 vocational the trend is more or less the same, as can be seen in fig. 7.1d.

Fig. 7.1d: Computers per 100 students
(Grade 11 vocational, 2006 and 2011, Country and EU level)



DEPLOYMENT OF COMPUTERS

Compared with 2006, figures[23] show a decline in the EU average for primary schools with computers located in labs (from 74% to 53% - see FIG7_3). Such a shift is in line with accepted practice to locate computers in classrooms and other learning spaces (no correlation can be observed between levels of use and location of computers in this survey). In 2006[24] 68% of grade 4 schools used computers in classrooms and 27% in libraries[25].

> The trend away from locating computers in labs is reflected in all 23 countries for which comparable data is available, and steepest in **Belgium, Denmark** and **Norway, Greece** however remaining fairly stable (74% in 2006, 71% of computers in labs in 2011).

In 2006 52% of lower secondary schools deployed computers in classrooms in 2006, 44% in libraries. 96% of lower secondary schools located computers in labs on average

> Only **Austria, Norway, Slovakia** and **Sweden** were below 90% in siting computers in labs.

In 2006, 47% of upper secondary schools general schools located computers in classrooms, 58% in libraries. 97% of these schools installed computers in labs on average in the EU.

> Only **Sweden**, of comparable countries, was below 90%.

In 2006, 46 to 47 per cent of upper secondary vocational schools used computers in classrooms and in libraries. 93% of vocational schools used computers in labs on average.

BROADBAND

Around 95% of schools are now connected to the internet via broadband (FIG7_4 shows data for schools without broadband connections), compared to 65 to 75 percent in 2006. In 2006[26], between 42% (primary) and 54% (vocational) schools were connected via ADSL[27] on average in the EU; the figure is now around 52% for all grades (FIG7_5). No figures are available for speed of connection in 2006.

CONNECTEDNESS

In 2006[28] 55% of grade 4 schools in the EU27 had a web site compared to 72% now (fig. 7.2a), 50% of schools had a LAN[29], and 36% an intranet[30] (FIG7_6a). In 2006 it was reported[31] that on average 5% of primary schools in Europe had none of these.

> In 2006, **Portugal** had the highest percentage (17%) of primary schools having none of these items, but in 2011 over 96% had a web site.

[23] Empirica 2006, Table 4-11: Percentage of schools which use computers for education in computer labs by school type. The figure is for EU+2. The 2006 indicator was % of schools using computers with one or more computers in classrooms.

[24] Ibid, Table 4-13.

[25] Ibid, Table 4-15

[26] Empirica 2006, Table 4-29

[27] It is not possible to calculate how many schools had no broadband connection in 2006 owing to the nature of the questions asked.

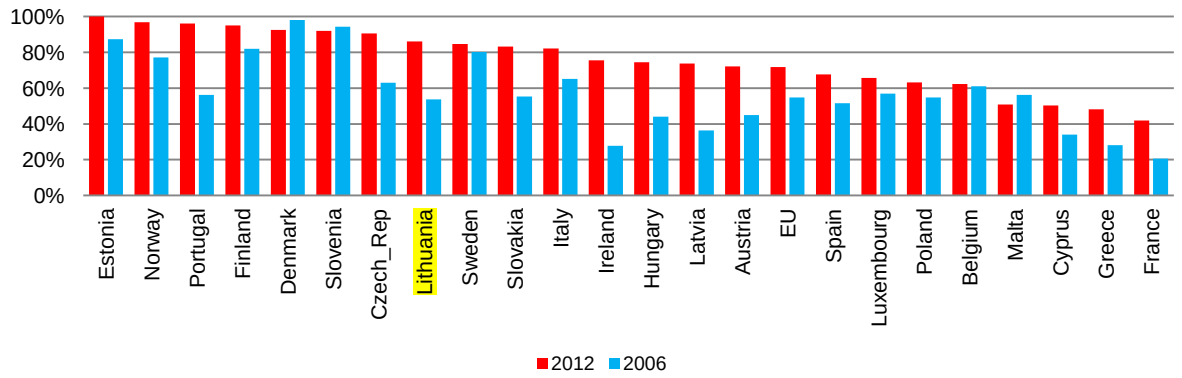
[28] Empirica 2006, Table 4-39.

[29] Empirica 2006, Table 4-45

[30] Empirica 2006, Table 4-47

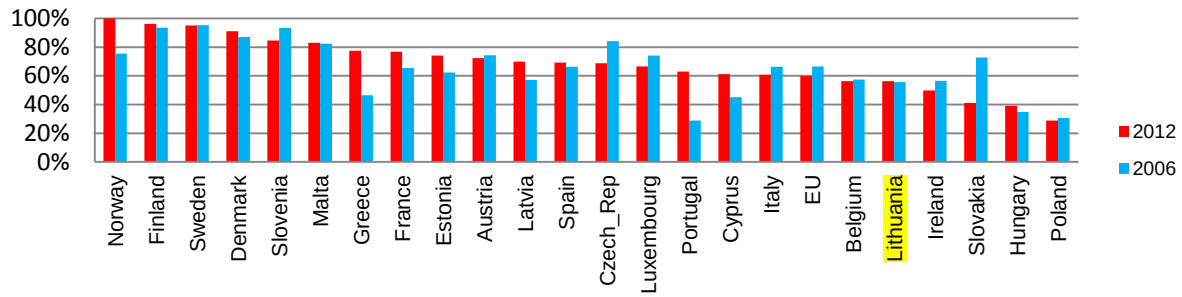
[31] Empririca2006, Table 4-51

Fig. 7.2a: School web site
(%schools with home page or web site; Grade 4, country and EU level)



67% of primary schools in 2006 provided email addresses for more than 50% of teachers (fig. 7.2b, again for grade 4) compared to 60% now[32], 21% for the majority of students[33], and 23% now. This relative stability of email address provision may well reflect the rise of other means of communication and access, e.g. identities to log on to a virtual learning environment, texting, and the growing use of social media such as Twitter and Facebook.

Fig. 7.2b: Email addresses
(% schools providing >50% teachers with email; Grade 4, country and EU level)



In 2006[34] 76% of lower secondary schools in the EU27 had a web site (see fig. 7.2c), 64% email addresses for more than 50% of teachers, 28% for the majority of students[35], 68% a LAN[36], and 47% an intranet[37]. In 2006 it was reported[38] that on average 2% of schools had none of the items listed, **Greece** having the highest percentage, with 6% of lower secondary schools having none of these items.

[32] Empirica 2006, Table 4-41

[33] Empirica 2006, Table 4-43

[34] Empirica 2006, Table 4-39.

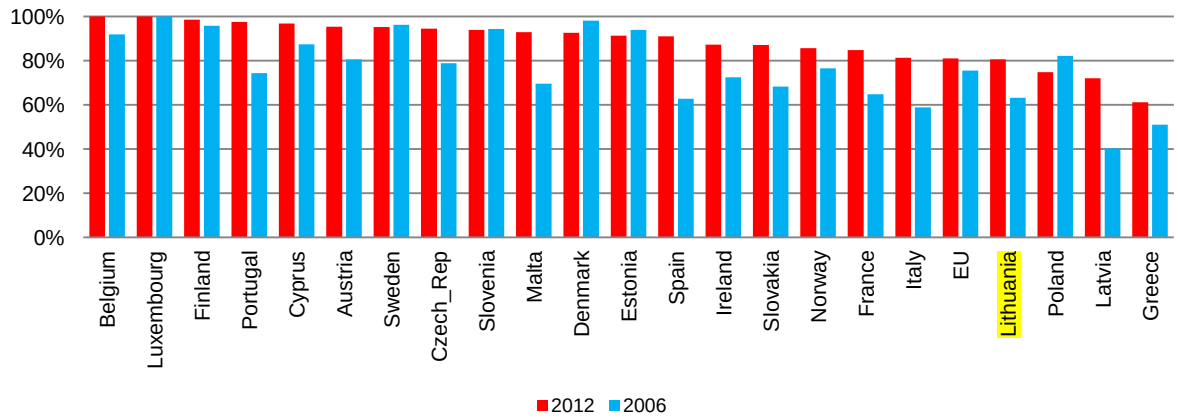
[35] Empirica 2006, Table 4-43

[36] Empirica 2006, Table 4-45

[37] Empirica 2006, Table 4-47

[38] Empririca2006, Table 4-51

Fig. 7.2c: School web site
(%schools with home page or web site; Grade 8, country and EU level)



In 2006[39] 88% of upper secondary schools in the EU27 had a web site, 62% email addresses for more than 50% of teachers, 28% for the majority of students[40], 75% a LAN[41], 53% an intranet[42] - see FIG7_6b. In 2006 it was reported[43] that on average 1% of schools had none of the items listed,

Lithuania had the highest percentage, 3% of its schools having none of these items.

In 2006[44] 85% of vocational schools in the EU27 had a web site, 64% email addresses for more than 50% of teachers, 29% for the majority of students[45], 72% a LAN[46], and 66% an intranet[47]. Over one in 20 grade 11 vocational students are in schools with no connectedness. In 2006 it was reported[48] that on average 1% of schools had none of these,

Portugal had the highest percentage, with 9% of vocational schools having none of these items.

[39] Empirica 2006, Table 4-39.

[40] Empirica 2006, Table 4-43

[41] Empirica 2006, Table 4-45

[42] Empirica 2006, Table 4-47

[43] Empririca2006, Table 4-51

[44] Empirica 2006, Table 4-39.

[45] Empirica 2006, Table 4-43

[46] Empirica 2006, Table 4-45

[47] Empirica 2006, Table 4-47

[48] Empririca2006, Table 4-51

USE OF ICT

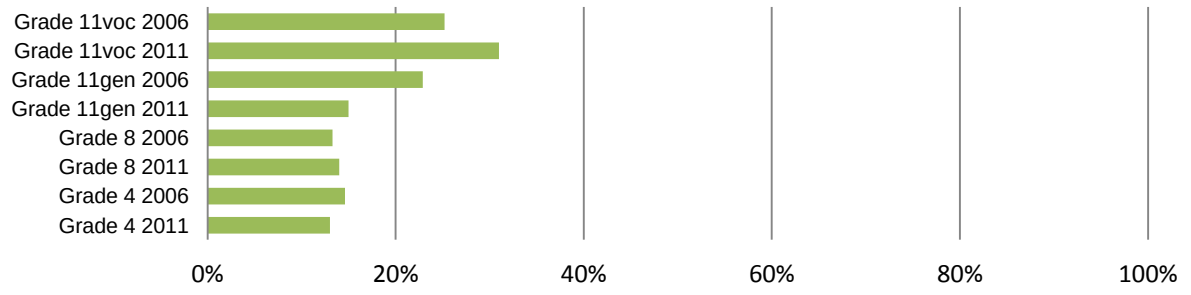
TEACHERS' USE OF ICT

	Grade 4 2011	Grade 4 2006	Grade 8 2011	Grade 8 2006	Grade 11gen 2011	Grade 11gen 2006	Grade 11voc 2011	Grade 11voc 2006
Use								
% teachers who used ICT for preparing lessons in past year	96%	88%	96%	91%	95%	91%	97%	93%
% teachers who used ICT in class in past year	86%	75%	81%	71%	84%	73%	87%	77%
% of teachers using ICT in more than 50% of lessons in the past year	13%	15%	14%	13%	15%	23%	31%	25%
% of teachers using ICT in more than 25% of lessons in the past year	29%	34%	32%	35%	32%	44%	50%	49%
% teachers reporting insufficient computers	34%	51%	26%	46%	26%	49%	19%	47%
% teachers reporting lack of teacher skills	11%	23%	11%	23%	11%	18%	10%	21%
% teachers reporting lack of content	9%	21%	10%	20%	12%	18%	11%	22%
% teachers reporting lack of content in national language	7%	9%	7%	9%	8%	7%	7%	8%
% teachers reporting lack of interest of teachers	5%	9%	4%	10%	5%	9%	3%	9%
% teachers reporting unclear benefits	3%	14%	3%	21%	5%	18%	3%	24%

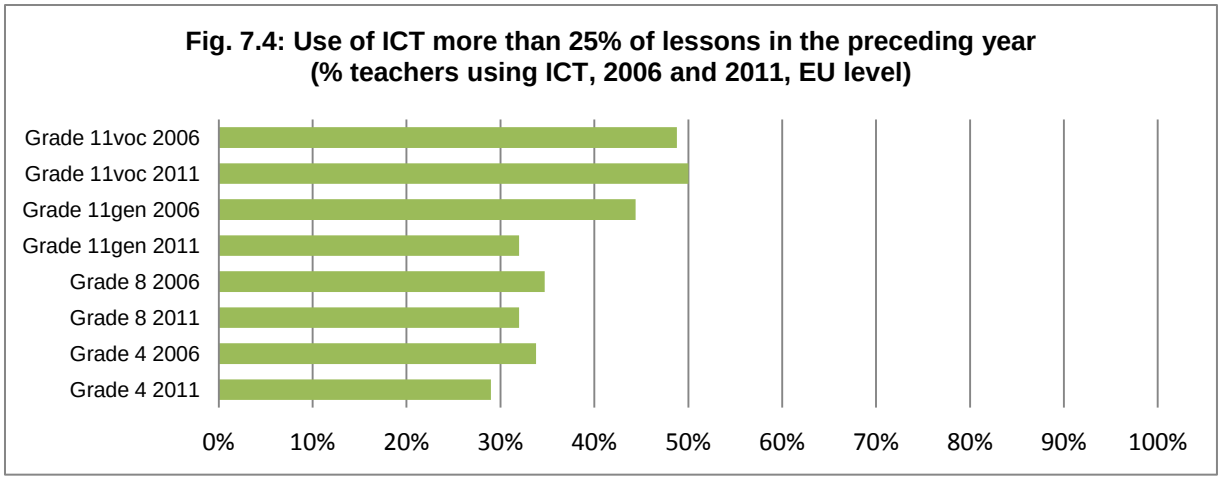
There has been an overall, but slight, increase in the use of ICT during the preceding 12 months for both preparing lessons and in class since 2006 at all levels (FIG7_1 for the underlying data). As far as comparisons with 2006 figures can be made, there is more ICT use at all levels both for preparing lessons and in class. Such figures can of course mask extremely low intensity of use.

As regards intensity of use, fig. 7.3 shows that percentages of teachers using ICT in more than half of their lessons remains fairly stable since 2006, except at grade 11 vocational where there has been an increase. At other levels there is a decline, most noticeably at grade 11 general.

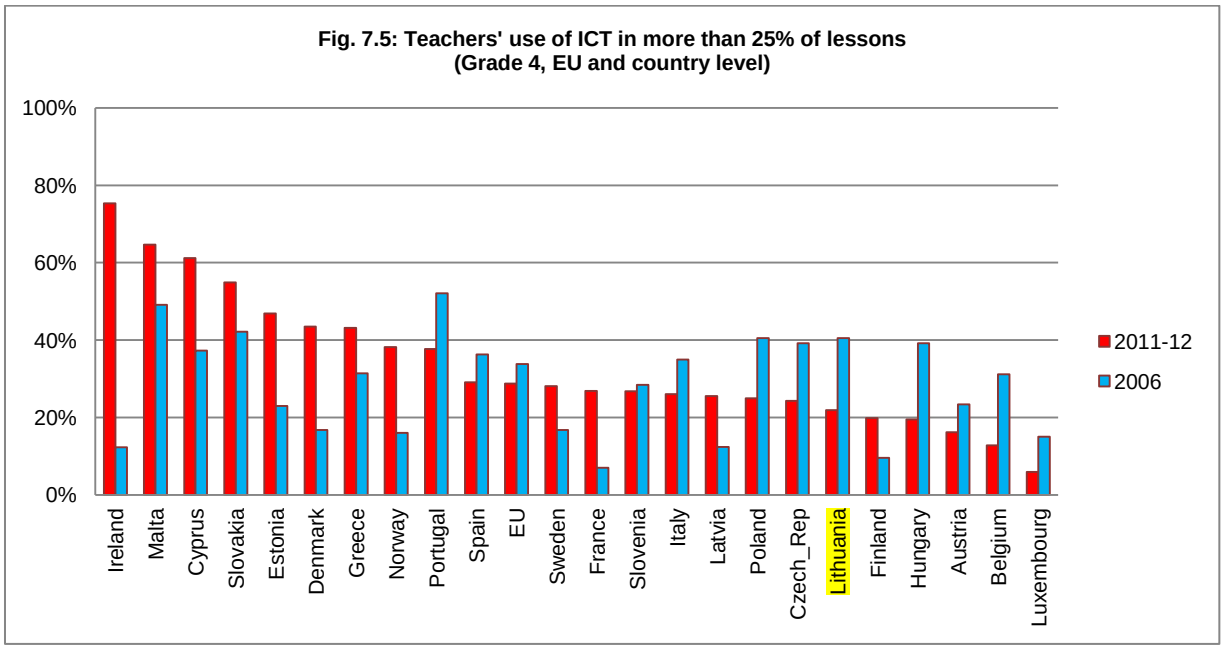
Fig. 7.3: Use of ICT in more than 50% of lessons in the preceding year (% teachers, 2006 and 2011, EU level)



The same pattern emerges when comparing figures at EU level for use in more than 25% of lessons (fig. 7.4, FIG7_7), with a slight increase at grade 11 vocational and a decline at other grades, particularly grade 11 general.



Country level figures can be seen in fig. 7.5 for grade 4. The slight drop in percentages at EU level is mirrored in 11 countries, but in 12 countries there has been an increase, the biggest in Ireland.

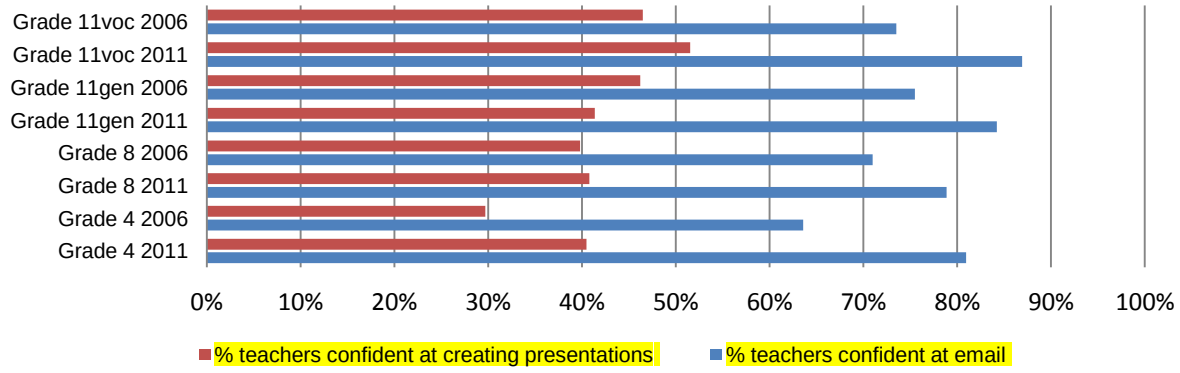


TEACHER CONFIDENCE

Teacher confidence	Grade 4 2011	Grade 4 2006	Grade 8 2011	Grade 8 2006	Grade 11gen 2011	Grade 11gen 2006	Grade 11voc 2011	Grade 11voc 2006
% teachers confident at producing text	78%	64%	77%	67%	81%	70%	83%	69%
% teachers confident at email	81%	64%	79%	71%	84%	76%	87%	74%
% teachers confident at creating presentations	40%	30%	41%	40%	41%	46%	52%	47%
% teachers confident at installing software	36%	33%	37%	40%	38%	45%	48%	44%

Confidence levels in two of these benchmarks, using email and creating presentations, have risen since 2006, particularly with regards to email but at grade 11 general teachers' reported confidence in creating multimedia presentations is down (see fig. 7.5 and FIG7_1 for the detail).

Fig. 7.5: Teacher confidence (% teachers, 2011 and 2006, EU level)



The 2006 survey pointed out the need for an 'ICT catch-up process' in schools (p20), calling for an increase in the number of computers, improvement of internet access with a move to broadband connection and the use of ICT for education in classrooms. While great strides have been made in the first two areas, it is the third that is proving more challenging.

8- PATTERNS AND PROFILES

In addition to providing a broad state of the art of ICT use in T&L at EU level and by country, the present survey also explores some specific patterns or profiles about such use at three levels: (i) the school level, (ii) the teacher level and (iii) the student level. These patterns, representing fictitious groups of people behaving more or less the same way or structures sharing more or less the same characteristics, will be used to define respectively the digitally supportive school, the digitally supportive teacher and finally the digitally supportive student. These profiles can in turn be used to develop some interpretations and predictions about ways to optimize ICT use in T&L.

This section presents different profiles of schools, teachers and students based on the result of a cluster analysis of their answers to the survey questionnaires. It presents how these profiles are distributed at EU level as well as by country. It also provides very first thoughts about profiles at school, teacher and student levels corresponding to particularly interesting learning environment or practice.

SUMMARY OF FINDINGS:

- Scrutinizing policies, strategies and concrete support measures (teacher's participation to training, availability of an ICT coordinator, etc.) developed by schools to integrate ICT in T&L, opinions of their school heads and what they consider as obstacles to integrate ICT use in T&L, four school profiles have been identified by the cluster analysis:
  - strong policy & strong support
  - weak policy & strong support
  - strong policy & weak support
  - weak policy & weak support

  Out of these school profiles, the one that could be considered at first sight as the most favourable one is the school defining strong policy and implementing strong support measures. Interestingly, students in schools characterised by weak policy but strong support measures report rather similar frequency of use of ICT equipment and ICT based activities in the classroom, compared to the students in schools with strong policy and strong support measures; in addition, these students report more frequent use of ICT equipment, and even more frequent ICT based activities in the classroom, compared to students in schools where policy is strong but concrete support measures are weak (or where both, policy and support, are weak). A similar pattern is observed concerning teacher's use of computer/internet in the classroom.

  As a result, the ***digitally supportive school*** at EU level is defined in the present survey as **the school developing strong concrete support measures associated or not with strong policy**.

  On average at EU level, between **40 and 50% of students at grades 4, 8**, and **11 in general education** (almost 35% in vocational education**)** are in such *digitally supportive schools*. A few countries are far beyond the EU average: **Slovenia** and **Norway** at all grades, the **Czech Republic** especially at grades 4 and 8 and **Denmark** especially at grade 11 in general education.

  But the situation appears alerting in some countries where only less than 15% of students are in *digitally supportive schools* at some grades (Greece and Turkey at grade 11).

  Boosting concrete support measures as provision of ICT coordinators, professional development opportunities for teachers, etc. appears as a potentially efficient option for schools wanting to develop (more) ICT use in T&L (and not always knowing how/where to start or fix priority). **Important progresses in this specific area are still needed with the aim to scale up their provision to T&L conditions offered to a large majority of students, at EU level and even more specifically in some countries**.

- Another cluster analysis has been processed about teacher's access to and use of ICT in T&L, their participation to professional development activities in the area, their confidence in different ICT based

activities, their opinions about using it for T&L, their attitudes towards computer use, and the obstacles to ICT integration into T&L.

This cluster analysis reveals the following four types of T&L conditions:

- high teacher's confidence/attitude & high access/low obstacles
- high teacher's confidence/attitude & low access/high obstacles
- low teacher's confidence/attitude & high access/low obstacles
- low teacher's confidence/attitude & low access/high obstacles

As a result, the ***digitally supportive teacher*** at EU level is defined as the **teacher working in T&L conditions with high access to equipment and low obstacles and being highly confident and positive about ICT use in T&L**.

Between 20 and 25% of students are taught by digitally supportive teachers at EU level.

Interestingly, confident and positive teachers working in schools with low access and high obstacles report more frequent use of ICT based activities compared to teachers with high access to ICT and low obstacles but declaring low confidence in ICT based activities and less positive attitude towards ICT use in T&L.; when including students in T&L conditions characterised by low access to ICT and high obstacles but high teacher confidence and attitudes, the percentages of students taught by highly confident and positive teachers grow up to between 45 and 55% whatever access and obstacles are high or low.

The situation varies between countries and grades. A few countries are far beyond the EU average when looking at the percentage of students in T&L conditions characterised by high teacher confidence and attitudes as well as high access to ICT and low obstacles. It's the case of **Denmark** and **Norway** at grade 11, as well as **Portugal** in vocational education.

But the situation is much less favourable at some grades in Austria, Belgium, Cyprus, Finland, France, Greece, Luxemburg, Romania and Turkey.

Increasing teacher professional development opportunities appears here as well as a potentially efficient way, supported by evidence, to boost ICT use in T&L through the provision of highly confident and positive teachers. Focusing policies specifically on teacher professional development is supported by the fact that teacher's opinions about the impact of using ICT for learning purposes is already positive or very positive (around 80% of students being taught by such teachers in schools where the school heads also share such positive views) as shown in the previous section 6 *Attitudes and opinions* of this report. **Convincing teachers and school heads about ICT use relevance for T&L appears no more as a priority conversely to equip them with the digitally based teaching competences and experience they need, for transforming positive opinions into effective practice in the classroom**.

❖ A third cluster analysis has been processed about student's access to ICT, number of years of experience and frequency of ICT based activities, at home in their free time on the one hand as well as at school during lessons on the other hand. As a result, three student profiles appear, i.e. those having:
  - high access/use at school & at home
  - low access/use at school & high access/use at home
  - low access/use at school & at home

The student profile characterised by **high access/use at school & at home** is defined as the *digitally supportive student* in the present report. Such profile is indeed associated with the **highest frequencies of ICT based activities at school**, **levels of confidence** in their operational ICT skills, social media skills, safe and responsible use of internet, as well as **with the most positive opinions** about ICT use in T&L and **attitudes** towards computers.

Around 30% of students at grade 8 and 11 in vocational education can be considered as digitally positive students, i.e. associated with high access/use at school & at home; **around 35% of students** are in this situation at grade 11 in general education. The highest percentage of students sharing this profile is systematically found in **Denmark** at all grades and **Norway** at grade 11.

At EU level, **around 50% of students** at grades 8 and 11 in vocational education, i.e. the largest group

of students, corresponds to the profile characterised by low access/use at school & high access/use at home (around 35% at grade 11 in general education). In addition, around **28% of students** at **grade 11 in general education** are part of the low access/use at school & home profile.

These findings plead for a reinforced public action at institutional, local, regional, national and European levels to boost ICT use at school with the objective to reduce the gap between ICT use out and within school, still there in 2012, and also give the opportunity to the around 30% of 16 year old students not having high access to ICT at home to experience it at school.

- **The three profile descriptions provide, for each country, the percentages of (i) digitally supportive schools, (ii) digitally supportive teachers, and (iii) digitally supportive students. A correlation analysis reveals relationships between these profiles. In other word, educational systems characterized by a high percentage of digitally supportive schools count a large percentage of digitally supportive teachers or students, or the reverse.**

  Up to a reasonable extent at grade 4 and at grade 11 in vocational education (0,43 and 0,54 correlation respectively), **as the percentage of digitally supportive schools increase, the percentage of digitally supportive teachers increase**. There might be national/regional contexts that might favor the development of digitally supportive schools and teachers, or digitally supportive schools might encourage teachers to become supportive, or the reverse.

  Up to a rather good extent at grade 11 in general education (0,70 correlation), **countries with a high percentage of digitally supportive schools are also countries with a high percentage of digitally supportive students** and few digitally supportive students can be found in countries with few digitally supportive schools. **A similar trend** is observed but **to a much smaller extent at grade 8 and 11 in vocational education** (0,26 and 0,19 correlation respectively).

  Finally, a relationship is also observed between the digitally supportive teachers and digitally supportive students. **Up to a rather good extent at grade 11 in vocational education** (0,73 correlation), **countries with a high percentage of digitally supportive teachers are also countries with a high percentage of digitally supportive students** (even if the correlation is not statistically significant which, as mentioned previously, is not surprising because of the size of the population here concerned, i.e. the number of participating countries). **The trend is similar but to a more limited extent** (0,43 correlation; again, not statistically significant) **at grade 11 in general education**.

THE DIGITALLY SUPPORTIVE SCHOOL

Even if central authorities are mostly responsible for policy formulation about ICT use in T&L as well as coordination in a majority of countries, this responsibility is shared with regional or local administration and institutions in some countries; institutions are anyway frequently responsible for implementing such centrally defined strategies (Eurydice, 2011). As a consequence, looking at policies, strategies, etc. at school level can be revealing of the ICT based T&L conditions students are effectively offered.

The questionnaire to school heads investigates, among many other issues, policy related issues as vision, strategies, incentives and innovation. It also addresses concrete support measures implemented as teacher's participation to training actions and the availability of an ICT coordinator, as well as obstacles encountered in the school capacity to provide ICT use in T&L, and school head individual attitudes towards ICT relevance for T&L.

A cluster analysis of the school heads answers to school policy related questions has been processed on the one hand, precisely concerning:

- existing school strategies to use ICT in T&L (question SC18)
- incentives to reward teachers using ICT (question SC19)
- school innovation policy (question SC20)

Another cluster analysis of the school heads answers to concrete support measures, opinions and obstacles related questions has been processed on the other hand, precisely concerning:

- percentage of school teachers that have undertaken professional development in the past two school years (question SC15)
- ICT coordinator availability (question SC16)
- shortage or inadequacy in different areas affecting the provision of ICT use in T&L (question SC17)
- school heads opinions about ICT use for educational purposes (question SC21)

Each of these two clusters analyses reveals two profiles that were later cross tabulated. As a result, four school profiles appear that can be summarised in the following way:

- strong policy & strong support (school profile 1)
- weak policy & strong support (school profile 2)
- strong policy & weak support (school profile 3)
- weak policy & weak support (school profile 4)

The percentages of students in each school profile, by grade at EU level as well as by country, are presented in Fig. 8.1. The tables with precise percentages and their confidence intervals, are presented in annex.

We will come back later on to a more in-depth analysis of these graphs. For the moment, let's underline that at EU level:

- **around 30% of students at grade 4** and **around 25% at the other grades** are in schools implementing strong policy & strong support (school profile 1);
- around **15% of students at grade 4 and 11 in general education** are in schools characterised by weak policy but strong support (school profile 2); they are **25%** in the same situation **at grade 8** and **less than 10%** at **grade 11 in vocational education**;
- around **35% of students** are in schools characterised by weak policy & weak support (school profile 4);
- Differences between countries (and grades) are important:
  - between 60 and 80% of students at grade 4 are in schools implementing strong policy & strong support in the Czech Republic, Norway and Slovenia; between 40 and 60% of students at grade 8 in the three same countries as well as in Ireland; between 50 and 60% at grade 11 in general education are in such schools again in Norway and Slovenia, as well as in Denmark; between 50 and 60% of students at grade 11 in vocational education are also in such schools in Slovenia and Norway;
  - conversely, only less than 15% of students are in *digitally supportive schools* at grade 11 in Greece and Turkey;
  - around 50% of students, and sometimes more, are in schools characterised by weak policy & weak support (school profile 4) at grade 4 in Austria, Belgium, France, Greece, and Luxembourg; at grade 8 in Croatia, Greece, Italy and Turkey; in Austria, Greece and Italy at grade 11 in general education, and in Croatia, Denmark, Hungary and Sweden in vocational education.

Fig. 8.1: Percentages of students by school type in terms of policy & support, by grade at EU level and by country, 2011-12

Fig. 8.1a - at grade 4

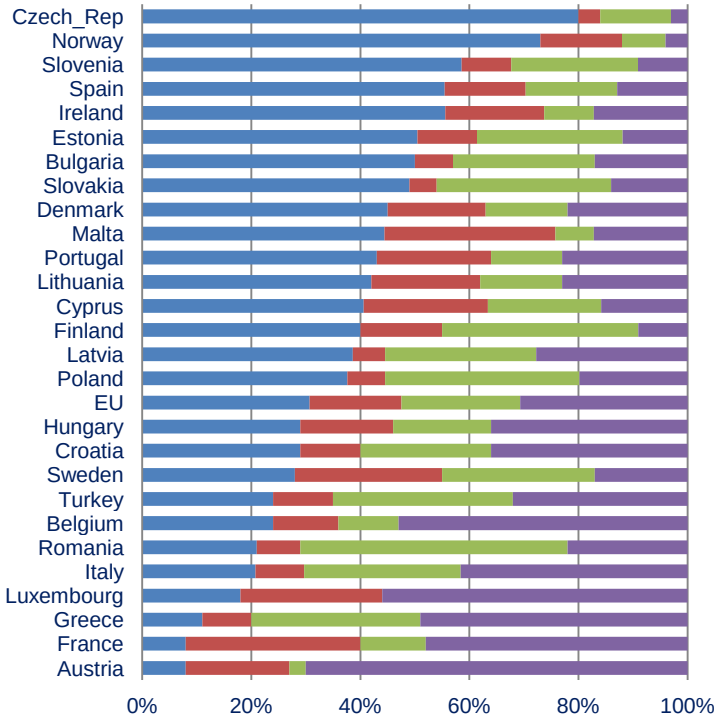


Fig. 8.1b - at grade 8

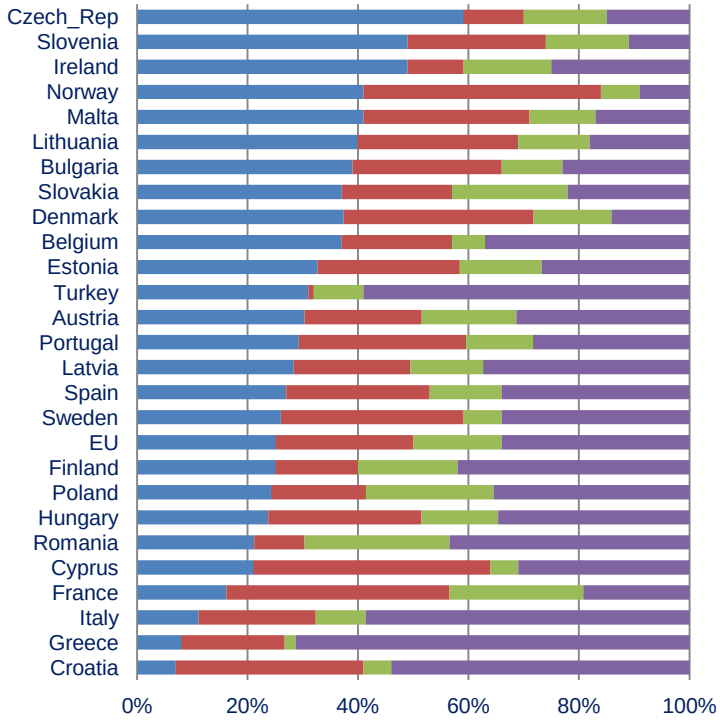


Fig. 8.1c - at grade 11 general education

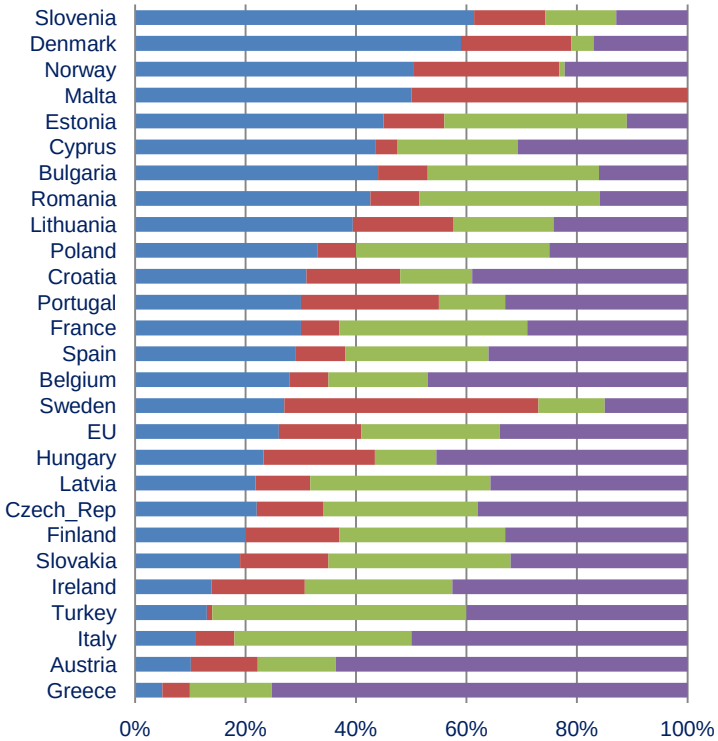
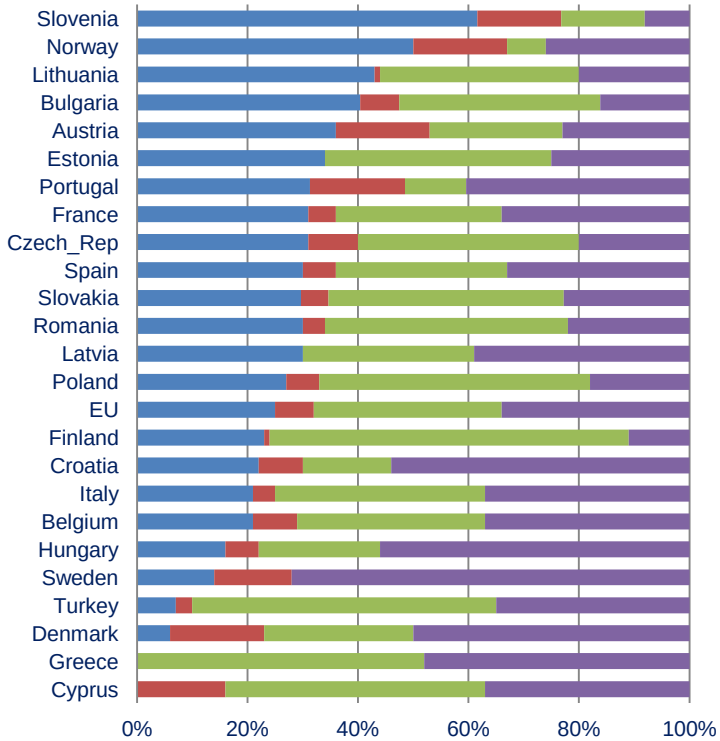


Fig. 8.1d - at grade 11 vocational education



- Concrete support or formulating policies, what does really matter? When comparing, at EU level, ICT based activities declared by students (question ST13) and their equipment use (question ST11) according to the four school profiles, it appears that providing concrete support (teacher training, ICT coordinator, low obstacles, and school head positive attitudes towards ICT use in T&L) matters more than formulating policies. Indeed, as shown by Fig. 8.2a and 8.2b, student's higher frequency of ICT equipment use, and even higher frequency of ICT based activities, is observed (and represented by higher mean scores in the graphs) in the two types of schools where support measures provided through the availability of an ICT coordinator, teacher training, etc. are strong (school profiles 1 and 2).

Fig. 8.2a: Student's ICT based activities frequency (mean scores on a scale from 1 to 4, EU level, 2011-12)

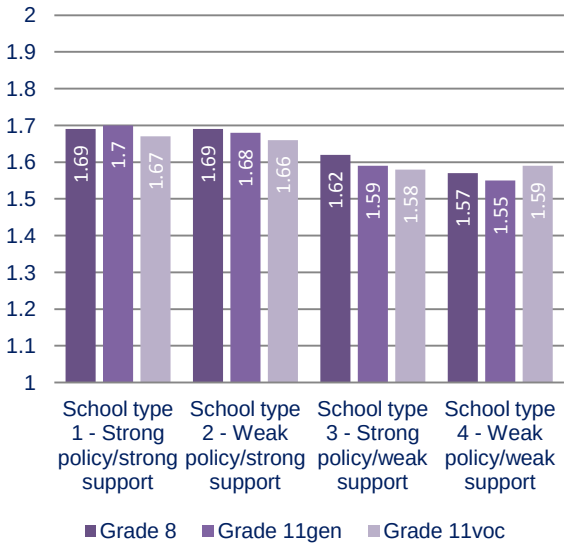
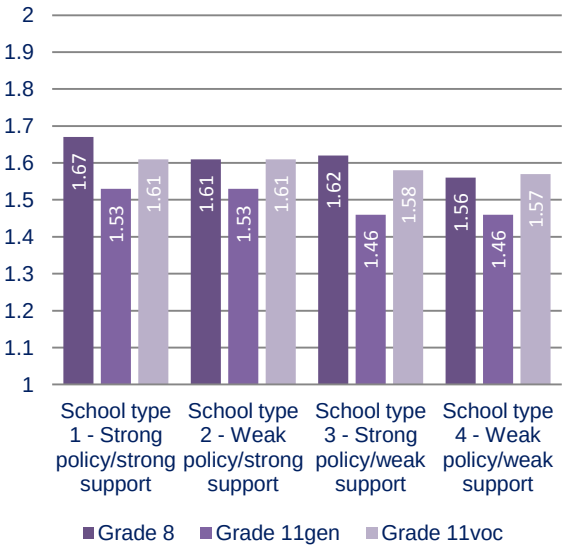
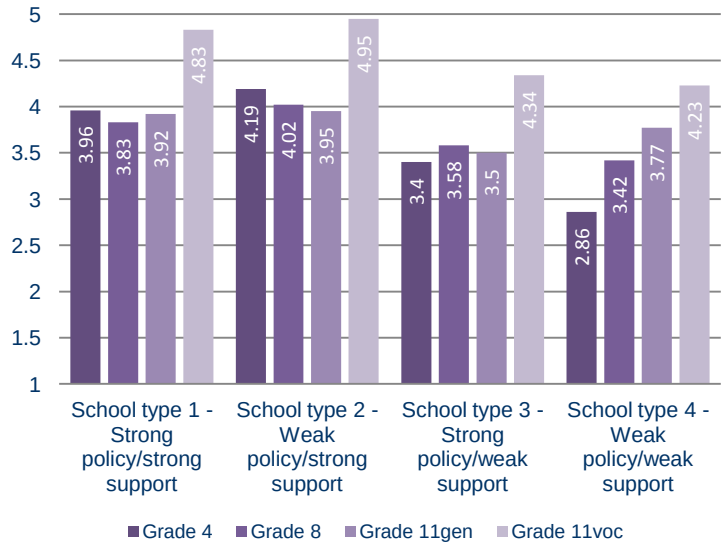


Fig. 8.2b: Student's equipment use frequency (mean scores on a scale from 1 to 4, EU level, 2011-12)



A similar situation is observed when comparing teacher's percentage of time using ICT in the past twelve months (question TE07) according to the four same school types mentioned above (see fig. 8.2c). Indeed, higher teacher's use (represented by higher mean scores in the graph) is observed in school types 1 and 2.

Fig. 8.2c: Teacher's use of computer/internet in the classroom during the last 12 months (mean scores on a scale from 1 to 7, EU level, 2011-12)



- According to the present survey and the cluster analysis presented above, the *digitally supportive school* can be defined as a school where policy & concrete support measures as teacher's participation to professional development actions, the availability of an ICT coordinator, low obstacles to ICT use in T&L and school head positive attitudes towards ICT use in T&L, are present.

  Looking back at figures 8.1, presented previously and showing the division of school profiles by grade at EU level and by country, we can notice that:

  - At EU level, between **40 and 50% of students** at grades 4, 8 and 11 in general education are in *digitally supportive schools,* i.e. schools with strong policy & strong support measures in favour of ICT use in T&L (school profile 1), or schools characterised by weak policy but strong support measures (school profile 2); a little bit less students (almost 35%) are in this situation at grade 11 in vocational education;

  - compared to the other grades, a higher percentage of students at grade 11 in vocational education – around 35% compared to around 20% at the other grades - are in schools having strong policy but weak support (school profile 3);

  - compared to the other grades, higher percentages of students at grade 8 are in schools having weak policy but strong support measures (school profile 2); this is the case in Denmark and Norway where percentages of students in school with strong policy & strong support (school profile 1) are already high; but it also happens in countries where school profile 1 is not that much represented as in Croatia, Cyprus, and France;

  - at grade 11 in Greece and Turkey (as well as grade 4 in Greece), less than 15% of students are in *digitally supportive schools*.

THE DIGITALLY SUPPORTIVE TEACHER

The teacher questionnaire investigates, among other issues, their participation to professional development (type and content of training; time dedicated to it), their confidence in different ICT based activities in T&L as well as their attitudes and opinions about it. It also questions them about their access to ICT and conditions of use, as well as about what they consider as being obstacles to ICT use in T&L.

A cluster analysis of teacher's answers to questions on these issues has been processed precisely concerning:

- Percentage of teaching time using computer/internet in the past twelve months (question TE07)
- Teacher's access to ICT infrastructure (question TE09)
- Teacher's professional development undertaken during the past two school years (question TE14)
- Time dedicated to such professional development (question T15)
- Shortages or inadequacy in different areas affecting the provision of ICT use in T&L (question TE20)
- Teacher's confidence in different ICT based activities (TE22)
- Teacher's opinions about ICT use impact on student learning (TE23)
- Teacher's attitudes towards ICT in T&L (question TE24)

This cluster analysis reveals four types of T&L conditions that can be summarised in the following way:

- high teacher's confidence/attitude & high access/low obstacles (T&L conditions type 1)
- high teacher's confidence/attitude & low access/high obstacles (T&L conditions type 2)
- low teacher's confidence/attitude & high access/low obstacles (T&L conditions type 3)
- low teacher's confidence/attitude & low access/high obstacles (T&L conditions type 4)

The percentage of students in each type of T&L conditions, by grade at EU level as well as by country, is presented in Fig. 8.3. The tables with precise percentages and their confidence intervals, are presented in annex.

We will come back later on to a more in-depth analysis of these graphs. For the moment, let's underline that, at EU level:

- around **25% of students** at grades 8 and 11 are in T&L conditions characterised by 'teacher's high confidence/attitude & high access/low obstacles' (T&L type 1); a slightly lower percentage of students is in this situation at grade 4 (around **20% of students**);
- around **30% of students** at grades 4, 8 and 11 in general education are in T&L conditions characterised by 'teacher's high confidence/attitude & low access/high obstacles' (T&L type 2); around 20% of students are in this situation at grade 11 in vocational education;
- **between 20 and 28% of students**, depending on the grade, are in T&L conditions characterised by 'teacher's low confidence/attitude & low access/high obstacles' (T&L type 4);
- differences between countries (and grades) are important:
    - between 45 and 65% of students at grade 11 are in T&L conditions characterised by 'teacher's high confidence/attitude & high access/low obstacles' (T&L type 1) in Denmark and Norway, and around 45% in Portugal in vocational education;
    - between 45 and 50% of students are in T&L conditions characterised by 'teacher's low confidence/attitude & low access/high obstacles' (T&L type 4) in Austria, Belgium and Luxembourg at grade 4; between 50 and 65% of students at grade 11 in general education in Greece and Turkey; around 50% in Greece and Luxemburg at grade 11 in vocational education;
    - in Austria, Belgium, Finland, France and Luxemburg at grade 4 (5% of students in T&L conditions characterised by high teacher confidence and attitudes as well as high access to ICT and low obstacles); in Cyprus, Greece and Luxemburg at grade 8 (around 5%); in Greece, Romania and Turkey at grade 11 in general education (around 5%); and in Cyprus, Greece and France in vocational education (below 10%).

Fig. 8.3: Percentages of students by type of T&L conditions (teachers confidence/attitudes & access/obstacles),

by grade at EU level and by country, 2011-12

Fig. 8.3a: at grade 4

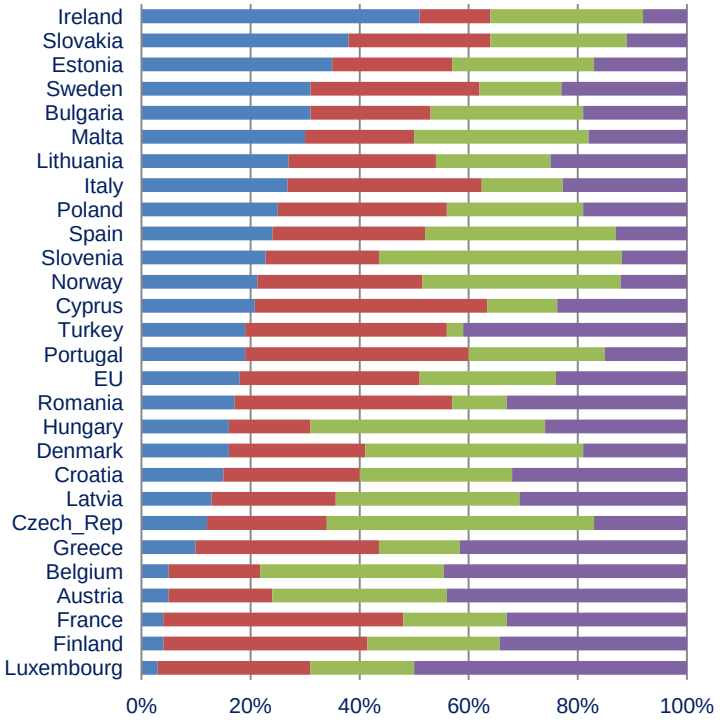


Fig. 8.3b: at grade 8

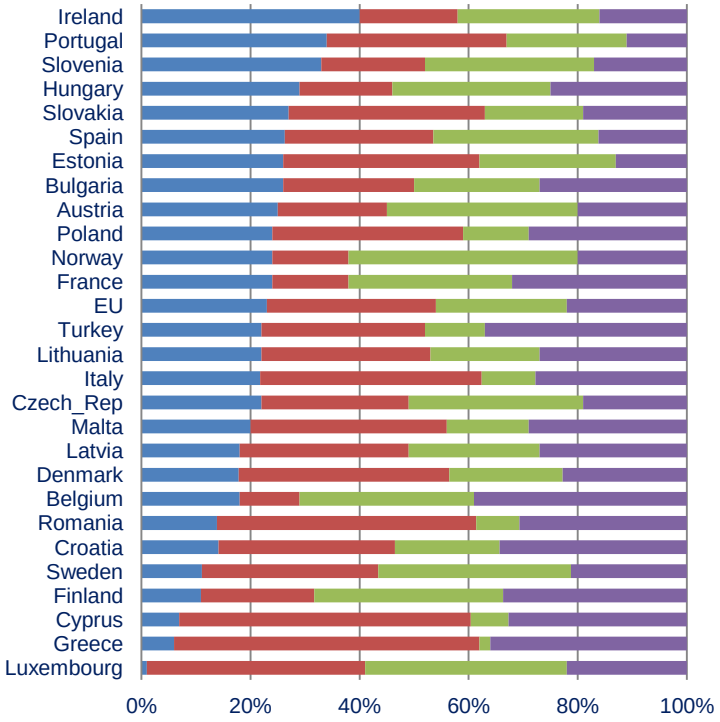


Fig. 8.3c: at grade 11 in general education

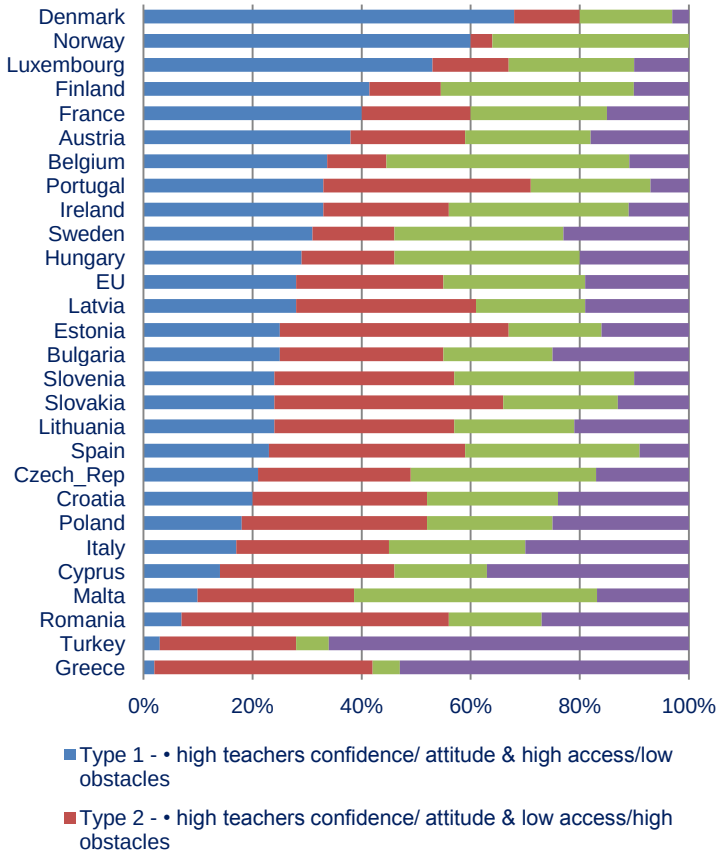
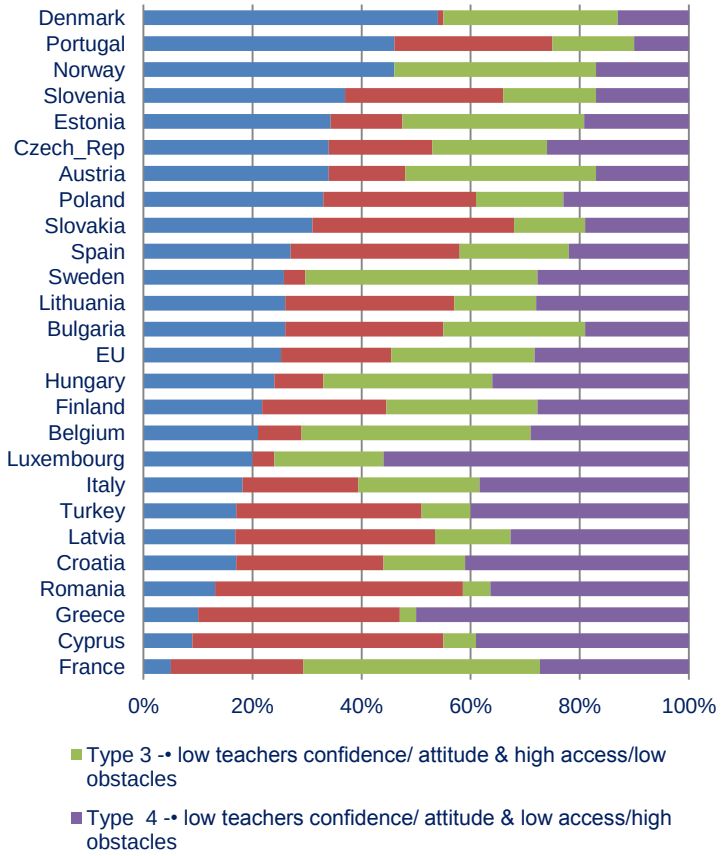
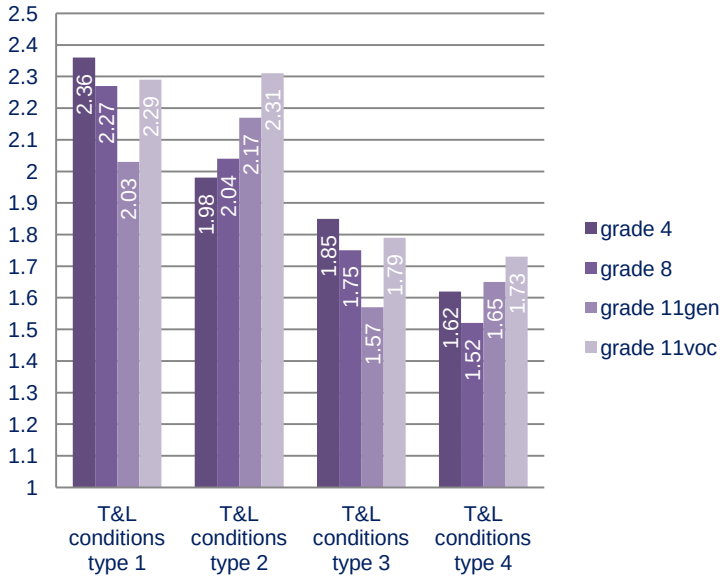


Fig. 8.3d: at grade 11 in vocational education



- Teacher profiles are also associated with the frequency of ICT based activities. At the EU level, high teacher's confidence/attitudes & high access/low obstacles (T&L conditions type 1) and high teacher's confidence/attitudes & low access/high obstacles (T&L conditions type 2) show higher frequencies of ICT based activities compared to the two other T&L conditions types. In other words, highly confident and positive teachers can overcome low access and high obstacles (see Fig. 8.4). At grade 11, such confident and positive teachers report similar or even slightly higher frequency of ICT based activities compared to T&L conditions characterised by confident and positive teachers and also high access and low obstacles.

Fig. 8.4: Teachers ICT based activities frequency with the class (mean scores on a scale from 1 to 4, EU level, 2011-12)



- According to the present survey and the cluster analysis presented above, the *digitally supportive teacher* at EU level can be defined as the teacher with high access and facing low obstacles as well as being highly confident and positive. Evidence supporting the fact that highly confident and positive teacher seems to be able to use ICT in T&L in an optimum way, even when access conditions is low and obstacles high, we can underline that looking back at figures 8.3:

    - At EU level, between **45 and 55% of students** (depending the grade) are in T&L conditions of type 1 or 2 (high teacher's confidence/ attitude & high access/low obstacles or high teacher's confidence/ attitude & low access/high obstacles);

    - Differences between countries are again important:

        - knowing that teacher's high confidence and attitude represent a way to overcome less favoured conditions of access to ICT, it's interesting to notice that around **35% of students** (and sometimes more depending grade and/or country) are in T&L conditions characterised by high teacher's confidence/ attitude even if low access/high obstacles in Greece and Romania at all grades; in Slovakia and Cyprus at three grades; in Italy, Portugal and Estonia at two grades; as well as in eight other countries at one grade;

        - in Austria, Belgium, Finland, France and Luxemburg at grade 4 (5% of students in T&L conditions characterised by high teacher confidence and attitudes as well as high access to ICT and low obstacles); in Cyprus, Greece and Luxemburg at grade 8 (around 5%); in Greece, Romania and Turkey at grade 11 in general education (around 5%); and in Cyprus, Greece and France in vocational education (below 10%).

THE DIGITALLY SUPPORTIVE STUDENT

The student questionnaire investigates among other issues their access to ICT, number of years of experience and ICT based activities in their free time, at home. It also questions them about the same issues (access, number of years of experience and ICT based activities) at school during lessons.

A cluster analysis of the student's answers to questions on these issues has been processed precisely concerning:

- access to ICT equipment at home or outside school (ST03)
- number of years using computers at home (ST04)
- frequency of ICT based activities in free time (ST05)
- number of years using computers at school (ST10)
- frequency of ICT equipment use at school (ST11)
- frequency of ICT based activities during lessons at school (ST13)
- opinions about ICT use impact on learning (ST16)

This cluster analysis reveals three student profiles that can be summarised in the following way:

- high access/use at school & high access/use at home (student profile 1)
- low access/use at school & high access/use at home (student profile 2)
- low access/use at school & low access/use at home (student profile 3)

The percentage of students in each profile, by grade at EU level and by country, is presented in Fig. 8.5. The tables with precise percentages and their confidence intervals are presented in annex.

We will come back later on to a more in-depth analysis of these graphs. For the moment, let's for now underline that at EU level:

- between **30 and 35% of students** are part of the 'high access/use at school & home' profile (profile 1), the highest percentage being observed at grade 11 in general education; this could reveal that more attention is dedicated to integrate ICT in T&L at that grade;
- around **50% of** students at grades 8 and 11 in vocational education are part of the 'low access/use at school & high access use at home' profile (profile 2); around **35% of students** share the same profile at **grade 11 in general education**;
- around **28% of students** at **grade 11 in general education** are part of the 'low access/use at school & home' profile (profile 3); around **18% of students** share the same profile **at grades 8 and 11 in vocational education**.

Fig. 8.5: Percentages of students by profile in terms of ICT use at home and at school, by grade at EU level and by country, 2011-12

Fig.8.5a: at grade 8

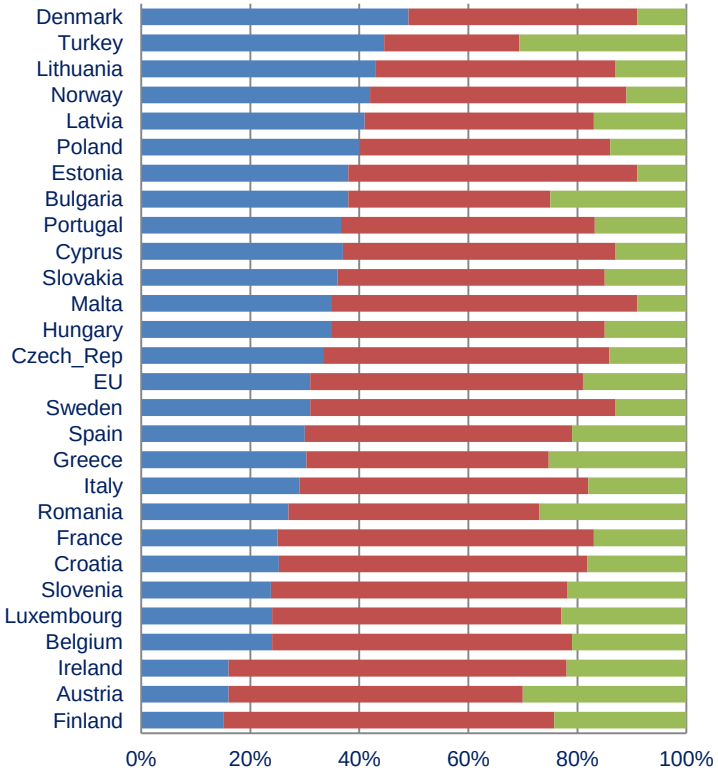


Fig.8.5b: at grade 11 in general education

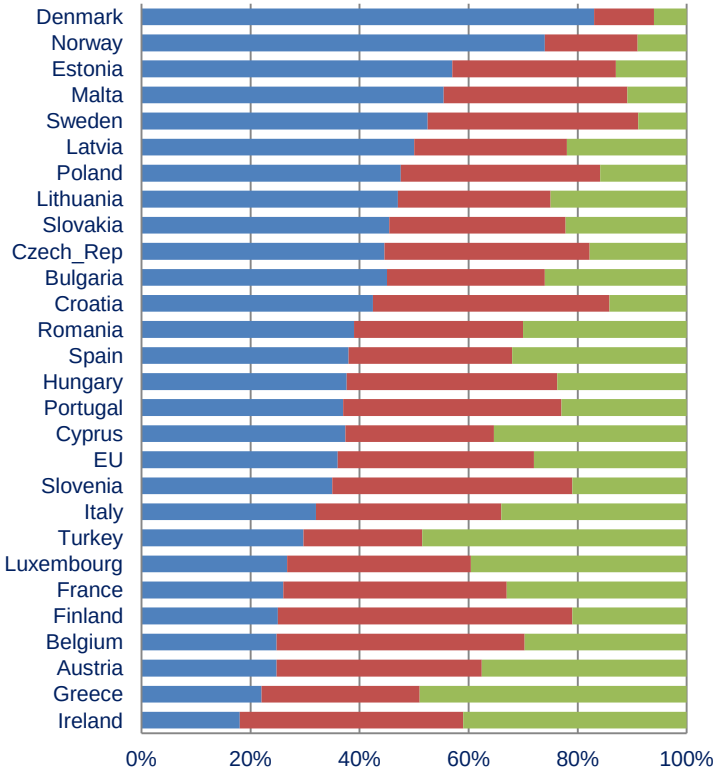
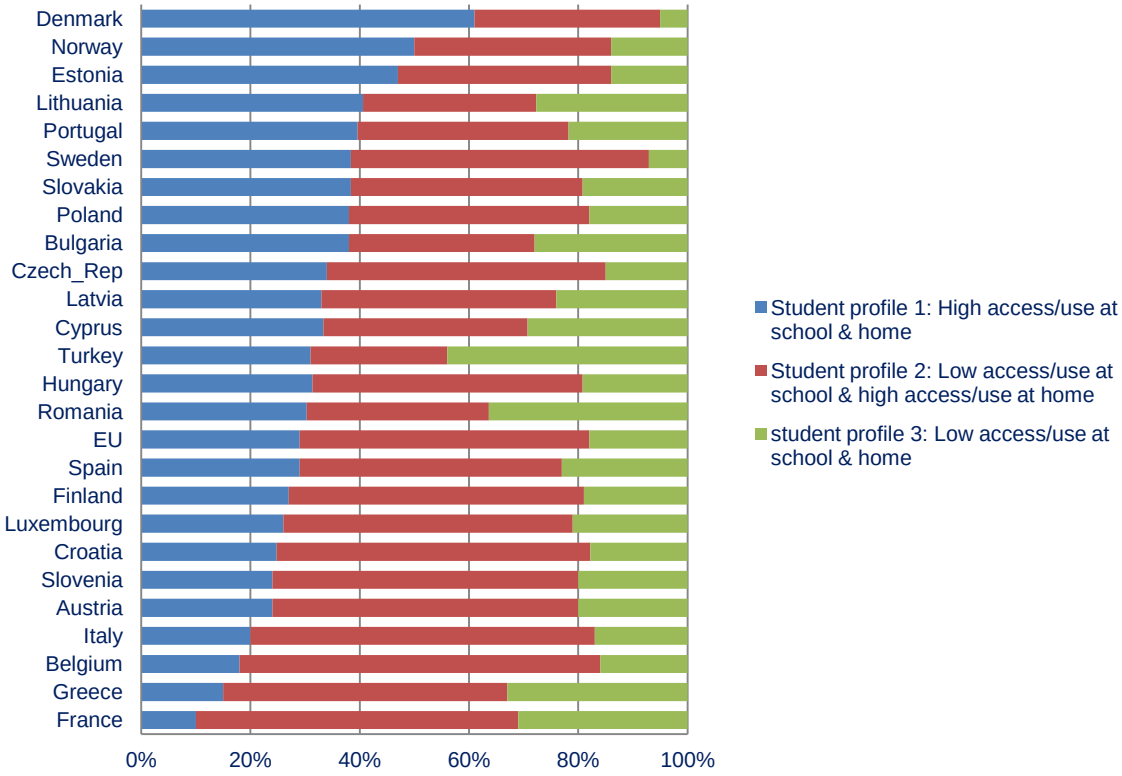


Fig.8.5c: at grade 11 in vocational education



- When comparing, at EU level, student's ICT based activities frequency during lessons (question ST13), their confidence in different skills (operational ICT skills, social media, safe and responsible internet use; question ST15), their opinions about positive impact of ICT use on their learning (question ST16) and their attitudes towards computers (question ST17), according to each type of students profile, it appears that students part of profile 1 (high access/use at school & at home) demonstrate higher frequency of ICT activities, higher confidence and more positive opinions and attitudes, compared to the students part of the two other clusters; they are followed by students corresponding to profile 2 (low access/use at school & high access/use at home), in turn followed by students corresponding to profile 3 (low access/use at school & low access/use at home) as shown in Fig. 8.6a to 8.6g.

Fig. 8.6a: Student's ICT based activities frequencies during lessons (mean scores on a scale from 1 to 4, EU level, 2011-12)

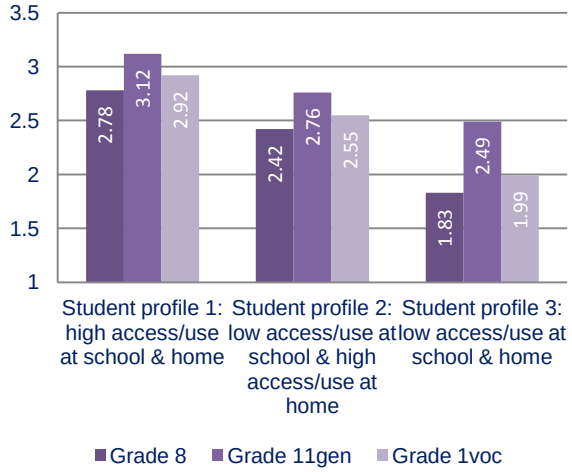


Fig. 8.6b: Student's confidence in their operational ICT skills (mean scores on a scale from 1 to 4, EU level, 2011-12)

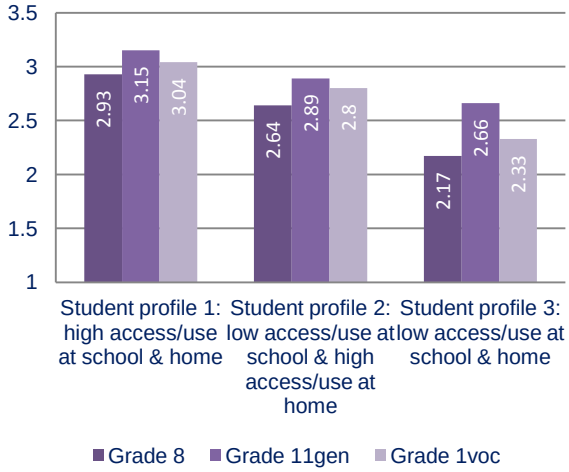


Fig. 8.6c: Student's confidence in their social media skills (mean scores on a scale from 1 to 4, EU level, 2011-12)

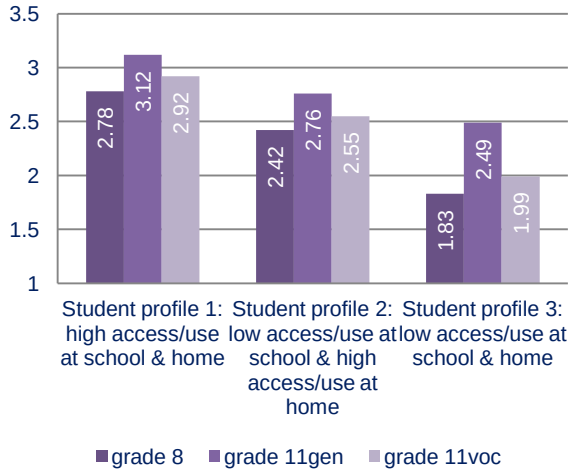


Fig. 8.6d: Student's confidence in their internet safe use (mean scores on a scale from 1 to 4, EU level, 2011-12)

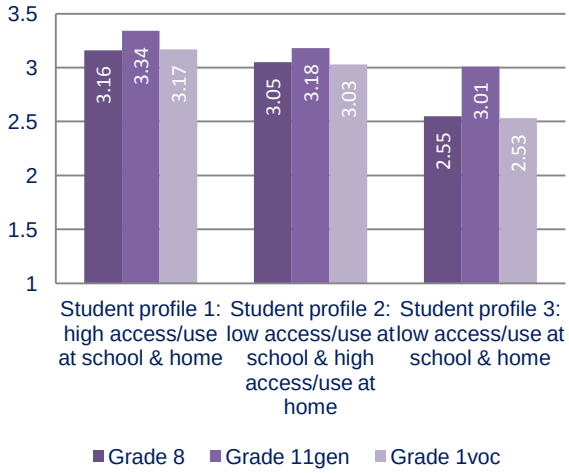


Fig. 8.6e: Student's confidence in their internet responsible use (mean scores on a scale from 1 to 4, EU level, 2011-12)

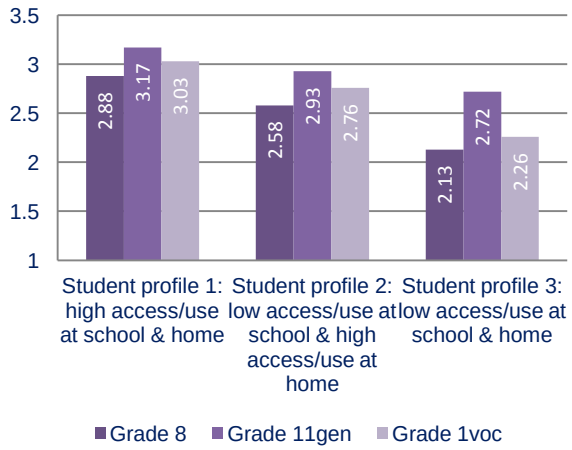


Fig. 8.6f: Student's opinions about positive impact of ICT use on their learning (mean scores on a scale from 1 to 4, EU level, 2011-12)

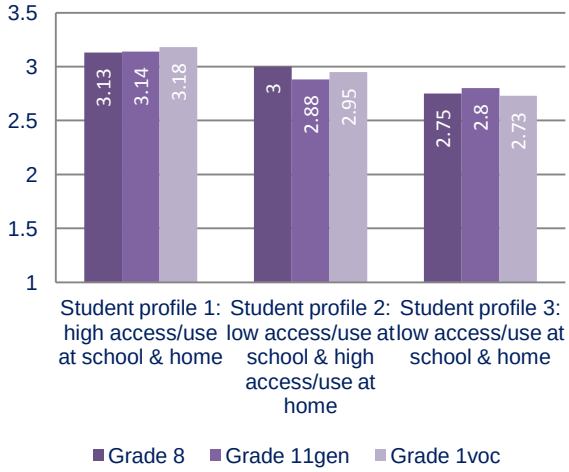
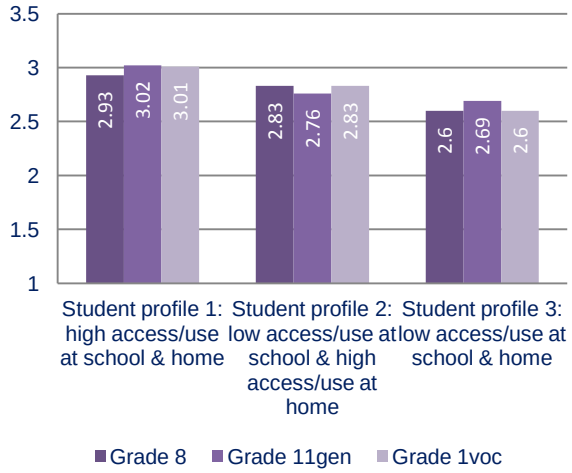


Fig. 8.6g: Student's attitudes towards computers (mean scores on a scale from 1 to 4, EU level, 2011-12)



- According to the present survey and cluster analysis, the *digitally supportive student* at EU level can be defined as having high access/use of ICT at school and at home, this situation being associated with highest level of confidence in their ICT based skills and most positive opinions about the positive impact of ICT on T&L as well as attitudes towards computer.

  Looking back at figures 8.5a to 8.5c, presented previously and showing the division of student profiles by grade at EU level and by country, we can notice that differences between countries are again important:

  - Highest percentages of students corresponding to profile 1 are systematically found in Denmark at all grades (between 50 and 80%, depending the grade) and Norway at grade 11 (75% in general and 50% in vocational education);

  - At the opposite, higher percentages of students corresponding to profile 3, i.e. having low access/use at school & home, are systematically found at all grades in Greece (between 25 and 50% depending the grade) and Turkey (between 30 and 50% depending the grade); at some grade, high percentages of students are also found in Austria (around 35% at grades 8 and 11 in general education), Romania (around 30% at grades 8 and 11 in vocational education),

Bulgaria (around 25% at grade 8) and France (around 30% at grade 11 in vocational education).

The three profile descriptions have provided, for each country, the percentages of (i) digitally supportive schools, (ii) digitally supportive teachers, and (iii) digitally supportive students. Are there any relationships between these profiles? In other word, do educational systems characterized by a high percentage of digitally supportive schools count a large percentage of digitally supportive teachers or students or the reverse.

To answer these questions, correlation coefficients were computed, at the country level, between these percentages.

❖ **Digitally supportive teachers and digitally supportive schools**

Up to a reasonable extent at grade 4 and at grade 11 in vocational education (0,43 and 0,54 correlation respectively), as the percentage of digitally supportive schools increase, the percentage of digitally supportive teachers increase. There might be national/regional contexts that might favor the development of digitally supportive schools and teachers, or digitally supportive schools might encourage teachers to become supportive or the reverse. A coefficient correlation cannot prove the causal relationship but can confirm the numerical association between the phenomena. In other words, where we can find supportive schools, we can find supportive teachers..

The **same trend** is observed **to a slightly smaller extent at grade 8 and at grade 11 in general education** (0,35 and 0,33 correlation respectively).

These correlations are statistically significant at grade 4 and 11 vocational, but not at grade 8 and 11 general which isn't surprising because of the small size of the population concerned (made of the participating countries to the survey), and so doesn't prevent to nevertheless mention the trend.

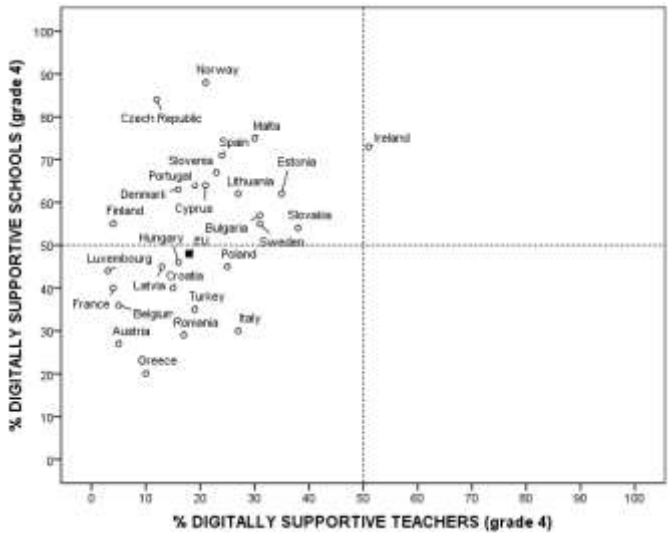
The mapping of the countries according to their respective percentages of students being in digitally supportive schools and the percentages of students being taught by digitally supportive teachers is presented in Fig. 8.7. It mostly shows that:

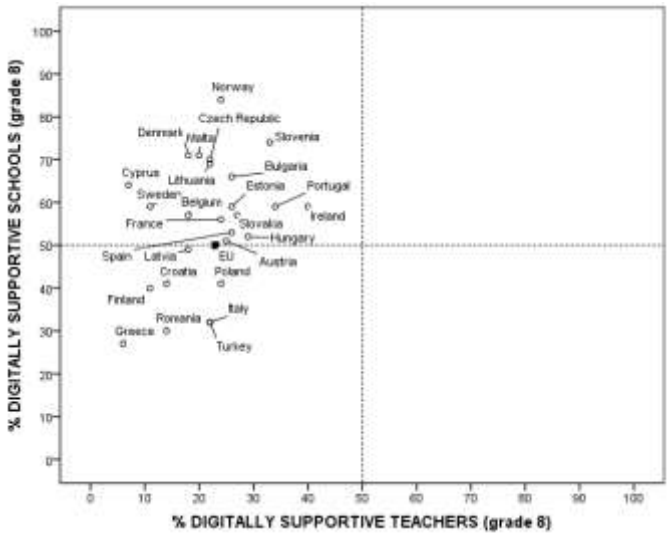
- differences between countries are larger concerning the percentages of students in digitally supportive schools (from around 20% to around 90%) compared to the percentages of students taught by digitally supportive teachers (from less than 10% to maximum 50%) at grades 4 and 8; these differences are a little bit smaller at grade 11 in general education, and even yet smaller in vocational education, the number of countries having more than 50% of students in digitally supportive schools decreasing as grade increases;

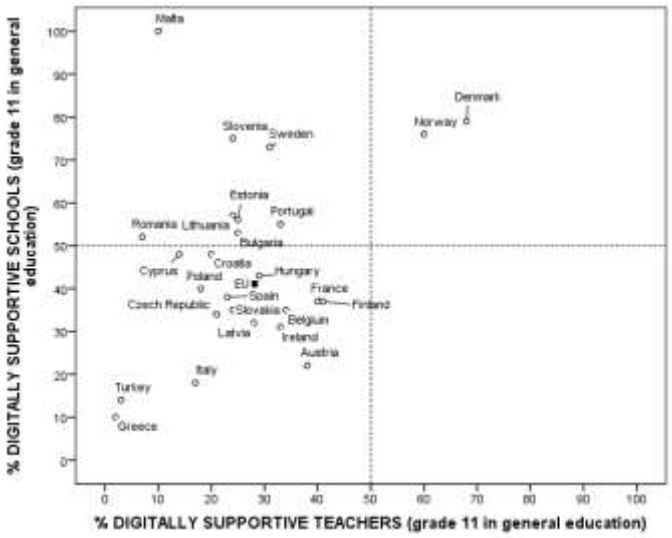
- at grade 11 in general education, the percentages of students taught by supportive teachers are especially high in Denmark and Norway compared to all the other countries; the percentages of students in digitally supportive schools are high too in both countries, increasing in Denmark compared to previous grades while decreasing in Norway;

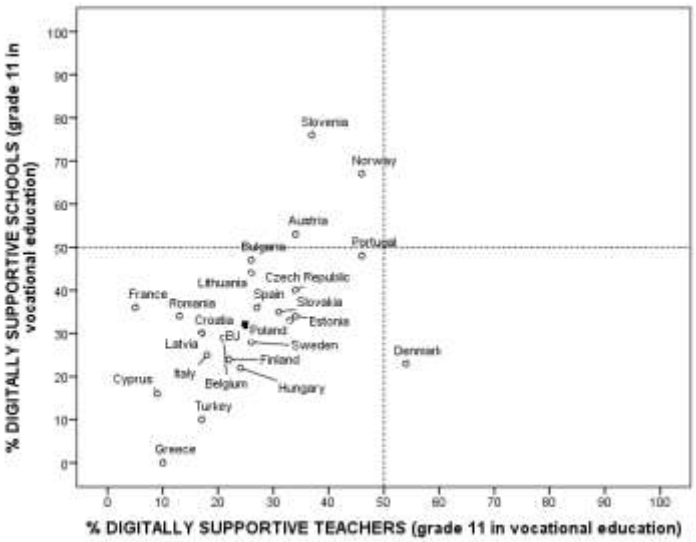
- only in Norway and Slovenia, more than 50% of students are still in digitally supportive schools at grade 11 in vocational education; in Slovenia, the percentage of students taught by digitally supportive teachers at that grade slightly increases compared to general education, while it decreases in Norway.

Fig.8.7: Mapping of the countries according to their respective % of students in digitally supportive schools and and % of students taught by digitally supportive teachers, by grade, at EU level and by country, 2011-12









❖ **Digitally supportive students and digitally supportive schools**

Up to a rather good extent at grade 11 in general education (0,70 correlation), countries with a high percentage of **digitally supportive schools are also countries with a high percentage of digitally supportive students and few digitally supportive students can be found in countries with few digitally supportive schools.** . **A similar trend** is observed but **to a much smaller extent at grade 8 and 11 in vocational education** (0,26 and 0,19 correlation respectively).

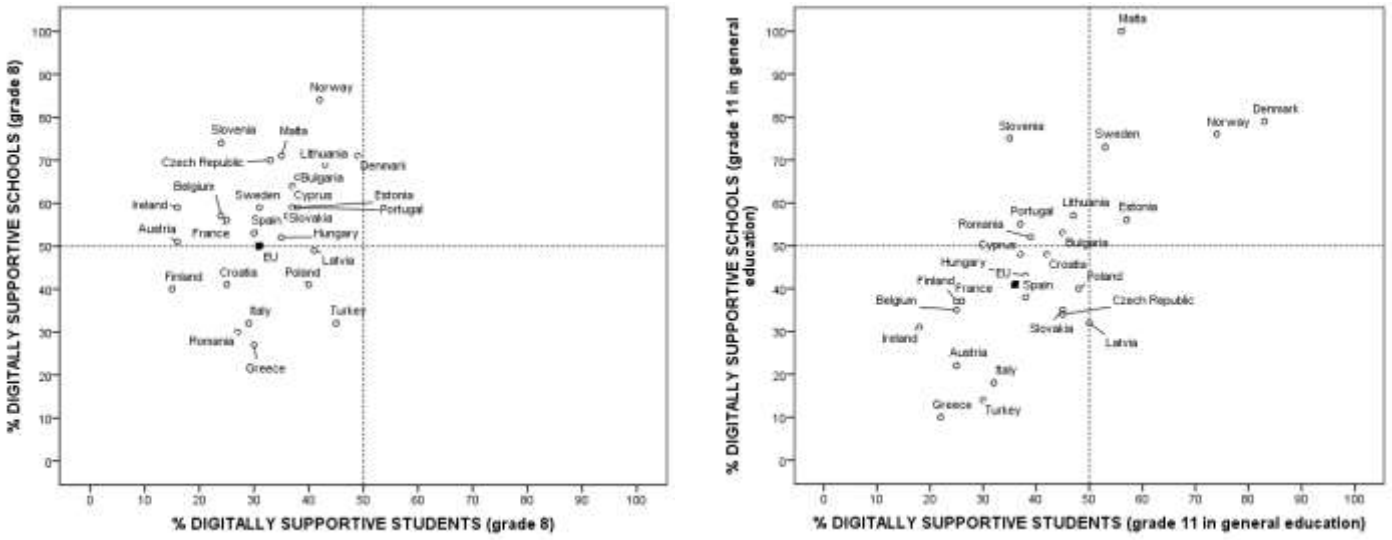
These correlations are statistically significant at grade 8 and 11 vocational, but not at grade 11 general.

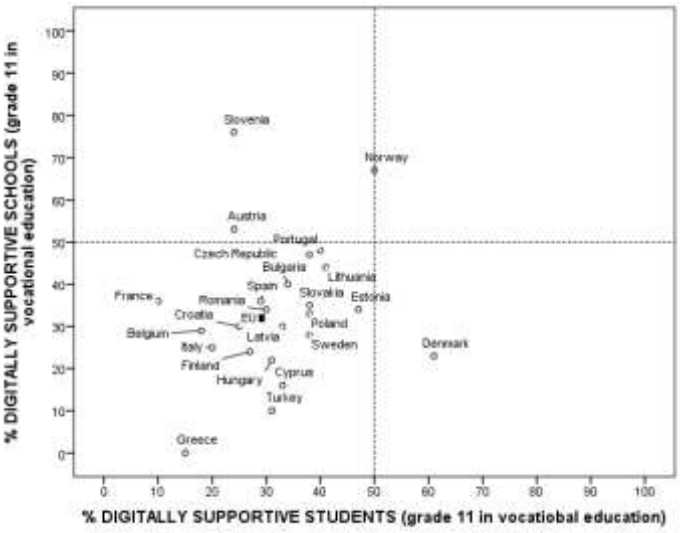
The mapping of the countries according to their respective percentages of students in digitally supportive schools and percentages of digitally supportive students is presented in Fig. 8.8. It mostly shows that:

- percentages of digitally supportive students at grade 11 in general education are higher to those at grade 8 and in vocational education, in Estonia, Malta and Sweden, and to a particularly large extent in Denmark and Norway; in these same five countries, the percentages of students in digitally supportive schools remain above 50% conversely to other countries, and even grow in Denmark, Malta and Sweden, compared to grade 8;

- in Denmark at grade 11 in vocational education, the percentage of digitally supportive students remains higher compared to all the other countries, while the percentage of digitally supportive schools decreases a lot.

Fig.8.8: Mapping of the countries according to their respective % of students in digitally supportive schools and % of digitally supportive students, by grade, at EU level and by country, 2011-12




% DIGITALLY SUPPORTIVE SCHOOLS (grade 11 in vocational education)
% DIGITALLY SUPPORTIVE STUDENTS (grade 11 in vocatiobal education)
Slovenia
Norway
Austria
Portugal
Czech Republic
Bulgaria
Lithuania
Spain
France
Slovakia
Estonia
Romania
Croatia
EU
Poland
Belgium
Latvia
Sweden
Denmark
Italy
Finland
Cyprus
Hungary
Turkey
Greece

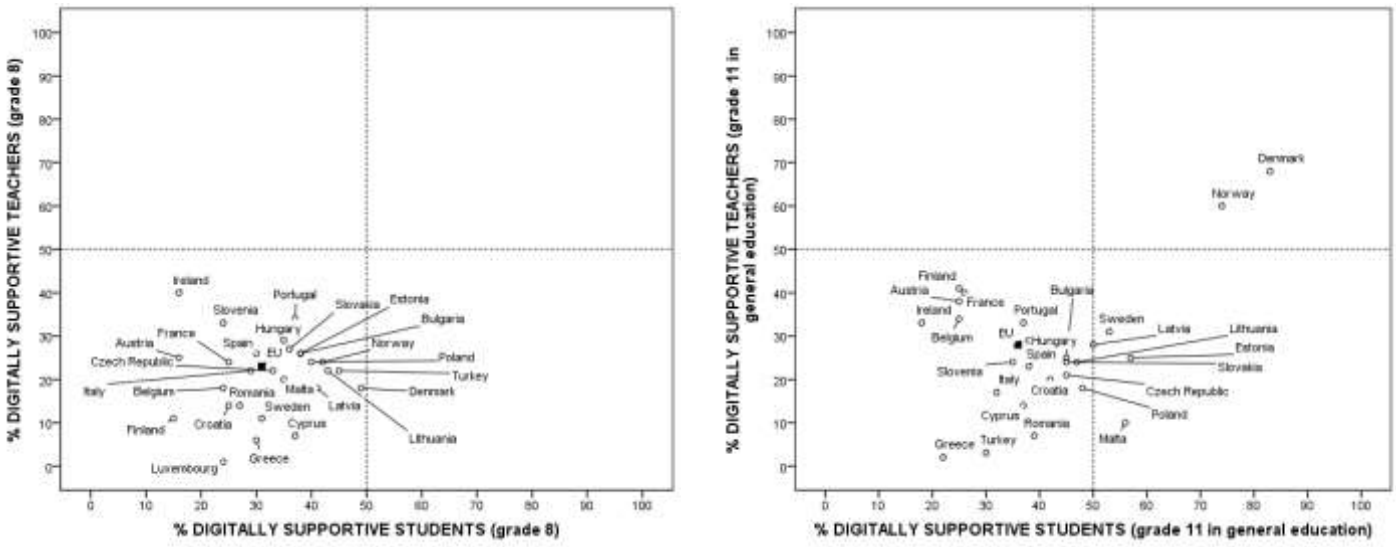
❖ **Digitally supportive students and digitally supportive teachers**

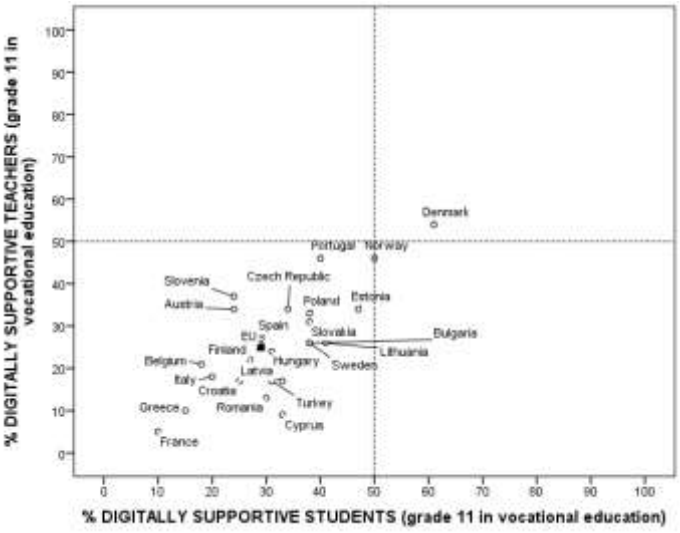
Finally, a relationship is also observed between the digitally supportive teachers and digitally supportive students. Up to a rather good extent at grade 11 in vocational education (0,73 correlation), countries with a high percentage of **digitally supportive teachers are also countries with a high percentage of digitally supportive students** (even if the correlation is not statistically significant which, as mentioned previously, is not surprising because of the size of the population here concerned, i.e. the number of participating countries). **The trend is similar but to a more limited extent** (0,43 correlation; again, not statistically significant) **at grade 11 in general education**.

The mapping of the countries according to their respective percentages of students taught by digitally supportive teachers and percentages of digitally supportive students is presented in Fig. 8.9. It mostly shows that:

- in most cases, in all countries and at all grades, percentages of students taught by digitally supportive teachers and percentages of digitally positive students are below 50%;
- at grade 11 in general education, percentages of digitally supportive students are nevertheless above 50% in Estonia, Malta, Sweden, and especially in Denmark and Norway; only in these two last countries, percentages of students taught by digitally supportive teachers are also high above 50%; a similar but less marked pattern is observed for Denmark and Norway in vocational education.

Fig.8.9: Mapping of countries according to their respective % of students taught by digitally supportive teachers and % of digitally supportive students, by grade, at EU level and by country, 2011-12




% DIGITALLY SUPPORTIVE TEACHERS (grade 11 in vocational education)
% DIGITALLY SUPPORTIVE STUDENTS (grade 11 in vocational education)
Denmark
Portugal
Norway
Slovenia
Czech Republic
Austria
Poland
Estonia
Spain
EU
Slovakia
Bulgaria
Finland
Lithuania
Belgium
Hungary
Sweden
Latvia
Italy
Croatia
Turkey
Greece
Romania
Cyprus
France

PRELIMINARY CONCLUSIONS

The 2011-12 Survey of Schools: ICT and education provides up-to-date and reliable benchmarking of access, use and attitudes towards the use of ICT in school level education across Europe.

The results show that nearly one in two students is now in a 'digitally supportive school' and between 20 and 25 percent of students are taught by 'digitally supportive teachers'. Between 30 and 35% of grade 8 and 11 students can be considered 'digitally positive students'. Strong progress since the previous survey in 2006 in terms of provision of equipment and broadband access and levels of confidence in teachers, although infrastructure provision at school level varies considerably between countries and use, as measured in the surveys, may not have risen as much as might have been predicted, given that obstacles seem to be less of a hindrance than previously was the case.

The survey results point to a number of policy actions at all levels of the system to ensure optimal use of increasingly tight financial resources, notably to boost concrete teacher support measures to transform positive attitudes into effective classroom practice, and to ensure that ICT use at school reduces the gap between ICT use by students in and out of school. The availability of the dataset should facilitate further valuable research work at national and European level, and indeed at school level, linking the data to those from other sources (e.g. PISA, SITES).

The survey methodology was effective in terms of focusing on the student in the conceptual model, sampling design, undertaking an online survey rather than other types, surveying students as well as school personnel, and building up a network of national coordinators. It is recommended that these approaches be adopted in future years. Owing to rapid changes in technology many of the technology indicators used just six years ago are no longer relevant for shaping and implementing policy in education, and those highlighted in this survey will doubtless suffer a similar fate. In future the focus should be even more on the use and quality of use of technology in teaching and learning, on the assumption that technology will be taken for granted (and therefore invisible) and that a majority of (but not all) students will increasingly be confidently using personally owned portable devices and have near-ubiquitous affordable broadband access.

The survey was completed in a relatively short period of time (18 months) compared to similar ones on such a scale, which, while yielding very up-to-date results, led to a number of difficulties, not least, a low response rate in at least four countries and lack of time for piloting and revising all processes. Consideration needs to be given to increasing participation rates in countries with highly autonomous schools (Netherlands and the United Kingdom in this survey) and (in the case of Germany for example) those with lengthy democratic consultation procedures and strong data protection measures. In all countries schools seem to be asked to take part in increasing numbers of surveys, so there needs to be compelling value in participating in future ICT surveys. Future surveys should simplify the work needed at school coordinator level, while maintaining sampling integrity. Surveys should take into account the fact that electronic school lists in most countries are not currently easily available.

COUNTRY CODES, ABBREVIATIONS AND ACRONYMS

COUNTRY CODES	
EU	European Union (2012)
AT	Austria
BE	Belgium
BG	Bulgaria
CY	Cyprus
CZ	Czech Republic
DK	Denmark
EE	Estonia
EL	Greece
ES	Spain
FI	Finland
FR	France
HR	Croatia
HU	Hungary
IE	Ireland
IT	Italy
LV	Latvia
LT	Lithuania
LU	Luxembourg
MT	Malta
NO	Norway
PL	Poland
PT	Portugal
RO	Romania
SI	Slovenia
SK	Slovakia
SE	Sweden
TR	Turkey

	ABBREVIATIONS & ACRONYMS
EU2020	The EU's growth strategy targeting employment, innovation, education, social inclusion and climate/energy.
EU27	The 27 Member States of the European Union after 1 January 2007
Gen.	General education
i2010	the EU policy framework for the information society and media (2005-2009)
ICT	Information and Communication Technology
ISCED	International Standard Classification of Education
IWB	Interactive White Board
PISA	Programme for International Student Assessment (OECD)
SC	School head questionnaire
SITES	Second Information Technology in Education Study
ST	Student questionnaire
TALIS	Teaching and Learning International Survey
TE	Teacher questionnaire
TIMMS	Trends in International Mathematics and Science Study
T&L	Teaching and Learning
VLE	Virtual Learning Environment
Voc.	Vocational education