Survey of Schools: ICT in Education

Benchmarking Access, Use and Attitudes to Technology in Europe's Schools

Digital Agenda for Europe

This study was carried out for the European Commission by

All materials produced in this survey, including the data set, are freely available and can be accessed at
https://ec.europa.eu/digital-agenda/en/pillar-6-enhancing-digital-literacy-skills-and-inclusion.

Survey of Schools: ICT in Education

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

Final Study Report

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Executive summary

Based on over 190,000 responses from students, teachers and head teachers collected and analysed during the school year 2011-12, the Survey of Schools: ICT in Education provides detailed, up-to-date and reliable benchmarking of Information and Communication Technologies in school level education across Europe, painting a picture of educational technology in schools: from infrastructure provision to use, confidence and attitudes.

The Survey was commissioned in 2011 by the European Commission (Directorate General Communications Networks, Content and Technology) to benchmark access, use and attitudes to ICT in schools in 31 countries (EU27, Croatia, Iceland, Norway and Turkey). The Survey is one of a series within the European Union's cross-sector benchmarking activities comparing national progress towards the Digital Agenda for Europe (DAE) and EU2020 goals. The Survey was conducted in partnership between European Schoolnet and the University of Liège (Service d'Approches Quantitatives des faits éducatifs, Department of Education).

It is the first Europe-wide exercise of this type for six years, following the eEurope 2002 and eEurope 2005 surveys. It is the first to be conducted online and the first to include students directly. Work on the survey took place between January 2011 and November 2012, with data collection in autumn 2011. The survey report and all related materials are freely available on the European Commission's Digital Agenda Scoreboard website[1]. In four countries (Germany, Iceland, Netherlands and the United Kingdom) the response rate was insufficient, making reliable analysis of the data impossible; therefore the findings in this report are based on data from 27 countries.

HIGHLIGHTS AND RECOMMENDATIONS

1: ICT INFRASTRUCTURE AND USE

SURVEY FINDINGS

There are now between three and seven students per computer on average in the EU; laptops, tablets and netbooks are becoming pervasive, but only in some countries. Interactive whiteboards are present in schools (over 100 students per interactive whiteboard), as well as data projectors. More than nine out of ten students are in schools with broadband, at most commonly between 2 and 30mbps on average in the EU. Most schools are connected at least at basic level (indicated by having, for example, a website, local area network, virtual learning environment). The Survey findings estimate that at EU level on average, between 25 and 35% of students at grades 4 and 8, and around 50% of students at grade 11, are in highly equipped schools, i.e. with high equipment level, fast broadband (10 mbps or more) and high connectedness. The percentages of such schools differ enormously between countries.

Even so, school heads and teachers consider that insufficient ICT equipment (especially interactive whiteboards and laptops) is the major obstacle to ICT use. Inhibitors like this are not the same across countries and these national differences are analysed in the main report and in more detail in the country profiles.

Around 50% of students at grades 8 and 11 in general education use a desktop or a laptop during lessons at school at least weekly, but around 20% of the students at the same grades never or almost never use a computer during lessons. Around 30% of students at grade 8 and 20% at grade 11 in general education use an interactive whiteboard at least weekly.

Interestingly, no overall relationship was found between high levels of infrastructure provision and student and teacher use, confidence and attitudes.

RECOMMENDATIONS FOR POLICY MAKERS

Central, local and institutional level. *Policies and action at infrastructure level are still needed to enable the large majority of students, at all grades, to be in highly digitally equipped schools as defined above. These policies, putting the focus on providing laptops (or tablets, netbooks, etc.) and interactive whiteboards, would help to overcome what is still considered by practitioners as the major obstacle to ICT use. Such policies are a matter of urgency in some countries lagging far behind others. Infrastructure-related policies should be accompanied by complementary measures in other areas – and particularly in teacher professional development (see below) - for the use of this infrastructure to happen. Depending the level of autonomy given to schools, national, regional and local policy makers, or school heads, are in the first line to implement such policies; reaching consistency and cross fertilising efforts between actions implemented at each of these levels are important in bringing about successful change.*

EU level. *Supporting policies should take into account the very different levels and characteristics of infrastructure provision measured by the Survey depending on the country, developing diversified support actions suited to the most equipped education systems as well as the less equipped ones.*

2: ICT BASED LEARNING ACTIVITIES AND CONFIDENCE IN DIGITAL COMPETENCE

SURVEY FINDINGS

Most teachers have been familiar with ICT for teaching and learning for some years but still use it first and foremost to prepare their teaching. Only a few use it – and still to a limited extent – to work with students during lessons, and even less frequently to *communicate with parents or to adjust the balance of students' work* between school and home in new ways. The overall frequency of use of different types of ICT-based activities in class reported by teachers is around several times a month on average at EU level.

On average at EU level, students report undertaking ICT-based activities between several times a month and never or almost never. Digital resources such as exercise software, online tests and quizzes, data-logging tools, computer simulations, etc. are still very rarely used by students during lessons. Students' ICT-based activities related to learning at home are more frequent compared to ICT activities at school. Such a finding underlines on the one hand the extent of informal or non-formal learning actually taking place out of school, and on the other hand students' interest in spontaneous self-directed learning.

The Survey findings provide evidence that teachers are confident in using ICT, positive about ICT's impact on students' learning, and organise more frequent ICT based activities than previously. They do it most when they are in schools with easy access to pervasive equipment, but also do it more often even when they are in schools with low equipment provision than teachers lacking confidence and not positive about ICT but in schools with high equipment provision and easy access.

Teacher participation in ICT training for teaching and learning (T&L) is rarely compulsory. At EU level, depending the grade, only around 25-30% of students are taught by teachers for whom ICT training is compulsory. This appears to contrast with teachers' appetite and interest in using ICT, as shown by the large majority of them who choose to develop their ICT-related skills in their own spare time. Interestingly, around 70% of students at all grades are taught by teachers who have engaged in personal learning about ICT in their own time. Although online resources and networks are widely available in Europe, they are a relatively new way for teachers to engage in professional development, and only a minority of these opportunities are used by schools.

It is not surprising that, across countries, teachers consider that they are more confident in their operational skills than in their use of social media. The more teachers are confident in using ICT, the more they participate in professional development and spend time on such training, and the more they report frequent ICT-based activities during lessons across all grades.

At EU level on average, students declare a fairly high level of confidence to use the internet safely and a lower one in their use of social media. Interestingly, students stating they have high access to and use of ICT at school AND at home also report higher confidence in their operational ICT skills, in their use of social media and in their ability to use the internet safely and responsibly, as well as more positive opinions about ICT's impact on their learning, compared to students reporting low access and use at school but high access and use at home.

Very large differences exist between countries in all the above areas.

RECOMMENDATIONS FOR POLICY MAKERS

Central and local level. Increasing students' ICT-based activities during lessons, and as a consequence their digital competence, strongly needs to be boosted. Policies and actions to support a quantitative and qualitative increase in teacher professional development are probably the most efficient ways to obtain results in this area, especially given the interest shown by a large majority of teachers learning ICT in their own spare time. This support could usefully look at capacity building specifically in the area of new patterns of teacher professional development through online learning communities and other schemes closely integrated into teachers' daily practice (informal methods, blended learning, 'on the job' training, teacher and school networking on a local/ regional basis, etc.), all training models not much used at present. These more recent professional development approaches could also more easily integrate teaching and learning scenarios and activities concretely showing teachers how ICT can be fully integrated to support efficient learning for all students. Policy makers should also dedicate attention to the creation and dissemination of good quality digital learning resources with the aim of increasing their use by teachers and students during lessons. Here again depending the division of responsibilities in each system, these action lines should be supported at central/national, regional and/or local level in a coherent way. In countries where an inspectorate exists, policy makers have to make sure that the efforts along the lines presented above are relayed and assessed by inspectors.

Institutional level. School heads should support the above policies and actions by adapting, when and where applicable, how professional development is organised at school level, replacing when appropriate external traditional training programmes by peer learning and sharing activities organised at school. They should support online teacher learning communities at school and/or school network levels. They should also allocate time for teachers to cooperate and reflect about new practices inspired by ICT based teaching and learning scenarios and activities, and to test, discuss - and adapt when possible - digital learning resources with a view to introduce them into mainstream teaching.

EU level. At EU level, policies along these lines could identify the conditions for the best use of such types of approaches and how to mainstream them, mostly from the point of view of the process-related aspects rather than the content ones. Funding large scale projects to produce evidence about what works concerning new models of teacher professional development (online learning communities, blended learning, etc.), and supporting high quality ICT-based scenarios and digital material – whether autonomous modules or a new type of 'textbook' – should (continue to) be high on the EU agenda. Make available tools to measure regularly progress in the adoption of ICT based activities in lessons at school, and teacher and students digital competence, as well.

3: SCHOOL POLICIES, STRATEGIES, SUPPORT AND ATTITUDES

SURVEY FINDINGS

On average at EU level and across all grades, around 50% of students are in schools where formalised school policies – based on written statements – about using ICT in general, or specifically in subjects exist. Only 20% of students are in schools where over-arching formal policies covering ICT use in general, in T&L AND in subjects have been adopted. Around 35% of students are in schools where there are plans and measures to support collaboration between teachers AND time scheduled for them to share, evaluate or develop approaches and instructional material. Between 45% and 50% of students at grades 8 and 11 are in schools which have organised change management training programmes in the last three years.

The two most frequent incentives used to reward teachers for using ICT in T&L are additional ICT equipment for the class and additional training hours. ICT coordinators are frequently available in schools, full time in one case out of two, and usually providing pedagogical support.

The Survey finds that students, as well as teachers, have the highest frequency of ICT use and ICT learning based activities during lessons when they are in schools which combine policies about ICT integration in T&L generally speaking as well as in subject learning, incentives to reward teachers using ICT, as well as concrete support measures including teacher professional development and the provision of ICT coordinators.

A very large majority of school heads and teachers agrees about the relevance of ICT use in different learning activities, as well as concerning the positive impact of ICT use on students' motivation and achievement, and on transversal and higher order thinking skills. They are also close to unanimity about the fact that ICT use is essential to prepare students to live and work in the 21st century. An overwhelming majority of students is also positive about the impact of ICT on the classroom atmosphere and on different learning processes. These last two support measures appear to play a key role.

RECOMMENDATIONS FOR POLICY MAKERS

Central, local and institutional levels. Depending the level of autonomy given to schools, national, regional and local policy makers, and school heads more importantly in decentralised systems, should combine – rather than choosing a single one – a set of actions from the following: defining and implementing specific policies about ICT integration in teaching and learning as well as in subjects, discussing on a regular basis this issue with teaching staff, implementing incentives to reward teaching staff using ICT in T&L, promoting collaboration among teachers about their ICT daily practice, and providing them with time for it. In addition, especially at institutional level, these policies should be systematically accompanied – or relayed when defined at a more central level – with concrete support measures for teachers' professional development and daily support in the classroom thanks to available ICT coordinators. In addition to clear and specific policies defined at central level particularly in systems where schools have limited autonomy, efforts are needed in all countries to reinforce policy and implementation capacity building at school level along the lines mentioned above.

EU level. EU level initiatives are needed to encourage and support Member States along these lines, supporting the development of tools to steer and monitor progress in a consistent and balanced way throughout Europe, and identifying the conditions for their streamlining through large scale pilot projects properly funded.

In summary, the 'recipe' suggested by findings of the Survey of Schools: ICT and education could be termed the *'5C approach'*:

- **Capacity building**, through sustained investment in teachers' professional development
- **Concrete support measures**, accompanying specific policies at school level
- **Combined policies and actions**, in different policy areas within a systemic approach
- **Country-specific support**, addressing large differences and degrees of ICT provision and implementation
- **Competence development**: these four actions directed at effectively and dramatically increasing young people's digital competence and the key competences described in the European framework.

KEY FINDINGS

This summary sets out some of the key findings from the survey together with some limited "Trends" data available from a similar study in 2006. Given the scale and complexity of the data and analysis provided by the survey, this can only be selective: readers seeking a more detailed picture should of course refer to the full report and supporting materials. This is especially so for those wanting to compare their country's position with other countries, since the scope of this summary does not allow any significant or fair handed presentation of such data.

Information and communication technologies profoundly and irreversibly affect the ways of working, accessing knowledge, socialising, communicating, collaborating - and succeeding – in all areas of the professional, social, and personal life of European young people and citizens. The *Knowledge Society* makes infinite and extremely varied resources of information, knowledge and learning provision available at any place and any time. The possibilities allowing one to participate in social life taking place anywhere in the world are pervasive and engaging. Such daily and easy access to all these exciting opportunities radically changes the environment, habits and expectations of young generations. It also offers education systems new – and challenging – opportunities not to be missed.

This context imposes a radical challenge to the educational paradigm to engage students in their learning and prepare them for their future life and contribution to society. Education systems are expected to develop new competences in students and new ways of teaching these. Active, personalised and collaborative learning environments are to be designed and offered to students for them to engage in effective, efficient and rich learning paths, developing the knowledge and key competences needed by 21st century societies. ICT, properly integrated for the sake of learning, can substantially contribute to education systems' success in facing this complex challenge. For this to happen, there are several key conditions to be met: students must have access to operational infrastructure in the classroom and make best use of it during lessons; teachers must have the right competences enabling them to use ICT to support engaging teaching and in-depth learning; suited pedagogical environments have to be designed for mainstream adoption while at the same time being adaptable to different contexts; good quality learning resources must be available and students' assessment models must be updated and implemented The *Survey in schools: ICT and education* examines these landscapes.

What is then the right mix of ingredients that is likely to support education systems to fully exploit the benefits arising from the numerous possible ICT based T&L opportunities and provide every student with a high quality learning experience?

1: POLICIES AND SUPPORT

Developing specific policies to use ICT in T&L and implementing concrete support measures at school level affect the frequency of students' ICT based activities for learning in the classroom

The *Survey* finds that students, as well as teachers, have the highest frequency of ICT use and ICT learning based activities during lessons when they are in schools which have policies about ICT integration in T&L generally speaking as well as in subject learning, using incentives to reward teachers using ICT, implementing concrete support measures including teacher professional development and the provision of ICT coordinators. Interestingly, students in schools focusing mostly on concrete support measures show more frequent use of ICT during lessons compared to schools with policies but no concrete support measures. Rather than reflecting a higher efficacy of concrete support measures compared to policies, such an observation is more probably related to the fact that policies are still defined at central level in several education systems and have not necessarily been reported by school heads specifically at school level. Schools belonging to these two groups, i.e. having policies and/or concrete support measures, are defined by the *Survey as digitally supportive schools*.

On average across the EU countries covered by the *Survey*, between 25-30% of students are in digitally supportive schools developing policies as well as concrete support measures. This percentage goes up to between 40-50% of students (a little bit less in vocational education) when adding students in *digitally* supportive schools mostly focusing on concrete support measures. Differences between countries are very large: minimum 50% of students – and much more in a few countries at grade 4 - are in *digitally supportive schools* (at several grades) having policies and support measures in Czech Republic, Denmark, Norway, Slovenia, as well as in Bulgaria, Estonia, Ireland and Spain at grade 4; while only less than 10% of students are in such schools in Croatia (at grade 8), France (at grade 4) and Greece at grade 8 and 11.

The Survey findings support the idea that increasing students' – and teachers' - ICT use for T&L during lessons could be reached through actions at the whole school level. Increasing the number of digitally supportive schools is then an objective to be set in several countries, and very urgently in countries with very low percentages of such schools. Depending the level of autonomy given to schools, national, regional and local policy makers, and school heads more importantly in decentralised systems, would do well by developing actions among the following: defining and implementing specific policies about ICT integration in teaching and learning as well as in subjects, discussing on a regular basis about this issue with the teaching staff, implementing incentives to reward teaching staff using ICT in T&L, promoting collaboration among teachers about their ICT daily practice and providing them with time for it. Taking teacher professional development measures, not just through traditional participation to training programmes but also through teacher peer learning, as well as providing daily support in the classroom thanks to available ICT coordinators, can only efficiently complement the above mentioned actions. Rather than one type of policy or measure being the panacea to support ICT use in T&L at school level, the findings of the Survey demonstrate that it is a combination of several of the above mentioned policies and measures, articulated together in a systemic approach, that make the difference.

In all cases, efforts at school level have to be usefully supported by central/national, regional and local policies encouraging action along the lines mentioned above, in the best suited way according to the level of autonomy given to the schools. In addition to clear and specific policies defined at central level particularly in systems where schools have limited autonomy, efforts are needed in all countries to reinforce policy and implementation capacity building at school level, in favour of ICT use in T&L during lessons. All the stakeholders responsible for teacher initial education and in service training should dedicate efforts to reinforce and enlarge the provision they offer concerning ICT based pedagogy and innovative learning situations; school heads and teachers should think about ways to develop peer learning opportunities within their own school, provided all decision makersconcerned at any level support the flexibility needed for this collaboration between teachers to take place within working time. EU level initiatives to encourage and support Member States along these lines, through peer learning activities, funding pilot projects and monitoring the development of tools in the above mentioned policy areas, are needed to steer and monitor the progress made in a consistent and balanced way throughout Europe.

2: TEACHERS' CONFIDENCE AND OPINIONS

Teachers' confidence and opinions about ICT use for T&L affect the frequency of students' ICT use for learning: boosting teacher professional development makes a difference, and appears to be a condition for an effective and efficient use of the available infrastructure.

Students' use of ICT for learning during lessons is related to teachers' confidence level in their own ICT competences, their opinion about the relevance of ICT use for T&L and their access to ICT at school. The *Survey* shows indeed that students have the highest frequency of ICT use during lessons when they are taught by teachers with high confidence in their own ICT operational as well as social media skills and ability to use the internet safely and responsibly, having positive opinions about ICT use for T&L, as well as facing low obstacles and having high access to ICT infrastructure at school. Such teachers are defined in the *Survey as digitally confident and supportive teachers*.

On average across the EU countries covered by the Survey, between 20-25% of students are taught by *digitally confident and supportive teachers* having high access to ICT and facing low obstacles to their use at school. Here again differences between countries are very large. Between 30-50% of students at grade 4 and/or grade 8 are taught by such teachers in Bulgaria, Estonia, Ireland, Portugal, Slovakia, Slovenia and Sweden; conversely, less Survey of Schools: ICT in Education 12 than 10% of students at the same grades are taught by such teachers in Austria, Belgium, Cyprus, France, Finland, Greece and Luxembourg. In secondary general education, more

than 45% of students are taught by such teachers in Denmark, Luxembourg, Norway and Portugal; conversely, less than 10% of students are in this situation in Greece, Romania and Turkey. Interestingly, students taught by teachers confident in their own ICT competence and positive about ICT use in T&L, but facing low access and high obstacles to use it at school, report more frequent use of ICT during lessons compared to students taught by teachers having high access and facing few obstacles, but not being very much confident in their own digital competence nor positive about ICT use for T&L. These findings demonstrate that confident and supportive teachers are needed to effectively use ICT infrastructure and exploit its potential; it also shows that teachers are able to make the best use of poor ICT learning environments.

These findings pave the way for strongly recommending to policy makers at central/national, regional, local and school level - to massively invest in teacher professional development as a necessary accompaniment to investment in school ICT infrastructure, however modest. School heads would do well to develop combined efforts to reduce obstacles and provide high access to ICT use at school, investing at the same time in teacher professional development and regularly discussing with teaching staff about ICT use for T&L, an opportunity to be seized by teachers as well. Depending on the school context, obstacles to be reduced can relate to equipment (still), lack of competence and pedagogical models, unclear goals for using ICT or a lack of consensus about it. Regular discussions with teaching staff would not only help to increase consensus about ICT use for T&L at the whole school level, but also develop a starting point for teacher peer learning exchanges on the issue and new ways of 'on the job' teacher professional development. The overwhelmingly positive opinion of teachers about the value and impact of ICT on T&L reveals an opportunity not to be missed for teacher professional development to produce huge benefits and impact. In other words, convincing teachers and school heads about the relevance of using ICT for T&L no longer emerges as a priority, while equipping teaching staff with the digitally based teaching competences and experience they need for transforming positive opinions into effective and efficient practice in the classroom, certainly does.

Policies and actions defined at EU level to support quantitative and qualitative increase in teacher professional development could only reinforce what is needed for schools to play their full role and bring their contribution to 21st century education needs. This support could usefully look at capacity building specifically in the area of new patterns of teacher professional development through online learning communities and other schemes closely integrated into teacher daily practice ('on the job' training, teachers and schools networking on a local/regional basis, etc.). This action at EU level could identify the conditions for the best use of such types of scheme and their mainstreaming, mostly from the point of view of the process related aspects rather than the content ones. EU actions in supporting the production of grounded evidence about the scheme to be used according to the objectives to be reached would be of great help.

3: STUDENTS' USE OF ICT

Students' ICT use during lessons still lags far behind their use of ICT out of school, affecting their confidence in their digital competences.

A key finding of the *Survey* shows that, across countries surveyed, students are more confident in their digital competences when they have high access to/use of ICT at home AND at school compared to students having low access/use at school and high access/use at home, or low access/use at both places[2] Such higher confidence applies to students' operational ICT and social media skills, their ability to use the internet responsibly, and, to a slightly less extent, their ability to use the internet safely. These students are not just confident in their digital competences but also positive about the impact of using ICT in T&L. Such students, having high access/use to ICT at home AND at school, are defined in the *Survey as digitally confident and supportive students*. These findings underline how important it is to effectively develop ICT use during lessons at school for students to Survey of Schools: ICT in Education 13 become more confident in their digital competence, regardless of the many opportunities some have to use ICT out of school, and even more fundamentally for those still lacking access to it at home.

Across the EU countries surveyed, on average between 30-35% of students are *digitally confident and supportive students*, i.e. have high access to ICT at home AND at school; the highest percentage of *digitally confident and supportive students* is systematically found in Denmark at all grades and Norway at grade 11. Across all the EU countries surveyed, the highest percentage of digitally confident and supportive students is observed at grade 11 in general education, suggesting a particular focus of policies at that education level. Nevertheless, around

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2   The cluster analysis implemented to analyse the present issue at stake doesn't identify a fourth group composed by students with high access/use at school and low access/use at home.

50% of students at grade 8 and 11 in vocational education still have high access/use at home, but low access/ use at school; it decreases to 35% at grade 11 in general education. Even more alarming is that between 18-28% of students, depending on the grade, have low access to/use of ICT at home as well as at school.

These *Survey* findings strongly plead for policy makers at school, local, regional and central/national levels to continue to combine their efforts to increase the number of students to be considered as digitally confident and supportive. The Survey findings concerning digitally supportive school and digitally confident and supportive teacher underline how much a systemic approach is the key to success, provided teacher professional development benefit from a large part of the efforts invested. Such attention to teacher competence should be kept in mind when implementing any policy or action even focusing first and foremost on infrastructure, including those related to mobile devices and 1 to 1 schemes. Policy makers also have to dedicate specific attention to offer access/use to ICT at school specifically to students not having access/use at home. Here as well, the efforts do not have to concentrate only on equipment matters; they also have to address the issue of effectively using ICT during lessons, implementing policies that have already been mentioned above concerning ways to support the development of digitally supportive schools and digitally confident and supportive teachers.

European policies should support all the above-mentioned policies needed to boost the development of digitally supportive schools and digitally confident and supportive teachers and students, by monitoring progress in all Member States. Special attention should be dedicated to countries where the effective use of ICT in T&L still lags far behind education systems in other countries.

The challenge to reach balanced progress throughout all the EU countries is particularly key as the Survey findings reveal that education systems characterised by a high percentage of digitally supportive schools include a large percentage of digitally confident and supportive teachers or students as well, or the reverse. It suggests that systemic actions, developing specific policies to use ICT in T&L, incentives, teacher professional development programmes, concrete support measures, etc. in parallel are on the right track and bring improvement. It also pleads for the education systems still far behind, to implement such systemic approaches as a priority and to be supported in this direction.

The survey also examines – as reported below – each of these areas in more detail, as well as a combination of elements within each area to understand how they interact to provide the best possible ICT setting for high quality teaching and learning.

CRITICAL FACTORS IN ICT IN EDUCATION

The survey identifies and analyses a range of important **factors which influence how successfully ICT is deployed in school teaching and learning**. This part of our summary picks out some of the more striking findings.

ICT INFRASTRUCTURE: HOW WELL EQUIPPED ARE OUR SCHOOLS?

The benchmark for a **highly 'digitally equipped school'** means that a school should have relatively high equipment levels, fast broadband (10mbps or more) and high 'connectedness' (e.g. having a website, email, a virtual learning environment and a local area network). According to the Survey findings, across the EU 37% of grade 4 students, 24% of grade 8 students, 55% of grade 11 general students and 50% of grade 11 vocational students attend such schools. There are great 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. Laptops, tablets and netbooks are becoming pervasive but in some countries only; on average in the EU there are between eight and 16 students per laptop at grades 4 and 11 vocational respectively. There are on average over **100 students per interactive whiteboard** and **50 per data projector**. More than **9 out of ten students are in schools with broadband**, generally from 2 to 30mbps, on average in the EU. Most schools are 'connected' at a basic level, that is, having a website, email for students and

teachers or a virtual learning environment (VLE). One in four grade 4 students is in a school with a VLE, rising to almost twothirds in vocational schools.

Trends

There are now around twice as many computers per 100 students in secondary schools as compared with 2006 - but the wide variations between countries reported in 2006 persist.

Laptops and interactive whiteboards are now extensively in place unlike in 2006. There is a trend towards smaller and portable computers, away from desktop computers in 2006 to laptops and personally owned devices such as mobile phones in 2011.

Broadband is now almost ubiquitous in schools, while in 2006 this was in place in less than three-quarters of schools.

The percentages of schools with websites, email for teachers and students, and a local area network have increased in all the levels of education surveyed.

The *Survey* findings concerning ICT infrastructure show that education systems are responsive to technological trends, for example implementing equipment policies reflecting recent trends in mobile devices - making laptops, netbooks, tablets, etc. pervasive – as well as equipping schools with interactive whiteboards and fast broadband; it seems that the priority is often to concentrate these efforts at first at secondary education level. Although the *Survey's* evidence points to progress as regards infrastructure, such policy efforts nevertheless still need to be increased if the majority of students, at all grades, are to be in highly *digitally supportive schools* as defined above. Policies to support better infrastructure are still needed, and as a matter of urgency in those countries lagging far behind others.

ICT IN SCHOOLS: HOW WELL IS IT USED?

There are **wide variations in the degree of use of the ICT equipment available**. Grade 11 vocational students are more than twice as likely as those at other grades to be in a school where teachers use ICT equipment in the majority 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. On average in the EU more than half of secondary school students use desktop computers at least once a week, and one in three grade 8 students use an interactive whiteboard at least weekly. 28-46% of students say they use their own mobile phone for learning purposes in schools at least once a week. Whether sanctioned or not – and it increasingly is –students appear to be bringing their own technology into school, and using it for learning.

There is **no correlation at EU level between level of computer provision in schools and frequency of use by students**.

Trends

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 not increased since 2006.

Percentages of teachers reporting resource-related or pedagogical obstacles to the use of ICT have declined, particularly amongst those stating that the benefits of ICT are unclear.

There is a debate on whether the major obstacle to ICT use is insufficient ICT equipment and technical support rather than pedagogical issues: in general, teachers are more concerned about pedagogical inhibitors than head teachers.

According to the *Survey* findings, the need for specific policies and actions substantially to increase ICT use in T&L during lessons is clear. The basic condition required for this to happen is the availability of operational equipment at the right place and time, in the classroom, where students' learning mostly takes place. However, mere provision of equipment is not a sufficient condition for its use, as we have seen previously when reporting students' higher frequency of ICT use when taught by *digitally confident and supportive* teachers, even in low ICT access conditions, compared to students' ICT use when taught by teachers who are neither confident nor supportive but have high access to equipment. For infrastructure to be effectively used, *digitally competent and supportive teachers* are needed. In other words, policies and actions substantially to increase ICT use in T&L are intrinsically a matter of teachers' professional development as well as discussion with teaching staff at whole school level about the relevance and goals of ICT use for T&L.

WHAT ARE TEACHERS' AND STUDENTS' EXPERIENCES IN ICT BASED LEARNING ACTIVITIES?

Across the EU, **around 75% of students at all grades are taught by experienced teachers with more than four years of using ICT at school**. Teachers with less than one year of ICT experience are extremely rare. Using ICT for teaching preparation is most common, with 30-45% of students being taught by teachers using ICT in this way every day or almost every day, or at least once a week.

Creating digital resources, and using the school website or virtual learning environment also takes place every or almost every day, or at least once a week, for teachers of around respectively 30% and 20% of students. But between 60% and 85% of students are taught by teachers who say they never or almost never communicate online with parents, assess students using ICT, evaluate digital resources, nor post homework for their students online.

Students' computer experience from home is greater than at school. Between 80% and 90% of students have more than four years of experience at home compared to 40-60% of students in this situation at school.

The **low use of digital resources and tools** is a concern. Digital textbooks and multimedia tools are the resources most frequently used. However, only 30% of students use them once a week or almost every day, but more than 50% of students at all grades never or almost never use such resources.

The *Survey* findings make the case for developing concrete policies and actions substantially to increase ICT based learning activities during lessons, exploiting the full potential of ICT to support students' in-depth learning and construction of knowledge through the use of simulation tools, learning/serious games, data-logging software, etc. Specific policies and actions should also be developed to exploit more fully the potential of ICT for communicating with students and parents, re-visiting student assessment practices, creating or evaluating quality digital learning resources, etc. Suitable professional development schemes, supporting teacher peer learning exchanges and cooperation with ICT-based learning experts, could certainly bring about an increase in ICT-based learning activities. Making easily and widely available to teachers examples of ICT-based learning activities and scenarios, validated by evidence as having a positive impact on learning, and flexible enough to be adapted to different school/class contexts, would also lead to progress. Policy makers at all levels should consider encouraging teacher professional development stakeholders (including those in initial teacher education) to develop and integrate such material in courses.

HOW CONFIDENT ARE TEACHERS AND STUDENTS IN ICT?

If we look at **teachers' professional development** across the EU, only about 25% of students at grade 8 and 11 and 30% at grade 4 are taught by teachers for whom ICT training is compulsory. Although ICT training forms part of initial teacher education in over half of EU countries, implementation varies according to the higher education institutions providing the training, and in a large portion of EU countries those institutions are free to adopt their own approach. Across the EU, around 70% of students at all grades are taught by teachers who have engaged in personal learning about ICT in their own time.

Across the EU, around 60% of students at grades 4 and 8 and around 45% at grade 11 (general and vocational education) are taught by teachers who have participated in equipment-specific training, while around 50% of students at grades 4 and 8 and around 40% at grades 11 (general and vocational education), are taught by teachers who have undertaken courses on the pedagogical use of ICT in the past two school years.

Teachers' confidence in using ICT can be as crucial as their technical competence, because confidence levels can have potential influence on the frequency with which teachers use ICT-based activities in the class-room. This is confirmed by the positive correlation found in the data of this survey between teachers' confidence in their operational use of ICT and their use of social media and the frequency with which they use ICT based activities across all grades; in other words the more confident teachers are, the more they use ICT based learning activities during lessons. Participation in professional development also has a positive effect on teachers' confidence in both their operational and social media skills.

In terms of **students' confidence in using ICT** (e.g. operational, social media): students across the EU in 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 than in any other component of ICT competence.

Trends

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.

Policy makers should consider increasing suitable provision to meet the need and demand for training and professional development identified in the Survey, as shown by the large proportion of teachers spending their own free time learning about ICT and exploring its possibilities for teaching. New ways of training, supported by ICT and using online facilities, should be piloted and implemented, with support designed appropriately at central/national, regional, local, and school level. Support action at EU level would also be welcome, using the European territory as a large field for investigation to support testing and analysis of mainstreaming conditions of interesting schemes in this area.

WHAT ARE THE POLICIES AND STRATEGIES AT SCHOOL LEVEL?

Just over one in two students are in a school where the use of ICT for T&L is discussed between school leaders and teachers. Formalised school policies (written statements) about using ICT precisely in general or in subjects also exist to a similar extent and concern around 50% of the students at all grades. Holistic formalised school policies, covering ICT use in general AND precisely in T&L AND in subjects, are much rarer: only around 20% of students are in such schools. Higher percentages of students are in this situation in Denmark, Turkey, and Slovenia, while lower percentages are evident in Austria, Croatia, Italy and Greece. The picture is fairly similar throughout the grades.

Plans and measures to support collaboration among teachers exist in schools, but still to a limited extent, not concerning the large majority of students. Around 50% of students are in schools where there is a policy to promote cooperation among teachers or time scheduled for them to share, evaluate or develop instructional material and approaches. Around 35% of students are in schools having both, i.e. a policy and scheduled time. In Survey of Schools: ICT in Education 17 Romania and Italy, the percentages are higher, contrary to Austria where such an approach is much less frequent. The picture does not differ very much between the grades.

Schools are adopting policies about responsible internet use and, to a lesser extent, the use of social networks for T&L. A majority of students (60%) are in schools where there is a policy about the responsible use of the internet; a large minority of students (40%) are in schools where a policy about safe internet use exists. Around 30% of students are in schools which have both. Slovakia, Croatia and Austria have the highest percentages of students going to schools which have both.

The two most frequent incentives used to reward teachers for using ICT in T&L are additional ICT equipment for the class and additional training hours for the teachers; the more grades increase, the more frequently they are used. Between 30%-45% of students are in schools implementing one or the other, and between 20%-25% have both. Competitions and prizes, as well as financial incentives are less frequent, except in the Eastern countries. Reduction of teaching hours is almost never used as an incentive.

ICT coordinators are frequently found in schools: between 65%-80% of students (slightly less at grade 4) are in schools with a designated ICT coordinator, full time in only one case out of two (even less at grades 4 and 8), rewarded in one case in two, and providing pedagogical support in three cases out of four.

These policies, strategies and support measures are developed in a context in which a large majority of both school heads and teachers are **positive about ICT use** – for retrieving information, doing exercises and practice,and learning in an autonomous and collaborative way – **and its impact:** on motivation, achievement, transversal skills and higher order thinking skills. Both school heads and teachers strongly agree about ICT's use in T&L being essential for students in the 21st century. A large majority of students at all grades share these positive views about the use and impact of ICT on T&L.

WHAT'S THE BOTTOM LINE?

Where does all this data and analysis take us? What are the lines of action for everyone involved? The survey picks out some areas where those concerned – especially policy-makers at national, regional and school levels – should consider further steps.

In general terms, the survey findings make the case for **strengthening public action** at institutional, local, regional, national and European levels, to boost ICT use at school so as to reduce the gap between ICT use in and out of school – a gap identified many years ago but still persistent in 2012 - and give greater opportunities to about 30% of 16-year-old students lacking adequate home access to ICT to experience it at school. Findings of this survey plead to orientate such public action preferably towards **building capacity for ICT pedagogical** expertise at school level. It also suggests investigating in more detail why digital learning resources are not used more, and ways to improve the situation, by increasing public/private partnerships with publishers, developing teachers' online communities for content creation and open content products, etc.

Evidence shows also that increasing **professional development opportunities for teachers** is efficient way of boosting ICT use in teaching and learning, since it helps build highly confident and supportive teachers. This seems only sensible given that teachers' opinions about the impact of using ICT for learning purposes are already very positive and about 80% of students are in schools where the school head also shares such positive views. Countries might be wise to ensure that ICT training – consistently specified and applied – is made a compulsory component of all initial teacher education programmes

Despite having access and positive attitudes towards implementing ICT in teaching and learning, teachers often find this difficult and require **support – not only technical but also pedagogica**l. Increasing the training provided by school staff and others to teachers of all disciplines should therefore be encouraged, including subject-specific training on learning applications. Online professional collaboration between teachers can also lead to effective changes in their practice, and a deeper awareness of their own professional development needs. Although online resources and networks are widely available in Europe, they are a relatively new way for teachers to engage in professional development, and only a minority are 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.

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. The availability of the dataset should facilitate further valuable research work at national and European level, as well as at school level.

All materials produced in this survey, including 31 country profiles, the questionnaires, tables and the data set, are freely available at https://ec.europa.eu/digital-agenda/en pillar-6-enhancing-digital-literacy-skills-and-inclusion.

INTRODUCTION

The evidence underpinning the Survey of schools: ICT in Education is a large set of responses from representative samples of head teachers, teachers and students to questionnaires available online between September and December 2011. The reference year for all data presented in this report is therefore school year 2011-12.

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

This report aims to provide both a detailed benchmarking snapshot in time of ICT in Europe's schools (sections 1 to 6) and a deeper analysis of trends over time and of the patterns and inter-relationships that emerge from the data (sections 7 and 8).

All materials produced in this survey, including 31 country profiles, the questionnaires, tables and the data set, are freely available at https://ec.europa.eu/digital-agenda/en/pillar-6-enhancing-digital-literacy-skills-and-inclusion

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 for their commitment, patience and support.

CONCEPTUAL APPROACH

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

- Emerging technologies
- Digital competence
- Student digital use and competence
- Teacher digital use and competence
- School 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; also covering US, Australia, South Korea, etc.
- Pelgrum (2009) Study on Indicators of ICT in Primary and Secondary Education (IIPSE)
- SITES 2006 (Second Information Technology in Education Study)/IEA (International Association for the evaluation of educational achievement)
- National benchmarking of ICT in schools (Norway, The Netherlands, United Kingdom)
- TALIS 2008 (Teaching and Learning International Survey)/OECD
- PISA 2006/OECD
- TIMMS 2007 (Trends in International Mathematics and Science Study)/IEA

A reference framework was developed on the basis of the literature review focusing on students' access, use and competence, looking at ICT equipment access, ICT based activities for teaching and learning (T&L), selfconfidence[3], attitudes and opinions about use in T&L, in each case both at student and teacher levels. The type of T&L activities implemented during lessons (with or without ICT) was also part of this reference framework, differentiating student versus teacher centred approaches[4]. Mostly at student level, ICT use at home has been included as well to a certain extent, to provide some comparison with the use at school.

Curriculum orientations and constraints, assessment activities and availability of digital learning resources, have been included as elements obviously framing teachers' practices in general. The school level has been integrated into the reference framework, looking at infrastructure and connectivity available, support provided to teachers, school leadership in the area of ICT use as well as innovation.

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3   Measuring students' or teachers' achievement in digital competences was out of the scope of the present survey. Nevertheless, to address the issue of competence, the survey asked students and teachers to declare their level of confidence in a set of ICT based activities, here referred to as 'self-confidence'

4   Definitions of student and teacher centred approaches is provided in the next sub-section 'Definitions' of the present section.

Figure 0.1: Reference framework
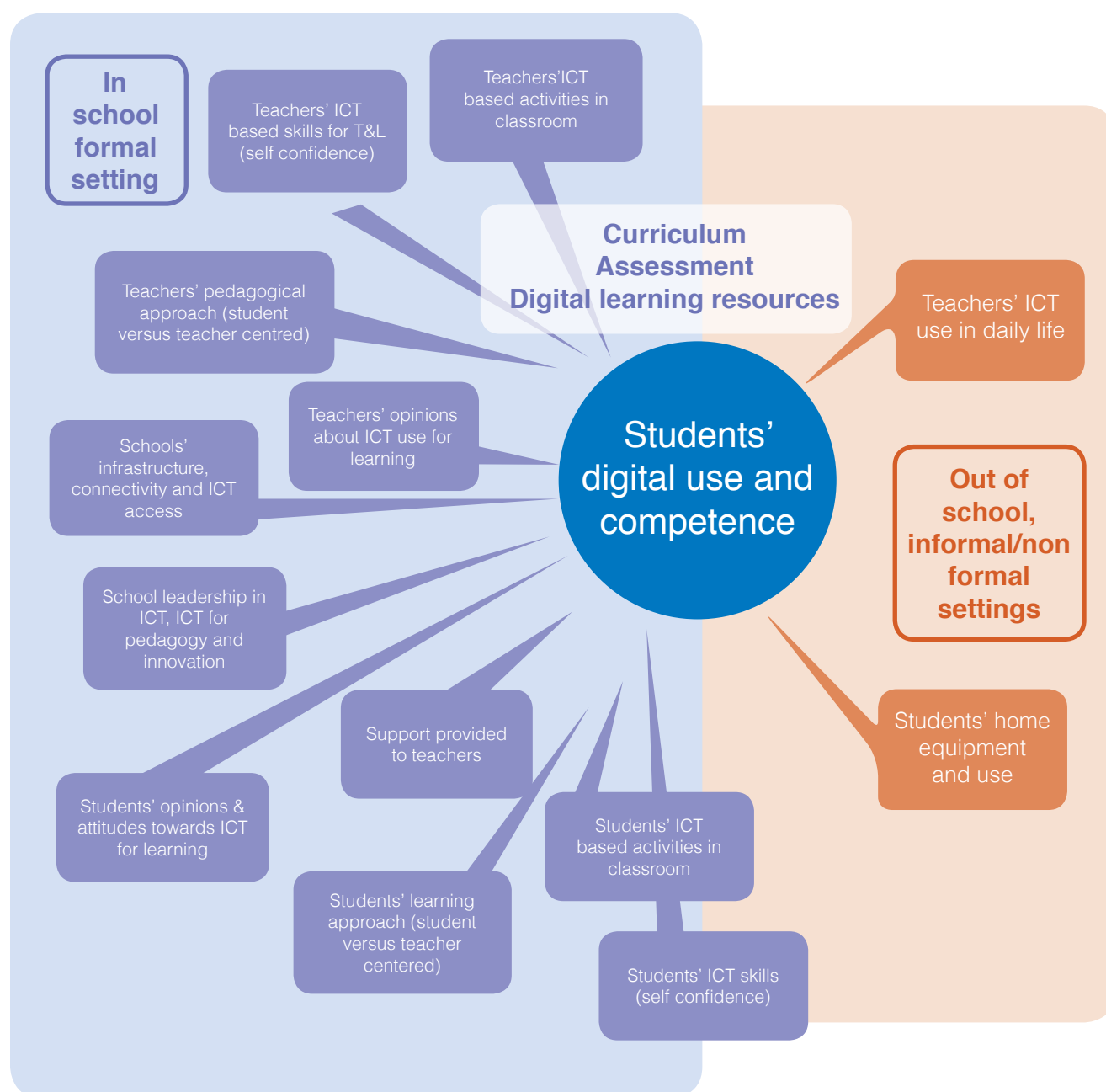
This analytical framework has guided the survey's design in terms of scope and content, identifying the most important issues with a view to gathering data and providing both a descriptive state of the art about ICT in schools through a set of relevant indicators, as well as discussing some additional explanatory findings.
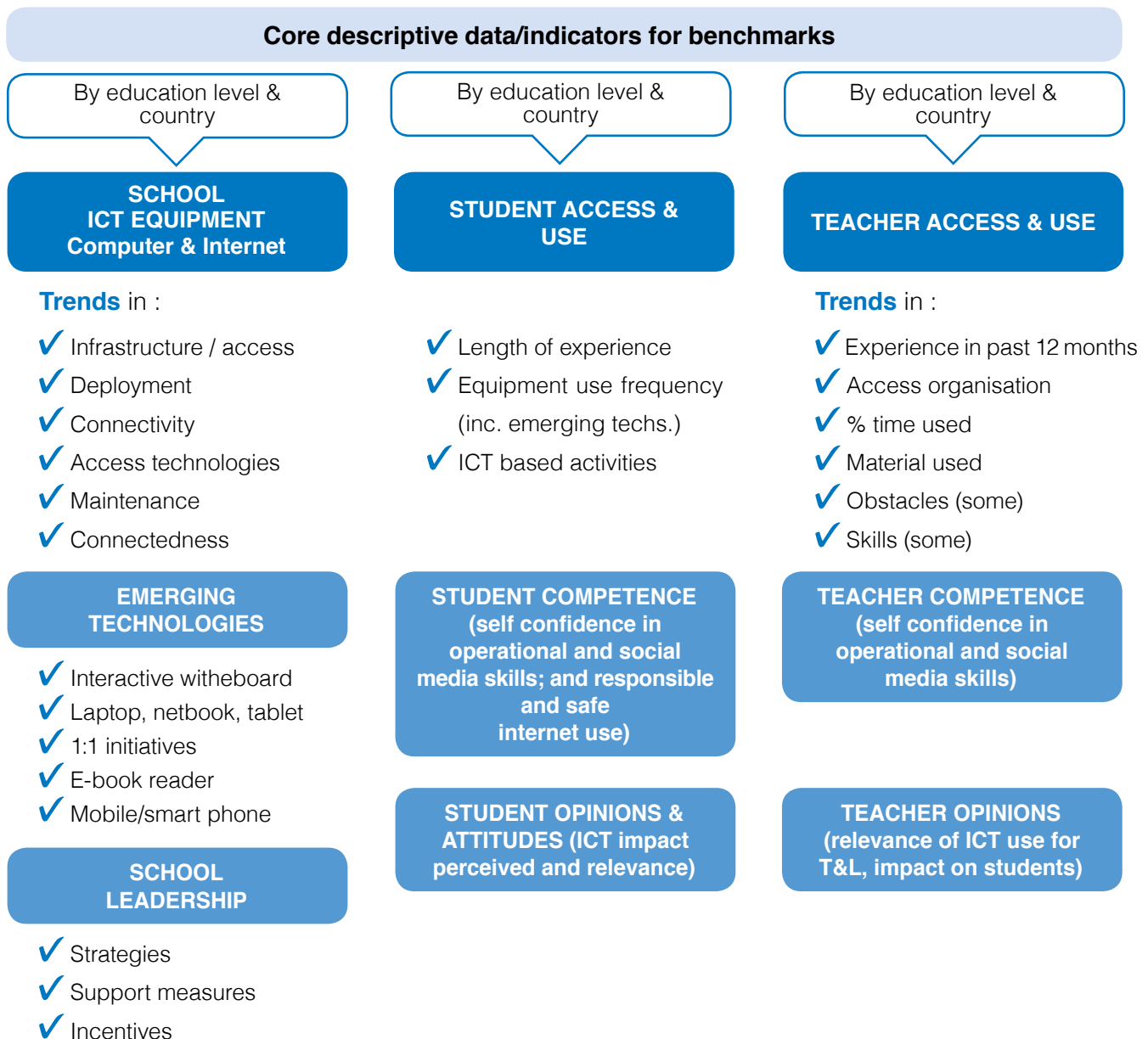
The whole survey has been designed to answer to the research questions summarized in fig. 0.2.

Fig. 0.2: Investigation questions

Questions for investigation

State of the art (descriptive)	ICT for 21st century education	Patterns and explanatory models
• **Which operational infrastructure?** (equipment, connectivity, content resources) • **To do what in teaching and learning?** • **Wow often?**	• **Which activities?** • **Which teaching and learning methods?** • **To develop which skills and competences?**	• **What are the specific patterns observed?** • **Which school and teacher factors are associated with specific patterns?** • **Which recommendations can be made and supported by evidence?**

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

Figure 0.3: Core descriptive data

Core descriptive data/indicators for benchmarks

By education level & country	By education level & country	By education level & country
SCHOOL ICT EQUIPMENT Computer & Internet	**STUDENT ACCESS & USE**	**TEACHER ACCESS & USE**

Trends in :

✔ Infrastructure / access
✔ Deployment
✔ Connectivity
✔ Access technologies
✔ Maintenance
✔ Connectedness

✔ Length of experience
✔ Equipment use frequency (inc. emerging techs.)
✔ ICT based activities

Trends in :

✔ Experience in past 12 months
✔ Access organisation
✔ % time used
✔ Material used
✔ Obstacles (some)
✔ Skills (some)

EMERGING TECHNOLOGIES

✔ Interactive witheboard
✔ Laptop, netbook, tablet
✔ 1:1 initiatives
✔ E-book reader
✔ Mobile/smart phone

STUDENT COMPETENCE (self confidence in operational and social media skills; and responsible and safe internet use)

TEACHER COMPETENCE (self confidence in operational and social media skills)

SCHOOL LEADERSHIP

✔ Strategies
✔ Support measures
✔ Incentives

STUDENT OPINIONS & ATTITUDES (ICT impact perceived and relevance)

TEACHER OPINIONS (relevance of ICT use for T&L, impact on students)

Finally, an overall conceptual model was agreed to frame the explanatory part of the analysis.

Using cluster analysis, some key relationships have been investigated, introducing the concepts of highly *equipped school, digitally supportive school, digitally confident and supportive teacher and digitally confident and supportive student.* The aim was to investigate through the data how each of these concepts could be defined on the basis of the data analysis, that is:

- How a digitally supportive school could be defined, looking at the school variables (in terms of policies, strategies, incentives, support measures such as the provision of an ICT coordinator and teacher wprofessional development, school heads' attitudes and obstacles) associated with higher frequency of ICT equipment use and ICT based activities, as well as higher competence levels (self-confidence) for students and teachers;

- How a digitally confident and supportive teacher could be defined, looking at the variables (access to and use of ICT, professional development undertaken, obstacles, self-confidence, opinions and attitudes towards ICT use in T&L) associated with teachers' higher frequency of ICT based activities for T&L;

- How a digitally confident and supportive student could be defined, looking at a set of variables characterizing ICT activities at school and home (access, length of experience, frequency of ICT equipment use and ICT based activities).

- How a digitally confident and supportive teacher could be defined, looking at the variables (access to and use of ICT, professional development undertaken, obstacles, self-confidence, opinions and attitudes towards ICT use in T&L) associated with teachers' higher frequency of ICT based activities for T&L;

- How a digitally confident and supportive student could be defined, looking at a set of variables characterizing ICT activities at school and home (access, length of experience, frequency of ICT equipment use and ICT based activities).

- How a digitally confident and supportive student could be defined, looking at a set of variables characterizing ICT activities at school and home (access, length of experience, frequency of ICT equipment use and ICT based activities).

DEFINITIONS

Concepts referred to in the above sub-section and the data analysis are defined as follows:

- *Student centred learning approach*: Student-centred learning is a learning model that places the student at the centre of the learning process, i.e. students are active participants in their learning; they learn at their own pace and use their own strategies; learning is more individualized than standardized.

- *Teacher centred approach*: Conversely, teacher-centred learning is characterized by the transmission of information from a knowledge expert (the teacher) to a relatively passive recipient (student/learner) or consumer.

- *Higher order thinking skills*: According to Bloom's cognitive taxonomy, higher order thinking skills are analysis, synthesis, and evaluation; these three skill levels being considered important in critical thinking.

- *Transversal skills*: According to the European framework for the development of key competences, transversal skills are not related to specific subjects and consist of learning to learn, social and civic, entrepreneurship and cultural competences.

- *Operational skills*: These comprise the fundamental skills to use generic ICT tools (e.g. Word, Excel, Outlook, PowerPoint) to function in the information society and in working life. They include basic computer and internet skills. For the purposes of this survey, teachers' operational skills are defined more precisely 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 data-base; 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.

- *Social media skills*: These enable users to interact and collaborate with each other as consumers of user-generated content in a virtual community. For the purposes of this survey, teachers' social media skills are more precisely 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.

- *Responsible internet use*: For the purposes of this survey responsible internet use includes students' confidence in their 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.

- *Safe internet use*: For the purposes of this survey safe internet use 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.

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.

QUESTIONNAIRE DEVELOPMENT

Three questionnaires were created and piloted in schools in France and the United Kingdom before being translated into 23 languages and published online. The 'school' (SC) questionnaires focused on head teachers, the second on classroom teachers (TE), in primary, lower secondary, upper secondary academic and upper secondary vocational education schools. The questionnaires were designed to enable comparison with previous surveys but are enriched and updated, addressing ICT use in and out of school the use of interactive whiteboards for example. The third questionnaire was for two groups of students (ST): those at ISCED 2 (grade 8 – 13.5 years old on average) and those at ISCED 3 (grade 11 – 16.5 years old on average); there was no student questionnaire at ISCED level 1. The same questionnaire (with the additional of some items on vocational studies at grade 11 vocational level) was administered to both groups of students and addressed students' ICT practices both in and out of school. All questionnaires contained closed questions, on facts (e.g. access to ICT and use) and on opinions (on statements, for example).

TARGET POPULATIONS

This study collected data from schools (school heads), classrooms (teachers), and students at ISCED1 level 1 (primary level of education), ISCED level 2 (lower secondary level of education) and ISCED level 3 (upper secondary level of education). The survey looks at four different school levels, which are described in terms ofgrades, as is the convention in OECD and other studies.

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

The international sample design framework for the survey was a stratified two-stage cluster sample design.

- First, schools were stratified, explicitly and/or implicitly, and selected with probabilities according to their size. Replacement schools were identified in advance in case of a school declining to take part.

- In a second stage, one class was randomly selected within the sampled participating schools, and all students in the selected class surveyed. Classes were selected with equal probabilities within schools.

This sampling procedure was applied at grade 4, 8 and 11 academic and vocational. In countries with fewer than 300 schools in total, all schools were sampled. At class level, the teacher questionnaire was completed at grade 4 by the teacher mainly responsible for the class. At grades 8 and 11 teacher questionnaires were completed by three teachers (of science, mathematics and language teacher (L1 not foreign languages). At school level, the questionnaire was completed by the school principal.

For this study, the international student target populations have been defined as follows:

- ISCED 1 Level: all students enrolled in the grade that represents four years of schooling, counting from the first year of ISCED Level 1, providing the mean age at the time of the testing is at least 9.5 years. Survey of Schools: ICT in Education 25

- ISCED 2 Level: all students enrolled in the grade that represents eight years of schooling, counting from the first year of ISCED Level 1, providing the mean age at the time of the testing is at least 13.5 years.

- ISCED 3 Level academic: all students enrolled in an academic track that represents eleven years of schooling, counting from the first year of ISCED Level 1, providing the mean age at the time of the testing is at least 16.5 years.

- ISCED 3 Level vocational: all students enrolled in a prevocational or vocational track that represents eleven years of schooling, counting from the first year of ISCED Level 1, providing the mean age at the time of the testing is at least 16.5 years.

Thus, four different student populations had to be identified in each country. In most countries, these were grade 4 (ISCED level 1), grade 8 (ISCED level 2), grade 11 academic (ISCED level 3), and grade 11 vocational (ISCED level 3).

Within schools, a simple random sample of one class was drawn from the list of classes for the target grade. At ISCED level 1, the teacher who mainly responsible for teaching the class was part of the teacher target population. At ISCED 2 and ISCED 3 levels, it was first necessary to define the concept of class, as students might move from one class to another depending on the subject. For this study, a class was defined as the learning group of students for the language of the test (i.e. a class learning English in England, German in Austria). At ISCED level 2 and ISCED level 3 academic, all mathematics, science, and language teachers who taught any student in the sampled class were considered to belong to the target teacher population. For ISCED level 3 vocational, another definition of a class was used if language was not a compulsory subject for vocational students in certain countries: the administrative unit. Within each sampled class, the sampled teachers consisted of the three teachers who had most contact hours with the students.

SELECTION OF SAMPLES

This study collected data at three levels:

1. School level, through a school questionnaire administered to the principal or to the head of teachers;
2. Classroom level, through a teacher questionnaire;
3. Student level.

The sample design is a *two-stage stratified cluster sampling*. First, a sample of schools was selected with a probability proportional to the school size from a complete list of schools containing the student population of interest. Principals of participating schools were asked to provide the list of classes at the target grade. In most countries, one class of students was then randomly sampled within the selected schools with equal probabilities.

In some small education systems, two or more classes of students were selected in order to increase the amount of data. Finally one (or three, depending on the education level) of the teachers associated with the selected class was sampled according to a simple random sample procedure.

As the student samples were drawn within a sample of schools, the school sample is designed to optimize the resulting sample of students, rather than give an optimal sample of schools. For this reason, the survey analysed school level and teacher level variables as attributes of students. Beyond these statistical considerations, analysing school and teacher data at student level also makes sense from an educational point of view (as underlined in the previous section about the analytical reference framework). The student is the end recipient of the educational process and therefore what matters is not, for example, the percentage of schools connected to the internet but the percentage of students in a school connected to the internet. Depending on the correlation between the school size and the school characteristic, the two statistics can be substantially different.

Before drawing the sampling, schools were grouped into strata that shared common characteristics. For withinschool sampling a school coordinator was designated by the head teacher within each sampled and participating school. A web tool was developed to help the school coordinator draw class and teacher samples. With the school username and password, the school coordinator was asked to code the name of all target grade classes, as well as their size. The software automatically identified the sampled class(es) and informed the school coordinator. At ISCED 2 and ISCED 3 general levels, the system also generated three letters to enable the school coordinator to select one teacher in the language of instruction, one teacher of mathematics and one teacher of science.

DATA COLLECTION

European Schoolnet worked with the ministries of education in the 31 countries to identify the most recent version of their official school databases (or lists of schools in some cases) and provide access to them. In each country, a national coordinator (NC) was identified, this person, having the full support of the ministry, but not necessarily being a member of the ministry staff. Preference was given to experts experienced in school survey administration at national or, preferably, international level. The role of the NC was to conduct the tasks described in the sampling manual, and to prepare the school sampling frames, i.e. spreadsheet files listing all schools with students at grades 4,8 and 11. The sampling frames included variables required by the sampling manual (email address, school size, etc.) and stratification variables considered relevant at national level. Once submitted, conformity checks of were carried out before drawing the sample for each target population.

The IEA data processing centre (IEA DPC) developed an automatic system to contact selected schools and their replacement schools if needed. Emails were sent to the sampled schools to inform them that they had been selected to participate in the survey, to provide information about it and to ask them to register using an online participation module developed by the IEA DPC. Those school principals who agreed to participate were then asked to identify a school coordinator and provide their email address when registering. The national coordinator followed up and chased schools on the basis of participation reports during the process sent by the consortium and contacted schools not reacting to try to convince the head teacher to participate in the survey. Once a school registered on the database, the system automatically sent an e-mail to the school coordinator inviting him/her to get from the IEA database all the information needed about how to support the random selection of the classes at the target grades, the teachers and the students. The school coordinator had to introduce into the online sampling module some basic data (mainly number of classes at the grades concerned and their respective class size) and the system automatically drew the different samples. After this step, the role of the school coordinator was to make sure that the head teacher, the sampled teachers and the sampled students answered the online survey questionnaires. The school coordinator was responsible for ensuring easy access to ICT equipment in the school for all the surveys participants. To support them, the school coordinator received by email guidelines in his/her own language, including a model letter to parents explaining the purpose of the survey. If a school coordinator encountered difficulties with the online platform, he/she contacted the national coordinator or the consortium if needed. If a school answered negatively, the national coordinator was expected to document the refusal of his/her school in the online database provided by the IEA data centre. As soon as a school recorded its refusal, the replacement schools (again randomly selected by the system) were automatically contacted. Once a week during the data collection period, participation rates were sent by the IEA DPC to the consortium.

The three survey questionnaires were made available to the respondents in all those languages. The administration of the survey was online. The school coordinator had to distribute the URL, IDs and passwords to school head, teachers and students who have been selected. Principals and teachers were free to choose when to complete the questionnaire. For students, we advised organising a group session in order to avoid losing lesson time. Depending of the country and the national school calendar, the survey questionnaires were available from mid-September to December 2011. Because of administrative constraints in Germany, the period of administration was reopened in March-April 2012.

PARTICIPATION

A participating school is defined as a school where at least one student, one teacher, or one principal has completed a questionnaire. Table 1 shows levels of participation as percentages of the total number of sampled schools.

Table 1: Participation rates

Country	Grade 4 % participation	Grade 8 % participation	Grade 11gen % participation	Grade 11voc % participation	All grades % participation
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	37

* = There are no vocational schools as such separately from grade 11 general in these countries

Where numbers of schools participating were insufficiently high (i.e. below 40), they are 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.

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 at 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 at all grades and Turkey at grade 4 and 8. Throughout the report, a footnote indicates if a country is missing from a chart owing to insufficient data. Ireland and Malta do not feature in any grade 11 vocational charts or commentaries, because there are no separate schools for vocational students in these countries.

> In this survey EU averages are given; these are weighted means for the EU27 excluding Germany, Iceland, Netherlands and the United Kingdom.
>
> Throughout the report, a footnote indicates if a country is missing from a chart owing to insufficient data.
>
> Ireland and Malta do not feature in any grade 11 vocational charts or commentaries, because there are no separate schools for vocational students in these countries.

DATA CLEANING

Data cleaning is an important step because it guarantees the integrity of the data and the quality of the reporte results. Data cleaning started with the school sample frames. The student population size at grade 4 and at grade 8 was compared with the population size estimates using the PIRLS and TIMSS databases. The school sample frames were also checked for duplicate records, using the school national identification and/or the e-mail address, for missing data in the stratification variables. The online data collection system (ODC) developed by the DPC allows the implementation of validity check during the data collection process. The first cleaning step consisted of comparing the questionnaire data files with the sampling and participation information files. Several tests were then implemented for checking the plausibility of the respondent answers to open-ended questions. Continuous variables were also standardized and outlying values could also lead to the recording of the data into missing information.

WEIGHTING

If the sampling units do not have the same chance of being selected and if the population parameters are estimated without taking into account these varying probabilities, then survey estimates might be biased. Therefore, data need to be weighted in order to compensate for these varying probabilities and to ensure that each sampled student represent the correct number of students in the full population as defined in the survey. Three weights have been computed: (i) principal (or school) weight, (ii) 'teacher' weight and (iii) the student weight.

SAMPLING VARIANCE AND STANDARD ERROR

Any survey statistic based on a sample should be associated with its standard error. A two stage sample should not be considered as a simple random sample. Indeed, selected students attending the same school cannot be considered as independent observations as they can be with a simple random sample because they are usually more similar than students attending distinct educational institutions. For instance, they are offered the same school resources, may have the same teachers and therefore taught a common implemented curriculum, and so on.

The sample design implemented in IEA and OECD PISA surveys is so complex that no mathematical formulae exist for the computation of standard errors. Since the IEA reading Literacy study in 1991, international surveys in education are using replication methods for estimating the standard errors. Like the IEA PIRLS and TIMSS

surveys, the standard error has been estimated by using the Jackknife repeated replication technique for stratified sample. For this survey, the Jackknife method 1 has been applied.

SCALING

Most questionnaire items were designed to be combined in some way so as to measure latent constructs that cannot be observed directly. For these items, transformations or scaling procedures are needed to construct meaningful indices. In a first step, we performed exploratory factor analyses using varimax rotation with SAS software. We performed the analyses at the EU level and used senate weights as this ensures that every EU country contributes equally. In a next step, we calculated the Cronbach alphas, at the EU level but also within each participating countries in order to validate the construct.

CLUSTERS

We used the two-step cluster analysis method in SPSS software to identify groups of students, teachers, and schools that are similar to each other on a number of preselected variables. When determining the number of clusters we not only took into account statistical criteria (best fit) but also criteria of interpretability and similarity across the different grades. This means that we looked for a solution that was interpretable and that fitted each grade. Finally, cluster analyses were performed at each ISCED level separately applying the same number of clusters.

1. Infrastructure provision

This section explores data relating to the underlying infrastructure to underpin teaching and learning with technology: the provision of ICT equipment, tools / applications and connectivity. Changes and trends since the previous benchmarking survey in 2006 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 to computer ratio in most countries.

  – There is large variation between countries. Denmark, Norway and Sweden have the lowest ratios at all grades, Spain, Malta, Cyprus and Belgium at some grades.

- **Laptops, tablet and netbooks are becoming pervasive, but only in some countries;** on average in the EU there are between eight (grade 11 vocational) and 20 students (grade 4) per laptop.

  – There are low ratios of students to laptops in Denmark, Norway and Sweden at all grade levels, Spain and Finland at some levels; desktop computers predominate in other countries.

  – In practice, ratios could well be lower in some countries, as personal ownership grows and 'Bring your own technology' policies are implemented in schools, as is the case in, for example Denmark, Portugal and Norway.

- Some **two-thirds** of computers are located in computer rooms on average.

  – There is a split between groups of countries siting computers in dedicated rooms and those distributing computers throughout the school, and this is not entirely related to overall 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**, at most commonly between 2 and 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 least at a basic level, that is having a website, email for students and teachers, a local area network or a virtual learning environment.

- **One in four grade 4 students is in a school with a virtual learning environment, rising to almost two-thirds in vocational schools.**

- High levels of virtual learning environment provision can be seen in Norway, Portugal, Finland, Sweden and Denmark; in some all students are in such schools.

  – Generally speaking it is schools' **own personnel (whether teachers or technical support 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 per cent of grade 4, 24% of grade 8, 55% of grade 11 general and 50% of grade 11 vocational students are in highly 'digitally equipped schools'**, that is with high equipment levels, fast broadband (10mbps or more) and high 'connectedness'.

- **No overall relationship was found between high levels of ICT provision and student and teacher confidence, use and attitudes.** This and other findings from the survey suggest that **supporting and developing teachers** could be as important as providing technology, especially once a certain threshold of infrastructure provision is reached.
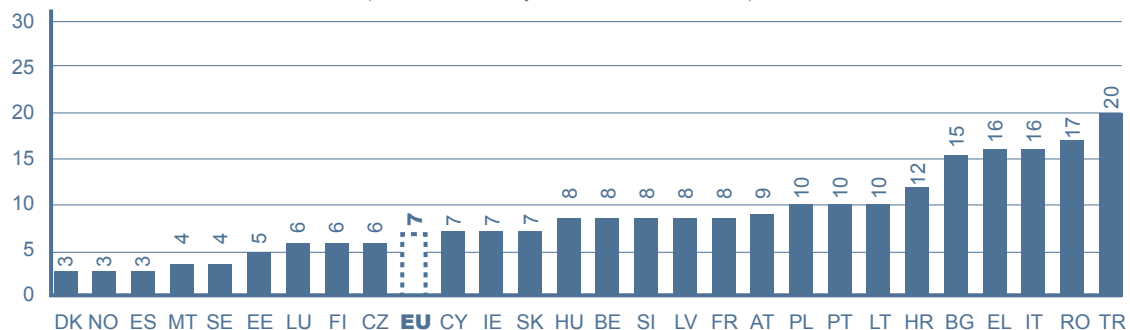
'Computers'

1. *In this report 'EU mean' or 'EU average' refers only to the EU27 countries for which sufficient data were obtained (i.e. not Germany, Netherlands and the United Kingdom) and not other countries if responses were low for a particular item) and excludes results from Croatia, Iceland and Turkey. It is a weighted average where the contribution of a country is proportional to the number of students in that country.*

2. *If responses to a questionnaire item from a country are insufficient to be reliably included this is mentioned in a footnote to the chart in question.*

3. *Figures are normally rounded to the nearest whole number in the text of the report.*

In this survey, a computer is defined as a desktop, laptop, netbook or tablet computer used for educational purposes, whether or not connected to the internet. In school the majority of such computers are desktops and almost all are connected to the internet. Countries with below average ratios of students to these computers students at three or more grades are Belgium, Cyprus, Denmark, Finland, Norway, Spain and Sweden. At all grades there is a 'long tail' of countries with above average ratios, and large differences between countries. In some countries there is a trend towards encouraging students, particularly older students, to bring their own zlaptops and tablets to school, a trend explored in later sections. Thus, actual ratios of students to computers, if computers *not* provided by schools are included, could well be higher than these.

At grade 4 there are on average in the EU seven students per computer, **Denmark, Norway** and **Spain** having half the number of students to computers, and five countries having more than twice the EU average, as can be seen in **fig. 1.1a.**

Fig. 1.1a: Students per computer
(Grade 4, country and EU level, 2011-12)

At grade 8 (fig. 1.1b[5]) there are five students per computer on average in the EU. 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** and **Sweden**).

Fig. 1.1b: Students per computer
(Grade 8, country and EU level, 2011-12)
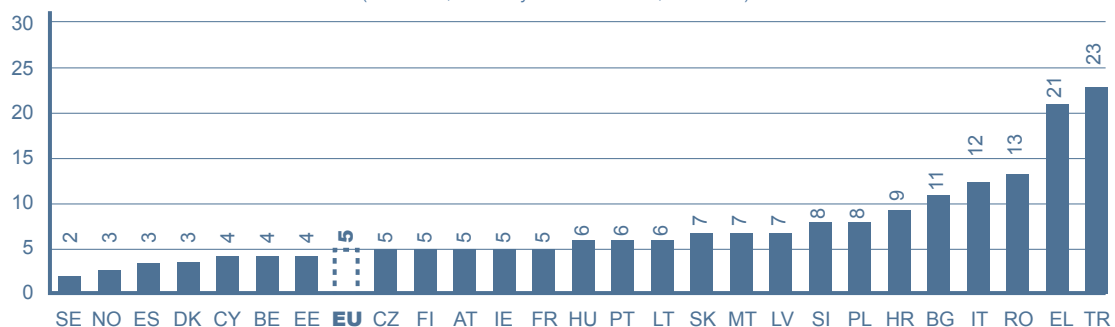
5 excl. LU (insufficient data).

At grade 11 general the student to computer ratio is 4:1 **(fig. 1.1c [6])**. The difference between countries with the lowest and highest ratios is even greater than at other grades: from 1:1 in Norway to 22:1 in Turkey.

Fig. 1.1c: Students per computer
(Grade 11 general, country and EU level, 2011-12)
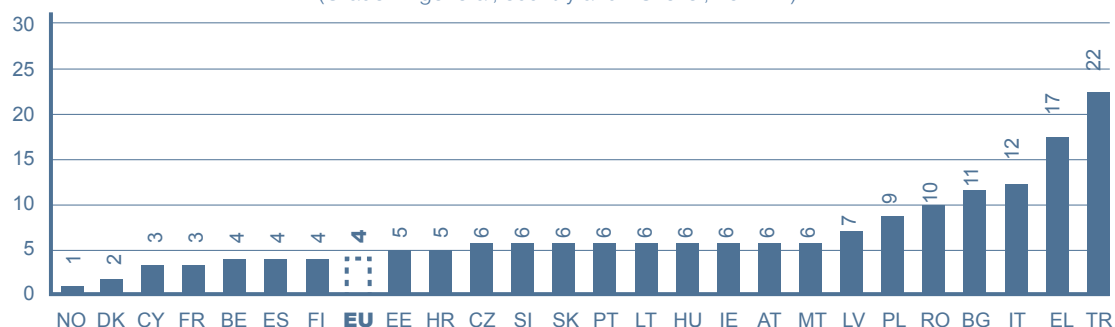
At grade 11 vocational there are three students per computer, as can be seen in fig. 1.1d[7]. In **Norway** there can be said to be system-wide 1:1 computing at grade 11, both general and vocational, with more than 1:1 computing in both cases.

Fig. 1.1d: Students per computer
(Grade 11 vocational, country and EU level, excl. LU, SE, 2011-12)
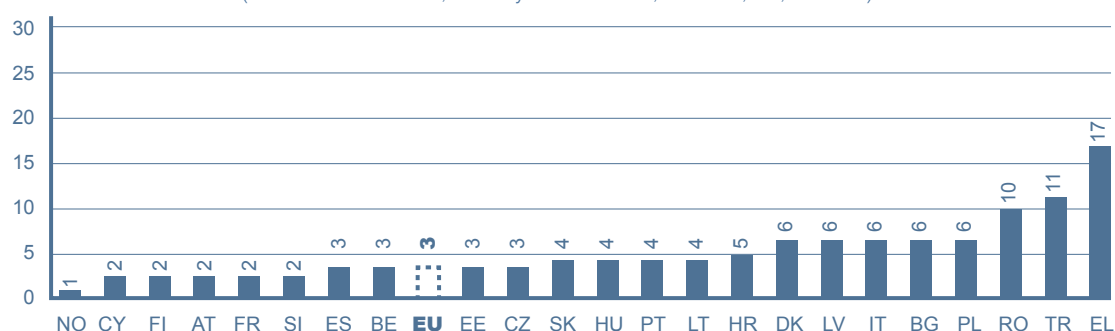
Patterns of computer provision

Considering the data concerning laptop and desktop computers, in some countries at some grades there are more laptops (including tablets, netbooks and mini-notebooks) than desktop computers, but in most it is desktop computers that predominate. On average in the EU, the older the student the more laptops available: 20 students per laptop at grade 4, 14 at grades 8 and 11 general and eight at vocational level. In addition to school provision of laptops, increasing percentages of students are allowed to, and do, bring their own laptop and, to a lesser extent, mobile phone into school. This is particularly the case in Scandinavia and the Baltic countries, but also to some extent in Portugal and Austria.

Is there a relationship between family income (percentage provided by head teachers of students from 'deprived homes') and levels of computer provision in their school? No correlation was observed at EU level, but there are some positive and negative correlations in some countries at some levels, as described below.

Grade 4

At grade 4, there are on average some two laptops for every three desktop computers, but laptops are distributed very unevenly between countries (fig.1.2a): from four students (Denmark) to 500 (Romania) per laptop (fig. 1.2a[8]). There are more online laptops than desktops in **Denmark, Spain** and **Norway**.

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6   excl. LU, SE (insufficient data).
7   excl. LU, SE (insufficient data). IE and MT do not have vocational schools.
8   Figures for desktops are in the data tables in the annex. For clarity and emphasis, the charts in this report show only laptop / notebook computers.
        Country profiles (fig. 2.2) show both desktop and laptop ratios.

Fig. 1.2a: Students per internet-connected laptop computer
(Grade 4, country and EU level, 2011-12)
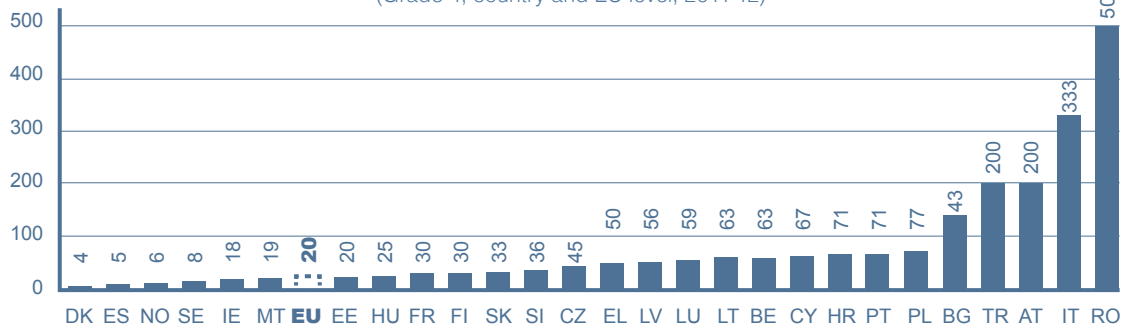
The survey data includes measures of socio-economic background of students (as indicated by the percentage of students from 'deprived homes' in school reported by head teachers). Correlation tests were carried out to investigate whether there is a relationship between equipment levels and percentages of students from low-income families in schools. Although none was observed at EU level, there are significant correlations[9] in Hungary, Norway and Portugal where the higher the percentage of students from low-income families in a school, the more online desktop computers tend to be available at grade 4 (and vice-versa).

Grade 8

Laptops are much in evidence, more so than desktops in some countries, notably **Sweden**, where there are 2.3 students per laptop, **Norway** and **Denmark**, both four per laptop (fig. 1.2b[10]).

Fig. 1.2b: Students per internet-connected laptop computer
(Grade 8, country and EU level, 2011-12)
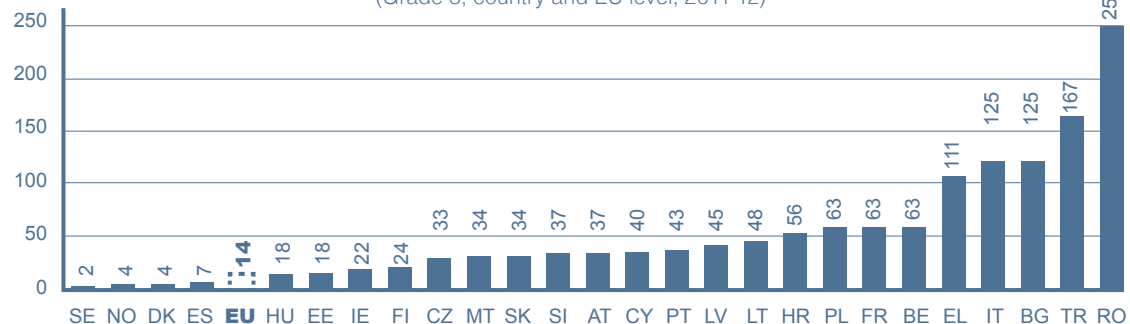
The lowest ratios of students to online desktop computers are to be found in **Cyprus** and **Belgium**, followed by **Austria** and the **Czech Republic.** There are more than 20 students per online PC in **Greece** and **Turkey**, and between 10 and 20 in **Bulgaria, Croatia, Italy, Norway, Romania, Slovenia** and **Sweden**.

No significant correlation is observed between low-income families and equipment provision at EU level. A number of significant correlations between low income homes and school equipment levels are observed at country level: the higher the percentage of students from low income families in a school, the more online desktop computers tend to be available in **Latvia, Lithuania** and **Malta**, and the more internet-connected laptops provided in **Ireland** (and the reverse).

Grade 11 General

There are more online laptops than online computers in **Norway, Denmark** and **Sweden** (fig.1.2c[11]). In **Norway** the student to laptop ratio is more than 1:1 and in **Denmark** and **Sweden** between two and three per laptop.

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9   Here and throughout r>0.2, p<0.01.
10   Excl. LU (insufficient data).
11   Excl. LU (insufficient data).

Fig. 1.2c: Students per internet-connected laptop computer
(Grade 11 general, country and EU level, 2011-12)
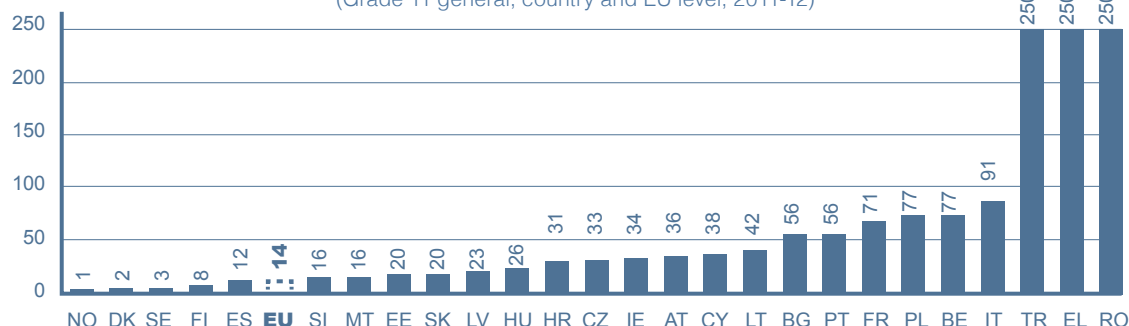
Within the overall four students per computer, grade 11 general students have the use of the highest numbers of online PCs in **Belgium** (four students to each computer), **Sweden**, **France** and **Cyprus.** The highest ratios of students to desktops are to be found in **Norway** (where laptops, not desktops, are pervasive), **Turkey** and **Greece**.

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 percentages of students from low-income homes, and a negative correlation in **Belgium** between levels of online desktop computers and of online laptops and the percentage of students from low income families in a school, and vice versa.

Grade 11 vocational

There is a 1:1 ratio of internet-connected laptops in **Norway** (1:1.07 in fact) and **Sweden**, whilst **Finland** and **Spain** have around 10 students per laptop. The EU mean, 8.5 students per laptop hides an enormous range as can be seen in fig. 1.2d[12].

Fig. 1.2d: Students per internet-connected laptop computer
(Grade 11 vocational, country and EU level, 2011-12)
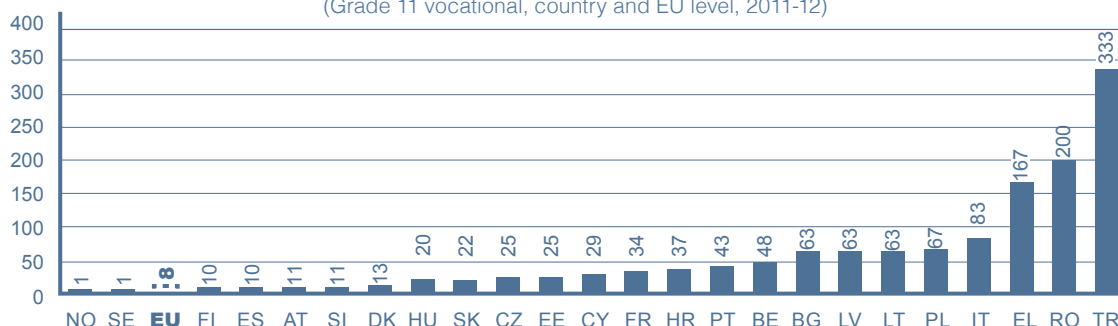
No correlation was observed at EU level between socio-economic background and equipment levels but significant correlations are observed at country level. The higher the percentage of students from low-income families in a school, the more online desktop computers tend to be available in vocational schools in **Cyprus** and **Portugal**, and the reverse. There are also positive correlations between the percentage of students from low-income backgrounds in schools and low numbers of students per internet-connected laptop in **Greece, Italy** and **Portugal**. However, there is a significant *negative* correlation between low income levels and desktop computer provision in vocational schools in **Austria, Croatia, Czech Republic, Hungary, Spain** and **Sweden**: the higher the percentage of students from deprived homes in the school, the fewer desktop computers available to them (but note than in some countries there may be a switch to laptops in progress).

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.

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12   Excl. LU (insufficient data) IE and MT do not have vocational schools.

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 students, grade 4, country and EU level, 2011-12)
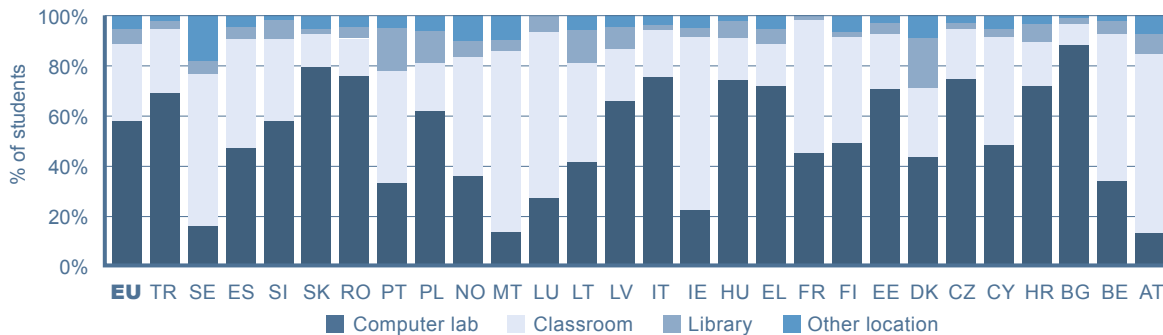
Grade 8

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).
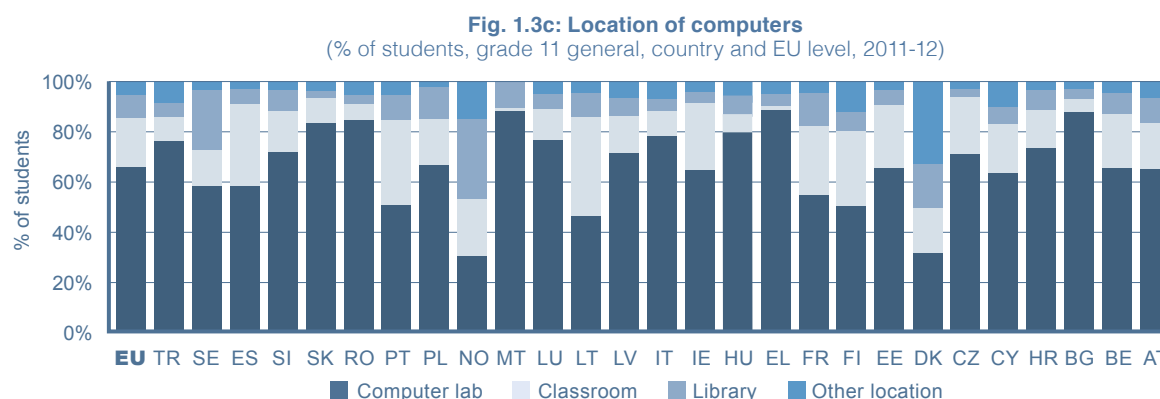
Fig. 1.3b: Location of computers
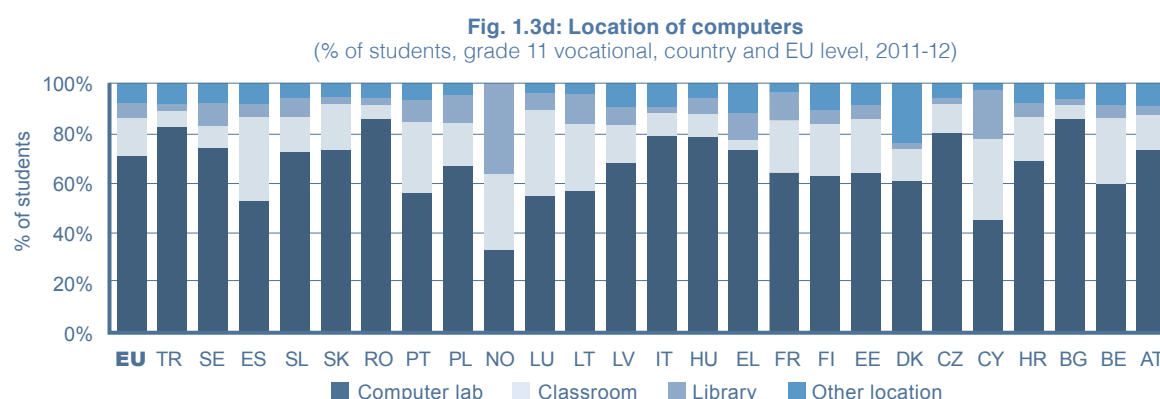(% of students, grade 8, country and EU level 2011-12)
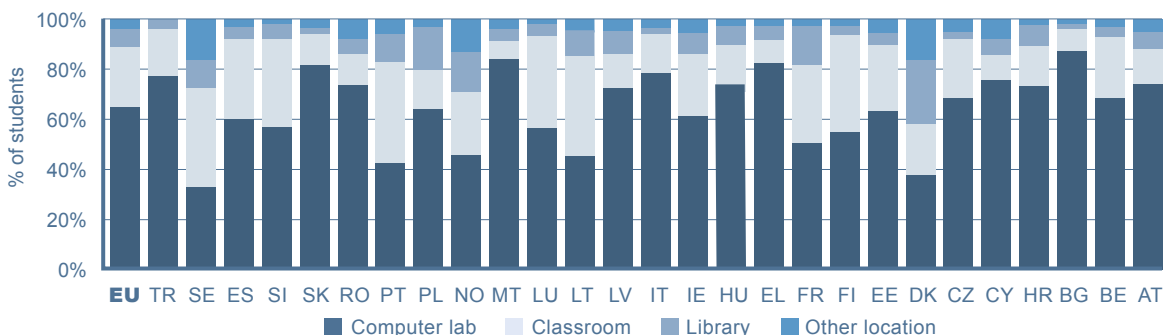
Grade 11 General

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**[13], 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...).

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13   Standard error is high in these countries

Fig. 1.3c: Location of computers
(% of students, grade 11 general, country and EU level, 2011-12)

■ Computer lab   ■ Classroom   ■ Library   ■ Other location

Grade 11 vocational

It is at grade 11 vocational level that computers are most likely to be installed in labs (fig.1.3d[14]): 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.

Fig. 1.3d: Location of computers
(% of students, grade 11 vocational, country and EU level, 2011-12)

■ Computer lab   ■ Classroom   ■ Library   ■ Other location

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.

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)

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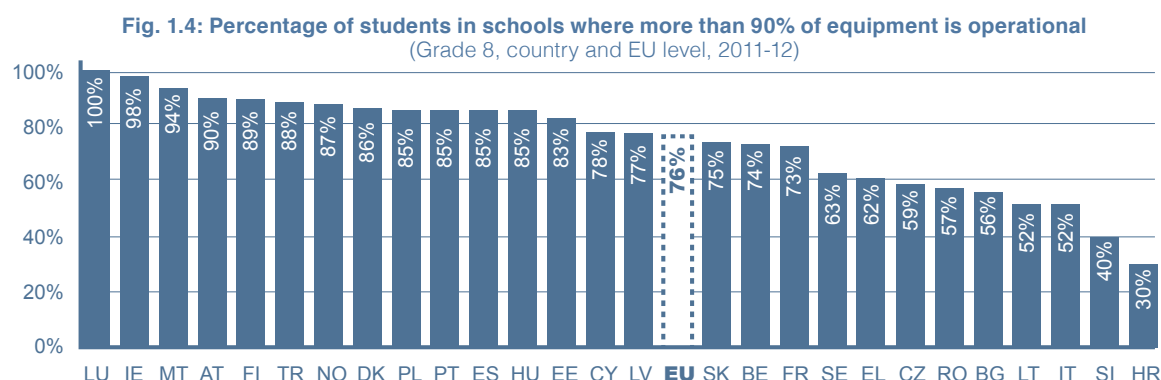
14   As throughout IE and MT do not have vocational schools.

The figure for students at grade 11 in general education, 74%, is close to that at grade 8. **Croatia** and **Sweden**[15] 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 interactive whiteboards

Interactive whiteboards (IWBs) are found across Europe at most levels, with approximately 100 students to each IWB at all grades.

At grade 4 (fig. 1.5a[16]: the lowest ratio of interactive whiteboards is reported in **Malta**, **Denmark**, **Ireland, Norway** and **Spain**, and more than 200 students per IWB in **Austria** (where there are none)**, Bulgaria, Croatia, France, Greece, Lithuania, Luxembourg, Poland, Romania,** and **Turkey**. The higher the percentage of students from 'deprived homes', the more IWBs are available in their school in **Hungary** and **Norway**, where positive correlations at grade 4 between student socio-economic background and the provision of IWBs are observed. Conversely there is a negative correlation in **Bulgaria** and **Luxembourg**; in these countries the lower the socio-economic status of students (as measured by head teachers' estimate of the percentage of students from 'deprived homes'), the fewer IWBs available, and the reverse.

Fig. 1.5a: Students per interactive whiteboard
(Grade 4, country and EU level, 2011-12)
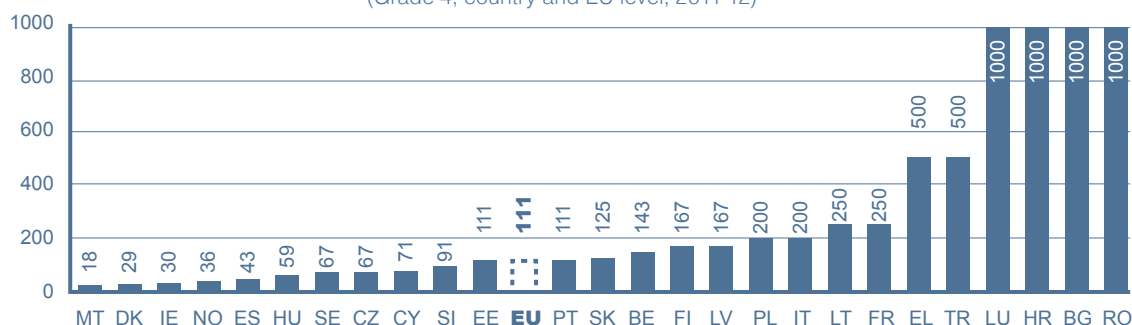
At grade 8 (fig. 1.5b[17]), the lowest ratios of interactive whiteboards to students are reported in **Denmark** (30:1), followed by **Hungary, Malta, Finland, Czech Republic** and **Estonia**. A significant positive correlation between low-income family background and the provision of IWBs is observed in **Hungary**: the lower the family income, the more IWBs are available in school and vice versa.

Fig. 1.5b: Students per Interactive whiteboard
(Grade 8, country and EU level, 2011-12)
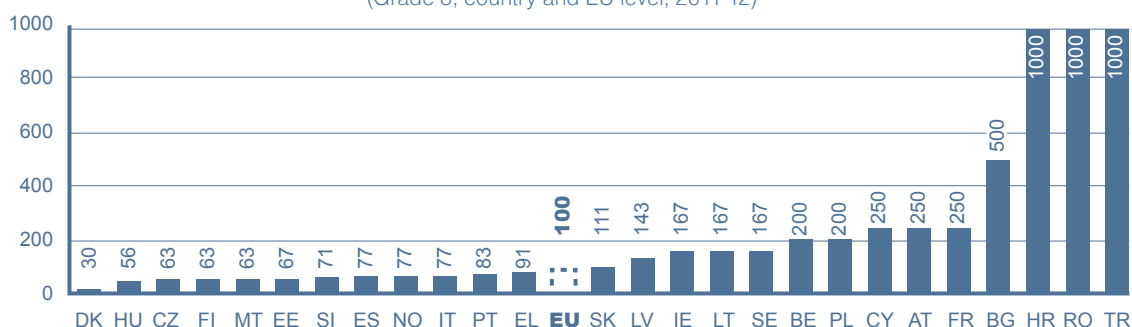
At grade 11 general(fig. 1.5c[18]), there are on average 167 students per interactive whiteboard. The highest ratios of interactive whiteboards are in **Denmark, Malta**, **Estonia** and **Finland**.
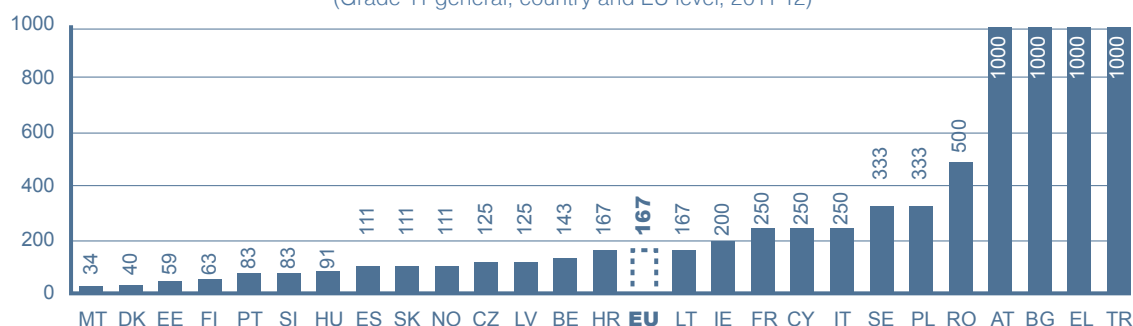
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15 But note the high standard error
16 AT is missing (insufficient data)
17 Excl. LU (insufficient data)
18 Excl. LU (insufficient data)

Fig. 1.5c: Students per interactive whiteboard
(Grade 11 general, country and EU level, 2011-12)

At grade 11 vocational (fig. 1.5d[19]), **Norway** has the highest ratio of interactive whiteboards, followed by **Portugal, Finland, Slovenia** and **Denmark**.

Fig. 1.5d: Students per interactive whiteboard
(Grade 11 vocational, country and EU level, 2011-12)
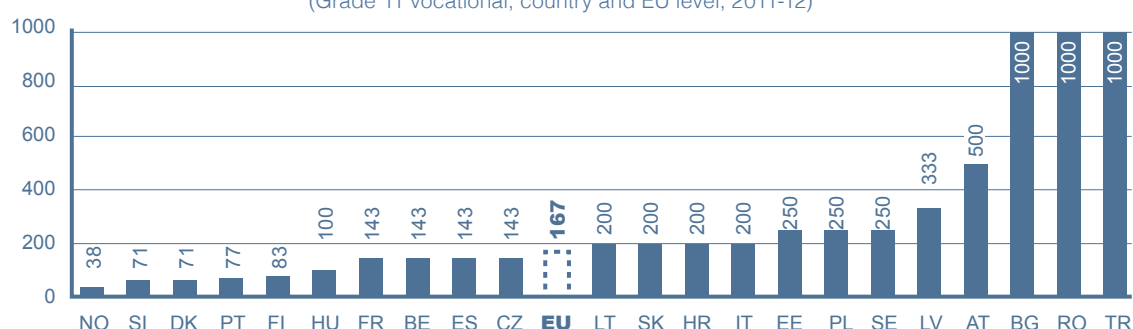
Location of interactive whiteboards

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). There could also be considerable variation between schools within a country as well (e.g. **Turkey**), as indicated by high standard errors. 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, more than 100 students per item in almost all countries. In **Scandinavia** and **Ireland** there are fewer than 100 students per digital camera at grade 4. At grade 11 general, mobile phones appear at levels below 100 students per phone in **Bulgaria, Croatia, Denmark** and **Sweden** (all around 50:1). **Sweden** has the lowest ratio of digital cameras at this grade (33 per camera), followed by **Finland** and **Norway**. Digital readers are almost totally absent in vocational schools, but mobile phones feature in **Finland** at this level (13 students per phone) and at higher ratios in **Bulgaria**, **Estonia**, and **Latvia**. **Norway** also has the lowest ratio of students to digital cameras at this level (25:1), together with **Finland** and **Sweden**. Relatively few are to be found in **Denmark, Estonia, Greece, Italy, Latvia, Lithuania, Poland, Romania, Spain** and **Turkey**.

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19   Excl. CY, EL, LU (insufficient data). There are no separate vocational schools in IE and MT.

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 50 grade 4 and 8 students per data projector and 34 grade 11 students to each data projector.
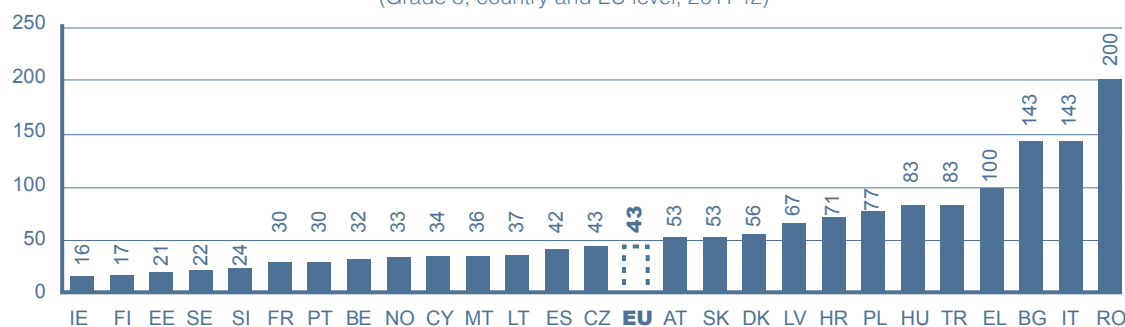
At grade 4 (fig. 1.6a), there are from 19 (in **Cyprus)** to 250 (in Italy and **Romania**) students per data projector.
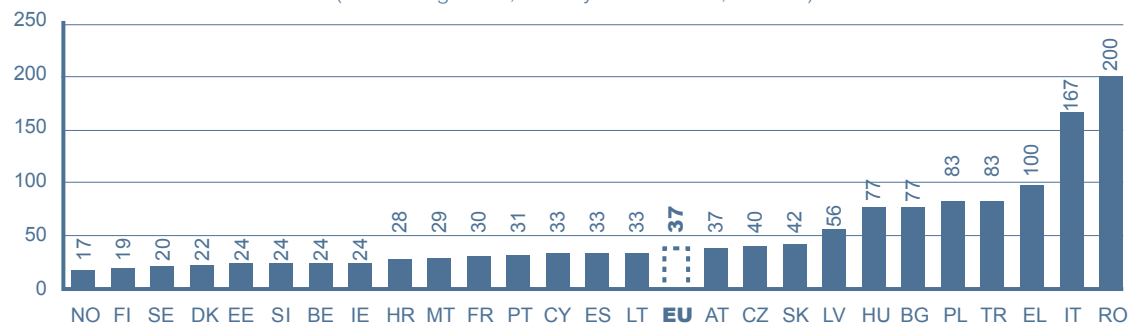
Fig. 1.6a: Students per data projector
(Grade 4, country and EU level, 2011-12)
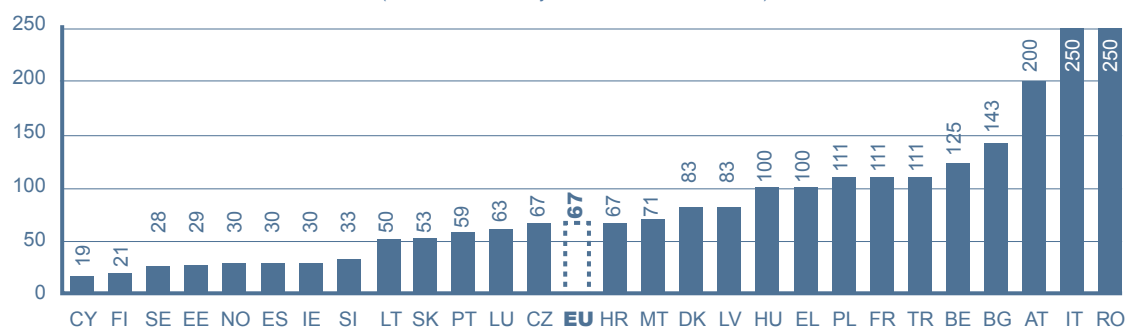
At grade 8 (fig. 1.6b[20]), **Ireland** and **Finland** have the lowest student:data projector ratios and **Romania** the highest.

Fig. 1.6b: Students per data projector
(Grade 8, country and EU level, 2011-12)

There are relatively high numbers of data projectors at grade 11 general (fig. 1.6c[21]) in **Norway** (17 students per data projector), **Finland** and **Sweden**, few in **Romania** and **Italy**.

Fig. 1.6c: Students per data projector
(Grade 11 general, country and EU level, 2011-12)

20   Excl. LU (insufficient data)
21   Excl. LU (insufficient data)

Italy, **Romania** and **Turkey** have few data projectors in grade 11 vocational schools (fig. 1.6d[22]): compared to other countries, and the lowest students to dataprojector ratios are to be found in **Norway** (10:1), **Cyprus**, **Slovenia**, **Belgium**, **Estonia**, **Finland, Spain** and **France**.

Fig. 1.6d: Students per data projector
(Grade 11 vocational, country and EU level, 2011-12)
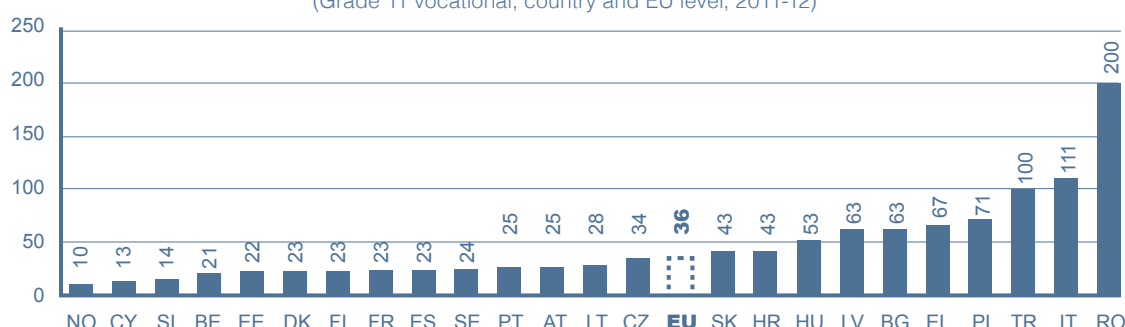
Broadband provision

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 as shown in fig. 1.7. At all levels, particularly in lower secondary schools (with 61%), this is the most frequent means of access.

Fig. 1.7: Percentage of students in schools with broadband
(All grades, EU average, 2011-12)
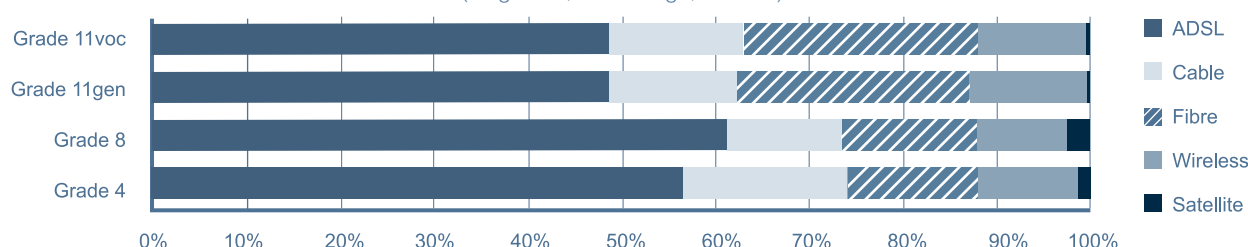
Satellite access is consistently low but significantly higher in **Ireland** at grade 4 (13% of students are in schools with such access), in **Czech Republic** at grade 8 (23%). At grade 4 over 50% of students are in schools connected via fibre in **Denmark**, **Norway** and **Portugal**. **Bulgaria** 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.
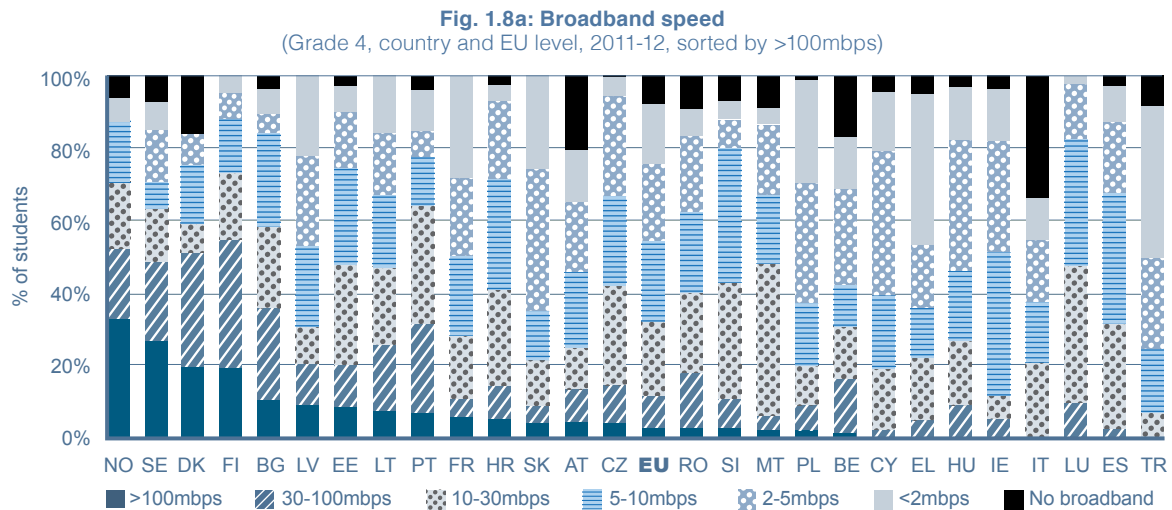
Broadband speed

There is a spread across the range of broadband speeds, most schools within a wide range from under 2mbps to 100 mbps.

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. One would expect schools with more students to have more bandwidth, 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** there is a negative correlation at grade 11 general, where larger schools appear to have lower broadband speeds.

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22   Excl. LU (insufficient data). There are no separate vocational schools in IE and MT.
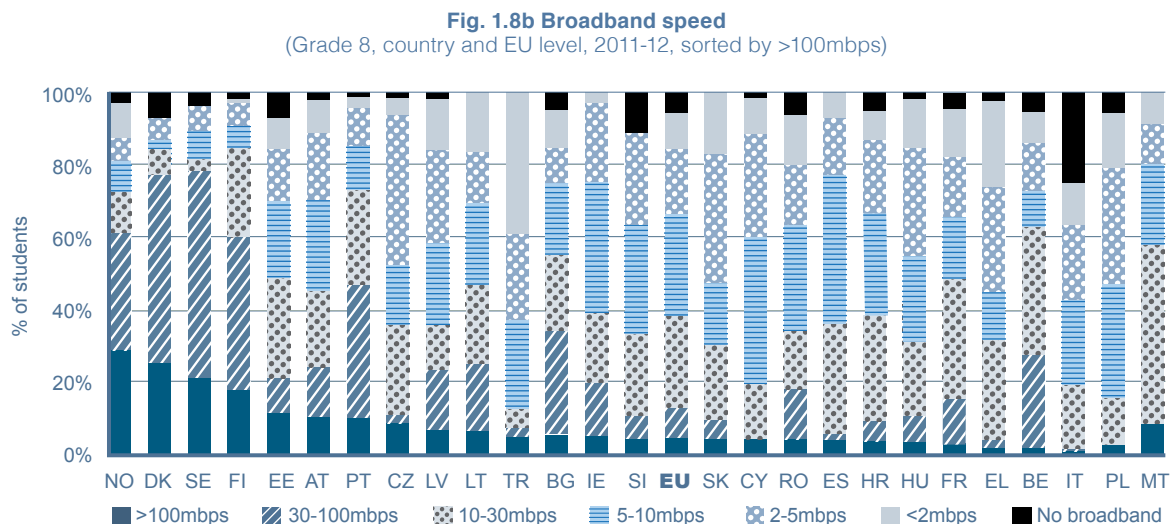
Grade 4

Figures 1.8 shows bandwidth by country and across the EU, dark shades being relatively slow and pale 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. 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, sorted by >100mbps)

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**), where broadband speed in more densely populated areas tends to be faster than in rural areas.

Grade 8

At grade 8, over 5mbps internet is available to over 50% of students in all countries in fig. 1.8b[25] except **Czech Republic, Turkey, Slovakia** and **Greece.**

Fig. 1.8b Broadband speed
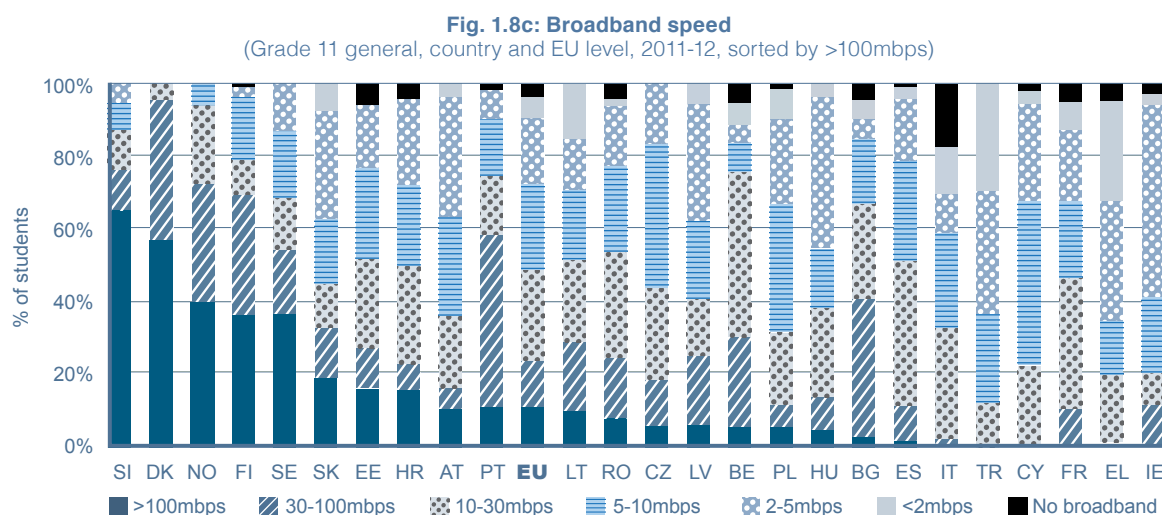(Grade 8, country and EU level, 2011-12, sorted by >100mbps)

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25   Excl. Lu (insufficient data)

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**), i.e. the more densely populated the area the faster the broadband in schools.

Grade 11 General

At grade 11 general (fig. 1.8c[26]), 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, sorted by >100mbps)

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**, as seen in fig. 1.8d[27]. There are no separate vocational schools in IE and MT.
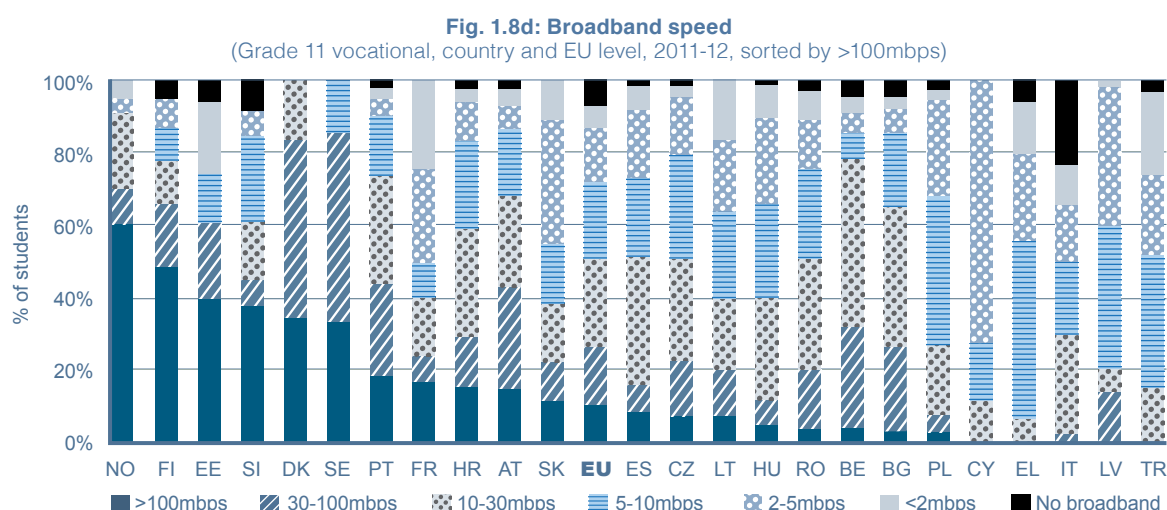
Fig. 1.8d: Broadband speed
(Grade 11 vocational, country and EU level, 2011-12, sorted by >100mbps)

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.

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26   Excl. LU, MT (insufficient data)
27   Excl. LU, MT (insufficient data) There are no separate vocational schools in IE and MT.

Students in schools without broadband

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. 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. Absence of broadband appears to be particularly acute in **Italy** at all grades.

Fig. 1.9a: % of students in schools without broadband
(Grade 4, country and EU level, 2011-12)
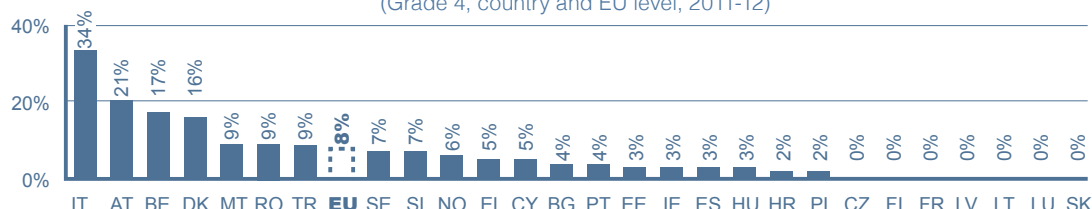
Fig. 1.9b: % of students in schools without broadband
(Grade 8, country and EU level, 2011-12)
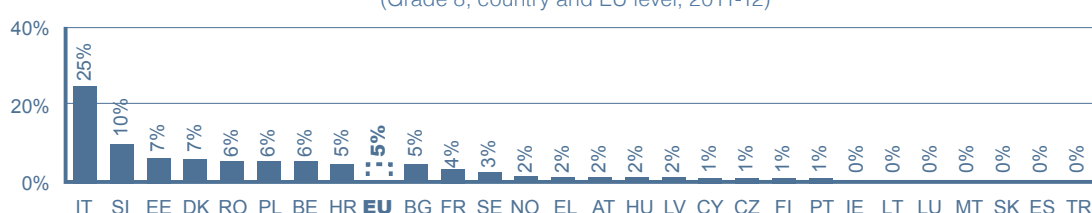
Fig. 1.9c: % of students in schools without broadband
(Grade 11 general, country and EU level, 2011-12)
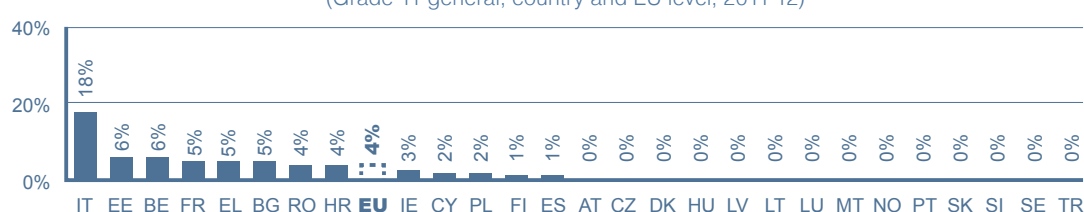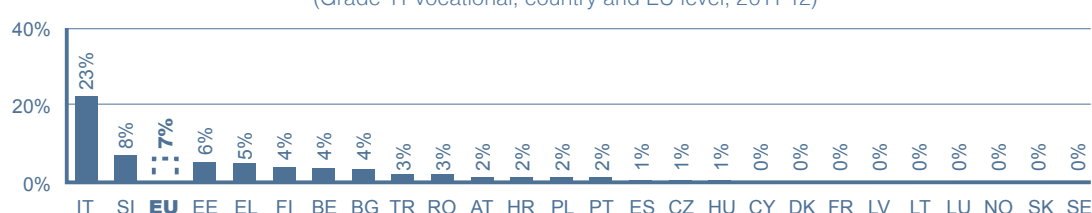

Fig. 1.9d : % of students in schools without broadband
(Grade 11 vocational, country and EU level, 2011-12)

Connectedness

The great majority of Europe's schools can be said to be 'connected', that is having facilities such as a website, external email addresses for teachers and students, a wired or wireless local area network (LAN) or a virtual learning environment (see following section).

A school website 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[28]. Between 57 (grade 8) and 66 per cent (Grade 11) of students are in schools providing 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.

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28   See table in annex

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). There may be under-reporting in some cases; in France for example all teachers are provided with email addresses but this is not all head teachers report this in the survey.

Grade 4

Almost three-quarters of grade 4 students are in schools with a website, and one in four in schools in which more than 50% of students have email. At grade 4 every school has a website in **Estonia** and **Norway**, and in five countries more than 90% of students are in schools with websites.

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 website. All grade 8 students in **Belgium** and **Luxembourg** are in schools with a website, and in 15 countries more than 90 per cent of students are in schools with websites. 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 website, the lowest percentages being in **Greece, Poland** and **Turkey** (where nonetheless 72% of students are in schools with a website). 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 website. 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 website in 14 countries, the fewest in **Poland** and **Turkey**. In 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.

Over one in 20 grade 11 vocational students are in schools with no connectedness. It is in **Poland** where there are most (28%) vocational students in schools with no connectedness, the least in **Spain** (1%).

Virtual Learning environment

A VLE or learning platform is arguably the strongest indicator of connectedness. As can be seen in fig. 1.10, across the EU, around 25% of grade 4 students and over 60% of secondary school students are in schools with a VLE.

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** and **Finland**; they are considerably more unusual in **Hungary, France, and Greece** where 6 to 8% 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)
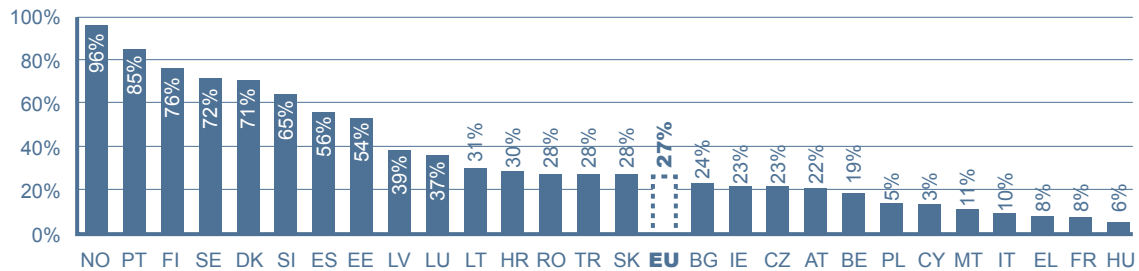
The percentage of grade 8 students in schools with VLEs ranges from 11 (**Hungary**) to 98 (**Norway**). In seven countries, more than 80 per cent of students are in schools with VLEs (fig. 1.10b[29]).

Fig. 1.10b: % of students in schools with a virtual learning environment
(Grade 8, country and EU level, 2011-12)
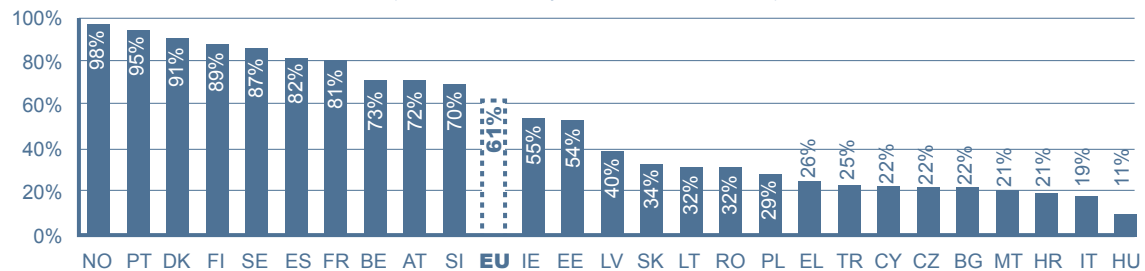
There is also a wide range of percentages of students in schools with VLEs at grade 11 general level (fig. 1.10c[30]): from 18% in **Hungary** to 100% in **Norway**. Over four in five students are in schools with VLEs in nine countries.

Fig. 1.10c: % of students in schools with a virtual learning environment
(Grade 11 general, country and EU level, 2011-12)
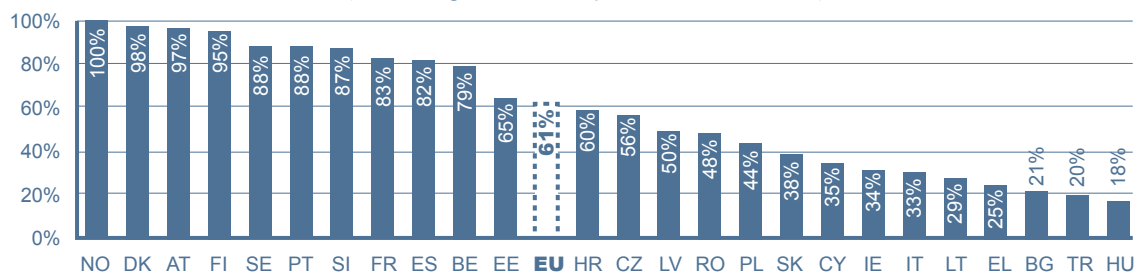
Over 80% of vocational students are in schools with a VLE in eight countries, and around 20% in countries with the lowest VLE penetration levels (fig. 1.10d[31]).

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29   Excl. LU (insufficient data).
30   Excl. LU and MT (insufficient data).
31   Excl. LU (insufficient data). There are no separate vocational schools in IE and MT.

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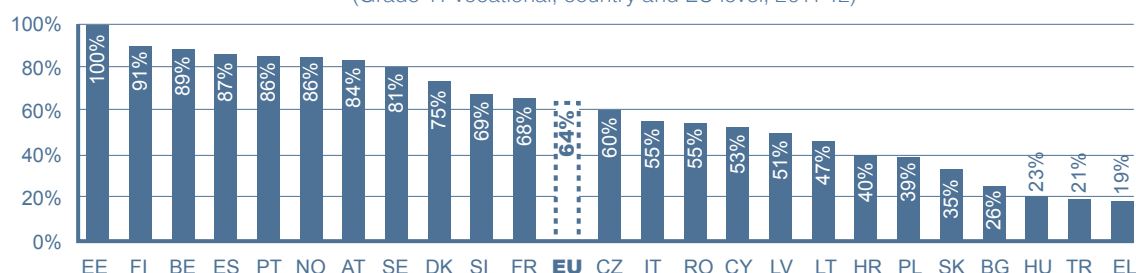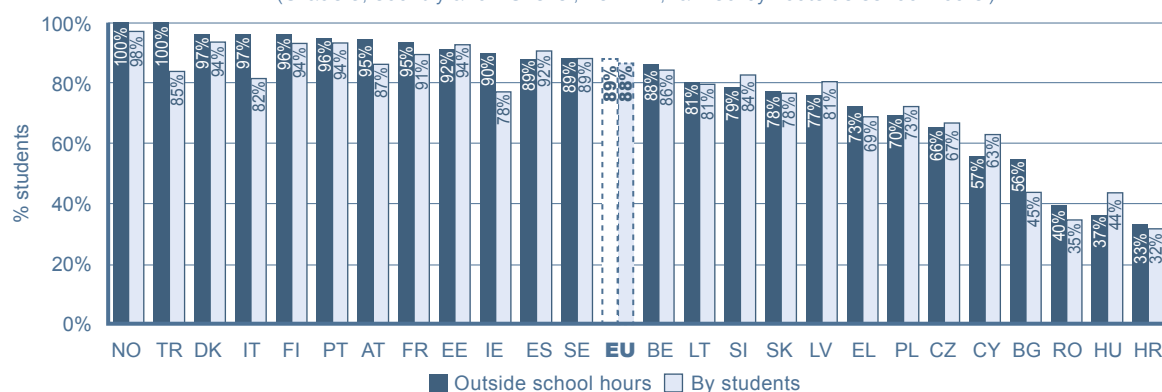

Access to the VLE outside school

Of the schools with VLEs, on average in the EU almost four in five grade 4 students are in schools where the head teacher reports that these learning platforms are accessible outside school hours, and 72% are in schools where the VLE can be accessed by students (fig. 1.11a) from outside.

Fig. 1.11a: % of students in a school with VLE with external access…
(Grade 4, country and EU level, 2011-12, ranked by 'outside school hours')
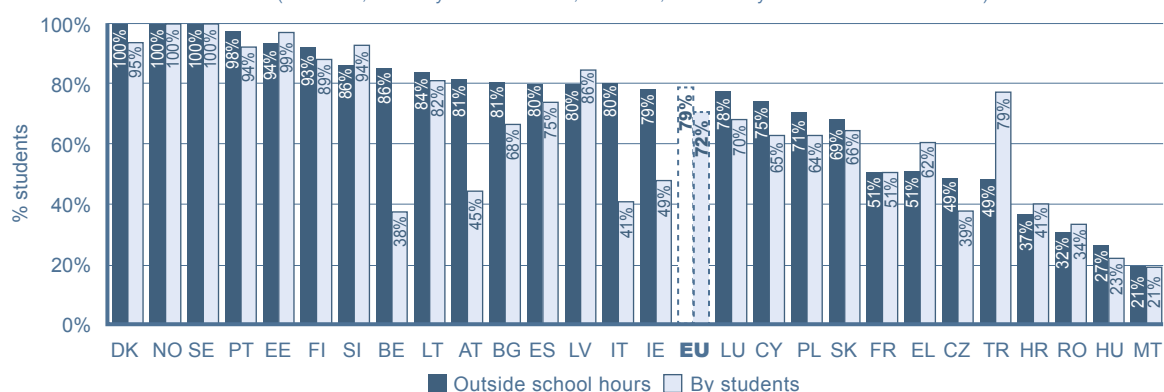
The proportion rises to almost nine out of ten grade 8 students on average in the EU who are in schools with VLEs where these learning platforms are accessible outside school hours, and by students (fig. 1.11b[32]).

Fig. 1.11b: % of students in a school with VLE offering external access…
(Grade 8, country and EU level, 2011-12, ranked by 'outside school hours')
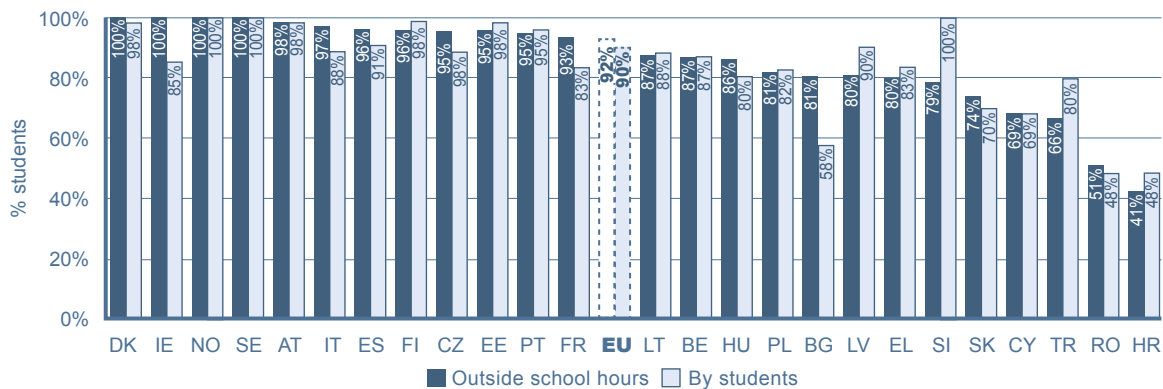

At **grade 11 general**, over 9 out of ten students on average in the EU are in a school whose learning platform is accessible outside school hours and by students outside school (fig. 1.11c[33]).

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32   Excl. LU and MT (insufficient data).
33   Excl. LU and MT (insufficient data).

Fig. 1.11c: % of students in a school with VLE with external access…
(Grade 11 general, country and EU level, 2011-12, ranked by 'outside school hours')

At **grade 11 vocational** (fig. 1.11d[34]), around nine out of ten students on average in the EU are in schools with VLEs where these learning platforms are accessible outside school hours. Most students have access outside school hours, except in **Turkey** and **Romania**.

Fig. 1.11d: % of students in a school with VLE offering external access…
(Grade 11 vocational, country and EU level, 2011-12, ranked by 'outside school hours')
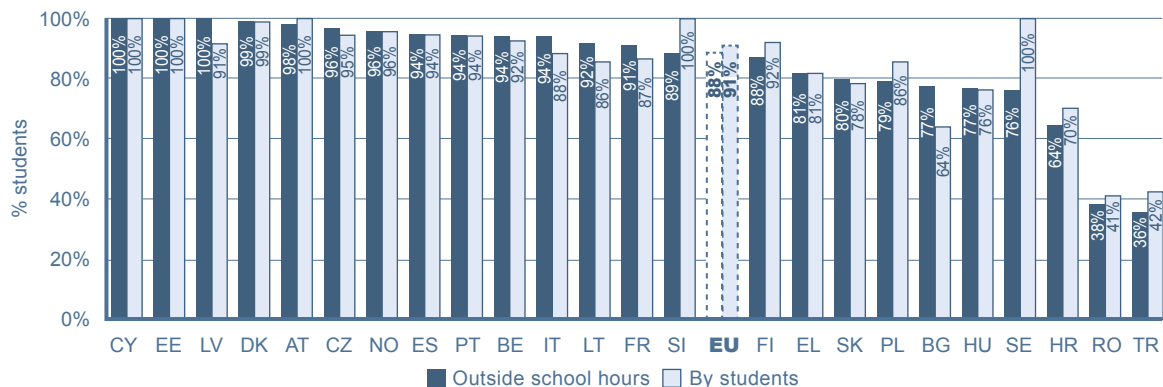
Technical Support

Maintaining educational technology equipment is clearly an in-school task (either by teaching staff or technicians who are part of the school's personnel), rather than undertaken by an external organisation (public or private sector) in most of Europe's schools between 75% (grade 4) and 94%[35] (grade 11 general) of students are in schools where the school personnel maintain equipment. Primary schools rely more on external support than secondary schools. 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.

Over 40 per cent of grade 4 students on average in the EU are in a school where an external unit run by the educational authority (e.g. the municipality) or a private company provides support. Over 95% of students in **Denmark** and **Slovenia** attend schools where school personnel maintain equipment. 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.**

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34   Excl. LU (insufficient data). IE and MT have no separate vocational schools.
35   Note: these percentages are taken from the underlying frequency table

Figure 1.12[36] shows the proportionate split for each country and the EU average at grade 8. In secondary schools at this and other grades around 90 per cent of students are in schools where school personnel are responsible for maintenance. 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, 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, 2011-12)
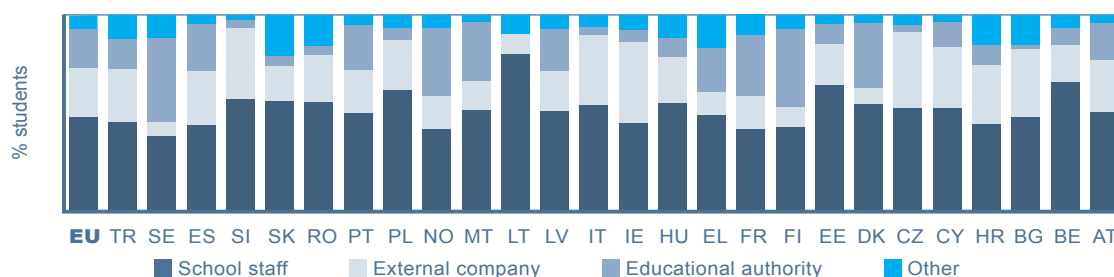
In only **Austria, Cyprus, Ireland, Italy, Malta, Spain** and **Turkey** do more than one in two students in upper secondary general schools benefit from commercially provided maintenance. More than one in two students in **Greece, Malta, Norway** and **Spain** are in schools where there is externally 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 also make extensive use of their own staff for maintenance. However, at least one in two students are in schools in **Cyprus, Denmark, Latvia, Slovenia** and **Spain** where external commercial support is provided.

The digitally equipped school

The notion of the digitally equipped school emerges from an analysis of survey data in five areas:

- 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) and type of broadband access (ADSL, cable etc.);
- Maintenance and support;
- Indicators of connectedness: a website, email addresses for teachers and students, a local area network, a virtual learning environment, or none of these.

Cluster analysis was carried out on these data; three school profiles emerged that can be summarised as follows:

- Type 1: Highly digitally equipped schools, characterised by relatively high equipment levels, fast broadband and relatively high connectedness
- Type 2: Partially digitally equipped schools, with lower than type 1 equipment levels, slow (less than 10mbps) or no broadband[37], and some connectedness
- Type 3: As type 2 but with no 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. Scandinavian 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 per cent of grade 4 students are in the first group of digitally equipped schools, 48 per cent are in type 2 schools, and 15 per cent 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.


36   Excl. LU (insufficient data).
37   Separating no broadband from less than 10mbps did not create a fourth cluster.

Fig. 1.13a: Percentages of students by school type in terms of equipment
(Grade 4, country and EU level, 2011-12)
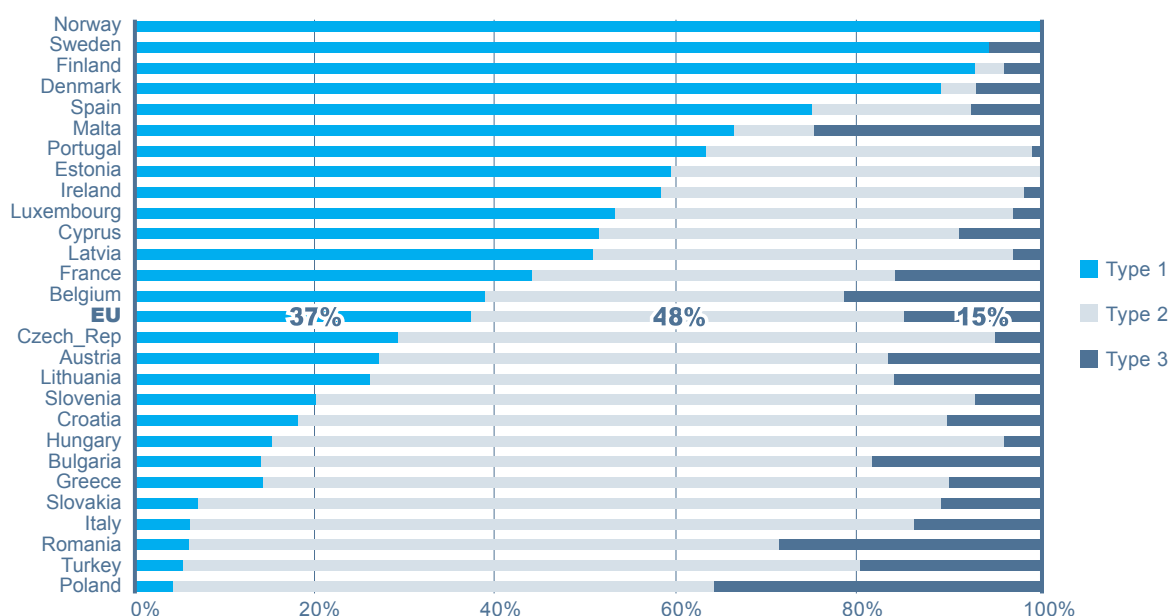
At grade 8, the EU average[38], as seen in fig. 1.13b, is 24% of students are in type 1 schools – considerably fewer than at other levels – and 68% in type 2 and 8% in type 3. In only the four Scandinavian countries are more than one in two students in a type 1 school.

Fig. 1.13b: Percentages of students by school type in terms of equipment
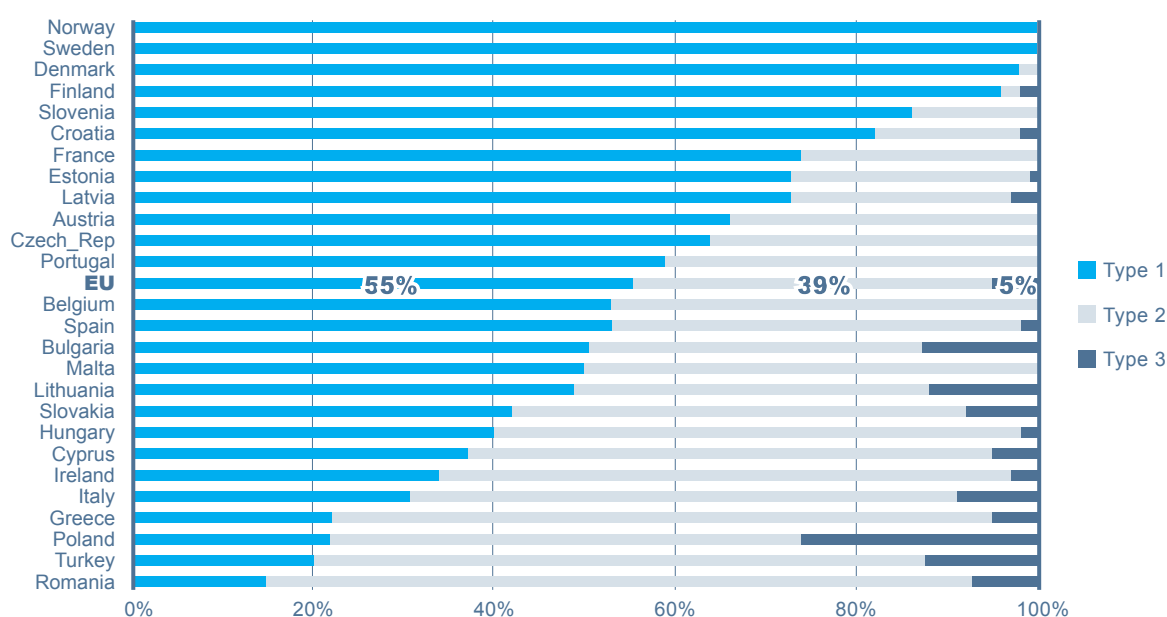(Grade 8, country and EU level, 2011-12)
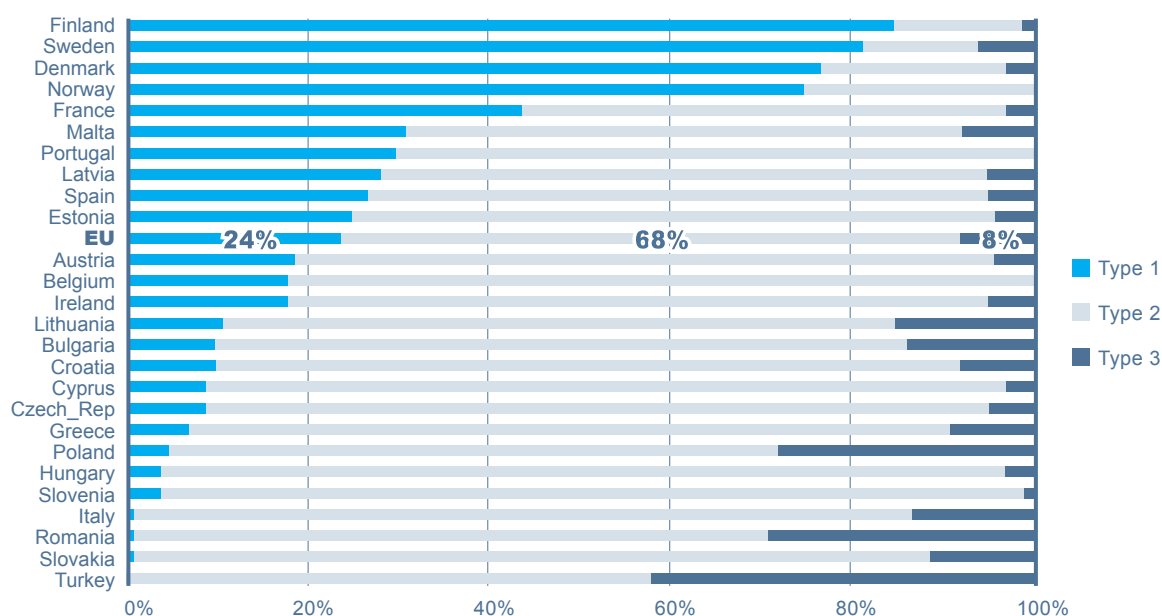
At grade 11 general, 55% of students are in type 1 schools, 39% in profile 2 and 5% in type 3 on average in Europe[39], as can be seen in fig. 1.13c. In 17 countries more than half of students are in type 1 schools – many more than at grade 8.

38   There is insufficient data for Luxembourg.
39   There is insufficient data for Luxembourg.

Fig. 1.13c: Percentages of students by school type in terms of equipment
(Grade 11 general, country and EU level, 2011-12)

Half of the EU[40]'s vocational students are in type 1 schools, 44% in type 2 schools (fig. 1.13d) and 6% in type 3.

Fig. 1.13d: Percentages of students by school type in terms of equipment
(Grade 11 vocational, country and EU level, 2011-12)
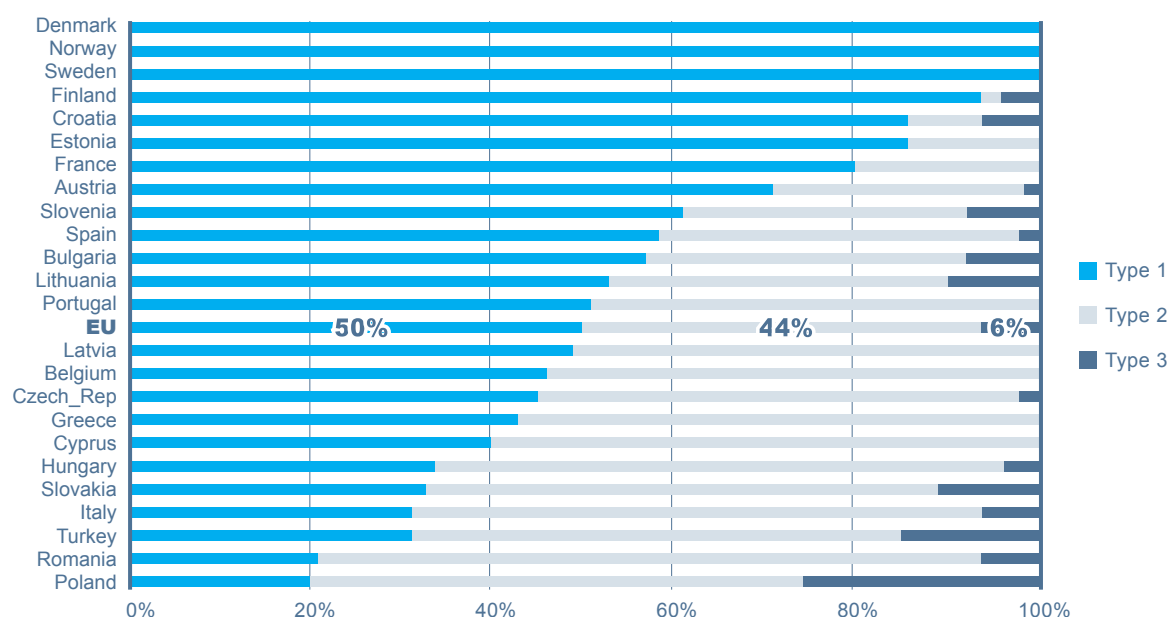
Unlike the three other cluster analyses (Section 8 below), no relationship emerged between this cluster and students' confidence, ICT activities, attitudes and opinions. One can therefore provisionally conclude from this analysis that **there is no overall relationship between high levels of ICT provision and student and teacher confidence, use and attitudes**. Rather, other factors, e.g. practical support to teachers, influence them, as described in later sections of this report.

This section has examined the data provided by head teachers in the *Survey of Schools: ICT and Education* concerning levels of provision, maintenance and patterns of deployment of computers and associated educational technology equipment, for example interactive whiteboards, broadband access and connectedness. From this data emerged three types of digitally equipped school. The next section analyses what head teachers, teachers and students say about the use of this equipment and connectivity.

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40   There is insufficient data for Luxembourg. There are no separate vocational schools in IE and MT.

2. Use (and non-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, section 3 examines teachers' use of ICT tools and applications in lessons.

Summary of findings

- More than **four out of five students are in schools where teachers have used educational technology in lessons** in the preceding 12 months. Almost all Europe's students are in schools where teachers use ICT for preparing lessons.
- 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 are in schools where teachers never or almost never use a computer** and one in two grade 8 and 11 students never use an interactive whiteboard. 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 per cent of students say they use their own mobile phone for learning purposes in schools at least once a week**.
- **No correlation was observed at EU level between the level of computer provision in schools and frequency of its use by students**.
- Yet **teachers and head teachers consider that insufficient ICT equipment (especially interactive whiteboards and laptops) is the major obstacle to ICT use** in teaching and learning, particularly at lower grades, and more so than pedagogical concerns (e.g. pedagogical support and training).

- At least **one in five students, and more at grade 4, is in a school where head teachers consider insufficient technical support a major inhibitor**.
- In general **teachers are more concerned about pedagogical inhibitors than head teachers**.
- **Inhibitors are not the same across countries**; what holds ICT use back in one country might not be an issue in another.
  - Higher levels of concern about equipment are evident in Turkey, Romania and Greece by both head teachers and teachers, and also about pedagogy in Greece.

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. 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, 2011-12)
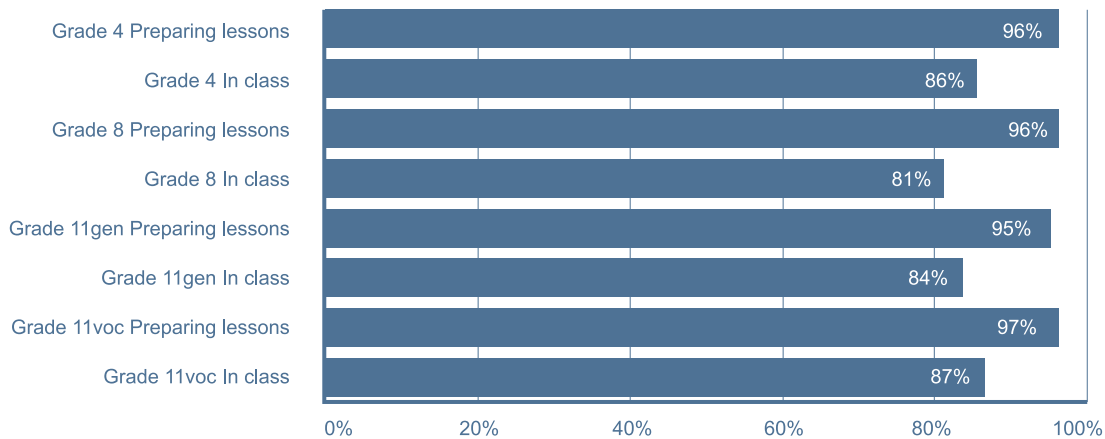
Such figures can of course mask extremely low intensity of use, so the present survey asked teachers in what proportion of lessons they use. Figures 2.2 show high intensity (ICT used in more than one in four lessons) and low intensity (less than one in 20 lessons) ICT use by teachers in the past year 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
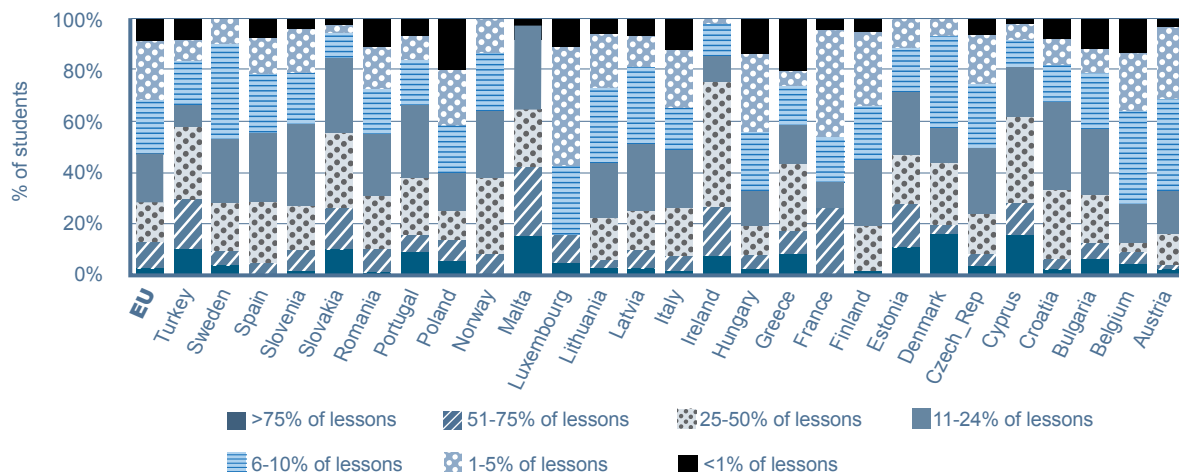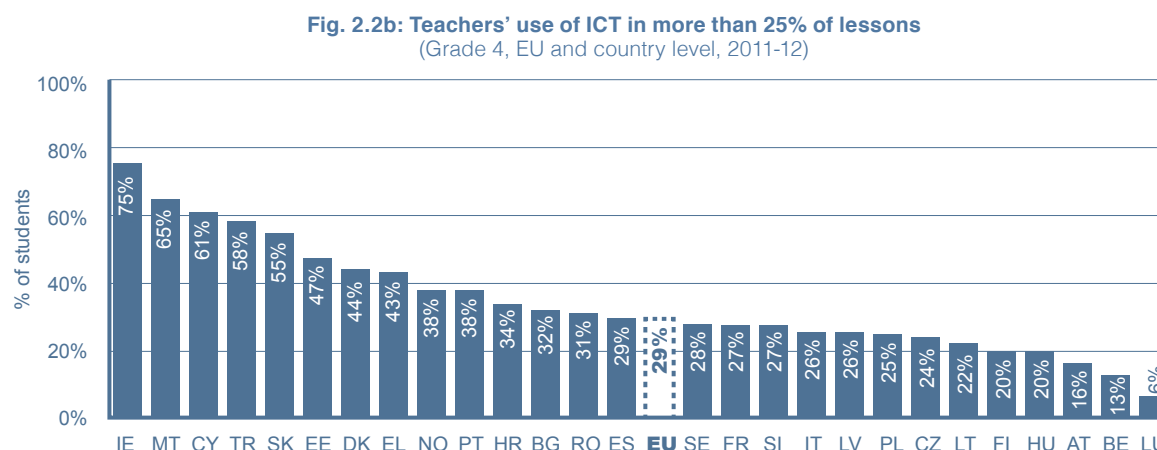(Grade 4, country and EU level)

Fig. 2.2b shows the same data in terms of teachers' use of ICT in more than one in four lessons[41].

Fig. 2.2b: Teachers' use of ICT in more than 25% of lessons
(Grade 4, EU and country level, 2011-12)

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.
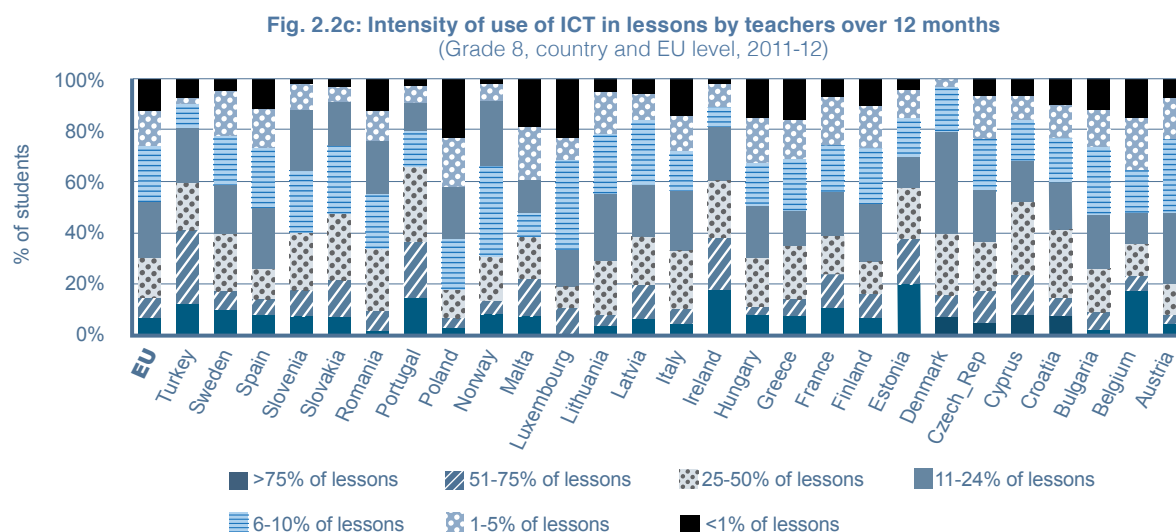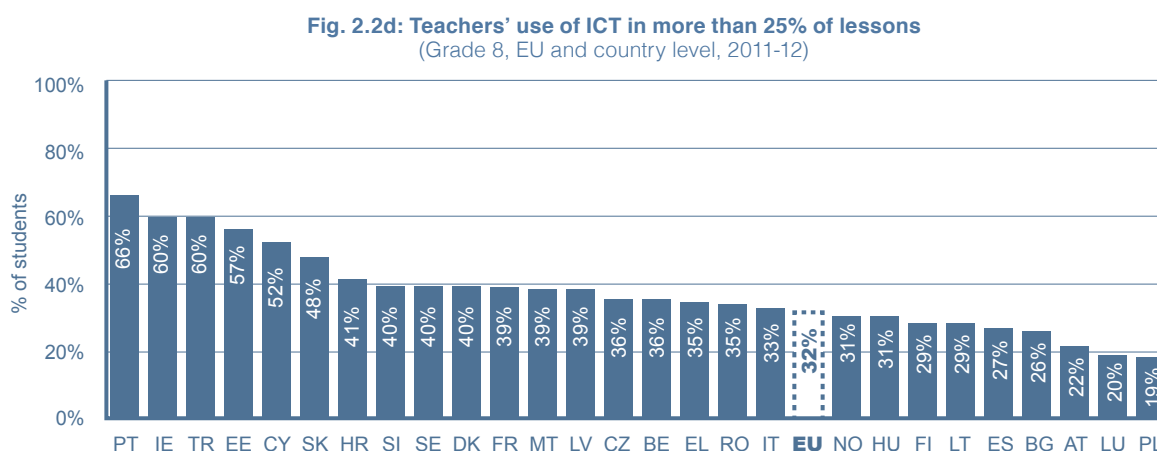
Fig. 2.2c: Intensity of use of ICT in lessons by teachers over 12 months
(Grade 8, country and EU level, 2011-12)

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

Fig. 2.2d: Teachers' use of ICT in more than 25% of lessons
(Grade 8, EU and country level, 2011-12)

At grade 11 general (fig. 2.2e[42]), 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.

41   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.
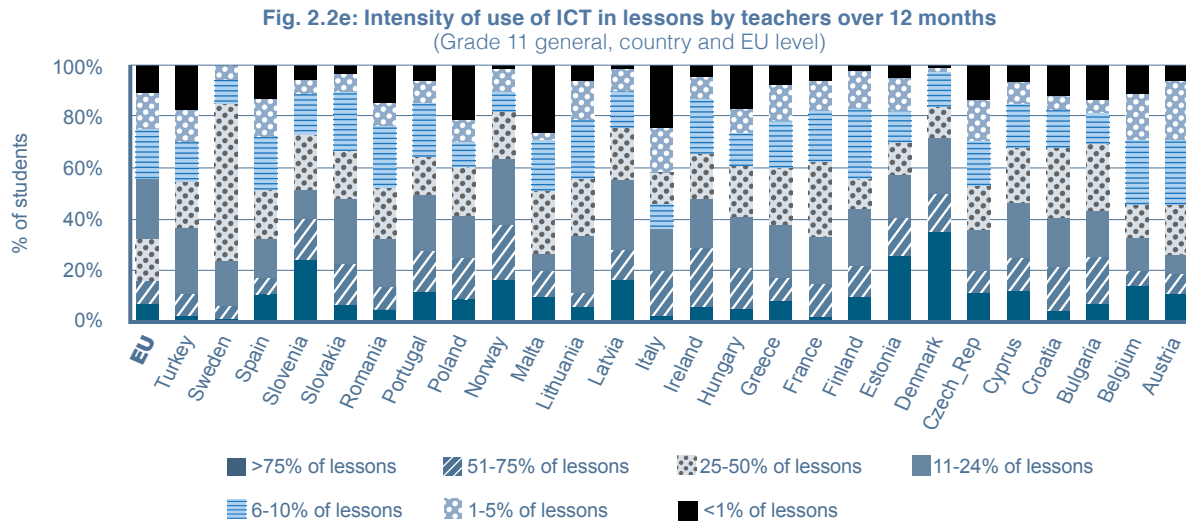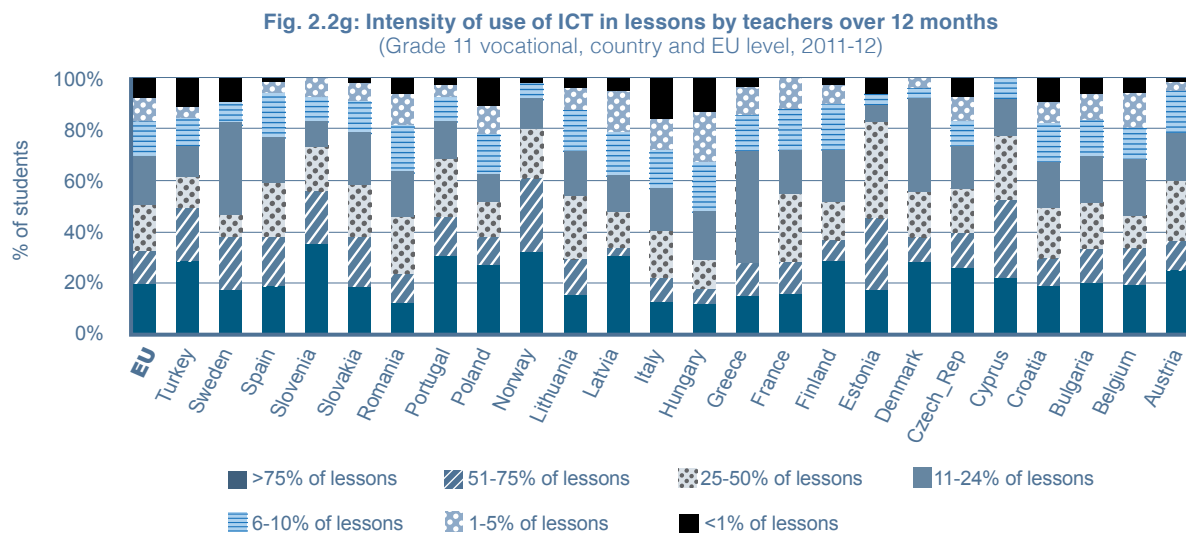42   Excl. LU (insufficient data).

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

- ■ >75% of lessons
- ▨ 51-75% of lessons
- ▦ 25-50% of lessons
- ▬ 11-24% of lessons
- ▤ 6-10% of lessons
- ▧ 1-5% of lessons
- ■ <1% of lessons

Fig. 2.2f[43] ranks countries by the percentage of students in schools where grade 11 teachers use ICT in more than one in four lessons.

Fig. 2.2f: Teachers' use of ICT in more than 25% of lessons
(Grade 11 general, EU and country level, 2011-12)
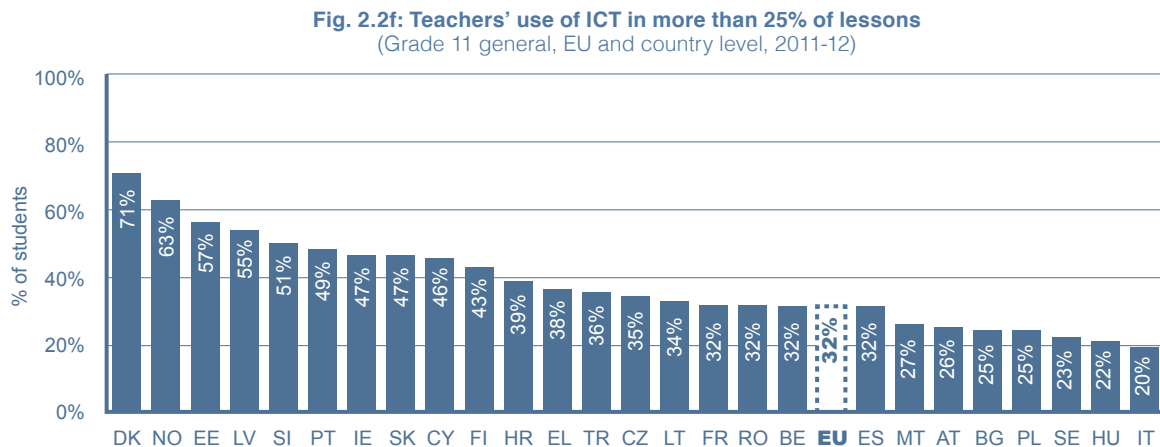
At grade 11 vocational (fig.2.2g[44]), the percentage of teachers (31%) using ICT in over 50% of lessons is double that at grade 8 and 11. However, patterns of use vary between countries more than at other levels.

Fig. 2.2g: Intensity of use of ICT in lessons by teachers over 12 months
(Grade 11 vocational, country and EU level, 2011-12)

- ■ >75% of lessons
- ▨ 51-75% of lessons
- ▦ 25-50% of lessons
- ▬ 11-24% of lessons
- ▤ 6-10% of lessons
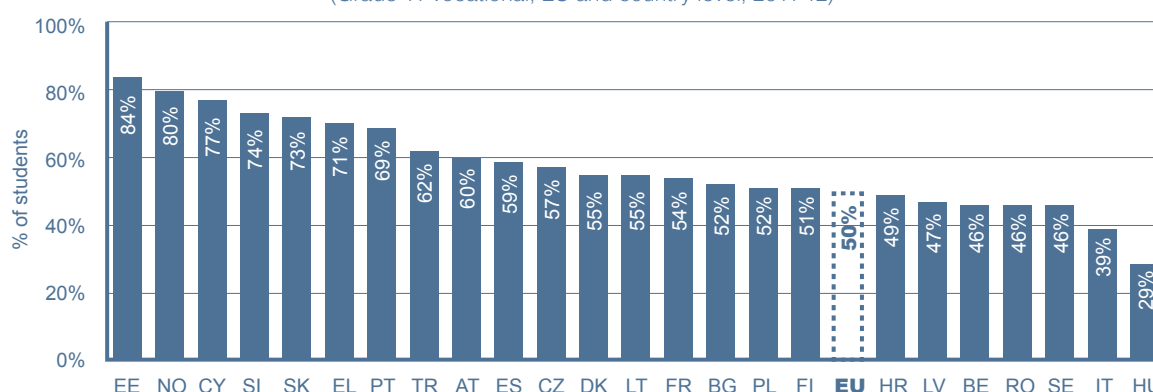- ▧ 1-5% of lessons
- ■ <1% of lessons

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

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43   Excl. LU (insufficient data)
44   Excl. LU (insufficient data). There are no separate vocational schools in IE and MT.

Fig. 2.2h: Teachers' use of ICT in more than 25% of lessons
(Grade 11 vocational, EU and country level, 2011-12)

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, as can be seen in fig. 2.3a, on average in the EU, 75% of students are in schools where both teachers and students use ICT equipment in lessons. 46% of students are in schools where ICT is available only to the teacher and 50% where only students have ICT.

Fig. 2.3a: Availability of ICT to students as well as teachers in lessons
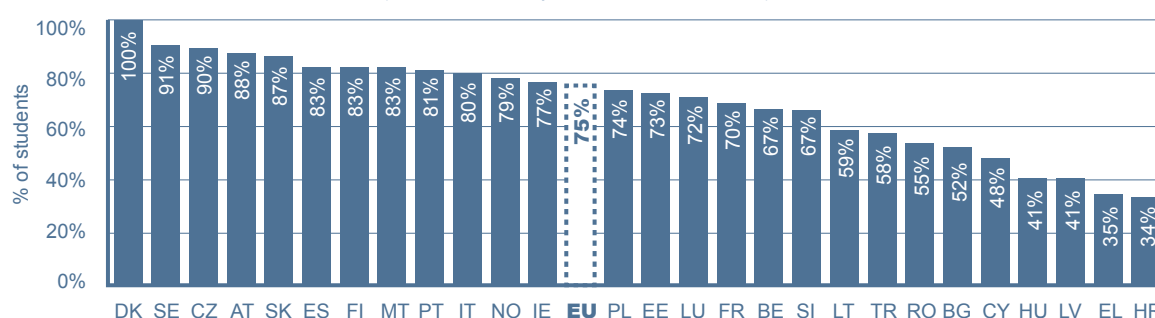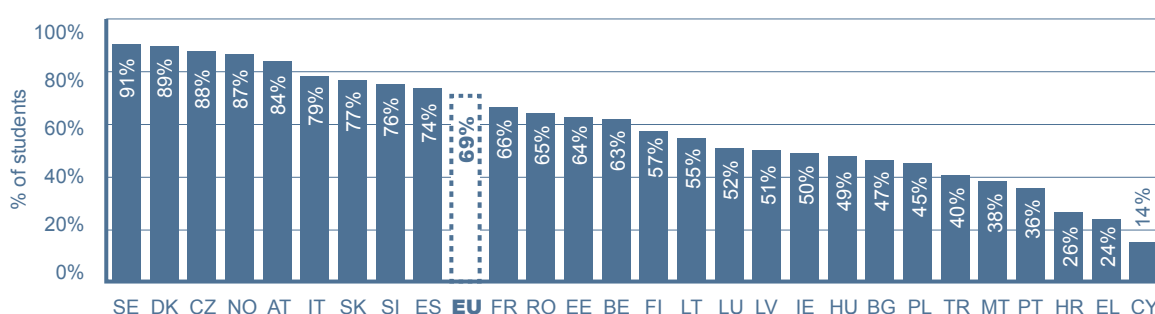(Grade 4, country and EU level, 2011-12)

Fig. 2.3b shows that at grade 8, fewer (69%) students than at grade 4 are in schools where both teachers and students use ICT equipment in lessons using ICT. Slightly more (54%) 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, 2011-12)

At grade 11 general, still fewer – 60% – of students are in schools where both teachers and students use ICT equipment in lessons using ICT (fig. 2.3c[45]). More (64%) of students are in schools where ICT is available only to the teacher; 42% are in schools where only students have ICT.

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45   Excl. LU (insufficient data).

Fig. 2.3c: Availability of ICT to students as well as teachers in lessons
(Grade 11 general, country and EU level, 2011-12)

At grade 11 vocational (fig. 2.3d[46]) 80% of students use ICT equipment in lessons using 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. Only 39% of students are in schools where ICT is available only to the teacher; 68% are in schools where only students have ICT.

Fig. 2.3d: Availability of ICT to students as well as teachers in lessons
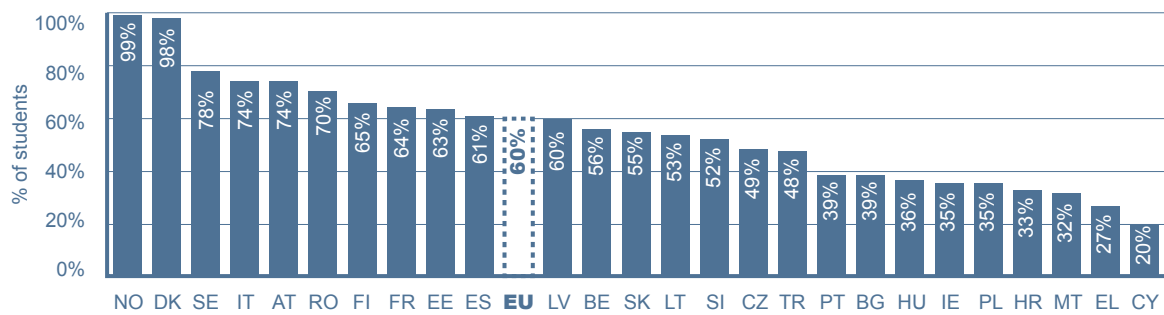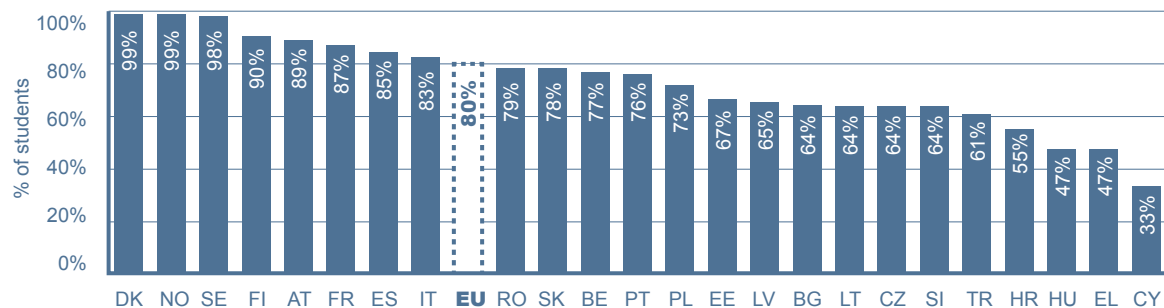(Grade 11 vocational, country and EU level, 2011-12)

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. 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, disruptive as it might be perceived by some, is a learning tool, the older they are the more so. In some schools and in some countries (notably Denmark, Norway, Sweden, Portugal, Austria, Latvia and Estonia), the majority of students are allowed to bring their own technology into school for learning purposes[47].

Fig. 2.4: Use for learning purposes during lessons - At least once a week
(Grades 8 and 11, EU level, 2011-12)
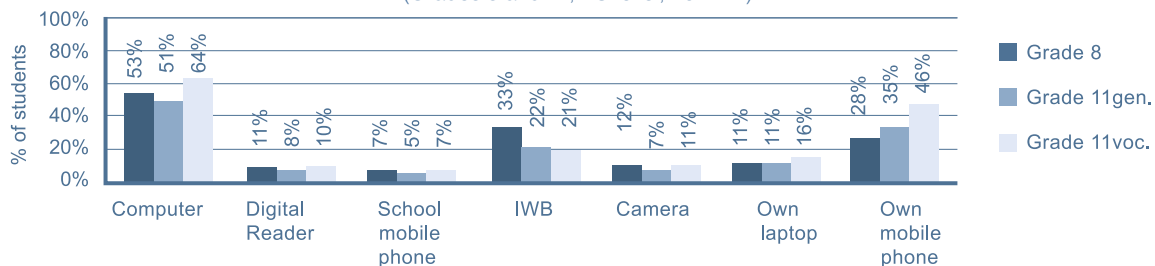
46   Excl. LU (insufficient data).
47   Teacher survey item 12. There are no separate vocational schools in IE and MT

Somewhat surprisingly, no correlation at EU or country level is observed 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, and not only on provision.

A country-by-country breakdown for students' use of school computers and their own mobile phone or laptop is shown in fig. 2.5. In some countries (e.g. Lithuania, Latvia, Denmark and Portugal), use of personally owned equipment approaches that of school computers.

Figure 2.5a shows percentages of grade 8 students declaring they use a school computer/laptop for learning purposes during lessons at least weekly.

Fig. 2.5a: Use of school desktop/laptop for learning purposes at least weekly
(Grade 8, country and EU level, 2011-12)
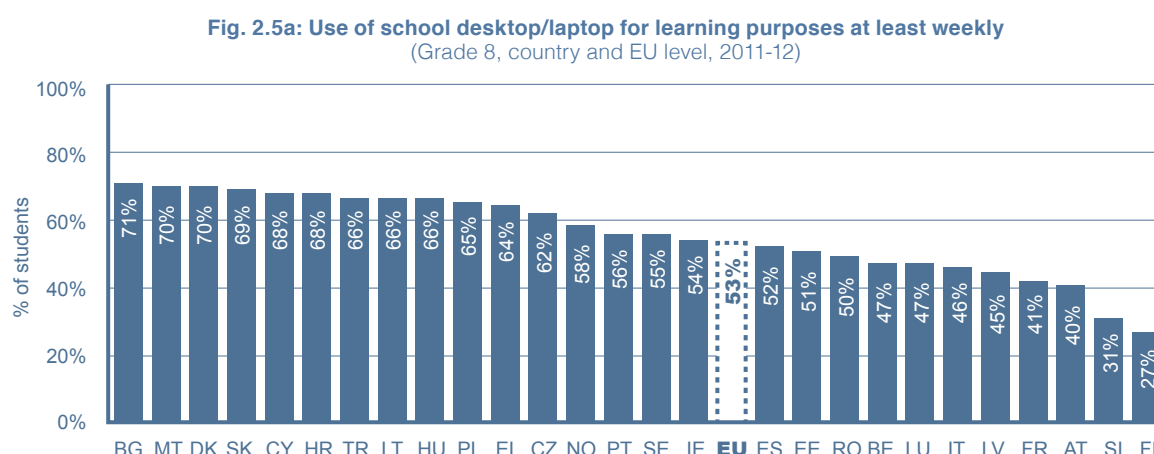
Percentages of students stating that they use their own mobile phone or laptop for learning in lessons are shown in fig. 2.5b. Whether official policy or not, it seems that students are bringing their own technology into school, and using it for learning.

Fig. 2.5b: Use of own mobile phone or laptop for learning purposes at least weekly
(Grade 8, country and EU level, 2011-12)
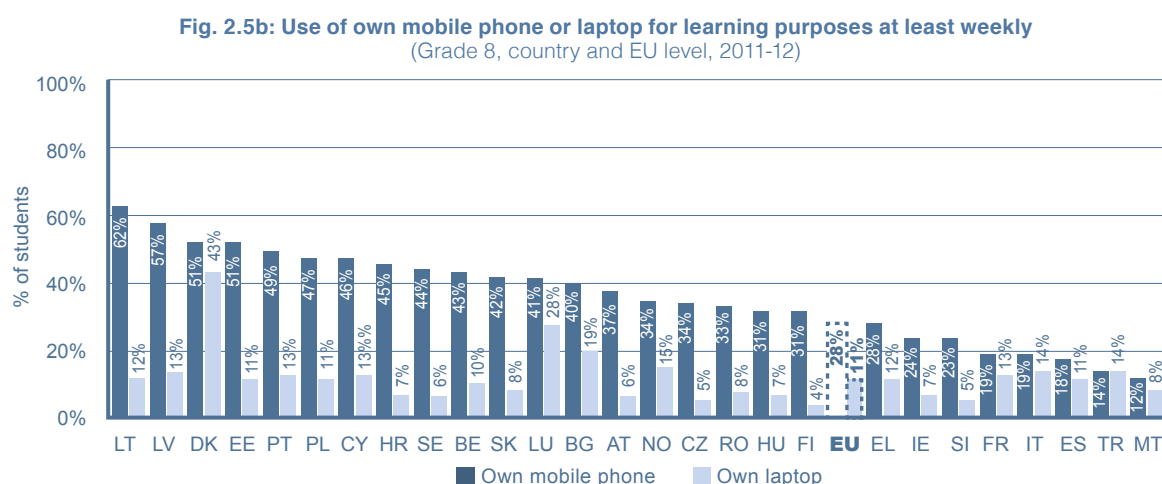
At grade 11 general (fig. 2.5c[48]) on average in the EU, the computer is most used and use of students' own mobile phone increases (over one in three reporting daily use in lessons), compared to grade 8. Denmark is very much the country of 'Bring your own laptop' and the Baltic states are again the heavy users of mobile phones. Students in Finland, at this and other levels, are less intensive users of technology than those elsewhere in Scandinavia.

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48   Excl. LU (insufficient data).

Fig. 2.5c: Use of school desktop/laptop for learning purposes at least weekly
(Grade 11 general, country and EU level, 2011-12)

Fig. 2.5d: Use of own mobile phone or laptop for learning purposes at least weekly
(Grade 11 general, country and EU level, excl. LU)

■ Own mobile phone   ■ Own laptop

The same pattern appears at grade 11 vocational (fig. 2.5e[49]), where on average in the EU, the online computer is most used and use of students' own mobile phone increases (36% reporting daily use in lessons).

Fig. 2.5e: Use of school desktop/laptop for learning purposes at least weekly
(Grade 11 vocational, country and EU level, 2011-12)

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49   Excl. LU (insufficient data) and SE (own laptop – insufficient data) There are no separate vocational schools in IE and MT.
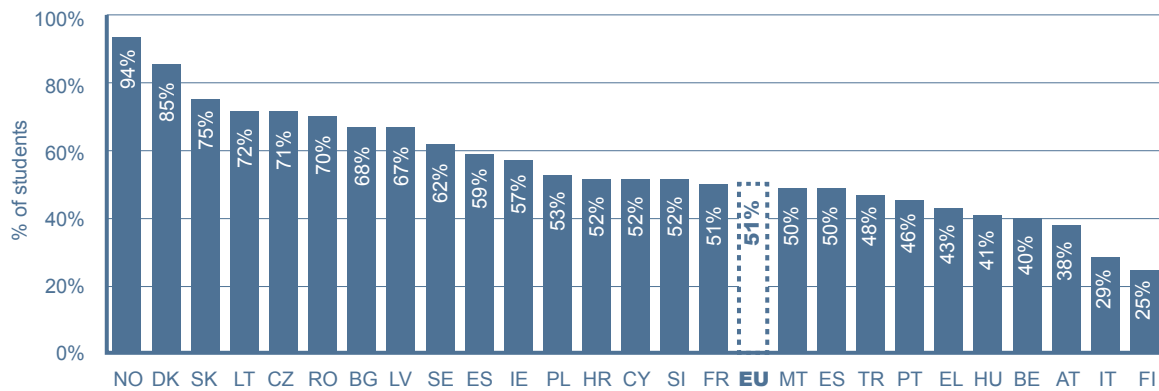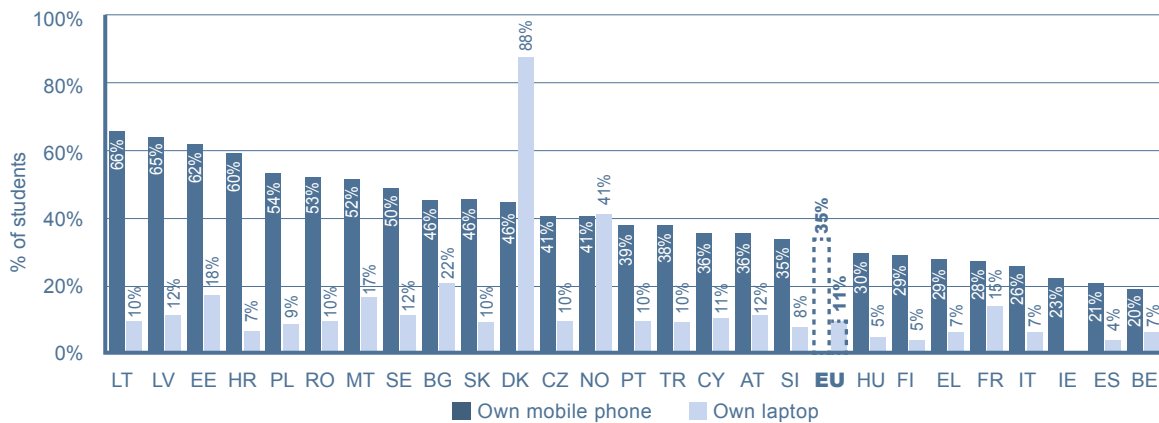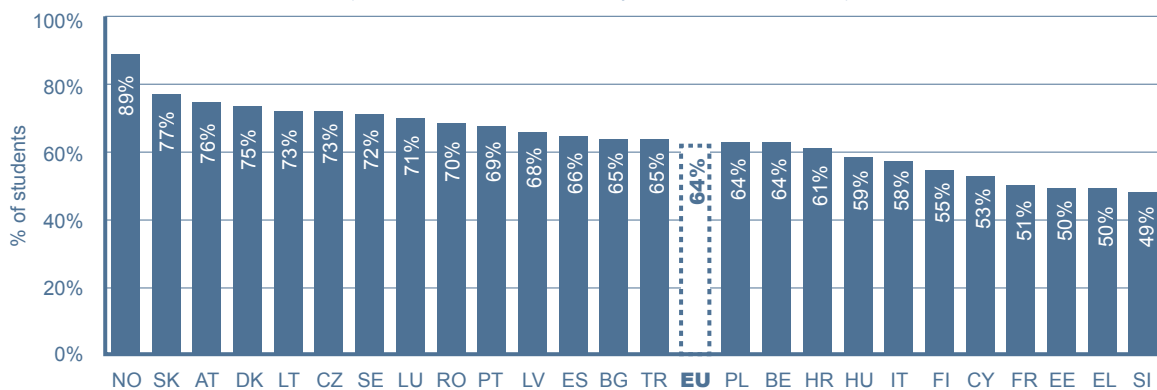
Fig. 2.5f: Use of own mobile phone or laptop for learning purposes at least weekly
(Grade 11 vocational, country and EU level)

Interactive whiteboards
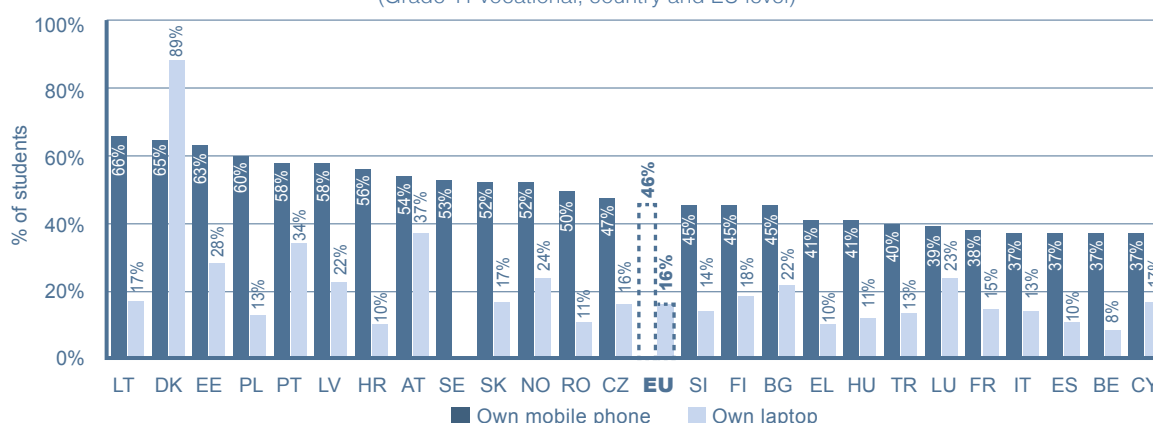
Students' use of interactive whiteboards at least weekly is shown in fig. 2.6. As with computers, patterns of use seem only loosely connected to levels of provision, as seen above and to be explored in later sections.

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[51].

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

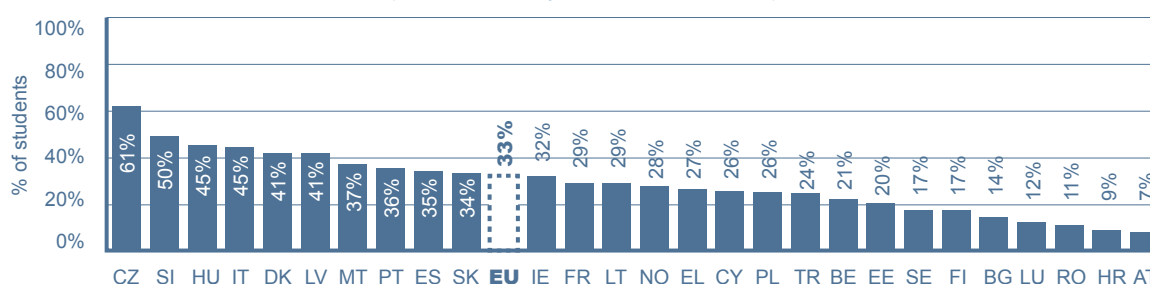**Fig. 2.6b: % students using interactive whiteboard at least weekly**
(Grade 11 general, country and EU level, 2011-12)

Fig. 2.6c: % students using interactive whiteboard at least weekly
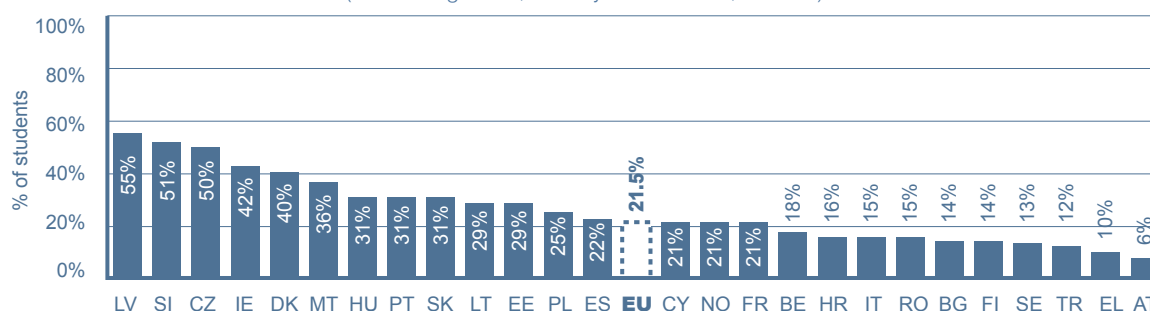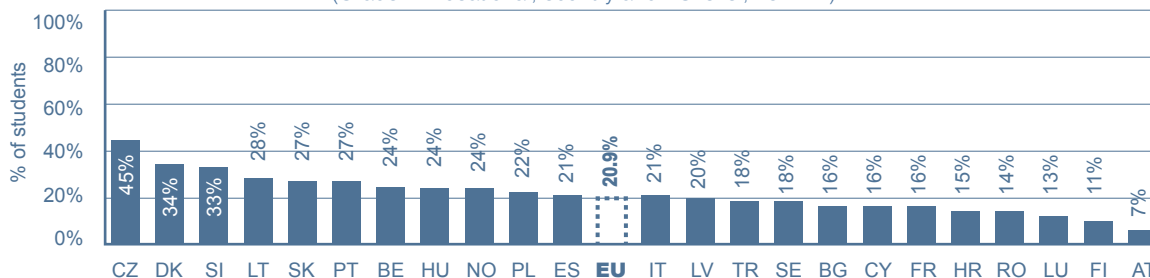(Grade 11 vocational, country and EU level, 2011-12)

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52   Fig. 2.6b LU is missing and in fig. 2.6c EE, EL are missing (insufficient data. There are no separate vocational schools in IE and MT.

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, 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.

Fig. 2.7: Use for learning purposes during lessons - "Never or almost never"
(Grade 8 and 11, EU level, 2011-12)
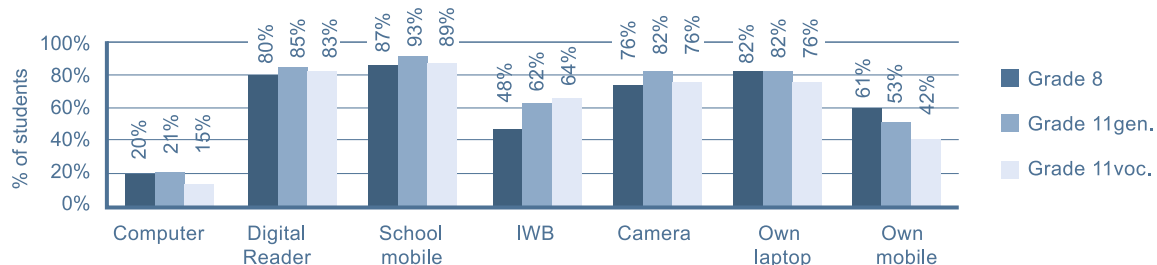
Figure 2.8[52] shows the results at country level. Despite having similarly high levels of equipment in classrooms, students in **Finland** particularly at grade 8 stand out as those least likely to be using technology in lessons, and yet those in **Denmark** and **Norway** among the countries where 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)
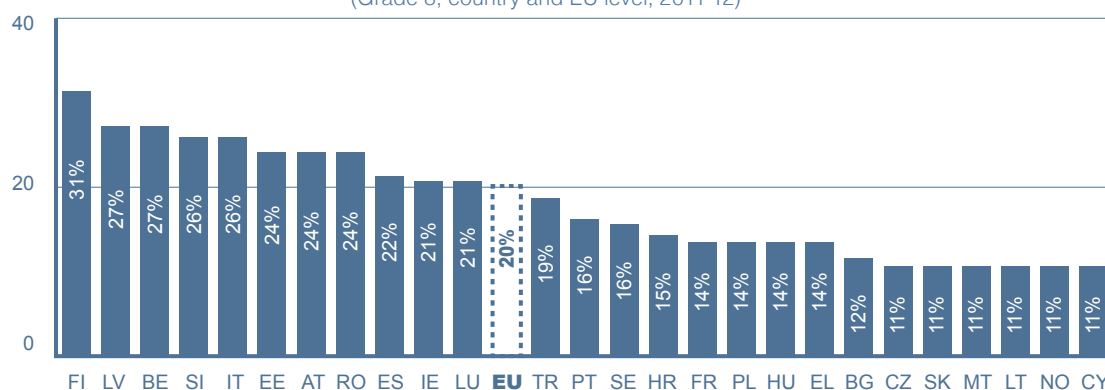
Fig. 2.8b: % students 'never or almost never' using a computer in lessons in the last year
(Grade 11 general, country and EU level, 2011-12)
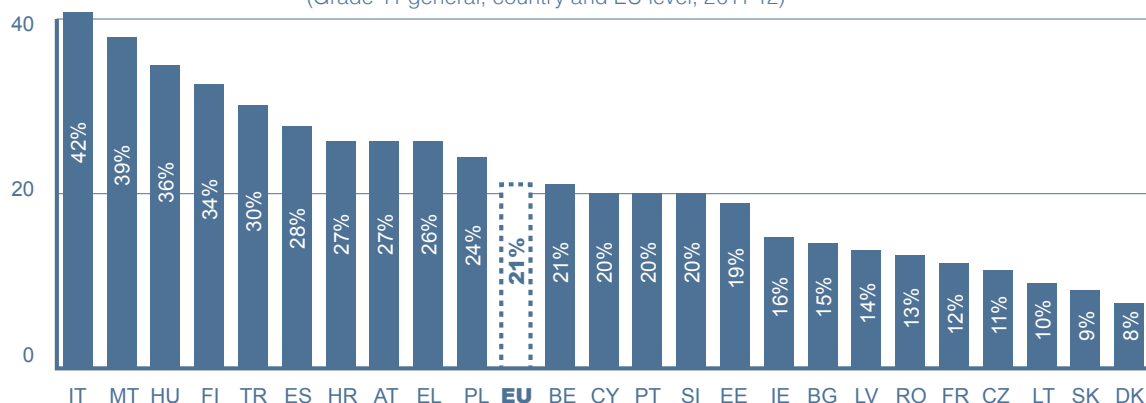
In vocational schools the chances of not using a computer in lessons are lower than at grade 8 or 11 general, particularly in **Portugal** where only six per cent of students never or almost never use a computer in the preceding 12 months, doubtless an effect of the 1:1 laptop scheme in that country.

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52   Fig. 2.8a excludes DK (insufficient data). Fig. 2.8b omits LU, NO and SE (insufficient data). In fig. 2.8c DK, LU and NO are missing (insufficient data) and there are no separate vocational schools in IE and MT.

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.
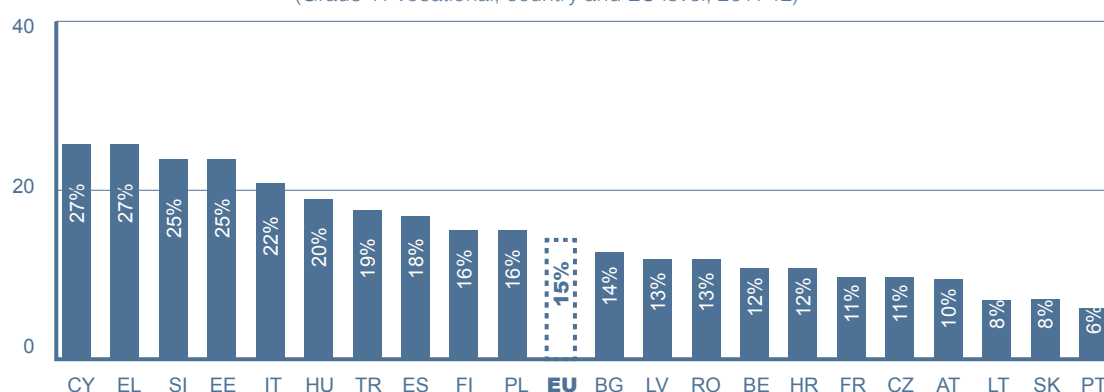
Head teachers' perception of obstacles to ICT use

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 reported by head teachers at grades 4, 8 and 11 general (equal to pedagogical), followed closely by pedagogical concerns (but this is the biggest inhibitor at grade 11 vocational) 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. The identification of equipment inhibitors by head teachers, particularly at lower grades, appears to contradict evidence that there is little relationship between levels of equipment provision and use. To some extent this can be explained by the high percentage of teachers reporting this obstacle in countries with relatively low levels of equipment, and by the obstacles being not computers but interactive whiteboards for example, but it may also be that the importance of measures other than equipment provision, notably teacher support, is under-estimated by head teachers.

At EU level, no significant correlation[53] is observed between students from low-income backgrounds and any of the three obstacles. Some positive and negative correlations are observed at country level concerning equipment provision. The higher the levels of low income homes in a school, the more head teachers tend to report concerns 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 percentage of students from low income families, the less the head teacher reports that insufficient or inoperative equipment is an obstacle to the use of ICT.

53   Correlation tables are in the annex.

Equipment

Figs. 2.9a-d show the extent to which head teachers agree that equipment is a barrier to ICT use. On average in the EU, the younger the student, the more this is perceived as an obstacle. Higher than average concern is expressed in **Romania, Turkey, Greece, Latvia** and **Italy** (less so at grade 11). Equipment issues are relatively unimportant in **Luxembourg** and **Malta** at grade 4, in **Portugal, Ireland, the Czech Republic** and **Denmark** at Grade 8, **Slovenia** and **Denmark** at grade 11 general and **Sweden** and **Finland** at grade 11 vocational**.**

Grade 4

At grade 4 (fig. 2.9a), apart from Latvia, the four countries in which head teachers report insufficient equipment are also the countries with the highest student to computer ratios (fig. 1.1a).

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)
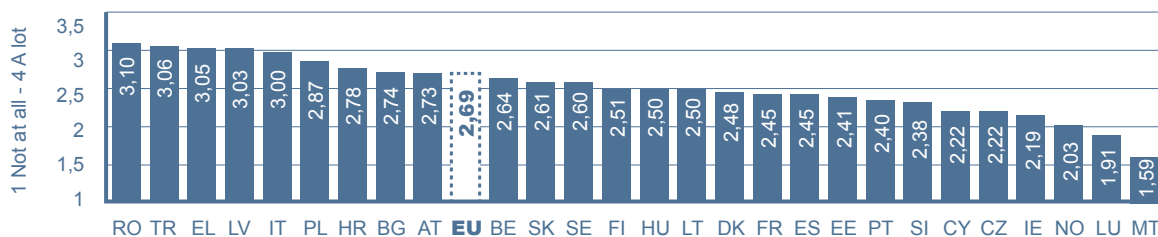
Further analysis of the data (published in table form separately) shows that in the EU generally, over one third of grade 4 students are in schools where principals report that shortage or inadequacy of interactive whiteboards (35%) and laptops (34%) affects their capacity to provide ICT teaching and learning, more so than desktop computers (18%). Old or faulty computers are third highest concern (25%) at this level. Insufficient bandwidth is reported in schools attended by 17% 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.

Grade 8

At grade 8 (fig. 2.9b[54]), the three countries in which head teachers report equipment issues are also the three with the highest student to computer ratios (fig. 1.1b), and the pattern is broadly similar looking at highly equipped countries, for example Sweden and Norway.

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54   Excl. Malta (insufficient data).

Fig. 2.9b: Extent to which insufficient or inoperative equipment inhibits use of ICT for teaching and learning
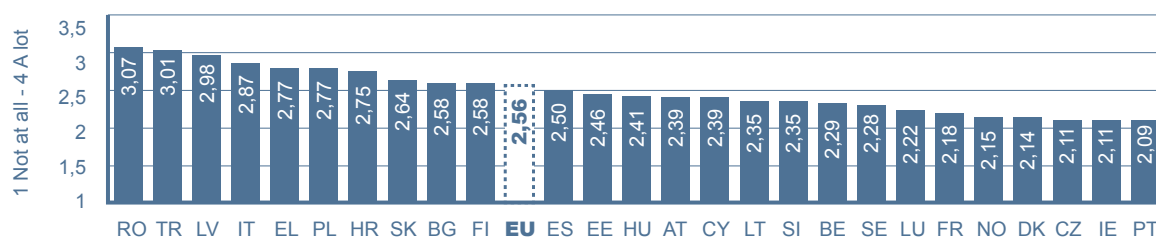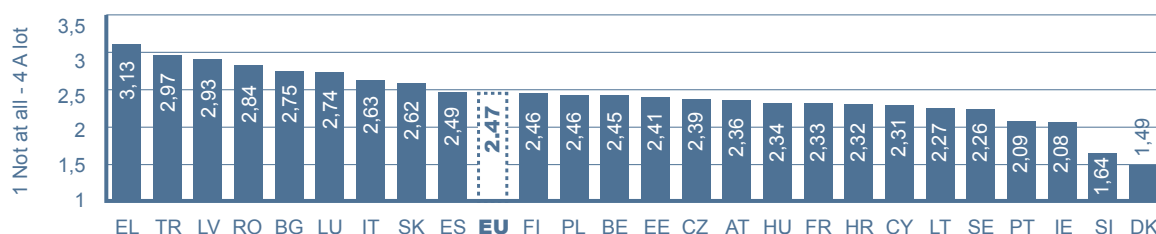(Grade 8, country and EU level, 2011-12)

Grade 11 General

Fig. 2.9c[55] shows the same pattern: head teachers in countries with relatively low computer levels (fig. 1.1c) are those who report most concern about equipment.

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, 2011-12)

Further analysis of the data (published in table form separately) shows that a lack of interactive whiteboards is the equipment issue where most (27%) grade 11 general 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 (both 24%). Shortage of desktop computers (whether or not connected to the internet) is a major obstacle relative to other countries in Finland[56] 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.

Grade 11 Vocational

Again, as seen in fig. 2.9d[57] country rankings correspond to levels of equipment seen in fig. 1.1d.

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, 2011-12)
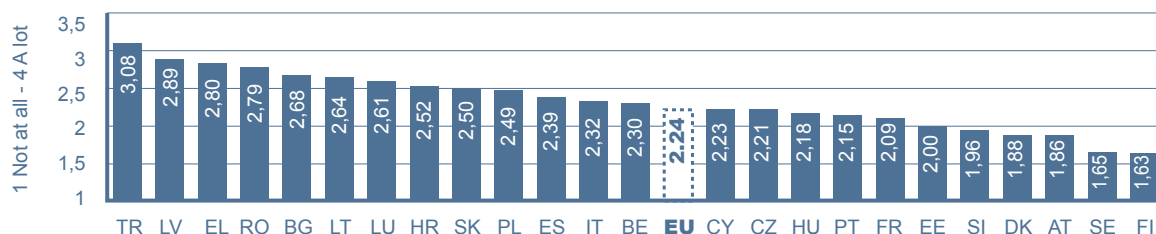
Further analysis of the data (published in table form separately) shows that, as at grade 11 general, at grade 11 vocational a lack of interactive whiteboards and laptops are the equipment items which most frequently

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55   Excl. Malta and Norway (insufficient data)
56   Note high standard error
57   Excl. Norway (insufficient data). There are no separate vocational schools in IE and MT.

considered to matter a lot on average, with 22% and 19% of vocational students in schools where this is the case. 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. Insufficiency of 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%).

Pedagogical

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

Grade 4

Fig. 2.10a[58] shows that pedagogical factors at grade 4 vary considerably between countries – particularly at the extremes: high levels of concern in Greece and low levels in the Czech Republic and Norway.

Fig. 2.10a: Extent to which pedagogical factors inhibit use of ICT for teaching and learning
(Grade 4, country and EU level, 2011-12)

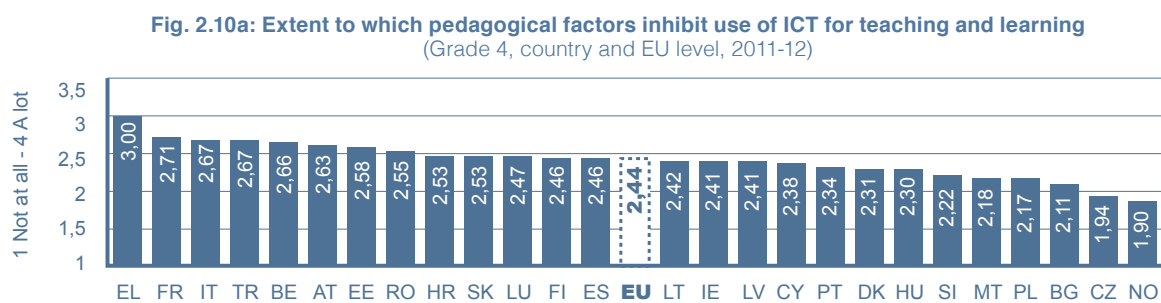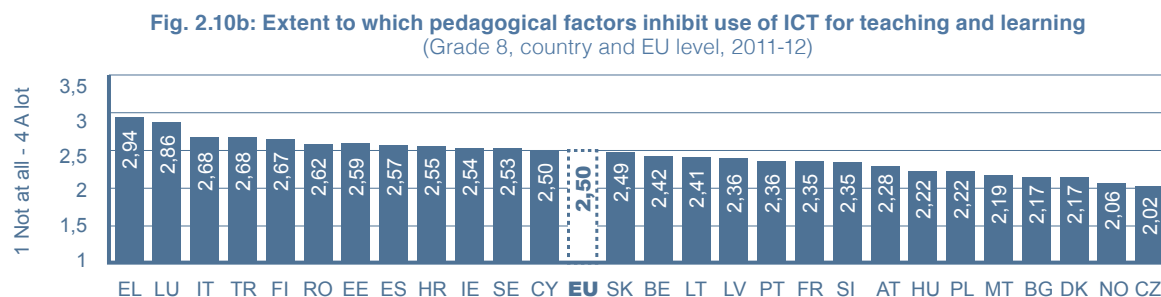Further analysis of the data (published in table form separately) shows that **23 per cent of the EU's grade 4 students are in schools reporting insufficient technical support for teachers**. This is the pedagogical issue of most concern to school principals, followed by lack of pedagogical models on how to use ICT for teaching and pedagogical support for teachers (both 14%), content (10%), ICT being too difficult to integrate (10%) and lack of teacher skills (11%). Concerns about lack of content in the local language (4%) 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.

Grade 8

As at grade 4 there is a considerable range on this scale, with the same countries at the extremes (fig. 2.10a). It is at this grade that concerns about pedagogy are the highest on average in the EU.

Fig. 2.10b: Extent to which pedagogical factors inhibit use of ICT for teaching and learning
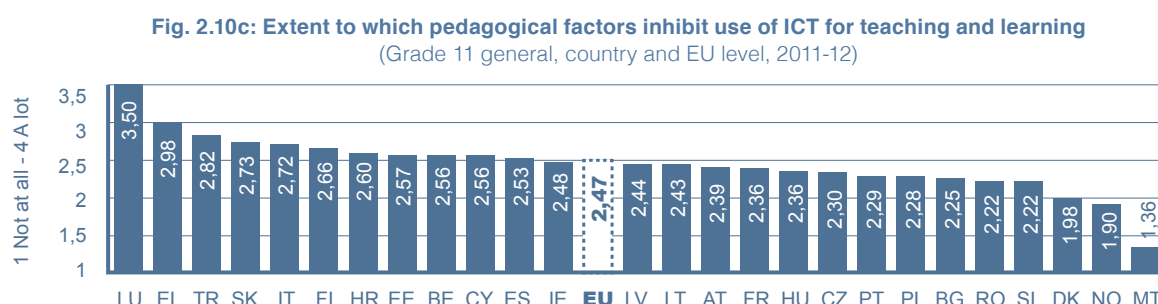(Grade 8, country and EU level, 2011-12)

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58   Excl. SE (insufficient data).

Further analysis of the data (published in table form separately) shows that as regards teaching and learning factors, 18% of grade 8 students are in schools reporting major concerns about technical support for teachers. 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 (8%), teacher skills (7%), ICT being difficult to integrate (7%), and lack of local content (5%). 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.
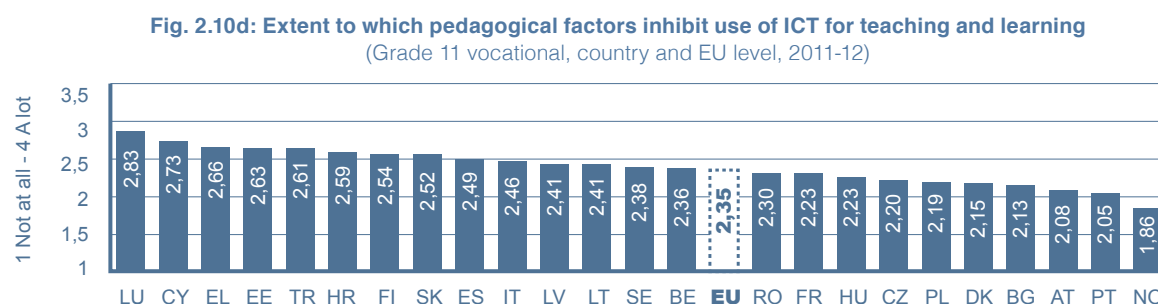
Grade 11 General

Fig. 2.10c shows an even wider gap between countries, this time head teachers in Luxembourg in particular reporting pedagogical obstacles to the use of ICT, with Malta at the other extreme.

Fig. 2.10c: Extent to which pedagogical factors inhibit use of ICT for teaching and learning
(Grade 11 general, country and EU level, 2011-12)

Further analysis of the data (published in table form separately) shows that, at grade 11 general, of the pedagogical inhibitors, the lack of technical support (16%), of models on how to use ICT for learning and of pedagogical support (both 13%) matter a lot. 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 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[59].

Grade 11 Vocational

Luxembourg again has the highest levels of pedagogical concerns about the use of ICT, as seen in fig. 2.10d showing mean scores. The EU average is the lowest of all grades however.

Fig. 2.10d: Extent to which pedagogical factors inhibit use of ICT for teaching and learning
(Grade 11 vocational, country and EU level, 2011-12)

Further analysis of the data (published in table form separately) shows that, at grade 11 vocational, the lack of pedagogical models is of most concern (11% of students are in such schools), followed by inadequate technical support (10%). 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

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59   But standard error is high in some cases at this level.

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%).

Goal

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

Analysis of the underlying data (published in table form separately) shows that, at grade 4, issues 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 (1%) being that ICT for teaching and learning is not a goal in their school. 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.

Few grade 8 principals considered goal factors to affect ICT teaching and learning a lot, with up to 2% of students in schools where the principal rated them as major obstacles, the highest being ICT not a goal in the school (2%). However, one in four students in Turkey are in schools where ICT is not a goal (but note that the standard error is high).

At grade 11 general on average in the EU, goal-related inhibitors are again rarely considered to matter a lot, with percentages ranging below 4% 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.

Relatively few grade 11 vocational principals on average in the EU report goals as being a major inhibitor, the highest being the lack of benefits for using ICT (2%). 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[60].

Other Factors

Analysis of the data (published in table form separately) reveals levels of concern relating to three other types of inhibitors.

Timetable pressures

On average between 7 (grade 8) and 12 per cent (grade 4) of students are in schools where the principal reports timetable constraints to be a major obstacle. 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[61].

Space difficulties

On average between 12 (grade 8) and 21% (grade 4) 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. This is of more concern in primary schools than secondary schools. 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[62].

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60   But note the high standard error.
61   Note the high standard error.
62   There is a high standard error in some cases.

Pressure of external examinations

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 10 at grade 4, 8 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[63].

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, it is equipment that is still the biggest obstacle to the use of ICT, 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).
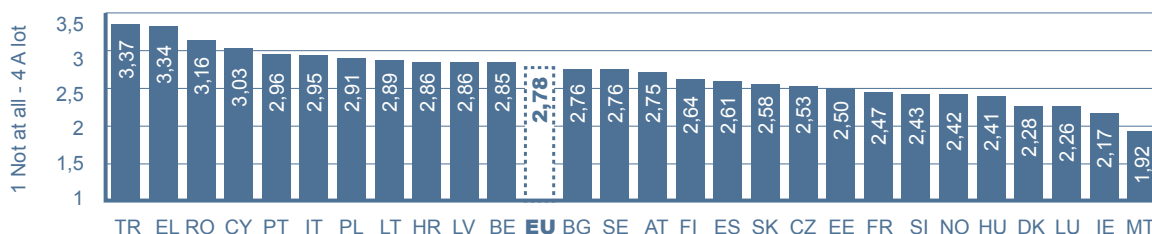
Equipment

Teachers' use of ICT in teaching and learning is rated by them most to be adversely affected by equipment factors. Figures 2.11a-d show 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. **Malta**, **Ireland**), the scale running from 1: Not at all to 4: A lot. Of the elements of equipment factors (computers, online computers, bandwidth, IWBs, laptops, out-of-date), teachers reported that insufficient IWBs (34% EU mean grade 8, but similar at other grades) and laptops (37% EU mean grade 8) affected learning with ICT 'a lot', more than the other elements. These two items headed the list for head teachers as well, as seen above, though with lower percentages.

Grade 4

At grade 4, as fig. 2.11a shows, the rankings are close to those for head teachers (fig. 2.9a), teachers in **Malta** and **Ireland** relatively satisfied with equipment levels, not seeing them as much of a concern as in other countries.

Fig. 2.11a: Extent of teachers' perception of equipment inhibitors
(Grade 4, country and EU level, 2011-12)

Grade 8

Fig. 2.11b shows that a higher percentage of teachers in **Cyprus** find equipment issues to be more of an inhibitor than other countries, yet there are five times as many students per computer in Greece, with a similar level of concern, than in Cyprus. Conversely, teachers in **Norway** and **Hungary** are relatively less concerned, yet in Hungary there are more than twice as many students per computer as in Norway (fig. 1.1b).

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63   Note the high standard error in some cases.

Fig. 2.11b : Extent of teachers' perception of equipment inhibitors
(Grade 8, country and EU level, 2011-12)
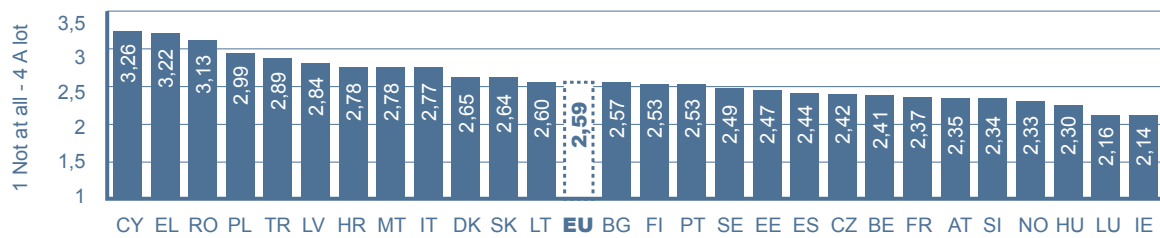
Grade 11 General

At this grade (fig. 2.11c[64]) there is again an approximate match with evidence from head teachers and with overall student to computer ratios.

Fig. 2.11c : Extent of teachers' perception of equipment inhibitors
(Grade 11 general, country and EU level, 2011-12)
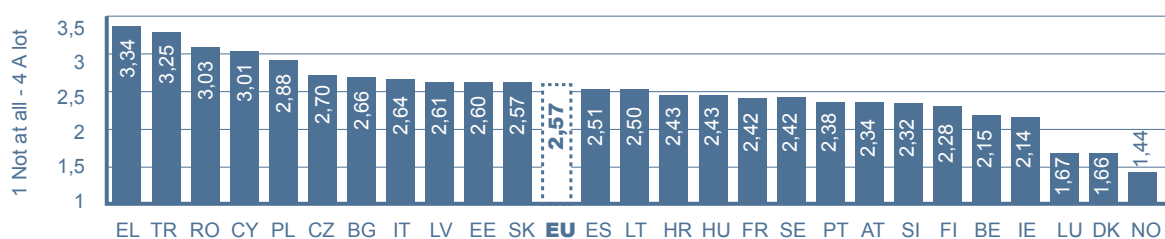
Grade 11 Vocational

Again there is a wide range across countries[65], from **Norway** and **Luxembourg**, where low levels of concern are reported, to four countries with values above 3 ('partially') on the scale.

Fig. 2.11d : Extent of teachers' perception of equipment inhibitors
(Grade 11 vocational, country and EU level, 2011-12)
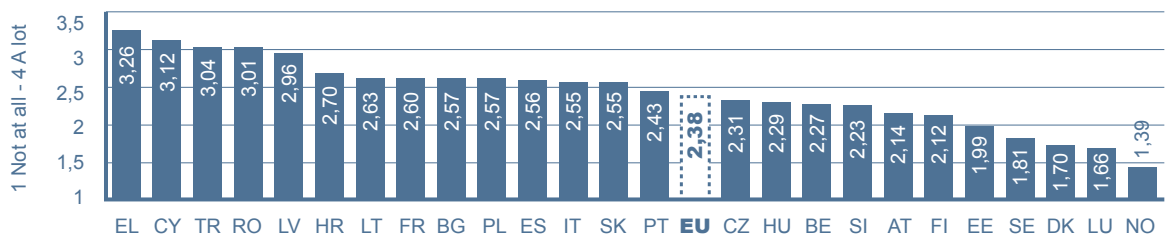
Broadband

Issues related to broadband are part of the equipment scale. Insufficient bandwidth is a concern to between 15 and 21 per cent of teachers on average, much more in some countries (**Turkey, Malta, Greece, Cyprus)** than others (**Norway, Luxembourg, Finland, Denmark**), as shown in fig. 2.12 for grade 8 (other grades are omitted for reasons of clarity, but the pattern is broadly similar at all grades).

Fig. 2.12: Insufficient bandwidth adversely affects ICT use
('% students in schools where teachers agree 'A lot', grade 8, country and EU level, 2011-12)

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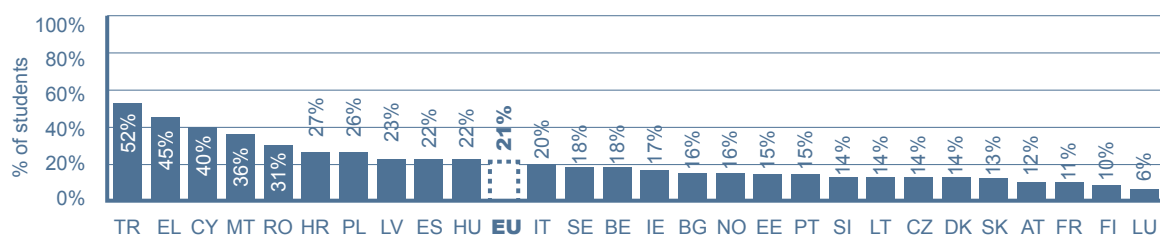
64   Excl. MT (insufficient data).
65   There are no separate vocational schools in IE and MT.

Interactive Whiteboards

Insufficient numbers of interactive whiteboards are rated to affect ICT adversely 'a lot' by 34% of EU grade 8 teachers as can be seen in fig. 2.13 and by over 50% of teachers at that grade in **Cyprus**, **Greece, Malta** (despite having the fifth lowest ratio of students to IWBs)**, Poland, Turkey** and **Romania**.

Fig. 2.13: Insufficient IWBs adversely affect ICT use
(% students in schools where teachers agree 'A lot', grade 8, country and EU level, 2011-12)
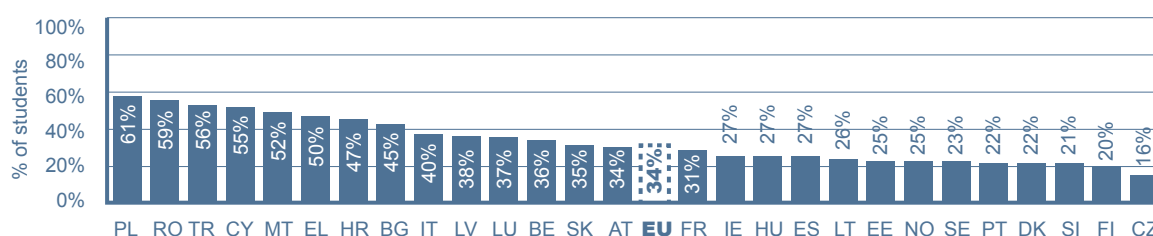
Laptops and notebooks

Many teachers – 37 per cent EU mean – also consider that insufficient numbers of laptops and notebooks inhibit ICT use 'a lot', as seen in fig. 2.14, even in countries like Denmark (but less so in Norway) where there are already large numbers of laptops.

Fig. 2.14: Insufficient laptops adversely affect ICT use
(% students in schools where teachers agree 'A lot', grade 8, country and EU level, 2011-12)
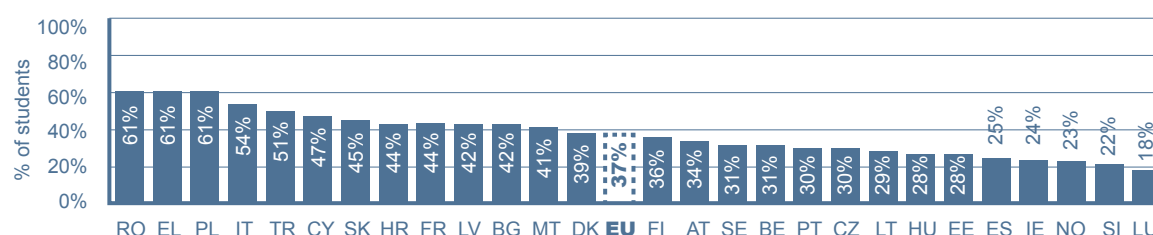
Pedagogical

Figures 2.15a-d[66] show the extent to which teachers in the survey perceive pedagogical factors as inhibiting the use of ICT in teaching and learning, in general lower than head teachers' perception. Teachers in Turkey, Greece, Cyprus and Romania more than in other countries (e.g. Ireland, Portugal and Norway) find this set of factors adversely affects ICT use. Teachers rate insufficient technical and pedagogical support higher than other elements making up this scale (lack of teacher skill, of content (including in the national language), of pedagogical models, and too difficult to integrate ICT).

Fig. 2.15a: Extent of teachers' perception of pedagogical inhibitors
(Grade 4, country and EU level, 2011-12)

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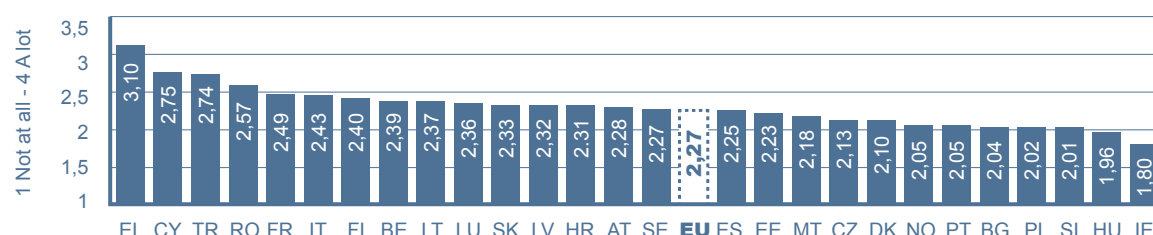
66   Fig. 2.15d excludes IE and MT (no vocational schools)

Fig. 2.15b: Extent of teachers' perception of pedagogical inhibitors
(Grade 8, country and EU level, 2011-12)
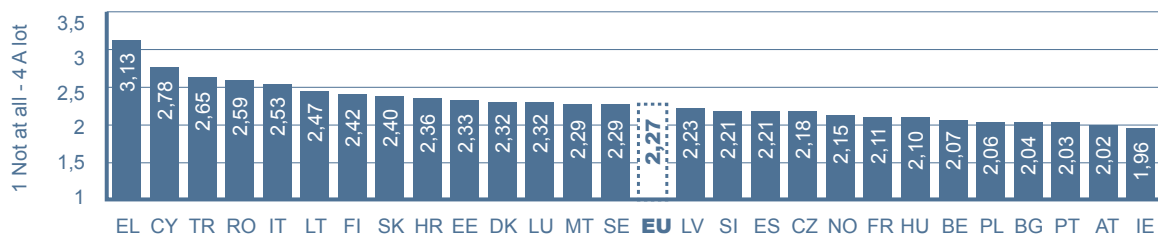
Fig. 2.15c: Extent of teachers' perception of pedagogical inhibitors
(Grade 11 general, country and EU level, 2011-12)
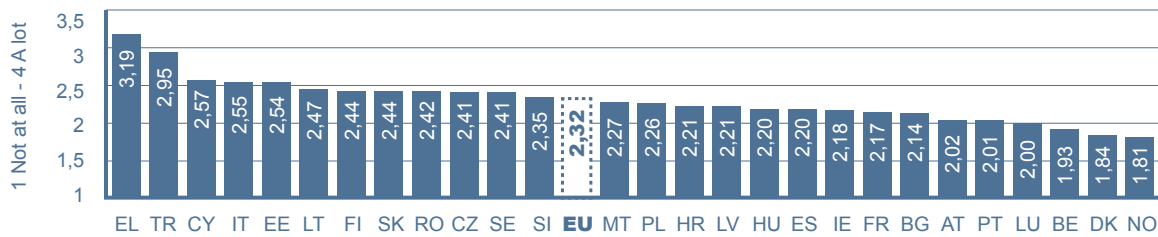
Fig. 2.15d: Extent of teachers' perception of pedagogical inhibitors
(Grade 11 vocational, country and EU level, 2011-12)
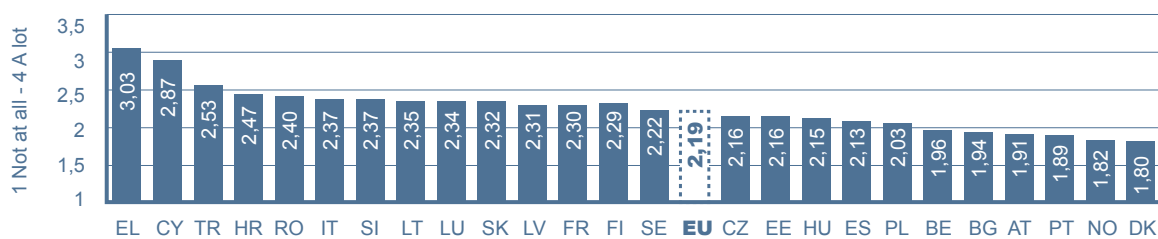
Goal

'Goal' related inhibitors (resistance of parents or teachers, teachers' lack of interest, unclear benefits and ICT use not being a goal in school) are a particular concern to teachers in **Greece** and **Romania**[67]. Although not rating as high as the other two factors discussed above, there are more concerns about lack of teacher interest (3.7 per cent of grade 8 teachers rating it to inhibit 'a lot') and unclear benefits (3.3% of grade 8 teachers) of ICT than the other obstacles.

Other Obstacles

Around 20 per cent[68] of teachers (EU average), a much higher figure than for head teachers, consider that school time and space organisation and examination pressure inhibit the use of ICT 'a lot'. Teachers in **Greece, Cyprus** and **Romania** register higher levels of concern at this set of inhibitors than those in other countries.

School time organisation, rigid timetables for example, is of particular concern to teachers in **Greece, Malta** and **Croatia**, around 30% stating that this affects learning 'a lot' at grade 8.

Space constraints in school, e.g. lack of room in classrooms, are reported to matter 'a lot' in **Turkey** (47% at grade 8)**, Luxembourg, Greece** and **Croatia.**

Finally, percentages of teachers stating that pressure to prepare students for examinations inhibits use of ICT 'a lot' range from 9 per cent (**Sweden**) to 67 per cent in **Malta**.

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67   See table in annex.
68   See table in annex.

The variation of views by teachers as well as head teachers between countries on the inhibitors discussed above implies that the mix of interventions to address them should also vary from country to country.

The foregoing 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.

In this section, survey evidence has been examined concerning the frequency of use of ICT equipment in teaching and learning as reported by teachers and students, and barriers to its use as perceived by head teachers and teachers. To complete the picture, the following section examines teachers' and students' use of ICT tools and applications in lessons.

3. ICT-based activities

Having examined the use of ICT equipment, we turn now to activities using ICT. This section reviews teachers' and students' ICT-based activities in the countries covered by the survey, as reported by teachers and students. Only activities related to teaching at school are covered as far as teachers are concerned, but students' activities at home are also partly investigated.

Summary of findings

Teachers

- At EU level, **a large majority of teachers have been using computers/internet at school for four years or more**: 75% of students at all grades are taught by teachers stating that they have this amount of experience. There are very few teachers with less than one year of experience with ICT: 4% of students or less are taught by such teachers. **This situation can be seen as the result of many equipment and training initiatives in all European countries to integrate ICT in education, and counterbalances the widespread perception of computers locked in cupboards and not used. Nonetheless it does not necessarily imply a high level of expertise**. Experienced teachers are more frequently found in Spain, Czech Republic, Denmark, Finland, Latvia and Portugal; and rarely in Greece.

- The most frequent ICT-based activities at EU level are related to the **preparation of teaching activities**: around 30-45% (depending the specific activity concerned) of students are taught by teachers declaring they do this every or almost every day, or at least once a week. **Creating digital resources** and **using the school website or virtual learning environment** also happens every or almost every day, or at least once a week, for teachers of respectively around **30% and 20% of students**.

- However, **between 60% and 85% of students** are **taught by teachers declaring that they never or almost never communicate online with parents, post homework for their students online, assess students using ICT, or evaluate digital resources**. The low extent of communicating online with parents and posting homework for students suggests that reveals that **current use of ICT in schools does not yet support better connections between home and school, either in terms of communication or of division of work**. More frequent teachers' activities related to creating digital resources compared to evaluating them could reflect a lack of existing

good quality appropriate resources, or a problem of access to them in some cases (no budget, high costs, etc.).

- When looking at combined types of ICT based activities to focus on frequency, teachers do not organise ICT-based activities very frequently: several times a month in fact, on average. Even in countries where such frequency is highest (Denmark, Estonia, Latvia, Lithuania, Norway, Slovakia and Turkey), it is still only 'several times a month', and does not reach 'at least once a week'. The lowest frequencies are reported in Greece and Italy.

Students

- **Students' length of experience with computers** is **much longer at home compared to school**. Only between 40 and 60% of students have four years' or more experience at school compared to 80-90% of students in this situation at home. This extent of experience at school is more frequently encountered at teacher level (see above) than at student level.

- The **low frequency of use of digital resources and tools is a matter of concern**. Digital textbooks at grade 8 and multimedia tools at grade 11 are the resources most frequently used. Nevertheless, only around 30% of students use them once a week or every day or almost every day; **between 50% and 80% students** (depending the grade and the specific tool concerned) **never or almost never use such resources**. This situation should be further investigated, using case studies for example, to identify if this is the result of a lack of existing good quality material related to the curriculum, insufficient information provided to teachers, a lack of skills at teacher level to use and integrate them into their teaching, or a lack of time for them to become fully familiar and feel comfortable to use such tools in the classroom with students. Adequate support initiatives could then be developed to improve the situation.

- Students undertake ICT-based activities **between several times a month** and **never or almost never**. This frequency is therefore lower compared to teachers'. Only at grade 11 in Denmark and Norway (two countries where the frequency is the highest compared to other countries), does students' frequency reach several times a month.

- Both student- and teacher- centred teaching and learning activities are present at EU level to a similar extent: **from teachers' answers, student-centred approaches seem a little more frequent; but students' answers show the opposite, i.e. slightly more frequent teacher-centred activities**. This finding reveals a difference in perception between teachers and students, and probably in expectations from students. Here as well, the situation should be further investigated, in order better to understand the issue from the point of view of daily practice in school both at teacher and student level, and be able to define efficient types of initiatives to reduce the gap between the two groups.

- Comparing ICT-based activities at home and at school, it appears that – as could expected – **activities at home are more frequent**, up to twice as frequent for 'fun' activities, i.e. related to music, films, sports, etc. It is interesting to notice that **home ICT-based activities related to *learning***, i.e. listening/watching to the news, online searching for information on specific topics of interest (not practical ones) are more frequent compared to ICT activities at school. This last finding underlines on the one hand, the extent of informal or non-formal learning effectively taking place out of school, and on the other hand students' interest in spontaneous self-directed learning.

Teachers

Teachers' experience in using computers/internet at school

The teacher questionnaire[69] contains a question about the number of years teachers have used 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. Analysis of the responses reveals that **a large majority of teachers have been using computers/internet at school for at least four years**. At EU level, **more than 75% of students** at each grade are taught by teachers who have **four or more years' experience** in using computers/internet at school. This situation can be seen as the result of the many equipment and training programmes over recent years. In fact most teachers have more than six years' experience (see fig. 3.1). It is more frequent to see teachers with significant experience at grade 11, especially in vocational education: at grades 4 and 8, around 55% of students are taught by teachers with more than 6 years' experience while at grade 11, such percentages increase up to around 70% in vocational education.

At all grades, there are very few teachers with less than one year's experience in using computers/internet at school and the percentages of students taught by such teachers is negligible (4% or less).

Fig. 3.1: Teachers' experience in using computers/internet at school by grade
(in % of students, EU level, 2011-12)
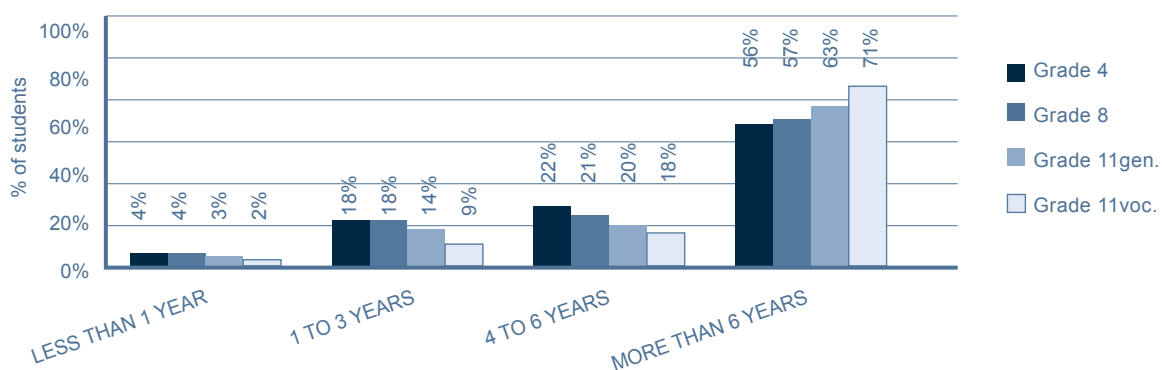
Looking at the situation by country, differences appear (see Fig. 3.2a to 3.2d).

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69   Annex, item 6.

Teachers with more than six years' computers/internet experience are much more frequently found in Estonia at all grades, and at one grade or more in the Czech Republic, Denmark, Finland, Latvia and Portugal; in these countries and at the grades concerned, around 80% of students are taught by teachers with this level of experience.

Conversely, it is much less frequent to find teachers with more than six years' ICT experience in Greece where only around 25% of students at grade 4 are taught by such teachers. But in this country, as well as in a few others in a similar situation at grade 4 or 8, the percentage of students taught by experienced teachers increases in line with grades, and is up to around 35% at grade 11. In many countries and at all grades, the less a country has teachers with six or more years' experience the more it tends to have teachers with four to six years' experience. This reveals a more gradual uptake in these countries, possibly reflecting more incremental approaches to supporting teachers' ICT experience with computers/internet at school, instead of 'one shot' initiatives targeting the whole teacher population at once.

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

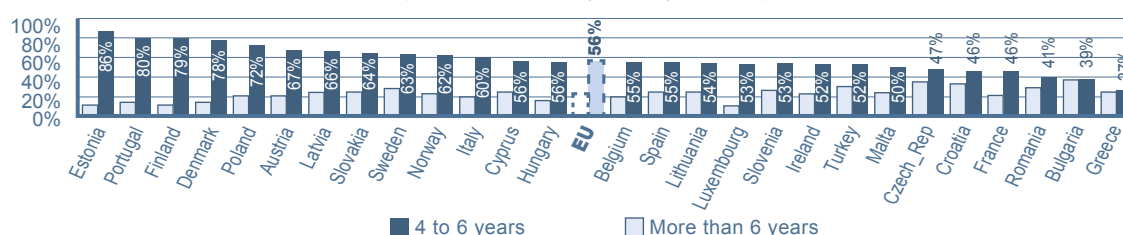**Fig. 3.2b: Teachers' experience in using computers/internet at school, at grade 8**
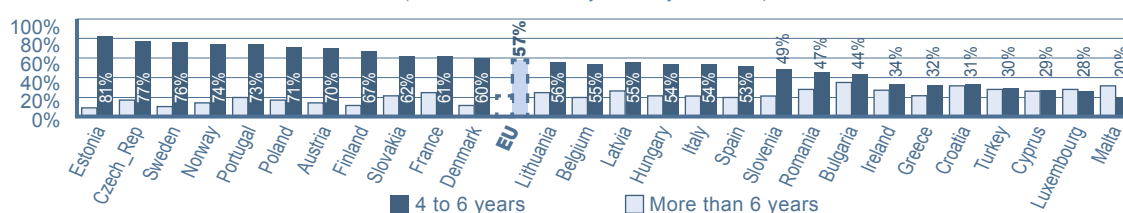(in % of students, by country, 2011-12)

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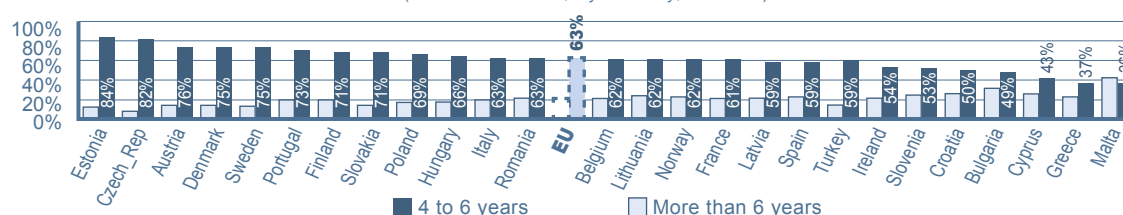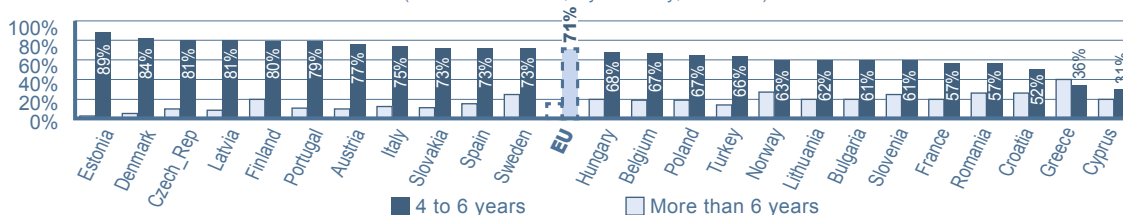(in % of students, by country, 2011-12)

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

Teachers' 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, for example, teaching preparation, creation and evaluation of digital resources, communication with parents, using the school website and/or virtual learning environment. For each activity, the respondent had to specify how often they do it on a four-level scale (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).

At EU level, looking at teachers' 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, collecting online resources to be used during lessons) **remains** – as underlined by evidence already available from several sources - **the most frequent ICT-based activity of teachers at all grades**. **Around 20% of students** (and around **an additional 25% at least once a week**) are taught by teachers who **browse the internet to prepare lessons** and **prepare tasks for students every or almost every day. Browsing the internet to collect material to be used by the students during lessons** is a little less frequent (around 15% every day or almost, and around 20% once a week) as well as **preparing presentations** (around 10% every day or almost, and around 20% once a week).

Creating digital resources is the next most frequent activity. Around 15% of students at all grades are taught by teachers declaring that they create digital resources every or almost every day, and around an additional 15% at least once a week. This activity can be considered as being part of the category 'preparing activities for teaching' in a broad sense, but is could represent more time and a longer term investment from teachers. **Creating digital resources is clearly a much more frequent activity compared to evaluating digital resources**, which is not only less frequent but also has much higher percentages of teachers declaring never or almost never doing it.

Using the school website/virtual learning environment comes next. Around 10% of students are taught by teachers who declare they use the school website/virtual learning environment every or almost every day and a slightly higher percentage at least once a week.

Conversely, **teachers rarely communicate online with parents, post homework for students on the school website, use ICT to assess students and evaluate digital resources**, at all grades: between 60 and 85% of students are taught by teachers declaring they never or almost never participate in such activities. **The first two of these activities suggest that use of ICT in schools does not yet support better home-school links, either in terms of communication or in terms of division of students' learning**. Using ICT to assess students is slightly more frequent in vocational education.

Fig. 3.3a: Frequency of teachers' ICT based activities with the class at grade 4
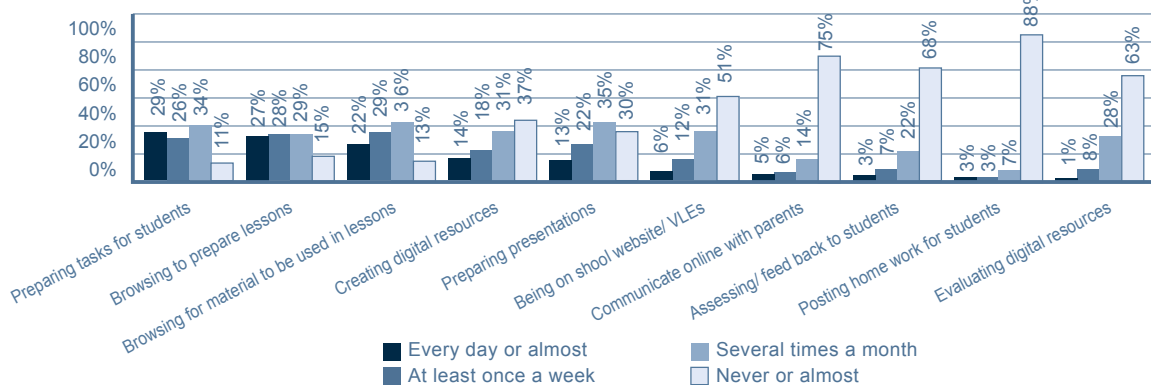(in % of students, EU level, 2011-12)

Fig. 3.3b: Frequency of teachers' ICT based activities with the class at grade 8
(in % of students, EU level, 2011-12)

Preparing tasks for students: 21% 27% 38% 14%
Browsing to prepare lessons: 20% 25% 34% 21%
Browsing for material to be used in lessons: 16% 28% 37% 20%
Preparing presentations: 13% 19% 35% 34%
Creating digital resources: 13% 18% 35% 33%
Being on shool website/ VLEs: 7% 14% 30% 49%
Posting home work for students: 6% 6% 13% 75%
Communicate online with parents: 6% 7% 17% 70%
Assessing/ feed back to students: 5% 8% 24% 63%
Evaluating digital resources: 2% 7% 23% 68%

Legend:
- Every day or almost
- At least once a week
- Several times a month
- Never or almost

Fig. 3.3c: Frequency of teachers' ICT based activities with the class at grade 11 in general education
(in % of students, EU level, 2011-12)

Preparing tasks for students: 24% 24% 37% 15%
Browsing to prepare lessons: 18% 23% 33% 26%
Preparing presentations: 16% 23% 35% 27%
Creating digital resources: 16% 17% 31% 36%
Being on shool website/ VLEs: 12% 21% 34% 33%
Posting home work for students: 9% 13% 27% 50%
Communicate online with parents: 6% 7% 16% 69%
Assessing/ feed back to students: 4% 10% 22% 65%
Evaluating digital resources: 3% 3% 23% 72%
(last): 3% 7% 18% 72%

Legend:
- Every day or almost
- At least once a week
- Several times a month
- Never or almost
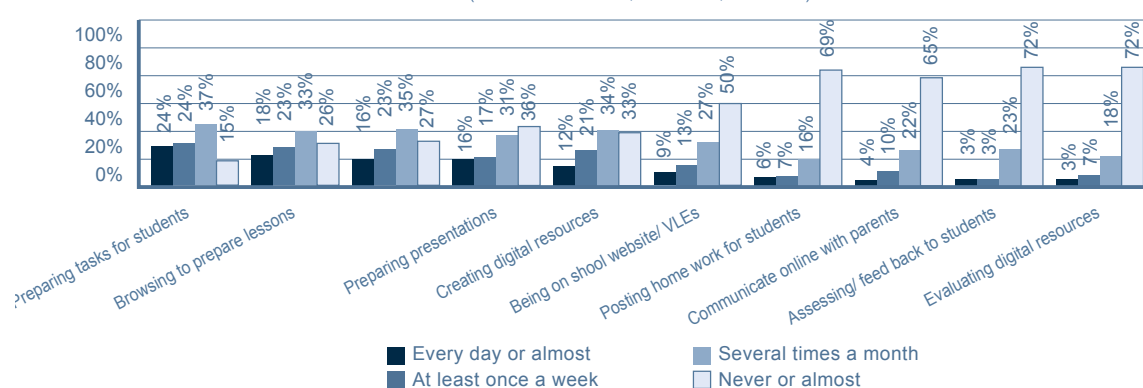
Fig. 3.3d: Frequency of teachers' ICT based activities with the class at grade 11 in vocational education
(in % of students, EU level, 2011-12)

Preparing tasks for students: 23% 28% 37% 12%
Browsing to prepare lessons: 21% 23% 36% 20%
Creating digital resources: 19% 19% 36% 26%
Browsing for material to be used in lessons: 18% 26% 37% 19%
Preparing presentations: 17% 21% 37% 25%
Being on shool website/ VLEs: 11% 12% 29% 48%
Posting home work for students: 9% 8% 16% 67%
Assessing/ feed back to students: 9% 11% 27% 54%
Evaluating digital resources: 6% 10% 26% 59%
Communicate online with parents: 3% 4% 17% 76%

Legend:
- Every day or almost
- At least once a week
- Several times a month
- Never or almost

A factor analysis of the frequency of the set of activities described above yielded one scale, 'ICT-based activities', still ranging 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 therefore appears that at EU level on average **the frequency of ICT based activities at teacher level is close to 'several times a month',** mean scores varying between 1,89 and 2,01, depending the grade (see Fig. 3.4a to 3.4d).

When looking at differences between countries (and depending the grade), it appears that the **highest frequency of teachers' ICT-based activities** are found in the same countries at all grades, i.e. in **Denmark**, **Estonia**, **Latvia**, **Lithuania**, **Norway** and, except at grade 11 in general education, in **Slovakia** and **Turkey**.

Higher frequencies, as well as larger differences between countries, are also found at grade 11, compared to grades 4 and 8. Conversely, lower frequencies are found in Greece at all grades, joined by Italy at grades 8 and 11 in general education.

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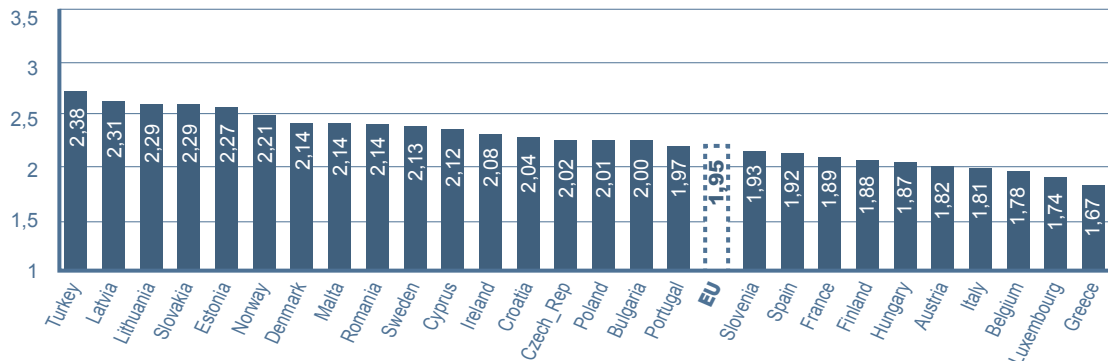
Fig. 3.4b: Teachers' ICT based activities frequency with the class at grade 8
(mean scores on a scale from 1 to 4, by country, 2011-12)

Fig. 3.4c: Teachers' 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)

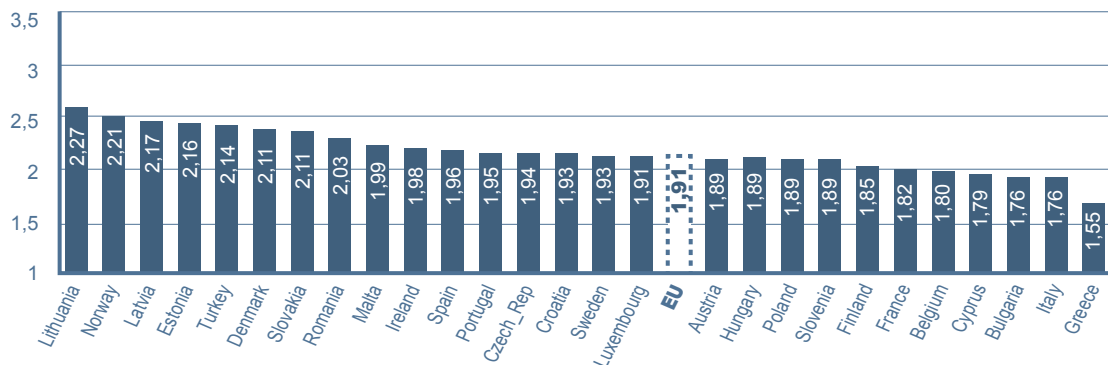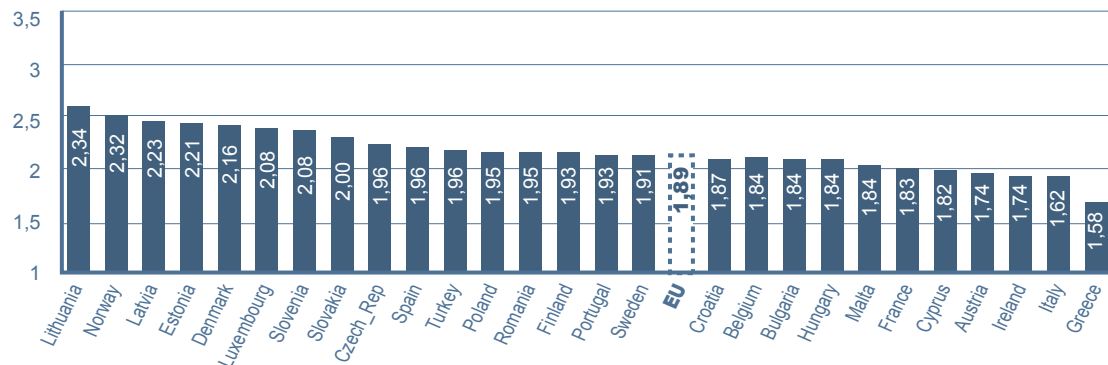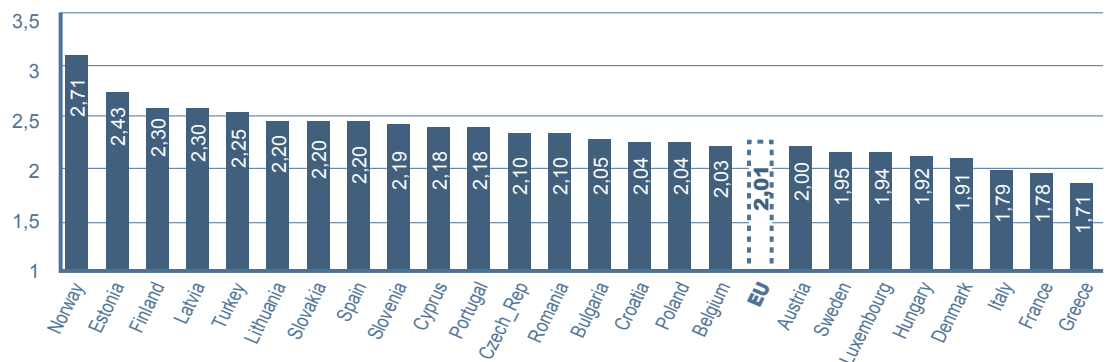**Fig. 3.4d: Teachers' ICT based activities frequency with the class at grade 11 in vocational education**
(mean scores on a scale from 1 to 4, by country, 2011-12)

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

Innovation in teaching and learning is often associated with a shift to student-centred from teacher-centred teaching and learning. Student-centred learning is a learning model that places the student at the centre of the learning process, i.e. students are active participants in their learning; they learn at their own pace and use their own strategies; learning is more individualised than standardised. Conversely, teacher-centred learning is characterised by the transmission of information from a knowledge expert (the teacher) to a relatively passive recipient (student/learner) or consumer.

The teacher questionnaire contains a specific question (TE21) asking about teaching activities organised by the teacher with students in the classroom, with or without ICT, such as the teacher presenting to the whole class, explaining things to individual students, students reflecting on their learning, students working in groups. The answer to each situation had to be chosen out of a four-level scale about the extent of its implementation, starting from 'none' (1), 'a little' (2), 'sometimes' (3), to 'a lot' (4).

As the result of a factor analysis of all items pertaining to question TE21, Figs. 3.5a to 3.5d[70] present the division of class activities according to these two approaches.

At all grades and in all countries, student-centred and teacher-centred activities co-exist, but student-centred activities are more frequent (i.e. between 'sometimes' and 'a lot') **compared to teacher-centred activities** (i.e. between 'sometimes' and a 'little'). At EU level, the mean scores vary from 3.23 to 3.39 concerning the student-centred approach compared from 2.75 to 3 concerning teacher-centred activities, depending the grade. When looking at the correlation between student- or teacher-centred teaching and the frequency of teacher ICT-based activities, there is a **slightly higher significant positive correlation between student-centred teaching and the frequency of teacher ICT based activities, at all grades** (0.21, 0.24 and 0.28 respectively at grades 4, 8 and 11 general for student-centred teaching; 0.04, 0.09 and 0.14 for teacher-centred teaching. In other words, the more student-centred teaching, the higher the frequency of teacher ICT based activities, and vice versa. No clear difference of correlation is observed in vocational education between the two teaching approaches; this could be due to the fact that the distinction between student-centred and teacher-centred approaches is not relevant or applicable in vocational education.

When looking at differences by country, at grade 4, 8 and 11 in general education, the student-centred approach appears to prevail in Hungary compared to other countries, and teacher-centred activities also seem to be less frequent here compared to other countries in which student-centred teaching is relatively frequent. Note that at some grades in a few countries, the number of schools with students in student-centred activities are too low to be taken into account in the analysis and are not represented in the charts.

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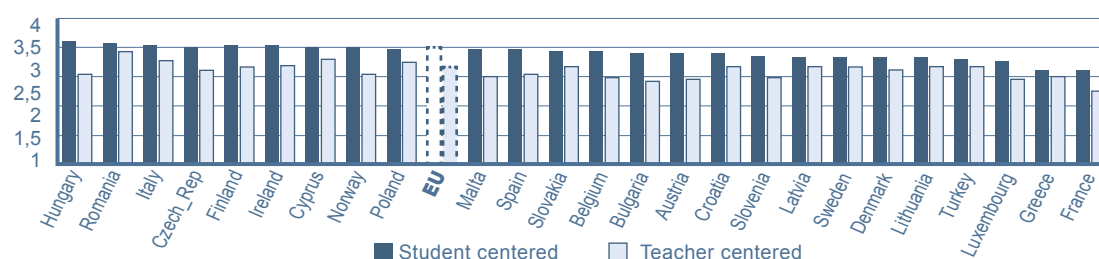(mean scores on a scale from 1 to 4, by country, 2011-12)

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)
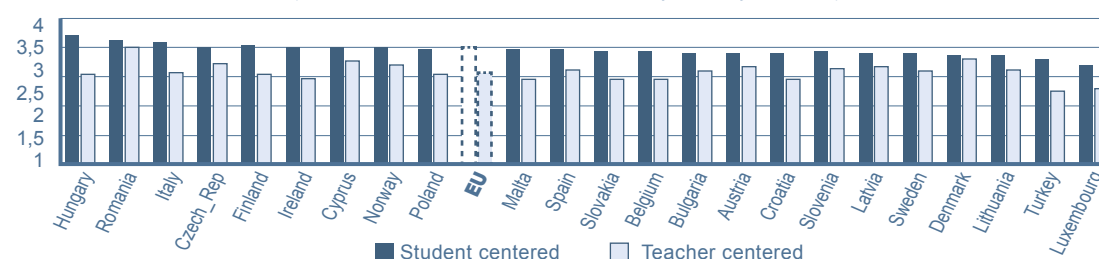
70   Fig. 3.5a excl. EE and PT (insufficient data); fig. 3.5b excl. EE, EL, FR, PT (insufficient data); fig. 3.5c excl. IE and MT; fig. 3.5d various countries (insufficient data).

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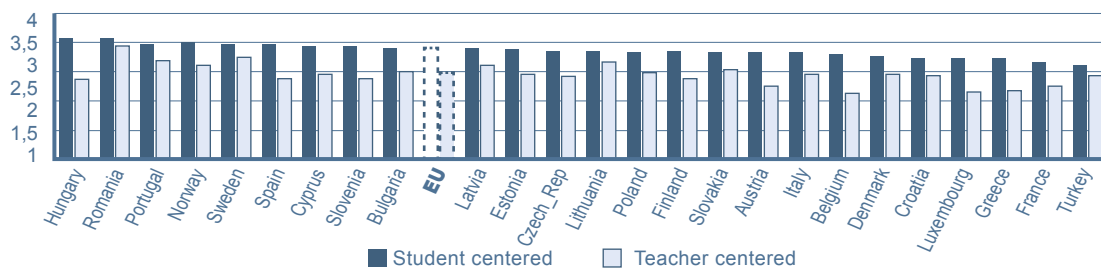
Fig. 3.5d: Student and teacher -centered activities implemented by teachers at grade 11 in vocational education
(mean scores on a scale from 1 to 4, by country, 2011-12)
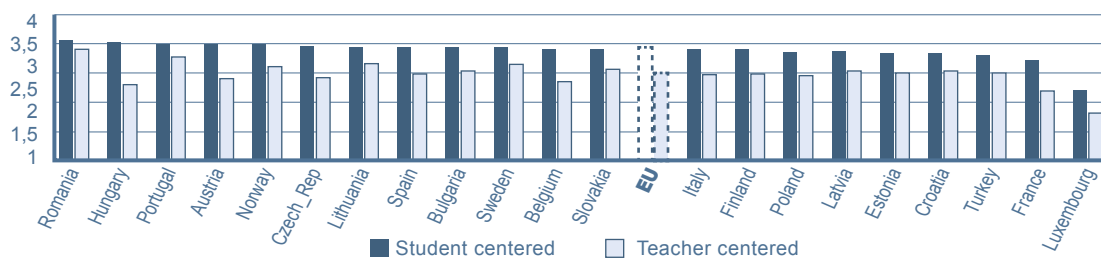
Students

Students' experience using computers at home and at school

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

At EU level, it is no surprise to report that longer experience with computers is more frequent at home than at school (see figs. 3.6a to 3.6c): **around 80% of students at grade 8 and 90% at grade 11** have used computers **at home for more than four years; only around 40% of students at grade 8 have the same length of experience at school**, and around **60% at grade 11.** Percentages of students are lower compared to the large majority of teachers who have used computers/internet at school for four years or more (see previous fig. 3.1). **This situation probably reflects recent efforts and initiatives targeting teachers' ICT use at school rather than students' use, particularly at grade 8.** It could also reflect a gradual evolution, not questioned until recently, away from the teacher-centred model prevailing for decades in formal education system.

Around 20% of students at grade 8 and **10% at grade 11** have been using **computers at school for less than a year**.

Fig. 3.6: Students' 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
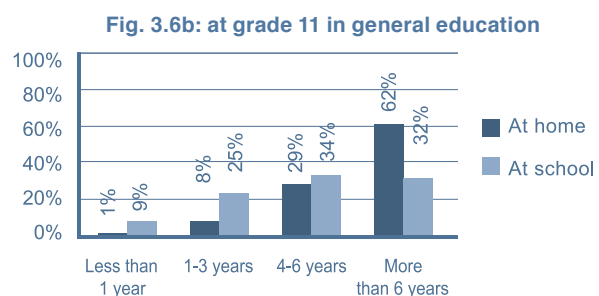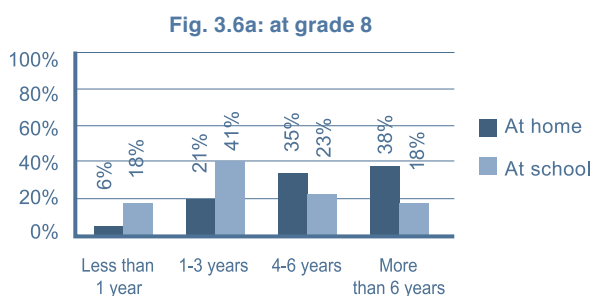
Fig. 3.6c: at grade 11 in vocational education
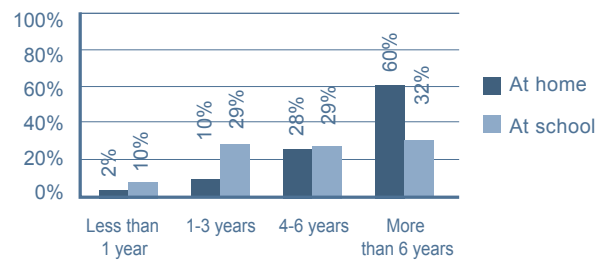
Students' use of digital resources and tools in lessons

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

At EU level, depending the tool and the grade, between **50% and 80% of students never use** digital textbooks, exercise software, broadcast/podcast, data-logging tools, simulations or learning games/video games. Around 35% at all grades never use multimedia tools. These digital resources and tools are nevertheless **more frequently used at grade 8** compared to grade 11 in general education.

Digital textbooks 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 used to a similar extent (even slightly more) at grade 11 in vocational training.

Simulations and data-logging tools are **very rarely used on a regular basis** (daily or once a week), at all grades. This situation could be the result of a lack of existing good quality material related to the curriculum, insufficient information provided to teachers, lack of skills to use and integrate them into teaching, or lack of time to become fully familiar with them and feel comfortable to use them in the classroom with the students.

Fig. 3.7a : Use of resources and tools during lessons at grade 8
(in % of students, EU level, 2011-12)
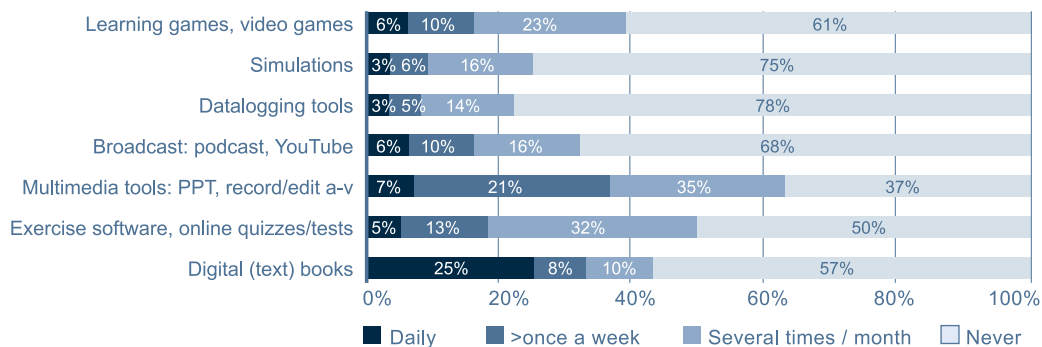
Fig. 3.7b : Use of resources and tools during lessons at grade 11 general education
(in % of students, EU level, 2011-12)
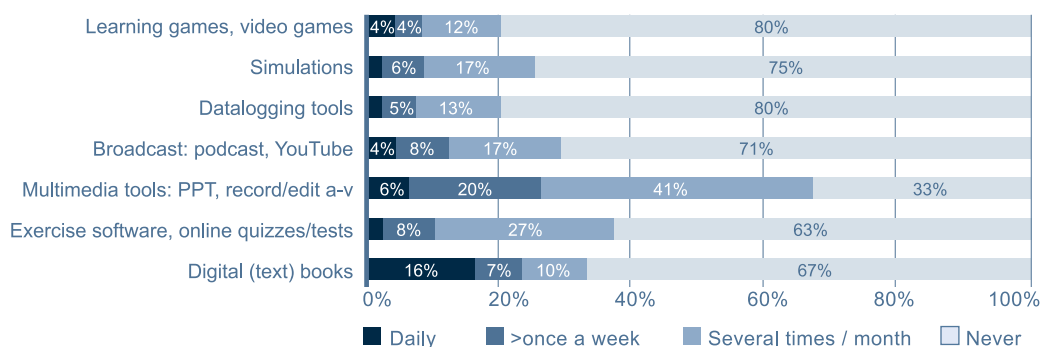
Fig. 3.7c : Use of resources and tools during lessons at grade 11 vocational education
(in % of students, EU level, 2011-12)

	Daily	>once a week	Several times / month	Never
Learning games, video games	6%	8%	14%	72%
Simulations	3%	8%	15%	73%
Datalogging tools	3%	6%	12%	79%
Broadcast: podcast, YouTube	6%	10%	16%	68%
Multimedia tools: PPT, record/edit a-v	9%	25%	32%	34%
Exercise software, online quizzes/tests	4%	12%	26%	58%
Digital (text) books	10%	8%	10%	72%

Students' ICT-based activities in lessons

The student questionnaire contains a question proposing a list of several possible activities using ICT during lessons (ST13), for example searching the internet, chatting online, posting home work on the school website, using computers to conduct experiments.

A factor analysis of this set of activities yielded a single frequency scale for 'ICT-based activities', 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).

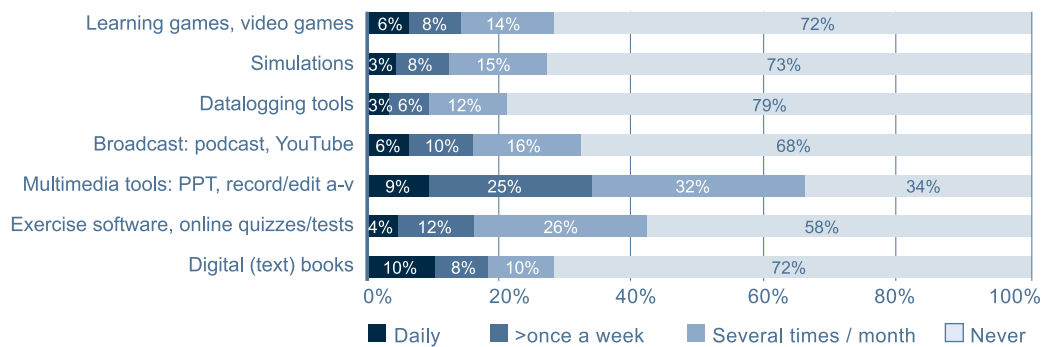The analysis shows that at EU level on average **students' frequency of ICT based activities is closer to 'several times a month' rather than to 'never or almost never';** the mean scores vary between 1.62 and 1.65, depending the grade (see figs. 3.8a to 3.8c[71]).

Activities identified by students appear to be less frequent compared to the same ones identified by teachers (for which the **average** at EU level **is closer to 'several times a month'**): mean scores vary between 1.89 and 2.01, depending the grade (see figs. 3.4a to 3.4d above). This difference between students' and teachers' ICT-based activities is probably explained by the predominance of ICT-based activities at teacher level dedicated to teaching preparation, underlined in the present survey not having a direct equivalent at student level. It could also be explained by a greater focus on teachers in the many initiatives to develop ICT in teaching and learning.

Looking at differences between countries, depending the grade, it appears that the **highest frequencies** of students' ICT-based activities **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'.** The highest frequencies at all grades are found in Denmark, as well as in Norway at grade 11 (also showing a high frequency at grade 8), and to a lesser extent and depending the grade in Bulgaria, Lithuania and Sweden.

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

Denmark	Turkey	Bulgaria	Lithuania	Norway	Portugal	Slovakia	Cyprus	Latvia	Estonia	Poland	Spain	Sweden	Czech_Rep	Greece	Hungary	EU	Croatia	Malta	Romania	France	Luxembourg	Austria	Italy	Belgium	Slovenia	Ireland	Finland
1,91	1,88	1,84	1,80	1,79	1,77	1,75	1,73	1,72	1,68	1,68	1,68	1,65	1,64	1,63	1,63	**1,63**	1,61	1,56	1,56	1,54	1,52	1,50	1,50	1,47	1,44	1,43	1,37

Fig. 3.8b: Students' 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)

Denmark	Norway	Sweden	Bulgaria	Slovakia	Lithuania	Latvia	Estonia	Romania	Croatia	Spain	EU	Portugal	Turkey	Poland	Austria	Czech_Rep	France	Cyprus	Malta	Belgium	Greece	Slovenia	Luxembourg	Finland	Hungary	Ireland	Italy
2,62	2,46	1,98	1,86	1,85	1,79	1,76	1,75	1,75	1,73	1,70	**1,65**	1,64	1,64	1,60	1,58	1,57	1,57	1,55	1,53	1,52	1,52	1,50	1,49	1,47	1,43	1,40	1,34

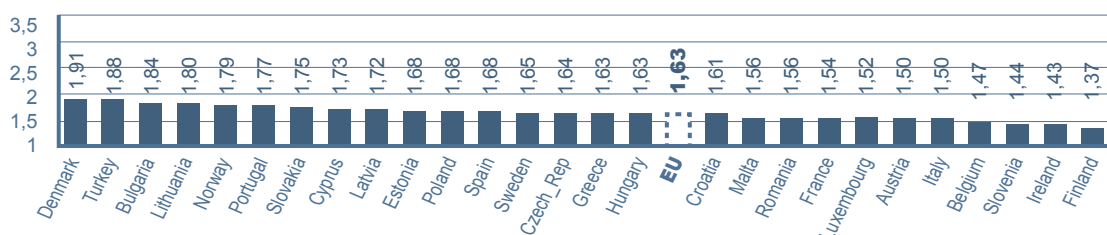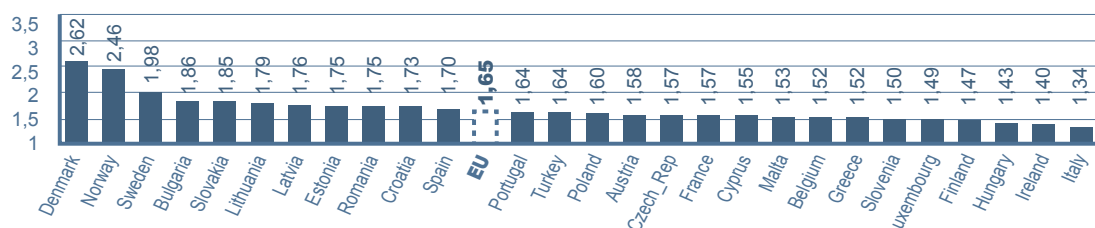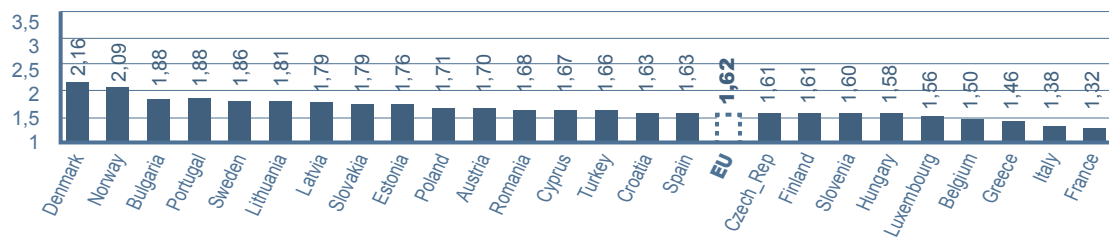71   Fig. 3.8c. IE and MT do not have separate vocational schools.

Fig. 3.8c: Students' 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-centred learning (with or without ICT)

As for teachers' ICT-based activities, a factor analysis of the items pertaining to question ST14 investigating the issue of student versus teacher-centred learning was processed. This question listed student or teacher-centred activities and asked students to specify the extent to which each activity took place.

As mentioned when looking at the same issue from the teachers' point of view, innovation in teaching and learning is often associated with student-centred instead of teacher-centred teaching and learning. Student-centred learning is a learning model that places the student in the centre of the learning process, i.e. students are active participants in their learning; they learn at their own pace and use their own strategies; learning is more individualised than standardised. Conversely, teacher-centred learning is characterised by the transmission of information from a knowledge expert (the teacher) to a relatively passive recipient (student/learner) or consumer.

Figs. 3.9a to 3.9c[72] show the division between the two approaches, as declared by students on a scale representing the extent of their use, from 1 to 4 (1 none; 2: a little; 3: sometimes; and 4: a lot).

At all grades and in all countries, teacher-centred activities are more widespread than student-centred activities, as declared by students. At EU level, the mean scores vary from 2.63 to 2.75 (teacher-centred approach) compared to 2.36 to 2.42 (student-centred approach), depending the grade. Unlike teachers' answers which indicate that student-centred activities are more frequent, students find the opposite. Such differing views could be explained by the fact that what is perceived by a teacher as a student-centred approach is still below the perceptions of students themselves.

Looking at the correlation between student- or teacher-centred teaching and the frequency of students' ICT-based activities, there is a **slightly higher significant positive correlation between student-centred teaching and the frequency of student ICT based activities at all grades** (0.35 and 0.4 respectively at grades 8 and 11 for student-centred teaching; 0.18, 0.24 and 0.26 for teacher-centred teaching). In other words, the more a student-centred teaching approach is implemented, the higher the frequency of student ICT based activities, and the reverse.

Looking at differences by country, the student-centred approach appears to be implemented to a higher extent and consistently throughout all grades in Sweden, Estonia, Spain, and Norway.

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)

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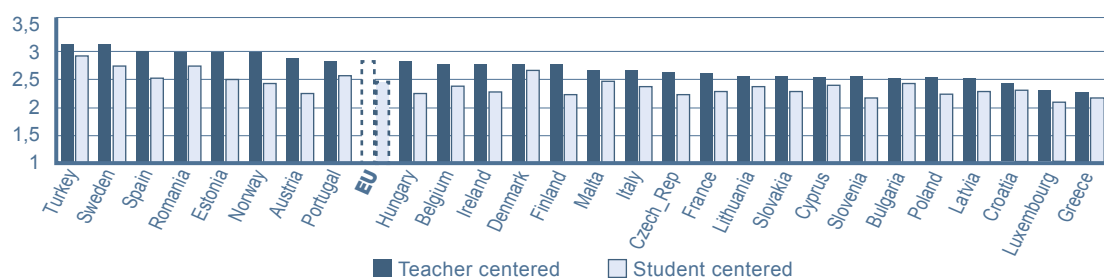
72   IE and MT do not appear in fig. 3.9c as there are no separate vocational schools.

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)

Teacher centered   Student centered

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)
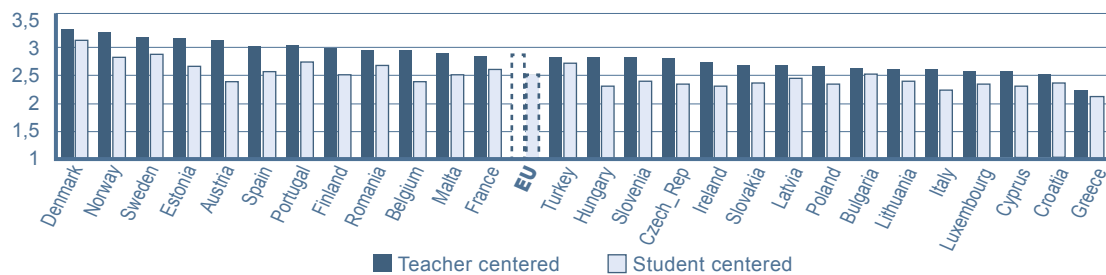
Teacher centered   Student centered
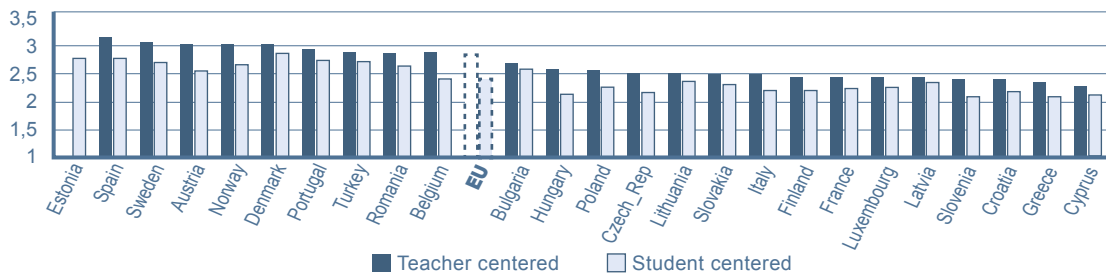
Students' home and school activities

The student questionnaire contains two questions about the frequency of a list of different ICT based activities, respectively at home (ST05) and at school (ST13) to be answered using a four level Likert scale (1 never or almost never; 2 for several times a month; 3 for at least once a week; and 4 for every day or almost every day).

Factor analysis revealed that the different activities form a single scale containing activities taking place at school, but three scales (or profiles) concerning activities taking place at home: '*fun*' activities (related to music, movies, videos, concerts, etc.), '*learning'* activities (related to listening/watching online news, searching online sources for information and learning, etc.) and '*games'* activities.

It appears that at EU level on average, students' **frequency of ICT-based activities at home is higher for all three groups of activities compared to school**, around twice as frequent for the 'fun' group of activities. The least frequent group of activities at home is gaming. It is interesting to note that activities at home related to learning are not only more frequent compared to the school ones, but also more frequent compared to the 'games' ones.

Fig. 3.10: Students' home and school activities
(all grades, mean scores, EU level, 2011-12)
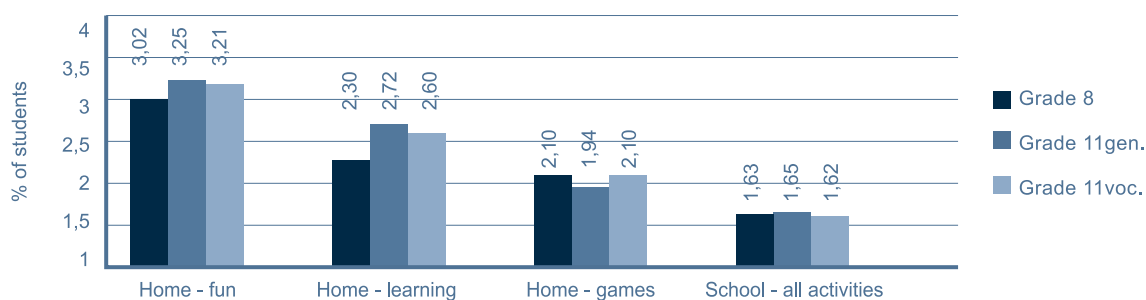
In this section teachers' and students' ICT-based activities – teachers at school, students at home as well as at school – in the countries covered by the survey have been reported and analysed. The following section considers what the data have to tell us about teachers' professional development in ICT and both their and students' confidence in the use of ICT and social media.

4. PROFESSIONAL DEVELOPMENT AND CONFIDENCE IN USING ICT

Research during the last 15 years has demonstrated the significant influence teacher competence has on student achievement (Owston 2006). It is therefore important for all teachers to have the necessary knowledge and competences to integrate ICT into their daily teaching practice, in order to maximize their ability to help improve students' digital competence. 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 (Fredriksson et al. 2008; Valiente 2010). Informal methods of training, blended training and training that relates to real classroom settings are favoured by teachers (Balanskat et al. 2010). Incoming teachers have not been sufficiently trained in the pedagogical use of ICT (OECD 2008c; Starkey, L., 2010), and teachers generally are more traditional users of the internet and lack knowledge in how far to exploit social media tools for learning (MMB, 2008).

We know from research undertaken in this area that more experience in using technologies is positively related to the acquisition of students' digital competences and to their confidence in using these tools (OECD 2010a). 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 schools (Selwyn, N. 2010). As what is required officially as part of the curriculum is an important factor influencing teachers' practices (Valiente 2010), it is interesting to note that 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 (Balanskat, A., & Gertsch, C. 2010).

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 70% 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 digital society and consequently teachers' need to integrate ICT into their daily teaching practice, countries might be wise to ensure that ICT training is made a compulsory component of all initial teacher education programmes.

  At EU level, around 70% 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 teachers 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 grades 4 and 8 and around 45% at grade 11 (general and vocational education) are taught by teachers who have participated in equipment-specific training, while around 50% of students at grades 4 and 8 and around 40% at grade 11 (general and vocational education), are taught by teachers who have undertaken courses on the pedagogical use of ICT in the past two school years. Subject-specific training and advanced courses on applications is less commonly participated in by teachers, rating at around 25% across all grades, and advanced courses on the internet and multimedia training even less so.

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

At EU level, the mean score of students across grades taught by teachers who are confident in social media use is substantially lower than those taught by teachers confident in the operational use of ICT.

At country level, the mean score of students taught by teachers declaring confidence in their operational use of ICT 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 use of social media, 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, is not the same as measuring their actual competence in these areas, it is nevertheless important as it is a component of their competence and can 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 substantially positive correlation found in the survey's data across all grades, illustrating that the more confident teachers are in their operational use of ICT and their use of social media, the more they tend to use ICT based activities with the target class. Correlation analysis also shows that teachers who participate in ICT-related professional development, and to a lesser extent those who spend more time on this, tend to have more confidence in their operational and social media skills.**

**Concerning students' confidence in using ICT**: At EU level, out of all the ICT skills surveyed, students across all grades have the highest mean score in their confidence to use the internet safely and the lowest mean score in their confidence to use social media. Grade 11 (general education) students' confidence mean score is consistently higher across all ICT skills surveyed, while grade 8 students' score is consistently lower.

Generally speaking, students at all grades across countries declare quite a 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 in ICT

Fig. 4.1: Teachers' compulsory participation in ICT training
(in % of students, EU level, 2011-12)
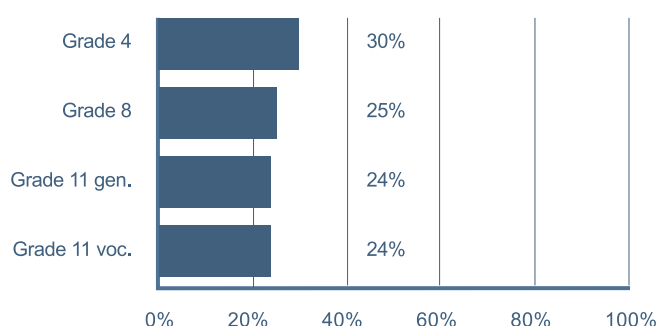
According to Eurydice's 2011 Key Data report on learning and innovation through ICT at school in Europe, ICT training is included in initial teacher education in over half of EU countries. However, it is noted that in practice implementation may vary in these countries according to the higher education 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[73] 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. 4.2a: Teachers' compulsory participation in ICT training
(in % of students, grade 4, by country, 2011-12)

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73   Excl. LU at grade 11 (insufficient data). At grade 11 vocational there are no separate vocational schools in IE and MT.
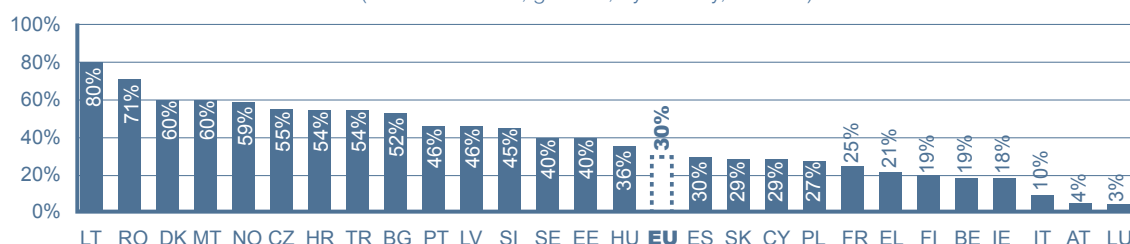
Fig. 4.2b: Teachers' compulsory participation in ICT training
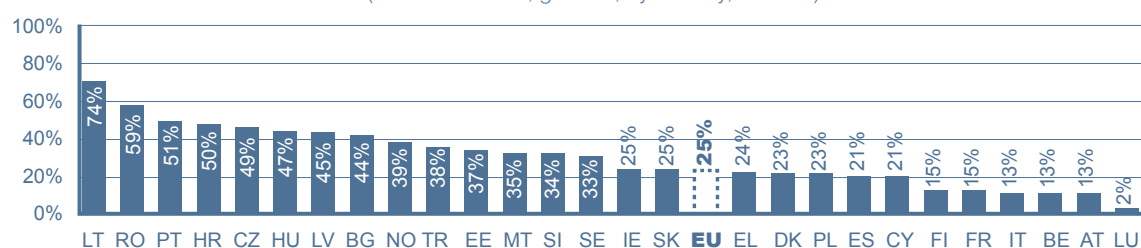(in % of students, grade 8, by country, 2011-12)

Fig. 4.2c: Teachers' compulsory participation in ICT training
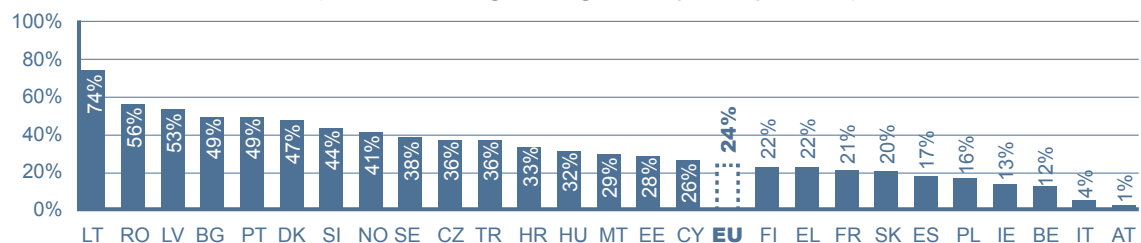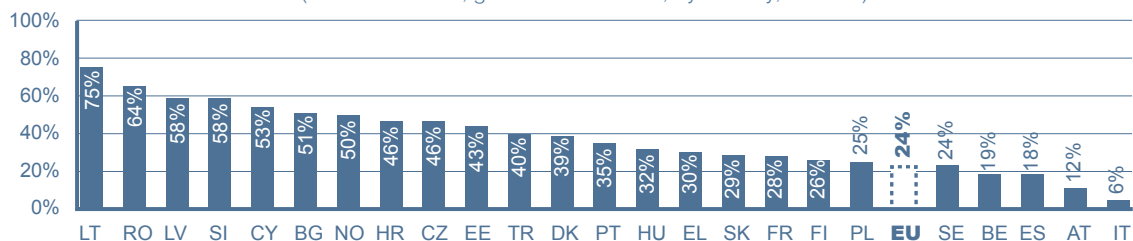(in % of students, grade 11 general, by country, 2011-12)

Fig. 4.2d: Teachers' compulsory participation in ICT training
(in % of students, grade 11 vocational, by country, 2011-12)

As illustrated by Figure 4.3a, around 70% 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 40% of students at grades 4 and 11 (general and vocational education) are taught by teachers who have participated in ICT training provided by school staff, while the percentage is slightly higher at 51% at grade 8.

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)
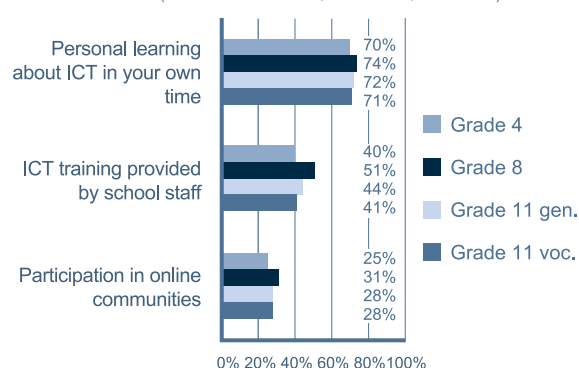
Analysis of teachers' professional development in the OECD's TALIS report emphasizes the importance of professional collaboration, as it often leads to a change in teachers' practice and further awareness of their own development needs, leading to participation in appropriate professional development 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 grades 4 and 8 and around 45% at grade 11 (general and vocational education) 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 and 8, and around 40% at grade 11 (general and 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, spread sheets, presentations etc.), roughly 35% of students across most grades and 45% at grade 8 are taught by teachers who have participated in this type of training in the past two school years. Subject-specific training and advanced courses on applications is less commonly participated in by teachers, rating at around 25% across all grades, and advanced courses on 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)
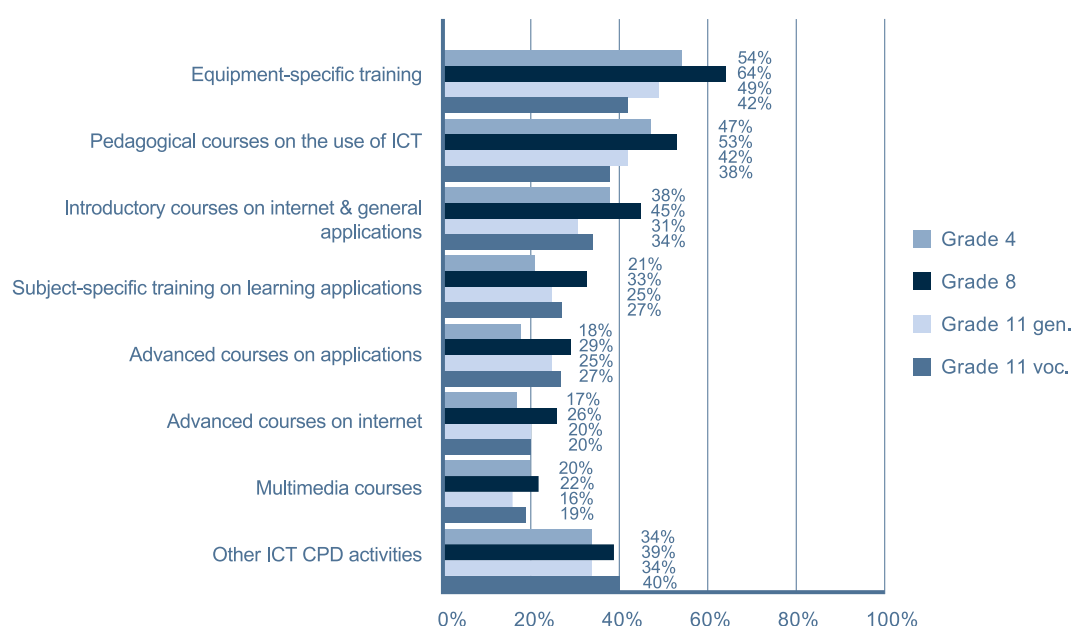
Figures 4.4 to 4.6 illustrate how countries compare with regards to teachers' modes of engagement in ICT related professional development, during the past two years. In Estonia, Bulgaria, Lithuania and Latvia as many as around 90% of students at all grades are taught by teachers who have used their own time to engage in personal learning about ICT during the past two school years (see Fig. 4.4[74]). 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.

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74   There are no separate vocational schools in IE and MT.

Fig. 4.4a: Teachers' involvement in personal learning about ICT in their own time
(in % of students, grade 4, by country, 2011-12)
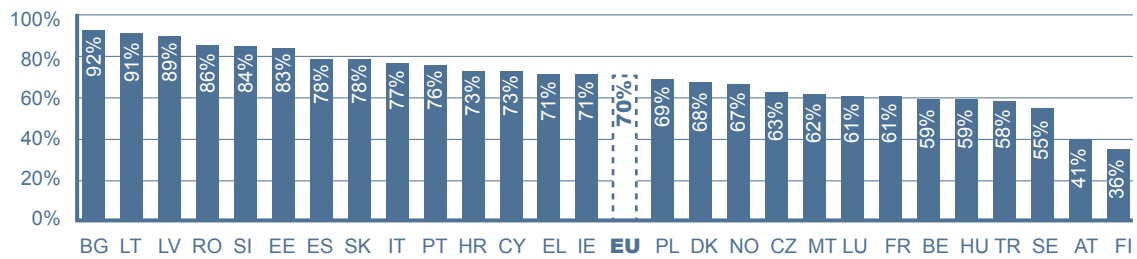
Fig. 4.4b: Teachers' involvement in personal learning about ICT in their own time
(in % of students, grade 8, by country, 2011-12)
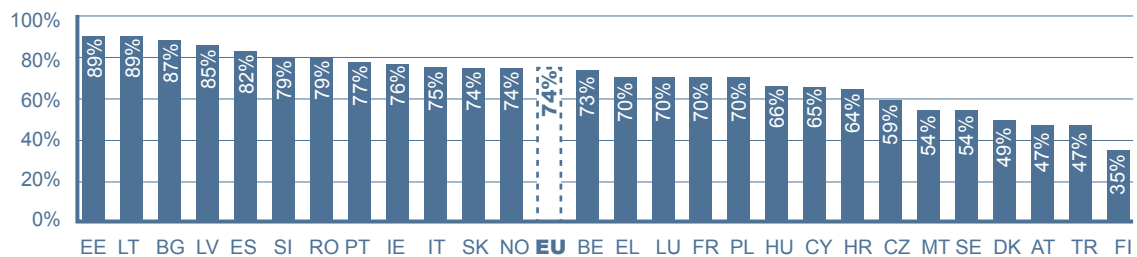
Fig. 4.4c: Teachers' involvement in personal learning about ICT in their own time
(in % of students, grade 11 general, by country, 2011-12)
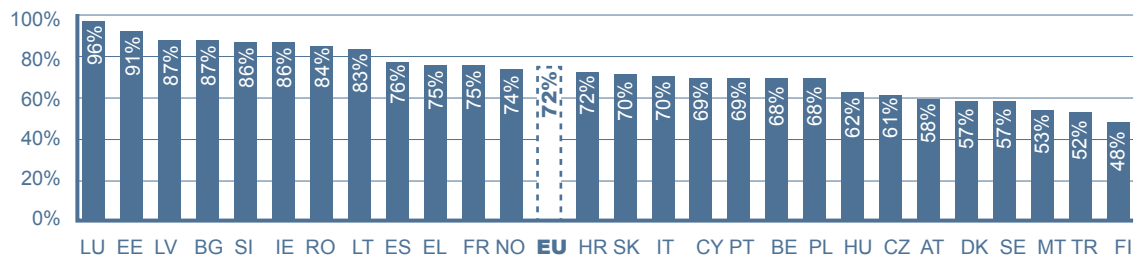
Fig. 4.4d: Teachers' involvement in personal learning about ICT in their own time
(in % of students, grade 11 vocational, by country, 2011-12)
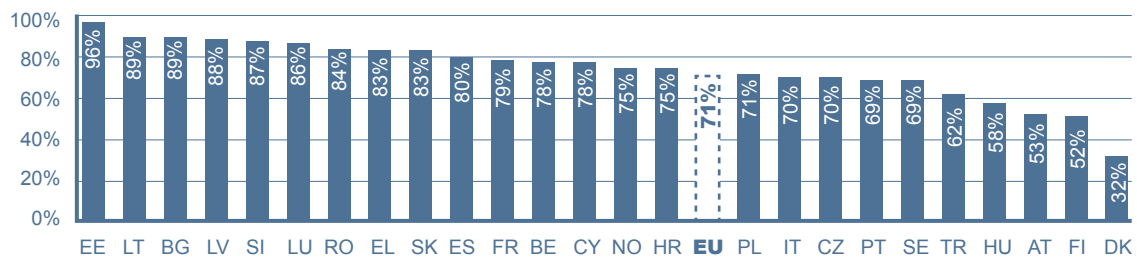
In Norway around 80% of students at all grades are taught by teachers who have undertaken ICT training provided by school staff (see Fig. 4.5[75]). In Croatia, Slovenia, Ireland, Spain and Estonia around 75% of students at one grade or more are taught by teachers in this situation. Conversely, only around 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.

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75   There are no separate vocational schools in IE and MT.

Fig. 4.5a: Teachers' participation in ICT training provided by school staff
(in % of students, grade 4, by country, 2011-12)
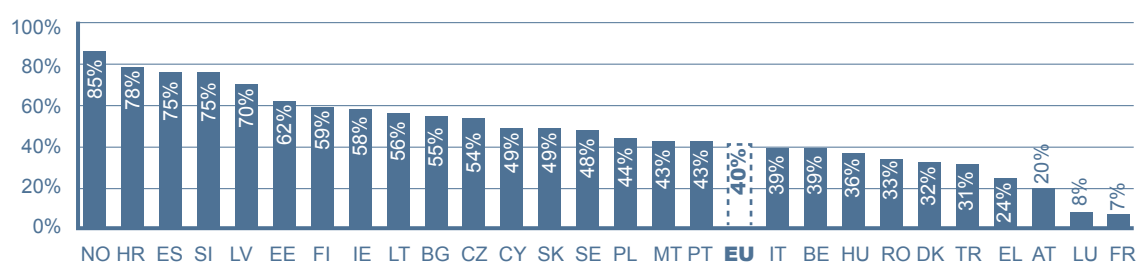
Fig. 4.5b: Teachers' participation in ICT training provided by school staff
(in % of students, grade 8, by country, 2011-12)
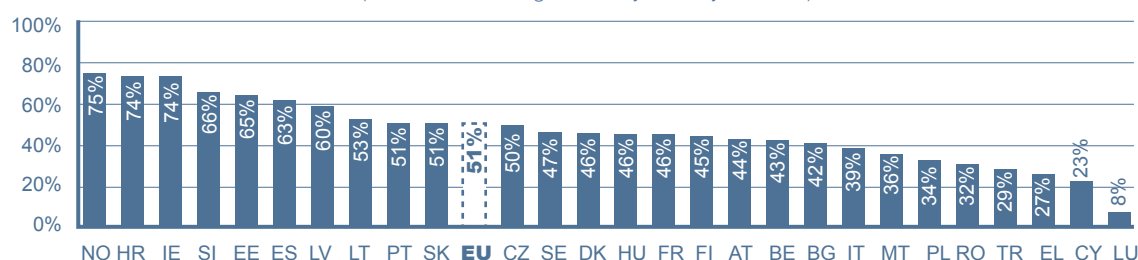
Fig. 4.5c: Teachers' participation in ICT training provided by school staff
(in % of students, grade 11 general, by country, 2011-12)
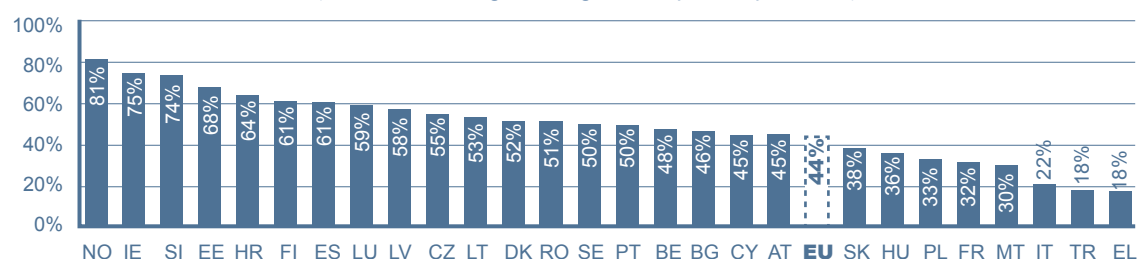
Fig. 4.5d: Teachers' participation in ICT training provided by school staff
(in % of students, grade 11 vocational, by country, 2011-12)
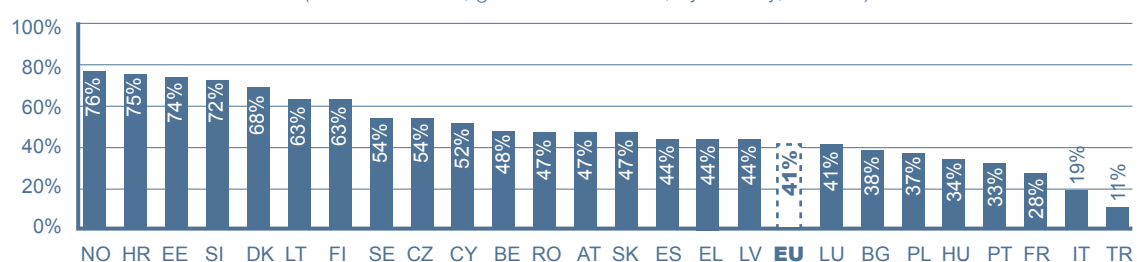
Figure 4.6[76] shows that Slovenia is the only country which has around 50% of students across all grades who are taught by teachers who have participated in online communities for professional exchanges with other teachers, during the last two years. Denmark has an equally high percentage of students 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).

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76   There are no separate vocational schools in IE and MT.

Fig. 4.6a: Teachers' participation in online communities for professional discussions with other teachers
(in % of students, grade 4, by country, 2011-12)
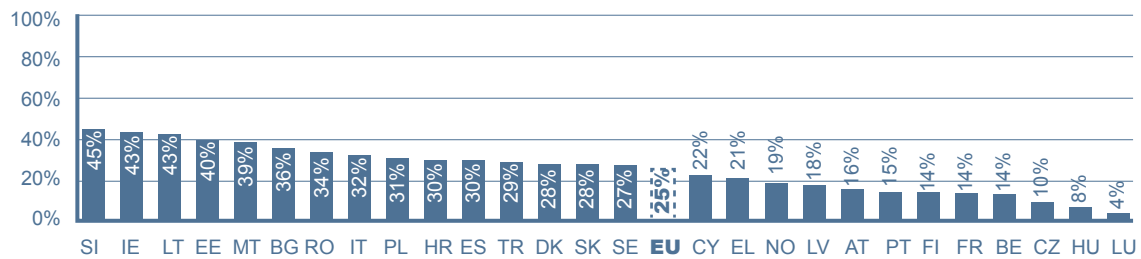
Fig. 4.6b: Teachers' participation in online communities for professional discussions with other teachers
(in % of students, grade 8, by country, 2011-12)
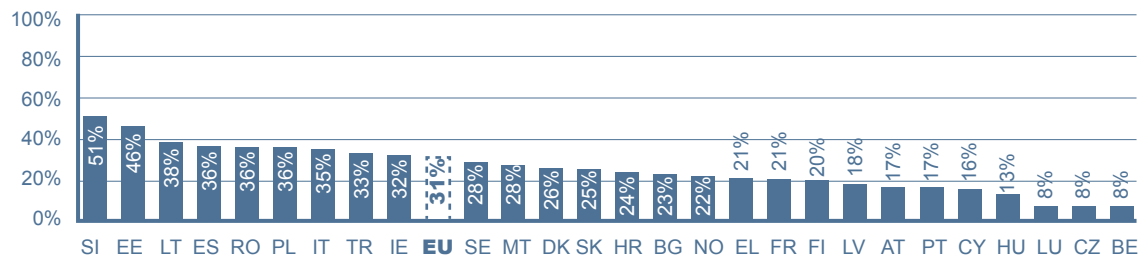
Fig. 4.6c: Teachers' participation in online communities for professional discussions with other teachers
(in % of students, grade 11 general, by country, 2011-12)
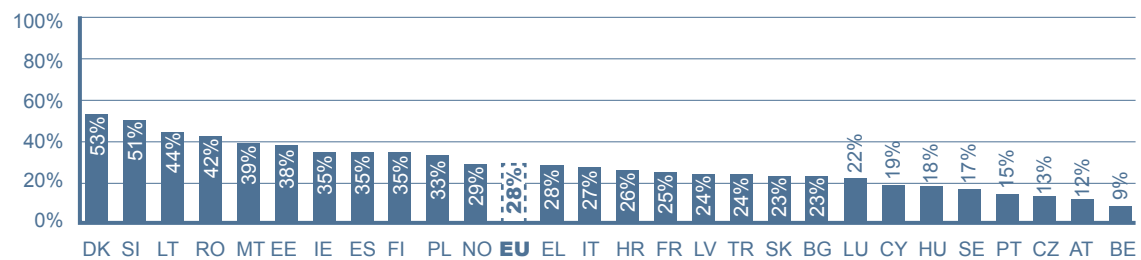
Fig. 4.6d: Teachers' participation in online communities for professional discussions with other teachers
(in % of students, grade 11 vocational, by country, 2011-12)
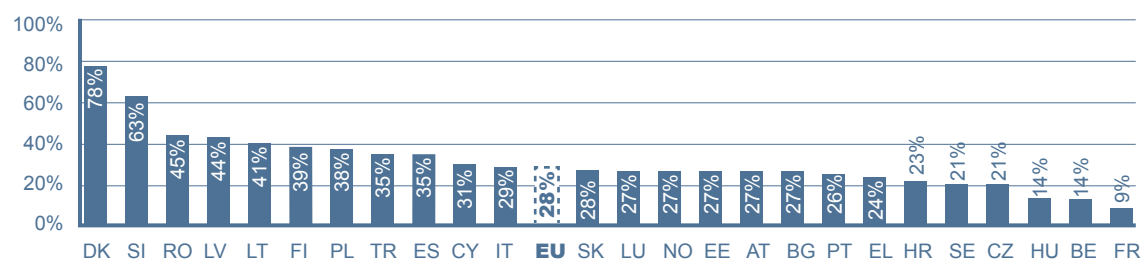
In Lithuania around 70% or more of students across all grades are taught by teachers who have undertaken courses on the pedagogical use of ICT (see Figure 4.7[77]). Roughly the same percentage of students is in this situation in Spain and Estonia at grade 4, Slovenia at grade 11 (general and vocational 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.

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77   There are no separate vocational schools at grade 11 in IE and MT.

Fig. 4.7a: Teachers' participation in courses on the pedagogical use of ICT in teaching and learning
(in % of students, grade 4, by country, 2011-12)
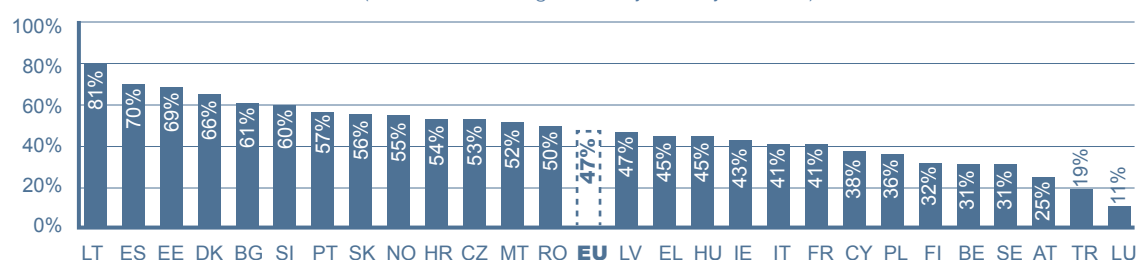
Fig. 4.7b: Teachers' participation in courses on the pedagogical use of ICT in teaching and learning
(in % of students, grade 8, by country, 2011-12)
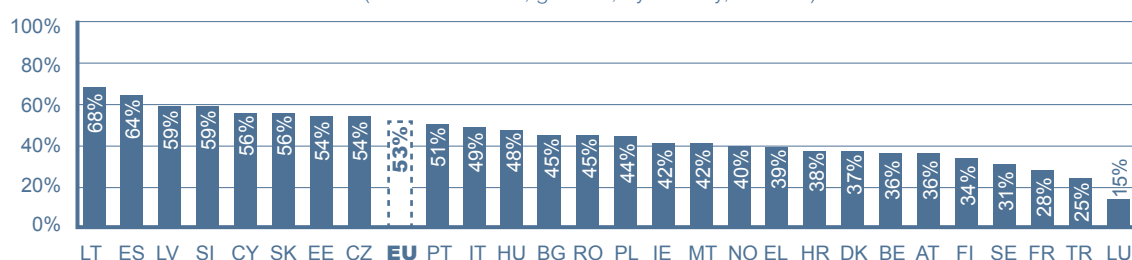
Fig. 4.7c: Teachers' participation in courses on the pedagogical use of ICT in teaching and learning
(in % of students, grade 11 general, by country, 2011-12)
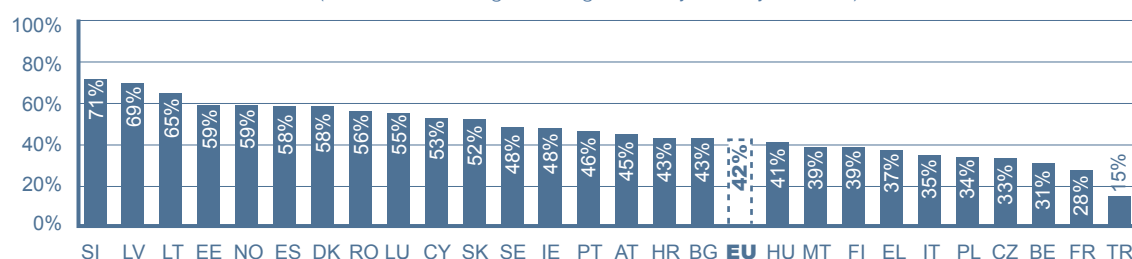
Fig. 4.7d: Teachers' participation in courses on the pedagogical use of ICT in teaching and learning
(in % of students, grade 11 vocational, by country, 2011-12)
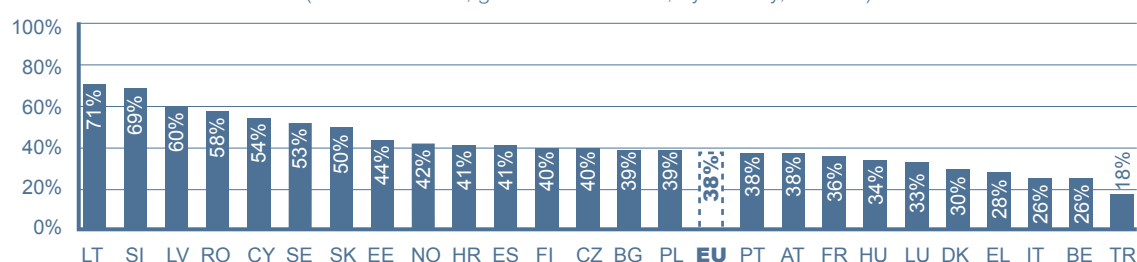
Estonia stands out in Figure 4.8[78] as the country with around 55% of students across all grades (excluding grade 11 vocational education, where only 14% are concerned) who are taught by teachers who have participated in subject-specific training on learning applications, such as tutorials and simulations, 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.

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78   There are no separate vocational schools at grade 11 in IE and MT.

Fig. 4.8a: Teachers' participation in subject-specific training on learning applications
(in % of students, grade 4, by country, 2011-12)
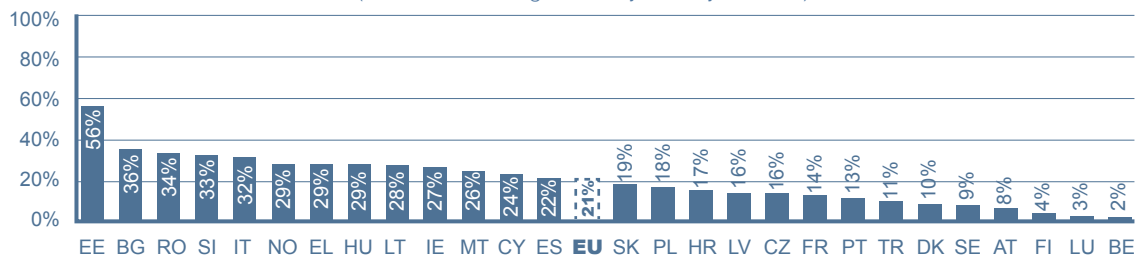
Fig. 4.8b: Teachers' participation in subject-specific training on learning applications
(in % of students, grade 8, by country, 2011-12)
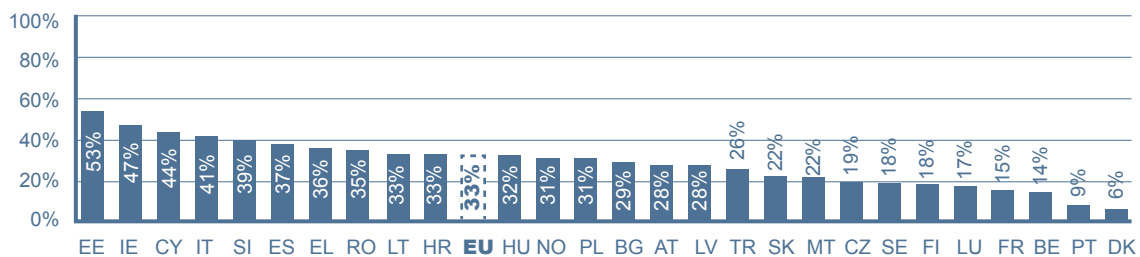
Fig. 4.8c: Teachers' participation in subject-specific training on learning applications
(in % of students, grade 11 general, by country, 2011-12)
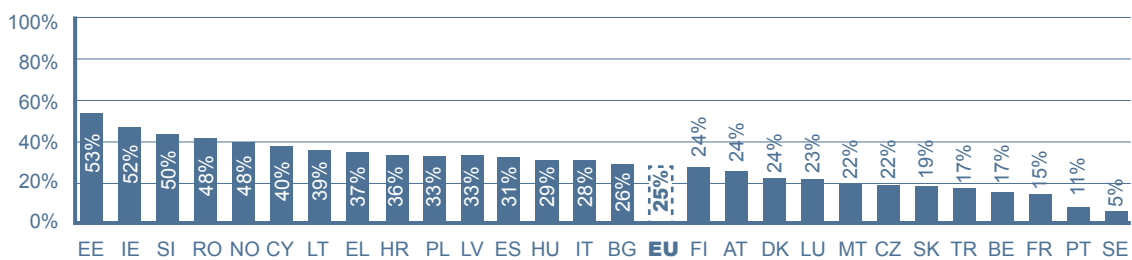
Fig. 4.8d: Teachers' participation in subject-specific training on learning applications
(in % of students, grade 11 vocational, by country, 2011-12)
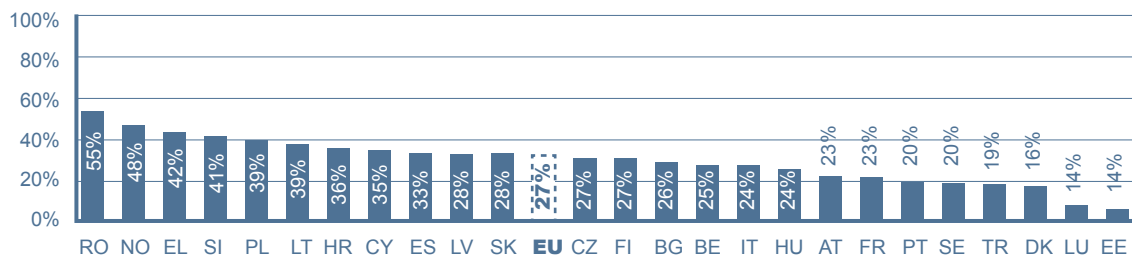
Fig. 4.9: Time invested by teachers in professional development activities during the past two years
(in % of students, EU level, 2011-12)
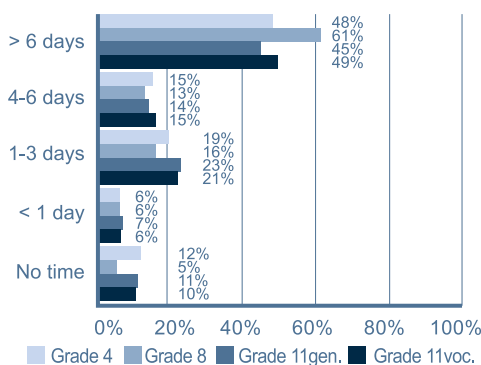
According to Figure 4.9, at EU level around 60% of students at grade 8 are taught by teachers who report having spent more than six days engaged in any of the professional development activities mentioned in Figure 4.3, during the past two years. For students at grades 4 and grade 11 (both in general 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[79]).

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79   Excl. EE at all grades, LU at grade 11. There are no separate vocational schools in IE and MT.

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. 4.10a: Teachers reporting having spent more than 6 days on ICT related professional development activities during the past two years
(in % of students, grade 4, by country, 2011-12)

ES	PT	RO	PL	EL	SK	CZ	IT	SI	HU	LT	CY	EU	TR	BG	HR	LV	IE	SE	NO	MT	AT	DK	BE	FR	LU	FI
76%	74%	71%	70%	66%	65%	56%	56%	55%	54%	51%	51%	48%	43%	42%	40%	36%	33%	26%	25%	22%	21%	19%	14%	11%	10%	7%

Fig. 4.10b: Teachers reporting having spent more than 6 days on ICT related professional development activities during the past two years
(in % of students, grade 8, by country, 2011-12)

ES	PT	PL	SK	EU	CZ	RO	IT	EL	SI	HU	CY	LV	BG	TR	LT	BE	HR	AT	NO	DK	FR	IE	SE	MT	FI	LU
76%	73%	71%	61%	61%	61%	60%	55%	53%	51%	49%	47%	42%	34%	34%	32%	32%	31%	30%	22%	22%	20%	20%	18%	16%	13%	12%

Fig. 4.10c: Teachers reporting having spent more than 6 days on ICT related professional development activities during the past two years
(in % of students, grade 11 general, by country, 2011-12)

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
73%	73%	66%	65%	63%	59%	57%	51%	45%	44%	42%	41%	40%	40%	37%	37%	35%	34%	31%	29%	29%	27%	26%	25%	21%	17%

Fig. 4.10d: Teachers reporting having spent more than 6 days on ICT related professional development activities during the past two years
(in % of students, grade 11 vocational, by country, 2011-12)

PT	CZ	SK	RO	PL	ES	CY	BG	EU	AT	HR	LV	FI	EL	SI	TR	NO	IT	SE	BE	LT	HU	FR	DK
72%	68%	68%	68%	66%	64%	61%	51%	49%	47%	46%	46%	46%	45%	45%	43%	42%	41%	40%	40%	40%	40%	21%	15%

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[80]). 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. 4.11a: Teachers reporting having spent no time at all on ICT related professional development activities during the past two years
(in % of students, grade 4, by country, 2011-12)

LU	BE	FR	AT	DK	TR	EL	IT	EU	FI	RO	SE	CY	BG	LV	HU	NO	SK	PT	ES	MT	LT	EE	HR	PL	SI	CZ
30%	29%	29%	21%	20%	17%	14%	14%	12%	10%	10%	9%	8%	8%	8%	7%	6%	5%	5%	4%	4%	2%	2%	1%	1%	1%	1%

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80   Grade 4: data missing for IE. Grade 11 general: data missing for LU and NO. Grade 11 vocational: data missing for LU, NO, SI and SE (there are no separate vocational schools in IE and MT).

Fig. 4.11b: Teachers reporting having spent no time at all on ICT related professional development activities during the past two years
(in % of students, grade 8, by country, 2011-12)
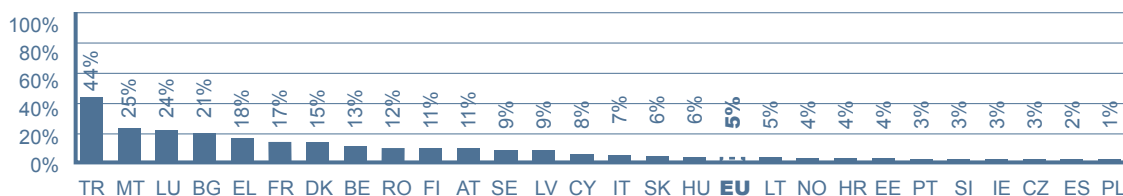
Fig. 4.11c: Teachers reporting having spent no time at all on ICT related professional development activities during the past two years
(in % of students, grade 11 general, by country, 2011-12)
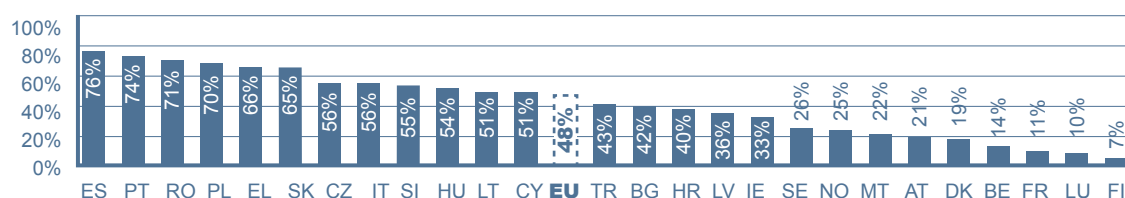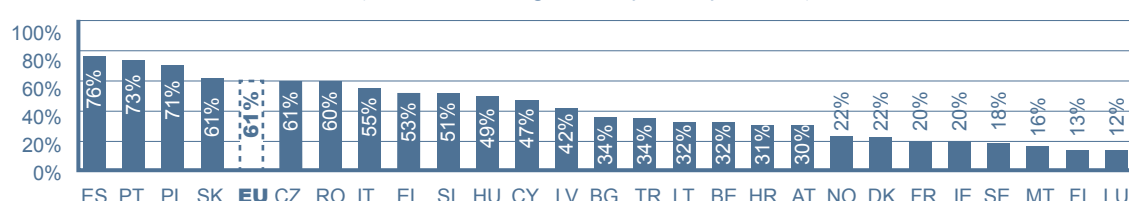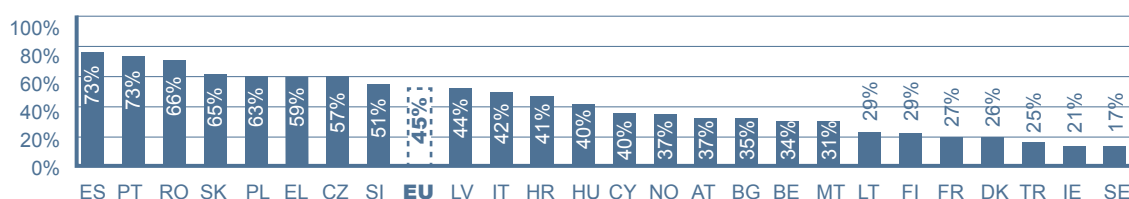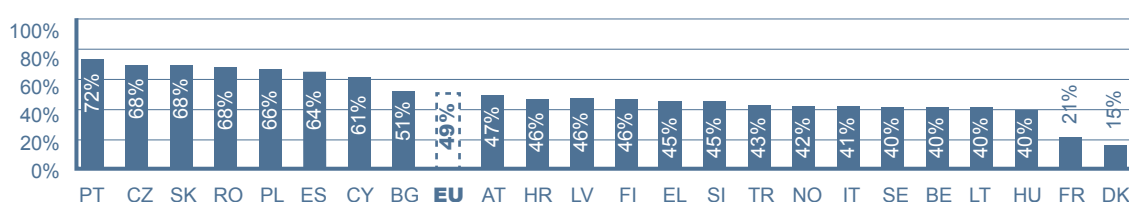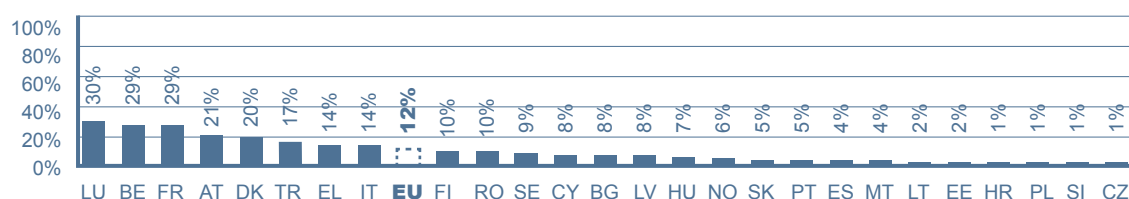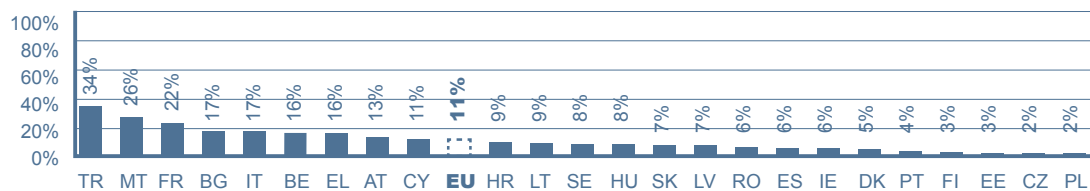

Fig. 4.11d: Teachers reporting having spent no time at all on ICT related professional development activities during the past two years
(in % of students, grade 11 vocational, by country, 2011-12)
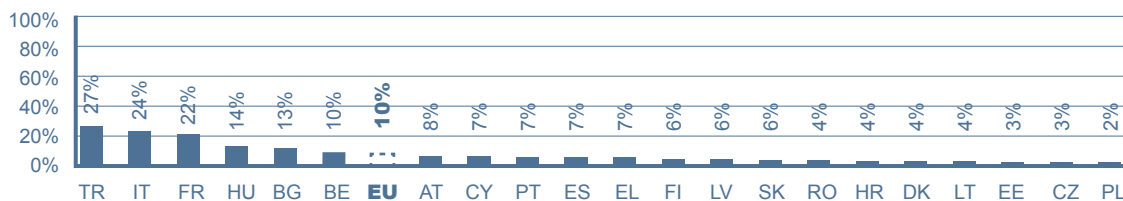
Teachers' confidence in using ICT

Although measuring teachers' confidence in relation to various ICT skills as this survey does, is not the same as measuring their actual competence in these areas, it is nevertheless important as it is a component of their competence and can have some potential influence on the frequency with which teachers use ICT based activities for T&L within the classroom, as the results in this section show.

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 categorised as operational and social media skills.

Operational ICT skills are the fundamental skills needed to use generic ICT tools (e.g. Word, Excel, Outlook, PowerPoint) to function in the information society and in working life. They therefore include key computer and internet skills. For the purposes of this survey, teachers' operational ICT skiils 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.

Social media skills enable users to interact and collaborate with each other as consumers of user-generated content in a virtual community. For the purposes of this survey, teachers' social media skills are more precisely defined as consisting of 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)
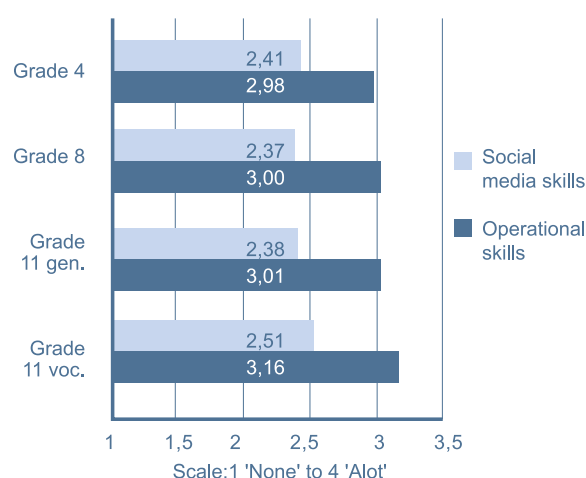
As Figure 4.12 illustrates, the mean score of students across grades taught by teachers who are confident in using social media is substantially lower than those taught by teachers confident in operational ICT.

The mean scores of students at grade 11 (vocational education) taught by teachers expressing confidence in their operational ICT skills as well as in using 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 use of ICT increases slightly with students' age. The mean score of students taught by teachers confident in social media however decreases at grade 4, and further still at grades 8 and 11 (general education).

As illustrated in Figure 4.13[81] below, the mean score of students taught by teachers declaring confidence in their operational use of ICT 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. 4.13a: Teachers' confidence in their operational skills
(mean score of students, grade 4, by country, 2011-12)

Fig. 4.13b: Teachers' confidence in their operational skills
(mean score of students, grade 8, by country, 2011-12)

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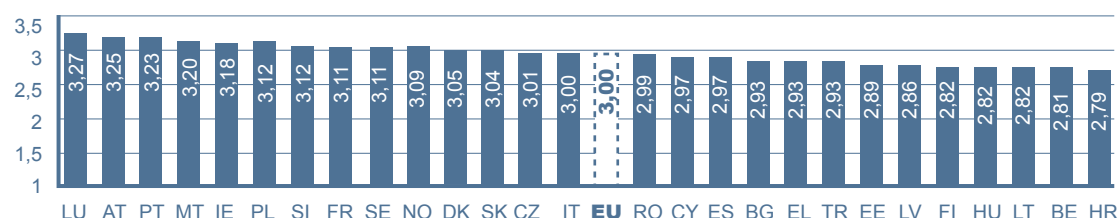
81   At grade 11 vocational there are no separate vocational schools in IE and MT.

Fig. 4.13c: Teachers' confidence in their operational skills
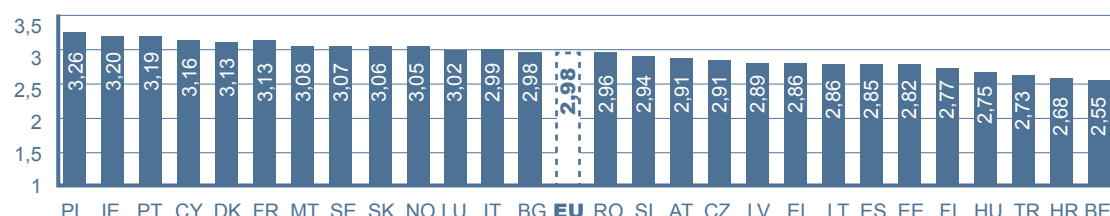(mean score of students, grade 11 general, by country, 2011-12)

	LU	MT	AT	FR	PT	SI	CY	PL	ES	SK	DK	RO	SE	EU	IE	CZ	NO	BE	FI	EL	EE	IT	BG	HU	HR	LV	LT	TR
	3,53	3,35	3,32	3,22	3,16	3,15	3,12	3,06	3,06	3,05	3,03	3,01	3,01	**3,01**	3,00	2,99	2,96	2,95	2,95	2,95	2,92	2,91	2,90	2,90	2,88	2,88	2,79	2,64

Fig. 4.13d: Teachers' confidence in their operational skills
(mean score of students, grade 11 vocational, by country, 2011-12)

	AT	PT	PL	SK	LU	FR	LV	ES	BG	CZ	RO	SI	EU	NO	TR	FI	EL	SE	IT	CY	LT	HU	EE	DK	BE	HR
	3,49	3,46	3,36	3,32	3,31	3,28	3,24	3,21	3,19	3,19	3,18	3,18	**3,16**	3,15	3,15	3,14	3,13	3,1	3,09	3,08	3,05	2,99	2,98	2,95	2,91	2,87

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 using social media (see Fig. 4.14[82]). 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 using social media 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. 4.14a: Teachers' confidence in their social media skills
(mean score by student, grade 4, country and EU level, 2011-12)

1 'None', 2 ' A little', 3 'Somewhat', 4 'a lot'	IE	NO	EE	FI	SK	PL	FR	SE	IT	PT	ES	BG	EU	CY	TR	RO	LT	DK	LU	SI	MT	HR	EL	BE	HU	AT	CZ	LV
	2,82	2,70	2,69	2,68	2,60	2,59	2,58	2,51	2,50	2,50	2,48	2,44	**2,41**	2,40	2,40	2,30	2,27	2,23	2,21	2,19	2,18	2,15	2,06	2,04	2,03	1,96	1,95	1,92

Fig. 4.14b: Teachers' confidence in their social media skills
(mean score by student, grade 8, country and EU level, 2011-12)

1 'None', 2 ' A little', 3 'Somewhat', 4 'a lot'	EE	TR	SE	FI	IE	NO	SK	DK	MT	LU	PT	SI	PL	ES	FR	RO	EU	IT	BG	HR	LT	AT	EL	CZ	HU	CY	BE	LV
	2,75	2,69	2,66	2,59	2,57	2,56	2,53	2,51	2,51	2,48	2,48	2,48	2,43	2,41	2,38	2,37	**2,37**	2,34	2,27	2,21	2,19	2,15	2,15	2,13	2,13	2,08	1,93	1,79

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82   At grade 11 vocational there are no separate vocational schools in IE and MT.

Fig. 4.14c: Teachers' confidence in their social media skills
(mean score by student, grade 11 general, country and EU level, 2011-12)

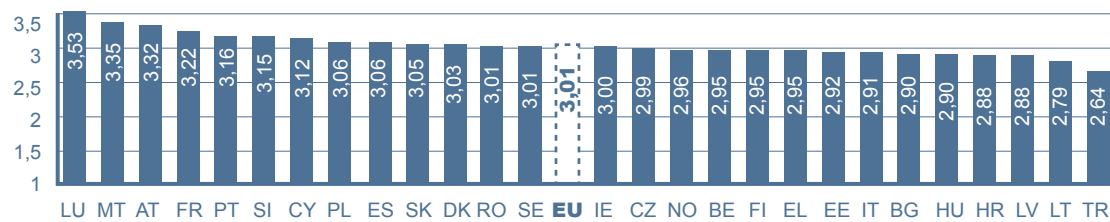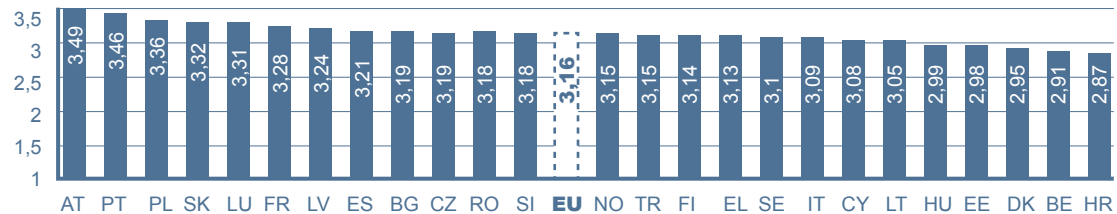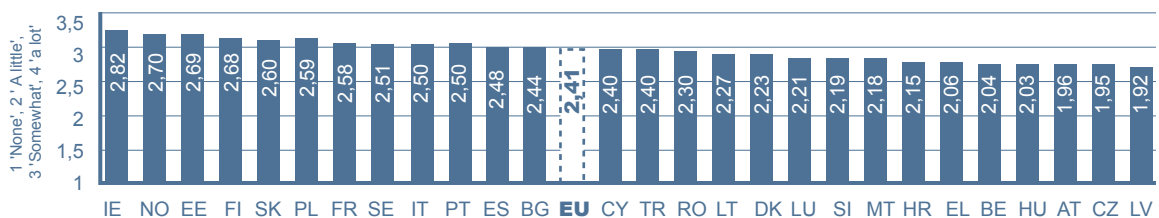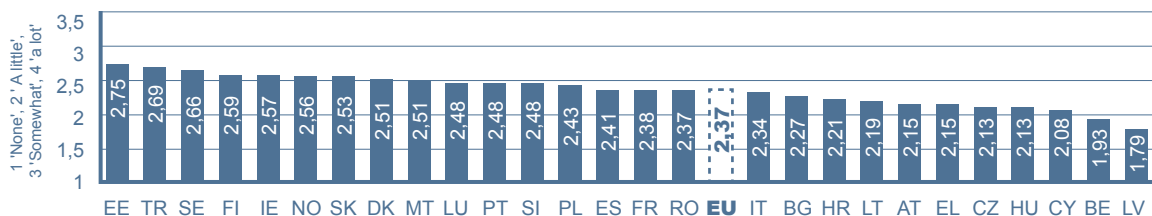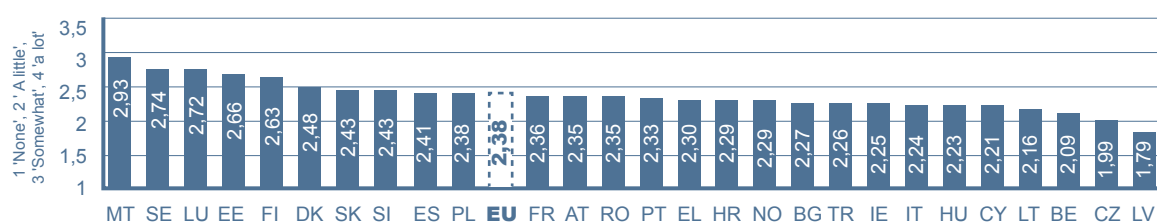**Fig. 4.14d: Teachers' confidence in their social media skills**
(mean score by student, grade 11 vocational, country and EU level, 2011-12)
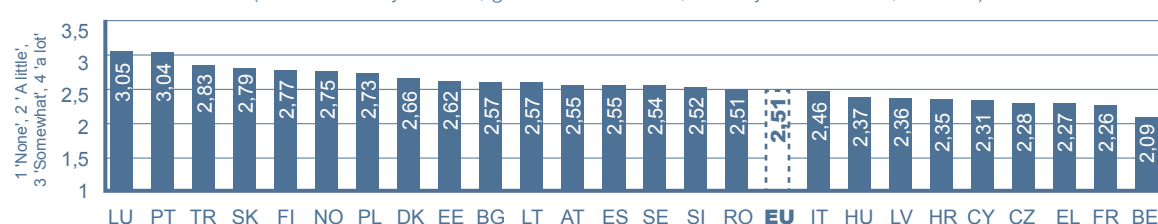
TEACHERS' CONFIDENCE IN USING ICT: SOME CORRELATIONS

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). This shows that at all grades, teachers who participate in ICT-related professional development tend to have more confidence in their ICT operational and social media skills. 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). This demonstrates that at almost all grades, the more time teachers spend on professional development, the more they tend to feel confident in their operational ICT skills. Teachers at grade 11 (vocational education) who spend more time on professional development also tend to feel more confident about their social media skills.

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). This illustrates that at all grades, the more confident teachers are in their ICT operational and social media skills, the more they tend to use ICT based activities with the target class.

Students' confidence in using ICT

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 and social media skills (as found in the teachers' data and defined accordingly, 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)
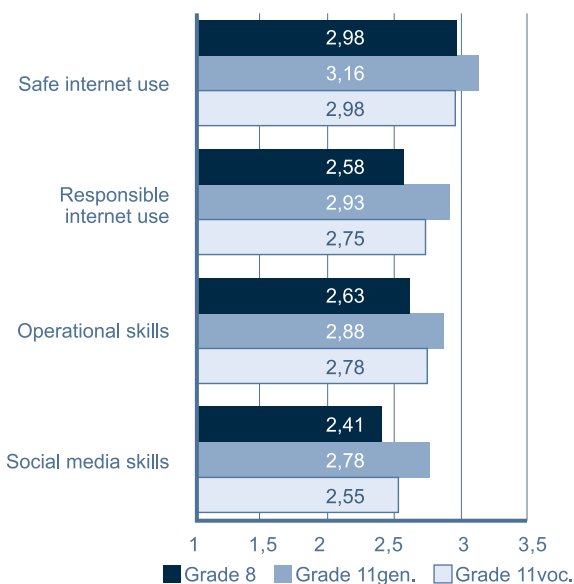
As is clear from Figure 4.15, at EU level, students across all grades have a higher mean score in their confidence to use the internet safely, than in any other ICT skill surveyed. Conversely, students across all grades have a lower mean score in their confidence to use social media, compared to any other ICT skills, particularly at grade 8. Grade 11 (general education) students' confidence mean score is consistently higher across all ICT skills surveyed, while grade 8 students' score is consistently lower.

As Figures 4.16a-c[83] show, 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. 4.16a: Students' confidence in their ability to use the internet safely
(mean score of students, grade 8, country and EU level, 2011-12)

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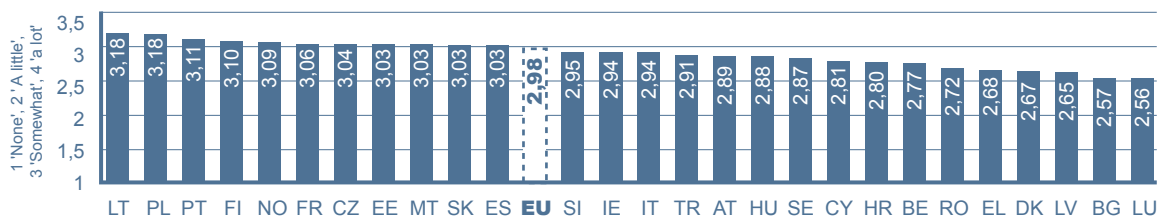
83   There are no separate vocational schools in IE and MT.

Fig. 4.16b: Students' confidence in their ability to use the internet safely
(mean score of students, grade 11 general, country and EU level, 2011-12)
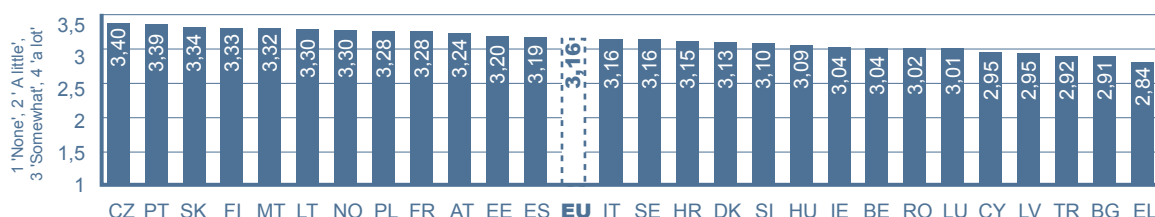
Fig. 4.16c: Students' confidence in their ability to use the internet safely
(mean score of students, grade 11 vocational, country and EU level, 2011-12)
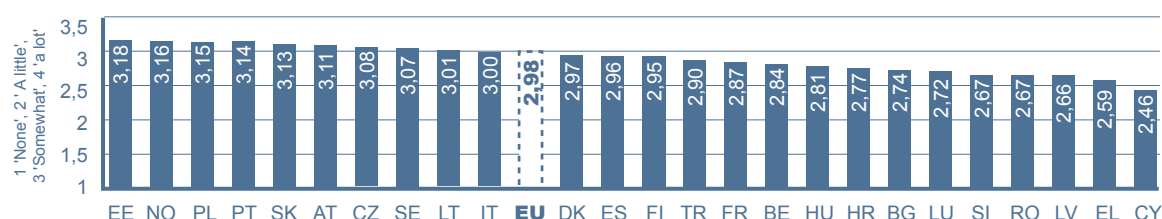
Students across all grades in Poland have a high mean score with regards their confidence in using the internet responsibly (see Fig. 4.17[84]). Swedish and Norwegian students also have a rather high mean score at grade 11 (general and vocational education). Countries which stand out because students 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. 4.17a: Students' confidence in their ability to use the internet responsibly
(mean score of students, grade 8, country and EU level, 2011-12)
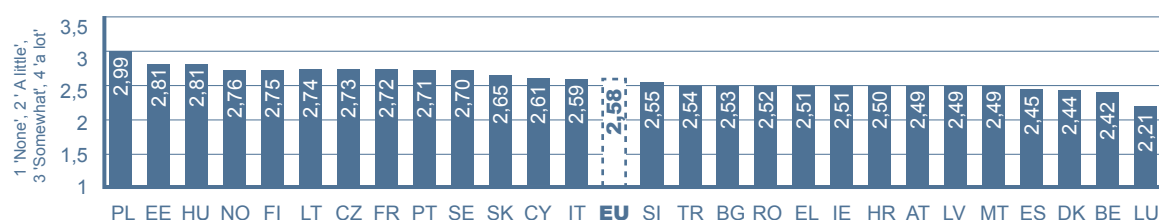
Fig. 4.17b: Students' confidence in their ability to use the internet responsibly
(mean score of students, grade 11 general, country and EU level, 2011-12)

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84   There are no separate vocational schools in IE and MT.
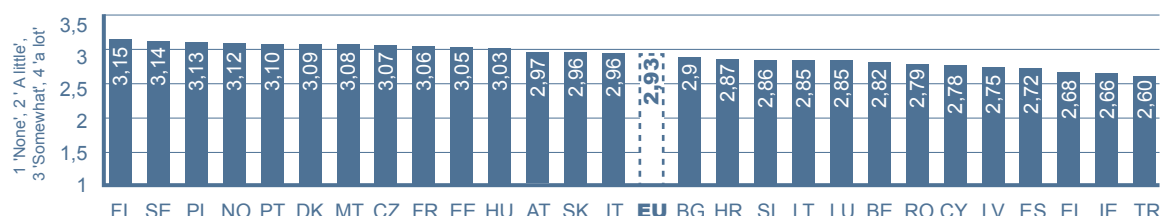
Fig. 4.17c: Students' confidence in their ability to use the internet responsibly
(mean score of students, grade 11 vocational, country and EU level, 2011-12)
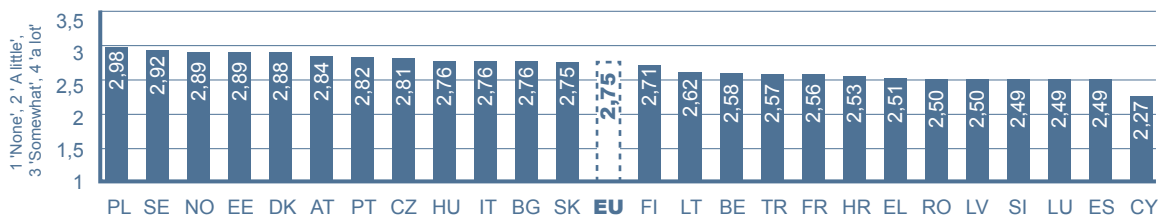
As illustrated in Figure 4.18[85] below, students across all grades in Poland and Portugal have a high mean score in their confidence to perform operational tasks related to ICT use. In Austria students at grade 11 (both general and particularly vocational education) have a high mean score, while in 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. 4.18a: Students' confidence in their operational use of ICT
(grade 8, country and EU level, 2011-12)
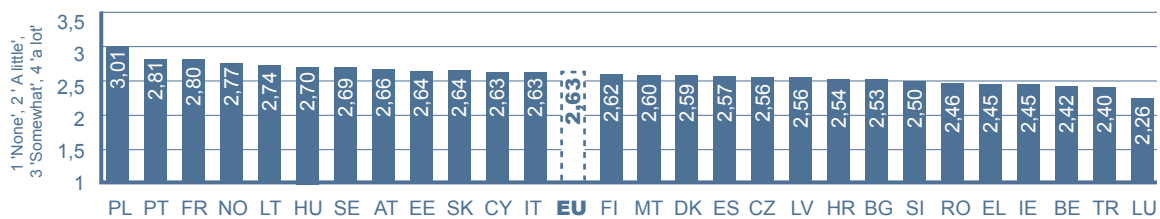
Fig. 4.18b: Students' confidence in their operational use of ICT
(grade 11 general, country and EU level, 2011-12)
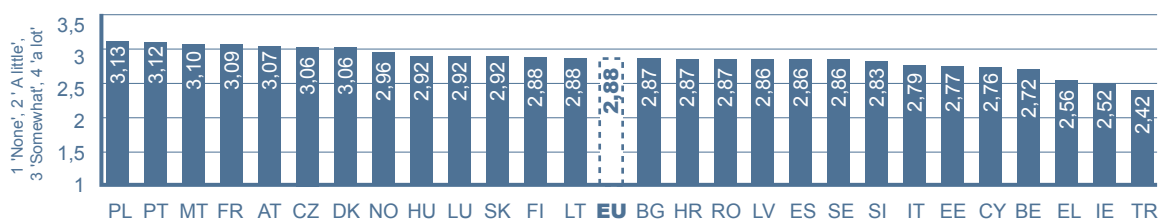
Fig. 4.18c: Students' confidence in their operational use of ICT
(grade 11 vocational, country and EU level, 2011-12)

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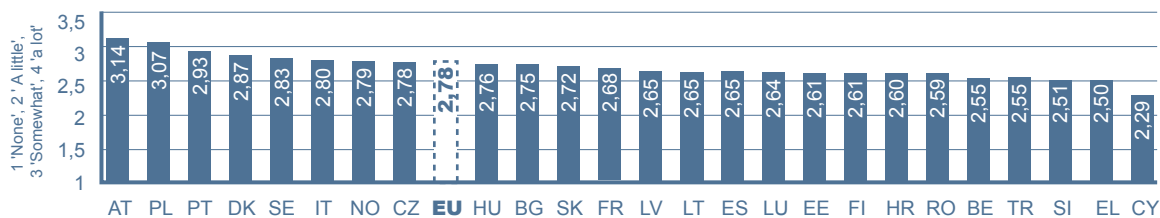
85   There are no separate vocational schools in IE and MT.

In Poland students across all grades stand out as having the highest mean score with regards their confidence in using social media (see Fig. 4.19a-c[86]). 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 social media.

Fig. 4.19a: Students' confidence in using social media
(grade 8, country and EU level, 2011-12)

y-axis: 1 'None', 2 'A little', 3 'Somewhat', 4 'a lot'

PL	EE	SE	PT	FI	HU	LT	FR	NO	SK	LV	HR	**EU**	RO	CZ	AT	BG	IE	ES	CY	SI	DK	TR	IT	EL	MT	LU
2,82	2,72	2,66	2,65	2,64	2,63	2,60	2,59	2,59	2,51	2,43	2,41	**2,41**	2,40	2,36	2,35	2,35	2,35	2,35	2,30	2,27	2,25	2,24	2,23	2,22	2,18	2,08
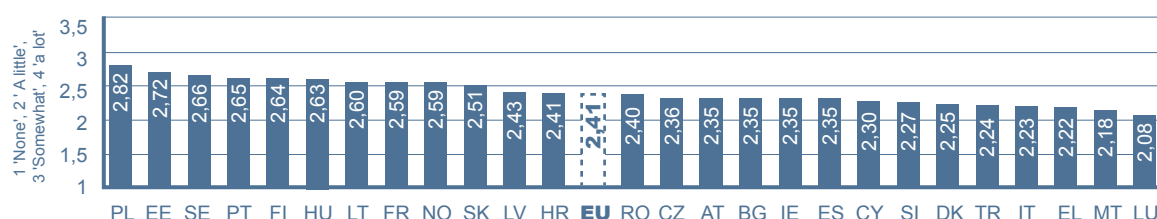
Fig. 4.19b: Students' confidence in using social media
(grade 11 general, country and EU level, 2011-12)

y-axis: 1 'None', 2 'A little', 3 'Somewhat', 4 'a lot'

PL	EE	FI	SE	PT	FR	NO	CZ	SK	HR	HU	**EU**	ES	AT	DK	LT	BG	MT	LV	RO	IT	LU	SI	BE	CY	IE	EL	TR
3,03	2,97	2,97	2,97	2,95	2,94	2,90	2,89	2,89	2,86	2,80	**2,78**	2,77	2,76	2,76	2,75	2,73	2,73	2,69	2,69	2,64	2,63	2,62	2,59	2,47	2,44	2,33	2,29
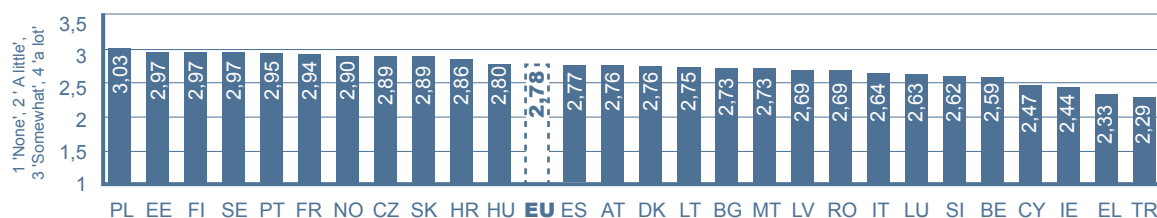
Fig. 4.19c: Students' confidence in using social media
(grade 11 vocational, country and EU level, 2011-12)

y-axis: 1 'None', 2 'A little', 3 'Somewhat', 4 'a lot'

PL	SE	AT	NO	PT	EE	SK	HU	**EU**	CZ	BG	LT	FI	FR	IT	DK	LV	HR	ES	RO	EL	SI	BE	TR	LU	CY
2,86	2,76	2,71	2,71	2,71	2,69	2,65	2,57	**2,55**	2,54	2,53	2,50	2,49	2,48	2,47	2,45	2,45	2,43	2,43	2,39	2,38	2,35	2,30	2,28	2,25	2,24
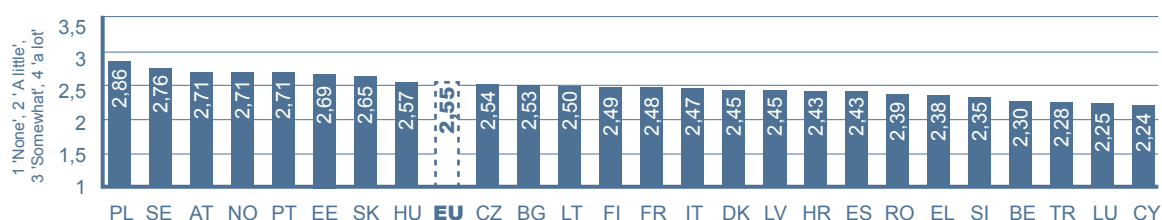
This section explored teachers' professional development in the area of ICT, as well as teachers' and students' self-reported confidence in their operational and social media skills.

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86   Excl. BE at grade 8. There are no separate vocational schools in IE and MT.

5. School policies, strategies, incentives and support

Evidence from research (SITES 2006) shows that for ICT to be effectively used for the benefit of teaching and learning, its use has to be part of the school vision and supported by specific policies and strategies. More importantly, the vision has to be defined around educational goals, shared at the whole school level and implemented through different types of specific measures such as incentives and the availability of support for ICT use during lessons. This section reviews these issues in countries covered by the survey, scrutinising general and specific strategies, incentives and support, as reported by school heads, and in some cases by teachers as well.

Summary of findings

- **School leaders and teachers discuss the use of ICT for teaching and learning (T&L)**: just over **one in two students are in such a school**. **Formalised school policies** (written statements) about using ICT in general or specifically in subjects also **exist to a similar extent** and concern around 50% of the students at all grades. **Over-arching formal school policies** covering ICT use in general, its concrete use in T&L *and* in subjects, are **much less frequently found**: only around 20% of students are in such schools. Higher percentages of students are in this situation in Denmark, Turkey, and Slovenia, lower in Austria, Croatia, Italy and Greece. The picture is fairly similar throughout the grades.

  These findings imply that there is a strong case for further increasing efforts at school level to develop strategies concerning the use of ICT in T&L in order to benefit the large majority of students, which is obviously not yet the case. Such strategies can - and will - vary between countries in order to fit governance and regulation modes, but need to be widespread as well as more holistic.

- **There are plans and measures to support collaboration between teachers in schools, but still to a limited extent, and not affecting most students**. Around 50% of students are in schools where there is a policy to promote cooperation between teachers or time scheduled for them to share, evaluate or develop instructional material and approaches. Around 35% of students are in schools having both, i.e. a policy and scheduled time. In Romania and Italy, the percentages are higher, unlike in Austria where such an approach is much less frequent. The picture does not differ very much between grades.

  Here again, initiatives to support increased teacher collaboration need to be widespread, under conditions appropriate to each education system. For students to benefit, such collaboration is most urgently needed for pedagogical practices involving integrating not only new digital learning objects but also new teaching and learning methods made possible by the use of ICT.

- **Schools are adopting policies about responsible internet use and, to a lesser extent, the use of social networks for T&L**. A majority of students (60%) are in schools where there is a policy about responsible internet use; a large minority of students (40%) are in schools where a policy about safe internet use exists. Around 30% of students are in schools which have both. Slovakia, Croatia and Austria have the highest percentages of students going to schools which have both.

  A large-scale European survey such as this one cannot investigate in detail what this really means and it is certainly an **issue to be investigated further in order better to understand the components and approaches adopted by such policies** and for example why policies on the responsible use of the internet appear to exist slightly more often at grade 8.

- **The two most frequent incentives used to reward teachers for using ICT in T&L are additional ICT equipment for the class and additional training hours**; the older the students, the more frequently they are used. Between 30% and 45% of students are in schools implementing one or the other, and between 20% and 25% have both. **Competitions and prizes, as well as financial incentives are less frequent**; between 10% and 20% of students are in schools which use 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**.

- **Initiatives to support innovation appear to be much more widespread than might be expected**

judging by the frequency of opinions expressed about the lack of innovation in education systems. Around 75% of students are in schools where school heads declare that initiatives to support innovation, i.e. change within school and in the educational system – not necessarily related to ICT – are implemented (this situation is nevertheless **less frequent at grade 4**). As regards change management training programmes, between 45% and 50% of students are in schools which have organised them in the last three years, but here again to a more limited extent at grade 4. Such change management programmes are particularly frequent in Estonia, Slovenia, Romania and Poland, possibly reflecting longer term processes to adapt the education systems inherited from the past to new global environments.

Such a hypothesis, as well as **what these school policies, initiatives and programmes aimed to support innovation consist of, could be investigated further** with a suitable methodology (case studies, for example).

- **ICT coordinators are frequently to be found in schools**: between 65% and 80% of students are in schools where there is an ICT coordinator (slightly less at grade 4), **full time in only one case out of two** (even less at grades 4 and 8), **rewarded in one case in two,** and **providing pedagogical support in three cases out of four**.

School policies and strategies

Depending the type of governance prevailing education systems, informal discussions about ICT use in teaching and learning (T&L) and/or implementation of support measures and/or the more formal existence of written statements about it are important elements to support ICT integration into lessons at school level.

The school heads' questionnaire 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, scheduled time for teachers to meet to share and develop approaches, responsible use of the internet and social network policies, etc.), with a 'yes/no' type of answer.

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

- around **60% of students** at all grades are in schools where regular discussions between school leaders and teachers about ICT in T&L take place;
- around **50% of students** at all grades are in schools where a written statement about ICT use in general or 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 teaching and learning (T&L)
(all grades, in % of students, EU level, 2011-12)
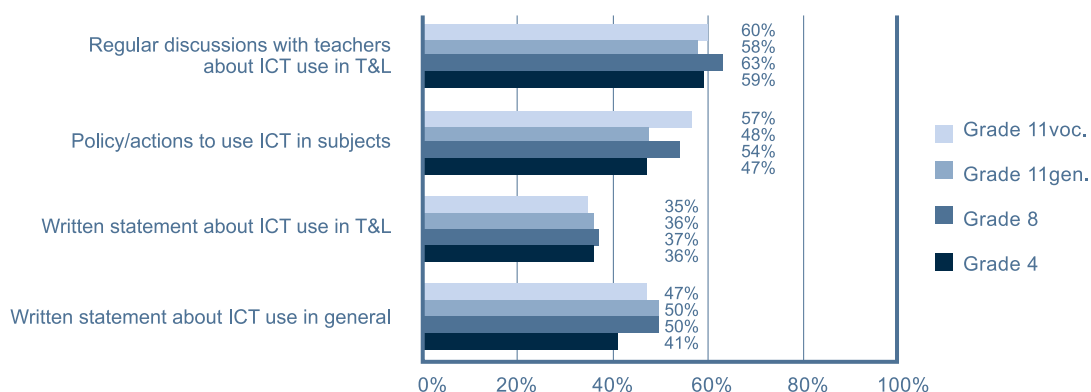
Looking at the co-existence of these strategies within a school (see fig. 5.2):

- around **25-30% 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, in T&L AND in subjects.

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

Written statement about ICT use in general and in T&L: 29%, 29%, 32%, 34%

Written statement about ICT use in general and in subjects: 27%, 26%, 29%, 27%

Written statement about ICT use in T&L and in subjects: 22%, 23%, 23%, 24%

ALL three strategies about ICT use (in general, in T&L, in subjects): 20%, 20%, 22%, 22%

Legend: Grade 11voc. / Grade 11gen. / Grade 8 / Grade 4

Figures 5.3a to 5.3d[88] illustrate the extent to which the situation varies depending on the country. The figure shows the percentages of students in schools which have a written statement about ICT use in general, specifically in T&L and in subjects.
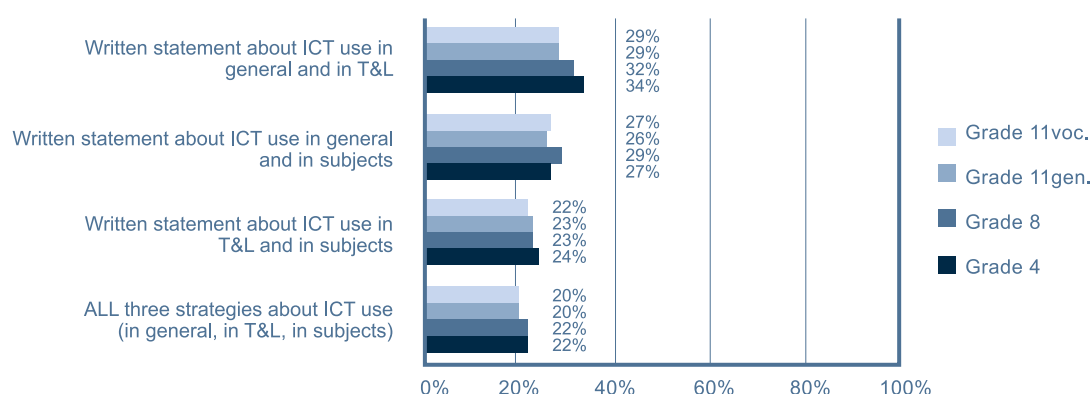
Compared to the EU level where around 20% of students are in schools where there are such statements about ICT use in general, in T&L and in subjects, around 40% of students are in such schools in Denmark and Turkey at grades 4 and 8 and around 55% in Slovenia at grade 11; conversely, at all or several grades between 5% and 10% of students are in such schools in Austria, Croatia, Italy and Greece.

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

Denmark 41%, Turkey 39%, Finland 37%, Romania 33%, Spain 33%, Latvia 32%, Norway 32%, Bulgaria 31%, Slovakia 31%, Lithuania 30%, Malta 28%, Ireland 27%, Czech_Rep 26%, Hungary 25%, Estonia 22%, EU 22%, Poland 21%, Slovenia 21%, Belgium 19%, Cyprus 19%, Portugal 17%, Sweden 17%, Greece 14%, France 8%, Italy 7%, Croatia 4%, Austria 3%

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

Denmark 49%, Turkey 38%, Romania 36%, Slovenia 34%, Belgium 32%, Ireland 32%, Lithuania 32%, Slovakia 32%, Austria 31%, Czech_Rep 31%, Bulgaria 30%, Finland 28%, Latvia 28%, Hungary 26%, Portugal 25%, Spain 22%, EU 22%, Poland 20%, Cyprus 19%, Estonia 19%, Norway 18%, France 17%, Malta 17%, Croatia 9%, Italy 8%, Greece 5%, Sweden 3%

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

Slovenia 55%, Finland 44%, Portugal 40%, Latvia 37%, Romania 37%, Norway 34%, Turkey 34%, Denmark 33%, Bulgaria 29%, Poland 29%, Lithuania 28%, Belgium 25%, Estonia 25%, Czech_Rep 21%, Spain 21%, France 20%, Slovakia 20%, EU 20%, Cyprus 19%, Hungary 19%, Ireland 14%, Austria 11%, Greece 7%, Croatia 4%, Italy 4%

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88   Fig. 5.3a excl. LU, fig. 5.3c excl LU, MT and SE (insufficient data). In fig. 5.3d IE and MT are not included as there are no separate vocational schools in these countries
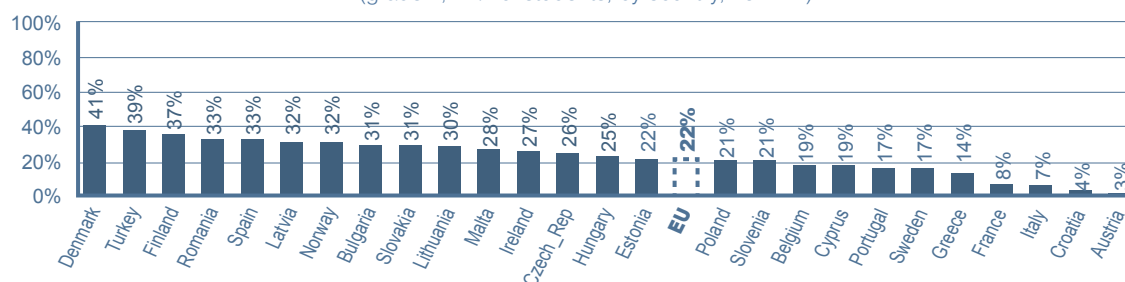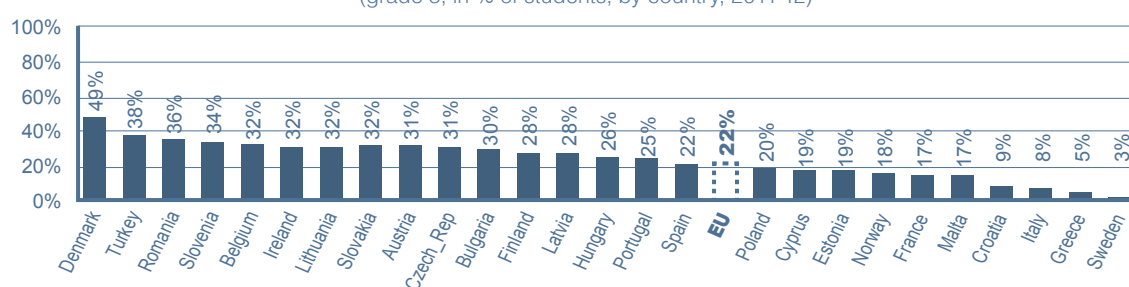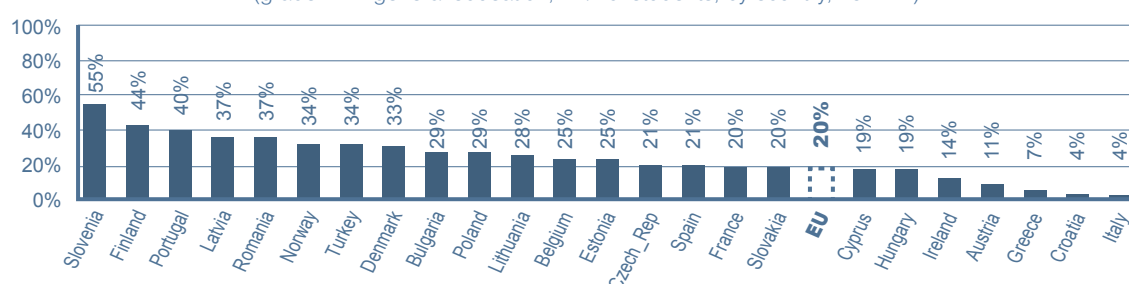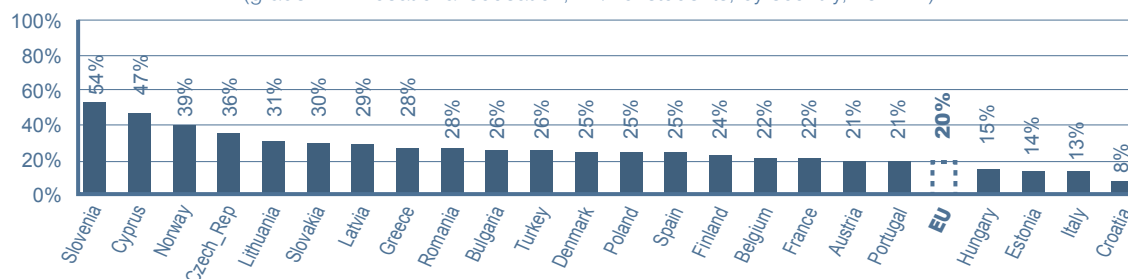
Fig. 5.3d: All three strategies about ICT use (in general, in T&L and in subjects) implemented within the school
(grade 11 in vocational education, in % of students, by country, 2011-12)

As shown in the previous fig. 5.1, school heads often report regular discussions with teachers about ICT use in T&L. It is interesting to note that this time according to what teachers report at EU level (see fig. 5.4), around 75% of students go to a school where teachers declare that there is a shared vision at whole school level about ICT use. The teacher questionnaire asks them if they share a common vision about integrating ICT in T&L at their school with colleagues, the school head and other staff (question TE17).

Fig. 5.4: School shared vision about ICT use, according to teachers
(in % of students, EU level)
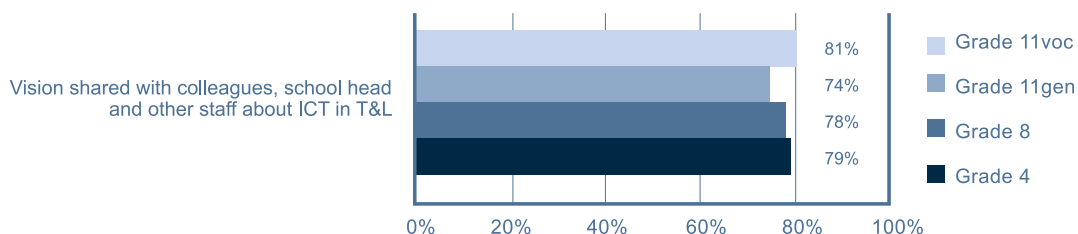
Implementing a vision and strategies to support ICT use in T&L as well as in subjects requires adapting teaching approaches; a challenge that can be usefully supported by specific strategies at the whole school level to allow teachers to cooperate and/or have time planned for it.

At EU level and according to what school heads report (still under question SC18):

- around **50% of students** are in schools where one of the two strategies is implemented (see fig. 5.5);
- around **35% of students** are in schools where the two strategies are combined (see fig. 5.6).

Fig. 5.5: Specific strategies to support ICT use through collaboration among teachers
(all grades, in % of students, EU level, 2011-12)
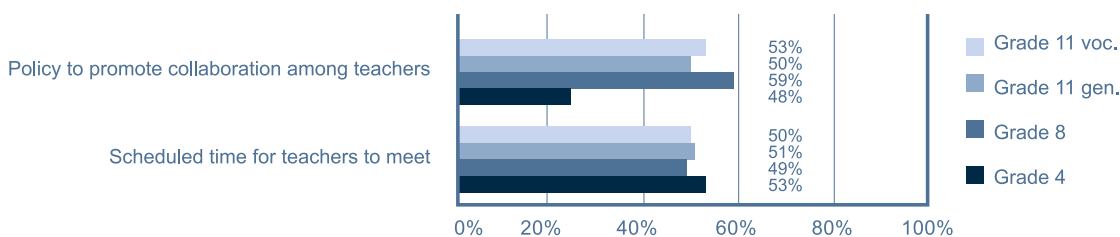
Fig. 5.6: Specific strategies to support collaboration among teachers combined
(all grades, in % of students, EU level, 2011-12)
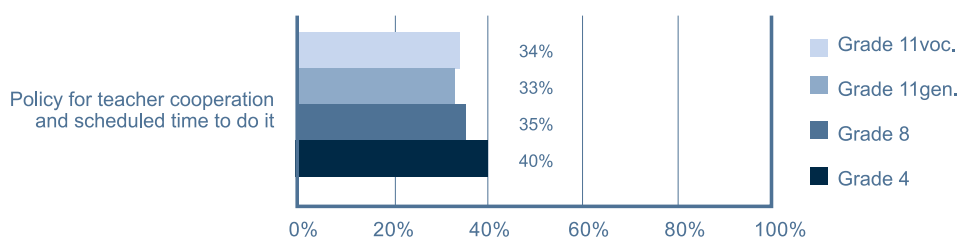
Figures 5.7a to 5.7d89 illustrate the diversity between countries, and in some countries between grades, about this issue. In Romania, around 60-65% of students at all grades go to a school where there is a specific strategy to support teacher collaboration as well as time planned for it; conversely, in Austria at grades 4, 8 and 11 in general education, only between 5% and 13% of students are in this situation.

Fig. 5.7a: Specific strategies to support collaboration among teachers combined
(grade 4, in % of students, EU level, 2011-12)
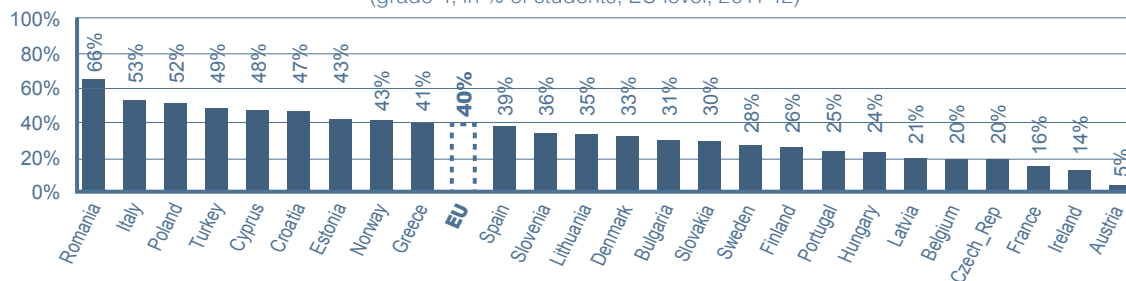
Fig. 5.7b: Specific strategies to support collaboration among teachers combined
(grade 8, in % of students; EU level, 2011-12)
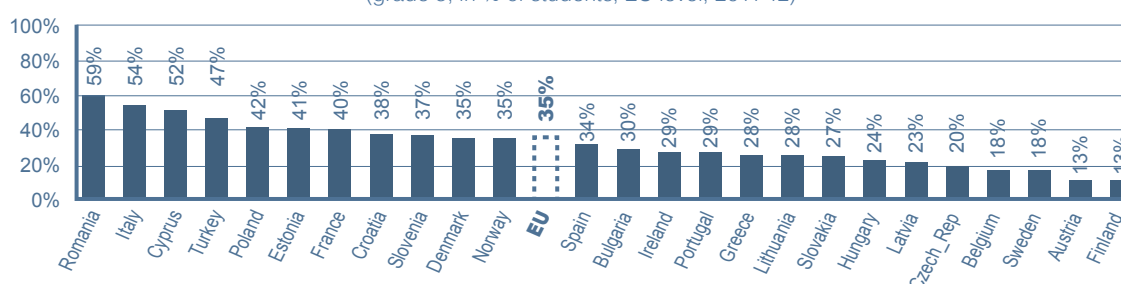
Fig. 5.7c: Specific strategies to support collaboration among teachers combined
(grade 11 general education, in % of students, EU level, 2011-12)
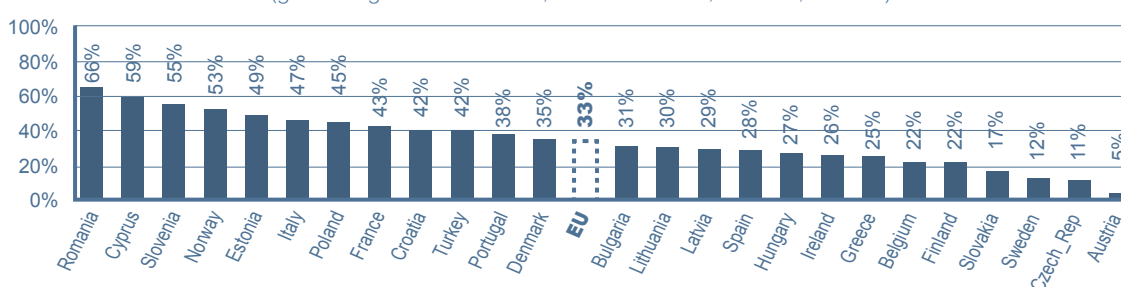
Fig. 5.7d: Specific strategies to support collaboration among teachers combined
(grade 11 in vocational educationi, in % of students, EU level, 2011-12)
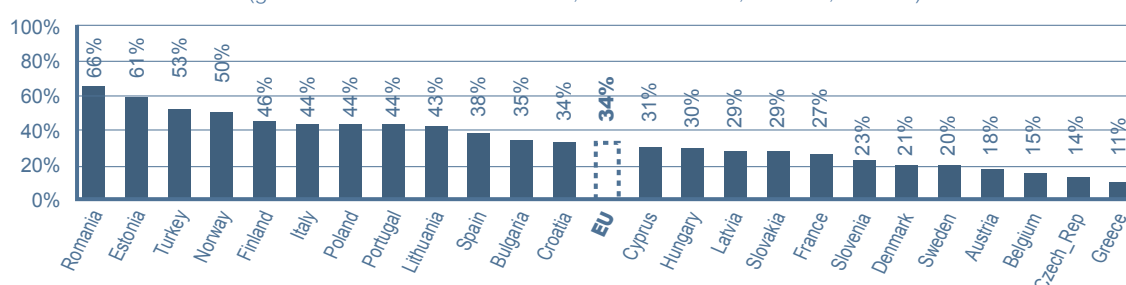
Another type of specific strategy that could reveal an integration of ICT use in T&L is the existence of a specific policy concerning the responsible use of the internet and/or social networks.

At EU level:

- Around **65% of students** (slightly more at grade 8) are in schools which have a specific policy about the responsible use of the internet; **around 40% of students** (only 25% at grade 4) are in schools which have a specific policy about the use of social networks (see fig. 5.8);
- Around **30% of students** are in schools which have both (see fig. 5.9).

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89   Data missing for LU and MT (insufficient data).

Fig. 5.8: Specific strategies about responsible internet and social networks
(in % of students, EU level, 2011-12)
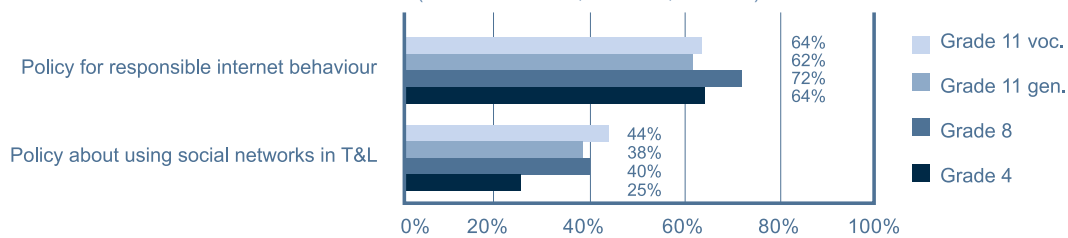
Fig. 5.9: Specific strategies about responsible internet and social networks combined
(all grades; in % of students, EU level, 2011-12)
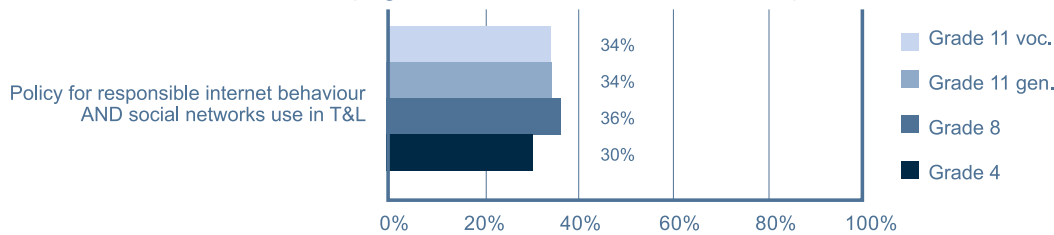
Figures 5.10a to 5.10d90 illustrate, again, the diversity between countries, and in some countries between grades, about this issue. In Slovakia, at all grades, between around 60% and 75% of students, as well as between 60% and 65% of students in Croatia at grades 4 and 8, and in Austria at grade 8, are in schools with 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 : Specific strategies about responsible internet and social networks
(grade 4, in % of students, EU level, 2011-12)
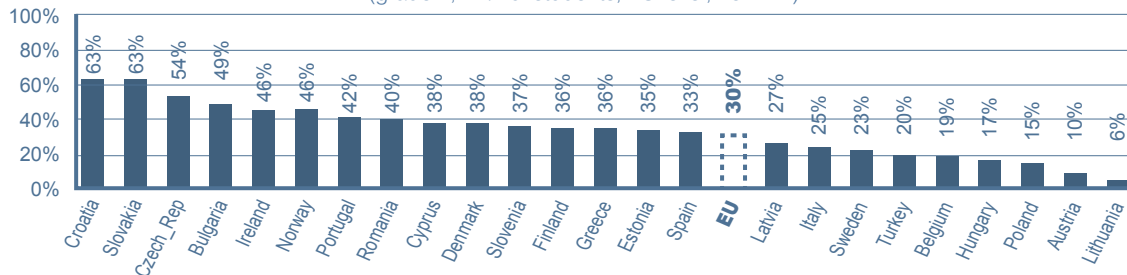
Fig. 5.10b: Specific strategies about responsible internet and social networks
(grade 8, in % of students, EU level, 2011-12)
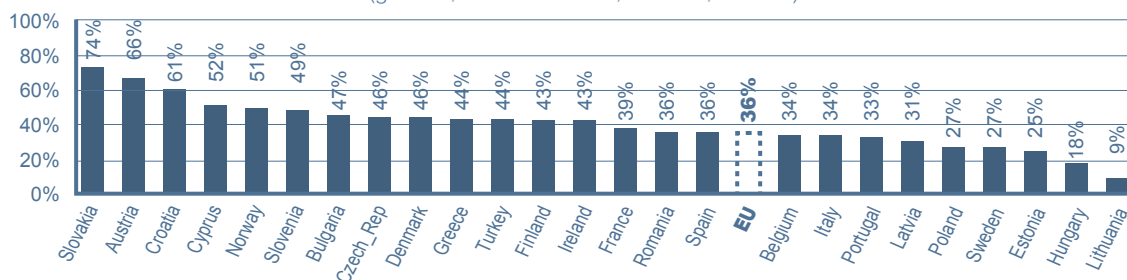
Fig. 5.10c: Specific strategies about responsible internet and social networks
(grade 11 general education, in % of students, EU level, 2011-12)

90   Data missing for LU and MT at all grades, and for FR (grade 4).
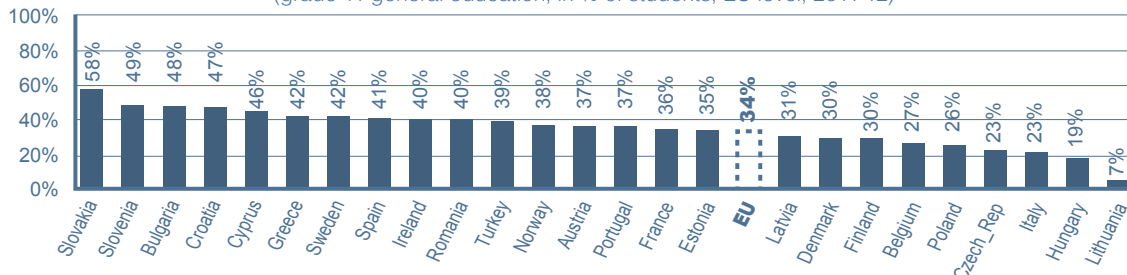
Fig. 5.10d: Specific strategies about responsible internet and social networks
(grade 11 vocational education, in % of student, EU level, 2011-12)
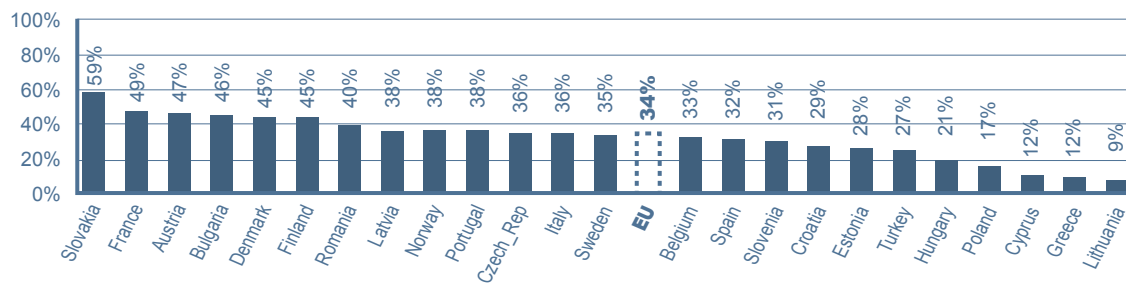
Incentives to reward teachers

Because of the differences between countries as regards governance and regulation, written statements about ICT 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 scrutinising strategies to support ICT use in T&L.

The school heads' questionnaire 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 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 30% and 45% of students** are in schools using one or the other; in both cases, the more grades increase, the more frequently they are used. **Around 20-25% of students** are in schools using both. Competitions and prizes, as well as financial incentives are much less frequently encountered, and a reduction of teaching hours is even less widespread.

Fig. 5.11: Incentives to reward teachers' use of ICT in T&L
(all grades, in % of students, EU level, 2011-12)
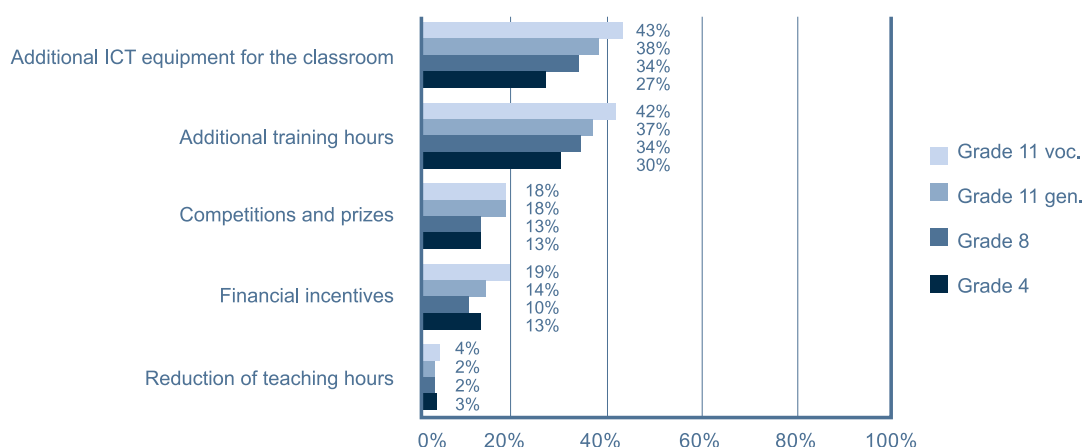
Fig. 5.12: Incentives combined to reward teachers' use of ICT in T&L
(all grades, in % of students, EU level, 2011-12)
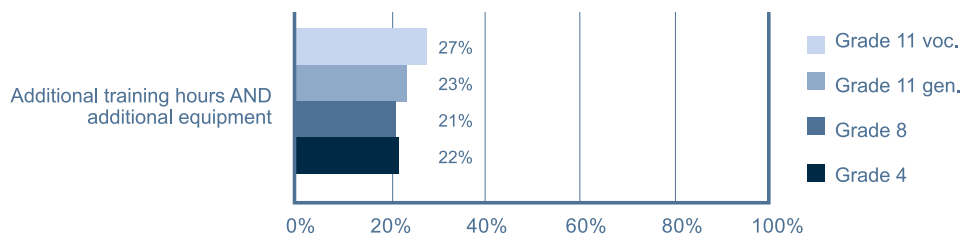
Again, because of the specificities of each education system, the situation in this area varies a lot between countries, as shown by figures 5.13a and 5.13b[91], illustrating the situation specifically at grade 11 in general education.

In Estonia, Slovenia, Lithuania and Poland, between 75% and 90% of students go to a school which uses 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 Poland, but less frequently in the other three countries, and even more rarely in Lithuania; they are also frequently used in the Czech Republic, Italy and Finland.

Fig. 5.13a: Additional ICT equipment or training hours as incentives to reward teachers' use of ICT in T&L
(grade 11 in general education, in % of students, by country, 2011-12)
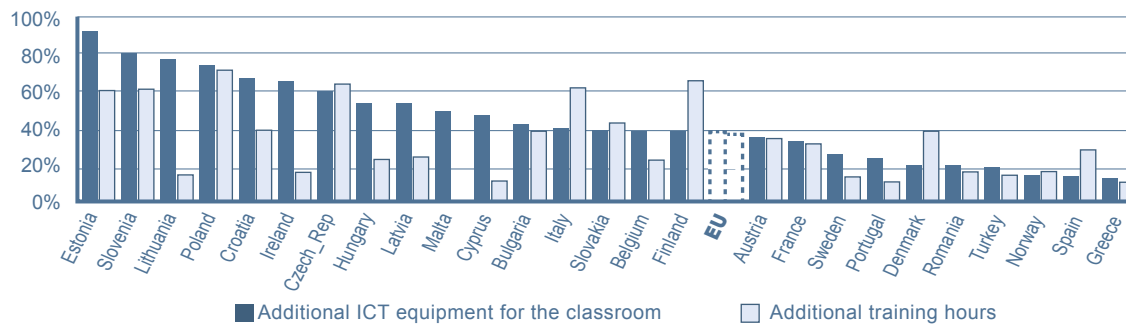
Very few countries use financial incentives and, even less, competitions and prizes. The use of financial incentives is mostly observed in Poland, Estonia, Italy, Slovenia, the Czech Republic, and Finland; all of which are countries already identified as using additional equipment and/or additional training hours rather frequently. 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 more frequent in Central European education systems.

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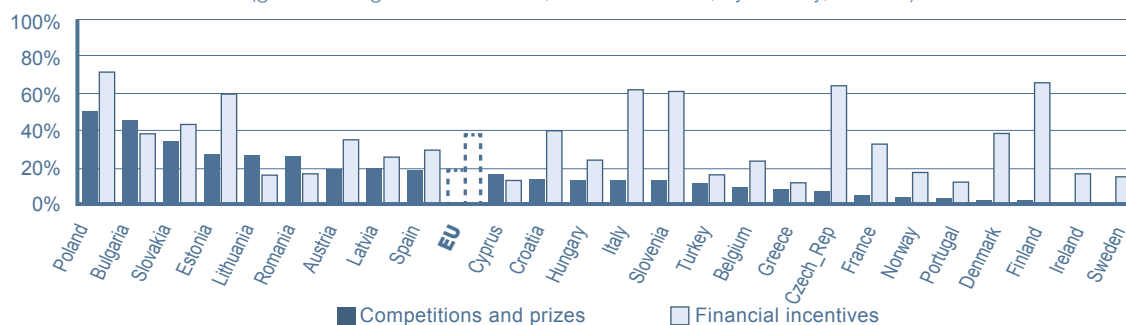
Innovation policy

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

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91   IE and MT are not included at grade 11 vocational as there are no separate vocational schools in these countries.

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

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

- **Between 75% and 80% of students** at grades 8 and 11 go to a school where initiatives to encourage innovation are reported;
- **Around 45-50% of students** at the same grades go to a school where there is a change management training programme (i.e. training sessions to enable teachers to cope with changes in school and in the educational environment generally);
- **Between 40% and 50% of students**, again at the above mentioned grades, go to a school where there is a policy statement about innovation in T&L;
- **Fewer students at grade 4** are in schools taking any type of the above-mentioned measures to support innovation, compared to what is done at the other grades.

Fig. 5.14: School innovation policy
(in % of students, EU level, 2011-12)
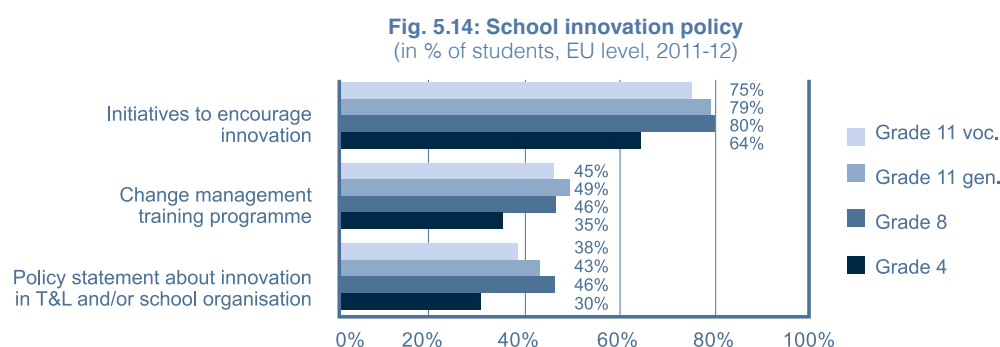
This very surprising but encouraging situation differs between countries, especially concerning change management training programmes, meaning, in this context, any type of training programme supposed to support the introduction of change at school level and implemented during the preceding three years. This option has to be seen as more specific than the 'initiative to encourage innovation' and closer to implementation than a 'policy statement', which were the two other options proposed to the respondents of the survey.

Fig. 5.14a[92] to 5.14d[93] 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.

More frequent change management training programmes seem to take place in several Eastern European education systems, and could be interpreted as a need still perceived in these countries to adjust their systems to a radically different environment compared to the past, through a long term process. The comparative absence of these programmes observed in other countries probably reflects different situations depending on the country concerned, i.e. systems managing change through a permanent and incremental process which is part of the system itself (Denmark, could be an example of such a situation), or lack of resources and capacity building to manage change and reform (as Greece could be representative of, for example).

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

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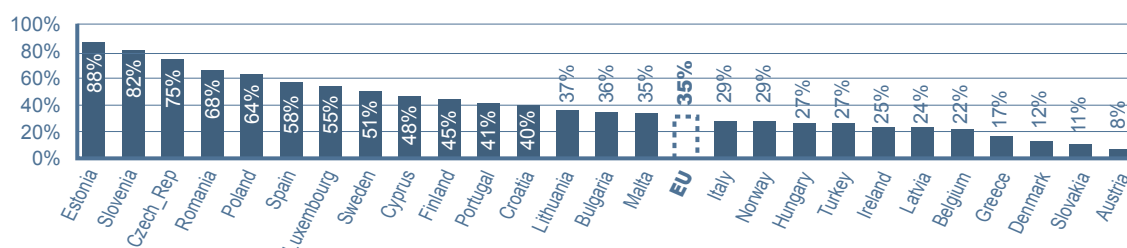
92   Excl. FR (insufficient data).
93   Excl. LU at grades 8 and 11 (insufficient data). IE and MT are not included at grade 11 vocational as there are no separate vocational schools in these countries.

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

Estonia 88%, Slovenia 78%, Romania 72%, Poland 67%, Cyprus 64%, Sweden 63%, Czech_Rep 60%, Finland 60%, Ireland 58%, Spain 54%, Malta 47%, EU 46%, Lithuania 43%, Belgium 38%, Austria 35%, Croatia 35%, Hungary 35%, Italy 33%, France 31%, Bulgaria 30%, Portugal 30%, Latvia 24%, Norway 24%, Greece 20%, Turkey 18%, Denmark 17%, Slovakia 10%
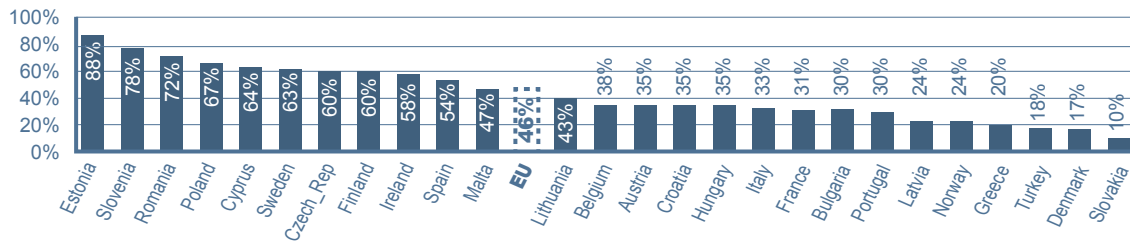
Fig. 5.14c: Change management training programme at school
(grade 11 general education, in % of students, by country, 2011-12)

Slovenia 94%, Estonia 91%, Poland 72%, Romania 69%, Cyprus 60%, Sweden 58%, Spain 56%, Czech_Rep 55%, Malta 50%, EU 49%, Finland 47%, Turkey 44%, Ireland 43%, Lithuania 42%, Denmark 41%, Italy 38%, France 35%, Belgium 32%, Portugal 31%, Latvia 29%, Croatia 26%, Bulgaria 24%, Norway 24%, Hungary 21%, Austria 14%, Greece 13%, Slovakia 8%
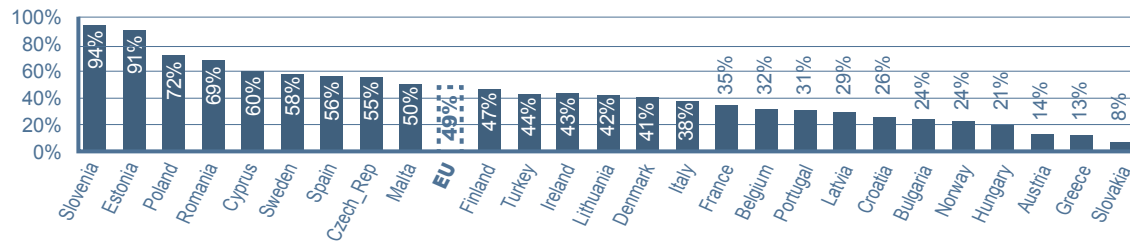
Fig. 5.14d: Change management training programme at school
(grade 11 vocational education, in % of students, by country, 2011-12)

Estonia 82%, Slovenia 77%, Finland 75%, Poland 74%, Romania 74%, Czech_Rep 68%, Spain 59%, Cyprus 47%, EU 45%, Lithuania 43%, Turkey 40%, Italy 38%, Croatia 37%, Belgium 36%, France 34%, Sweden 33%, Austria 31%, Greece 31%, Bulgaria 28%, Portugal 28%, Latvia 22%, Norway 22%, Hungary 21%, Denmark 15%, Slovakia 11%
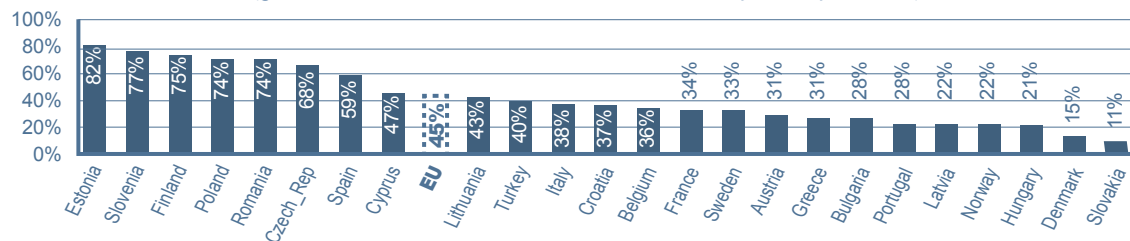
ICT coordinator

In addition to the existence of the school vision, general and specific strategies, incentives and innovation policies to support ICT use in T&L, research has identified the support provided to teachers by an ICT coordinator in their regular T&L as being highly important.

The school head questionnaire contains a question (SC16) about the provision and availability at school level of such an ICT coordinator, and whether or not the function is rewarded and pedagogical support provided. It is a 'yes/no' type of question.

At EU level 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 two, rewarded in two cases out of three, 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 three (more often in vocational education) and rewarded to the same extent (but less often at grade 4) and providing pedagogical support in three cases out of four.

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

ICT coordinator provided
- 70% — Grade 11 voc.
- 68% — Grade 11 gen.
- 80% — Grade 8
- 62% — Grade 4
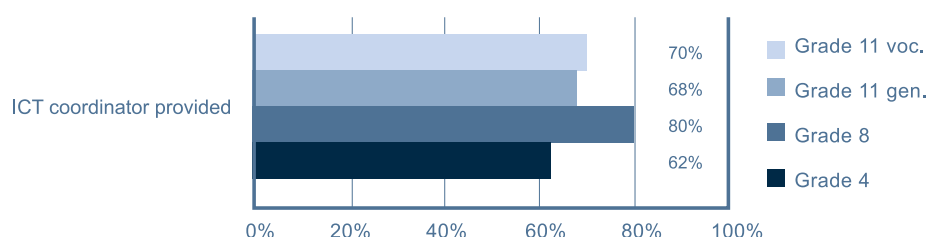
Fig. 5.16: ICT coordinator support
(all grades, in % of students, EU level, 2011-12)

Providing pedagogical support
- 71%
- 73%
- 72%
- 76%

Rewarded (increase in salary, reduction of workload, etc.)
- 64%
- 64%
- 71%
- 56%

Available full time
- 50%
- 50%
- 35%
- 39%

Legend: Grade 11 voc. / Grade 11 gen. / Grade 8 / Grade 4
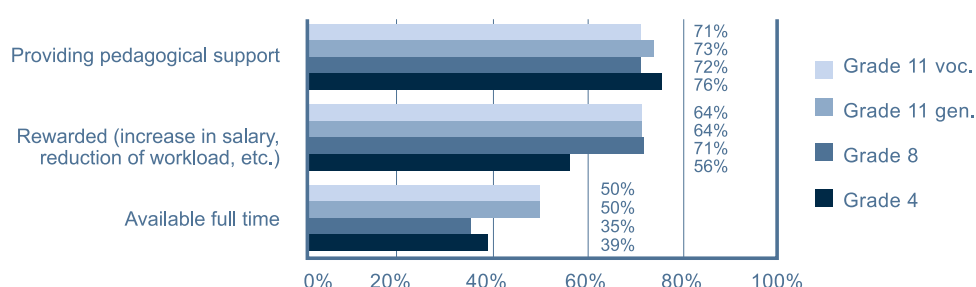
Concerning differences between countries (see Fig. 5.17[94]), it is observed that in around half a minimum of 75% of students at all grades – and sometimes up to 90% or more – are in schools where an ICT coordinator is provided. In a few countries only (three or four, depending on the grade), less than 50% of students are in a school which provides an ICT coordinator; this is the case at several grades in Hungary, Poland and Greece.

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

Country	%
Cyprus	98%
Norway	98%
Slovenia	95%
Finland	94%
Denmark	93%
Spain	93%
Ireland	92%
Czech_Rep	90%
Portugal	82%
Sweden	77%
Italy	75%
Latvia	75%
Estonia	73%
Slovakia	72%
Malta	64%
EU	62%
Turkey	60%
Belgium	59%
Croatia	56%
Romanii	56%
a Lithuania	55%
Austria	52%
Bulgaria	51%
Poland	51%
Greece	47%
France	28%
Hungary	24%
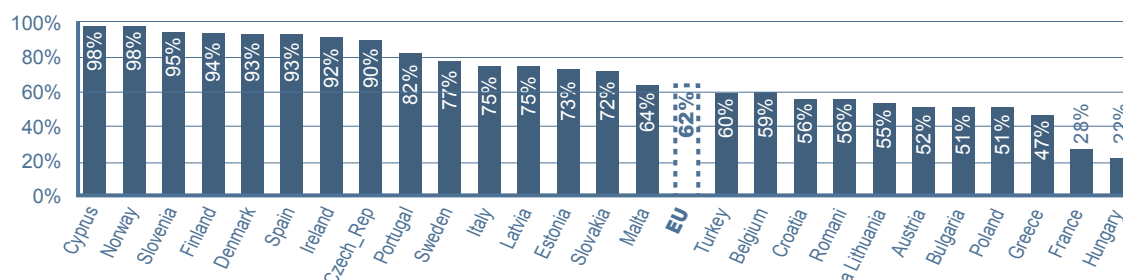
Fig. 5.17b: Provision of an ICT coordinator
(grade 8, in % of students, by country, 2011-12)

Country	%
Denmark	100%
France	95%
Norway	95%
Slovenia	94%
Austria	92%
Czech_Rep	92%
Finland	92%
Belgium	88%
Spain	88%
Ireland	83%
Portugal	83%
Estonia	80%
EU	80%
Italy	79%
Sweden	76%
Latvia	74%
Slovakia	72%
Turkey	71%
Cyprus	68%
Lithuania	67%
Malta	66%
Croatia	60%
Bulgaria	55%
Romania	53%
Greece	46%
Poland	38%
Hungary	27%
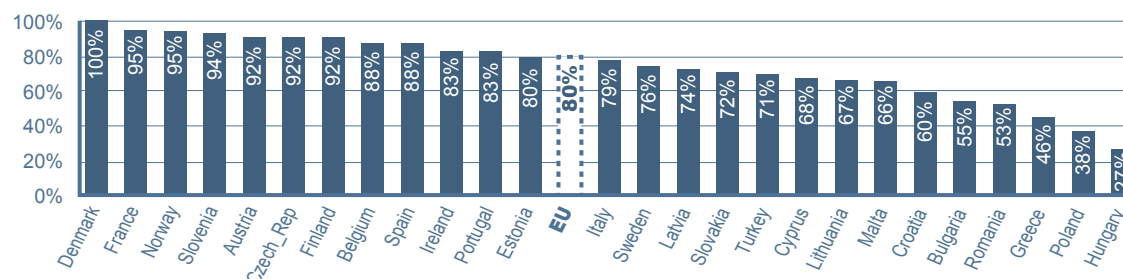
94   Excl. LU at grade 11 (insufficient data). IE and MT are not included at grade 11 vocational as there are no separate vocational schools in these countries.

Fig. 5.17c: Provision of an ICT coordinator
(grade 11 in general education, in % of students, by country, 2011-12)
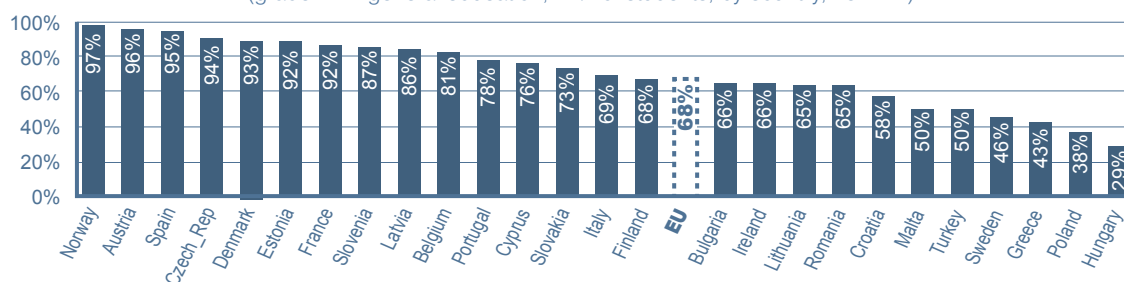
Fig. 5.17a: Provision of an ICT coordinator
(grade 11 in vocational education, in % of students, by country, 2011-12)
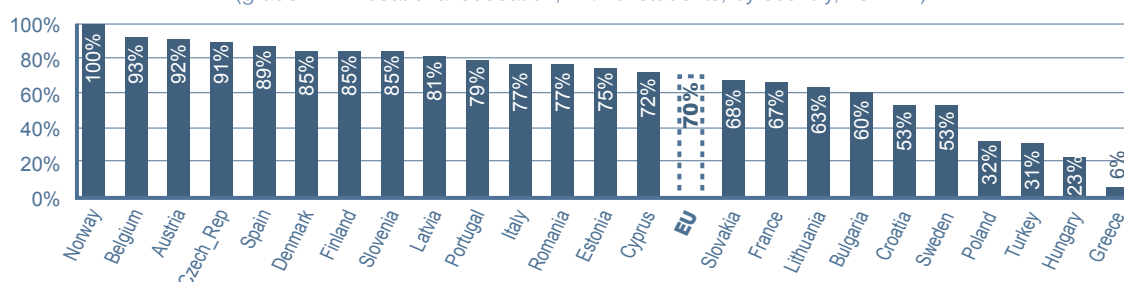
This section has considered the existence of a school vision, general and specific strategies, incentives and innovation policies to support ICT use in teaching and learning and the provision and role of an ICT coordinator. The next section examines opinions and attitudes regarding ICT, as expressed in the survey.

6. Attitudes and opinions

This section presents opinions of school heads and teachers about ICT use in T&L, ICT's impact on learning and some more general issues, and compares 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

- **A very large majority of school heads and teachers agree or strongly agree about the relevance of ICT use in different learning activities**, i.e. doing exercises and practice, learning in an autonomous and collaborative way; they are particularly positive concerning the use of ICT to **retrieve information.**

- **The great majority of school heads and teachers also agree or strongly agree that ICT use has a positive impact on students' motivation and achievement, as well as on the development of their transversal and higher order thinking skills. In particular both school heads and teachers are more frequently and strongly positive about students' motivation.** Although very positive, teachers appear to be slightly less frequently convinced about this than school heads. Such a difference could be explained by the fact that teachers are more often in direct contact with students in different learning and assessment processes; as a consequence, they are closer to detailed and grounded evidence about the issues at stake.

- **School heads and teachers are close to unanimity** about the fact that **ICT use in T&L is essential to prepare students to live and work in the 21st century**.

- The survey findings point to an intriguing issue: **school heads - and teachers even more so – agree or strongly agree about the need for a 'radical change' for ICT to be fully exploited in T&L**. This is only a first sign of a possible trend, to be interpreted with caution but certainly deserving further attention and more in-depth further analysis in order better to understand the meaning of the opinion expressed, as around 85% of students are in schools where school heads and teachers share this opinion.

- On all the above issues, there is **no major difference between grades** concerning **school heads' opinions**. Conversely, **teachers' opinions vary** according to grades. At grades 4 and/or 8, teachers in Turkey, Greece, Bulgaria, Lithuania, Italy and Romania are particularly positive, as opposed to teachers in Norway, Finland, Spain, France and Sweden who are less frequently positive as grades increase.

- On the basis of the above evidence, **it is likely that campaigns aimed at school heads and teachers to convince them of the relevance and positive impact of ICT use are no longer of value,** as a large majority of them appear to already believe this**. However, in a few countries and at some grades, such campaigns could still be useful**.

- **An overwhelming majority of students is positive to very positive** about the **impact of ICT use on the classroom atmosphere and on different learning processes,** to a similar extent regardless of the specific issue concerned.

- As for **students' attitudes towards computers, 70 to 75% agree or strongly agree** that **'using a computer is fun'** and that they use them for **'learning to help with future adult life'**. Interestingly, **'losing track of time when learning with computers'** and **'using computers for learning because of being very much interested in them'** are the attitudes least represented.

Head teachers and teachers

The school head and the teacher questionnaires (questions SC21 and TE24) investigate in exactly the same way both groups' 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 fully exploit ICT potential in T&L, it asks about the relevance of ICT use in different learning processes, as well as its impact on students' skills, motivation and achievement. The questions had to be answered on a four-level Likert scale from 'strongly disagree', 'disagree', 'agree' to 'strongly agree'.

Generally speaking, at EU level, the very large majority of both school heads and teachers are positive to very positive about ICT use and impact.

Between 90% and 95% of students, or more depending on the learning activity concerned and without much difference between grades, are in schools where **school heads and teachers agree or strongly agree about ICT use to retrieve information, do exercises and practice, and learn in an autonomous and collaborative way** (see Fig. 6.1 illustrating the situation at grade 8 only, as the picture at the other grades is very similar).

School heads and teachers are particularly positive concerning retrieving information (for which higher percentages 'strongly agreeing' are observed at all grades). Teachers are very slightly less frequently positive compared to school heads about collaborative work among students.

Fig. 6.1: School heads' and teachers' opinions about ICT use in T&L
(grade 8, in % of students, EU level, 2011-12)
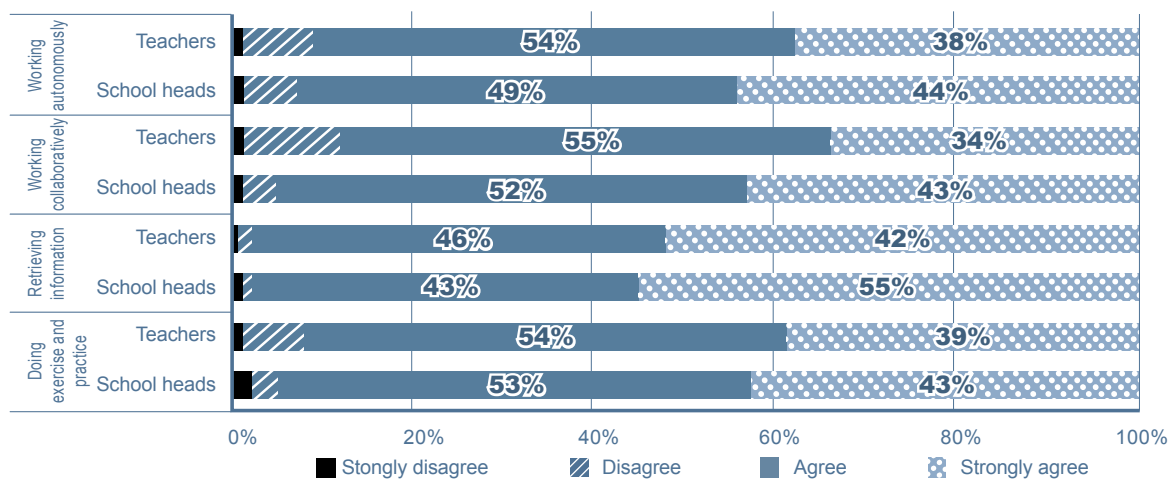
Between 90% and 95% of students, without large differences between grades, are in schools where both school heads and teachers agree or strongly agree about **ICT's positive impact on students' motivation**. Teachers at grade 11 are slightly less frequently positive.

Between 75% and 85% of students are in schools where **school heads agree or strongly agree about ICT's positive impact on students' achievement, transversal and higher order thinking skills development.** On each of these issues, **teachers' opinions** are nevertheless **less frequently positive compared to school heads' opinions**: around 85% of students are in schools where school heads are positive while around 75% of students are taught by such positive teachers.

Fig. 6.2: School heads' and teachers' opinions about positive impact of ICT use on....
(grade 8, in % of students, EU level, 2011-12)

		Stongly disagree	Disagree	Agree	Strongly agree
Transversal skills	Teachers			58%	20%
	School heads			60%	27%
Higher order thinking skills	Teachers			52%	18%
	School heads			58%	24%
Achievement	Teachers			53%	20%
	School heads			62%	26%
Motivation	Teachers			52%	39%
	School heads			51%	46%

■ Stongly disagree   ▨ Disagree   ■ Agree   ⊡ Strongly agree
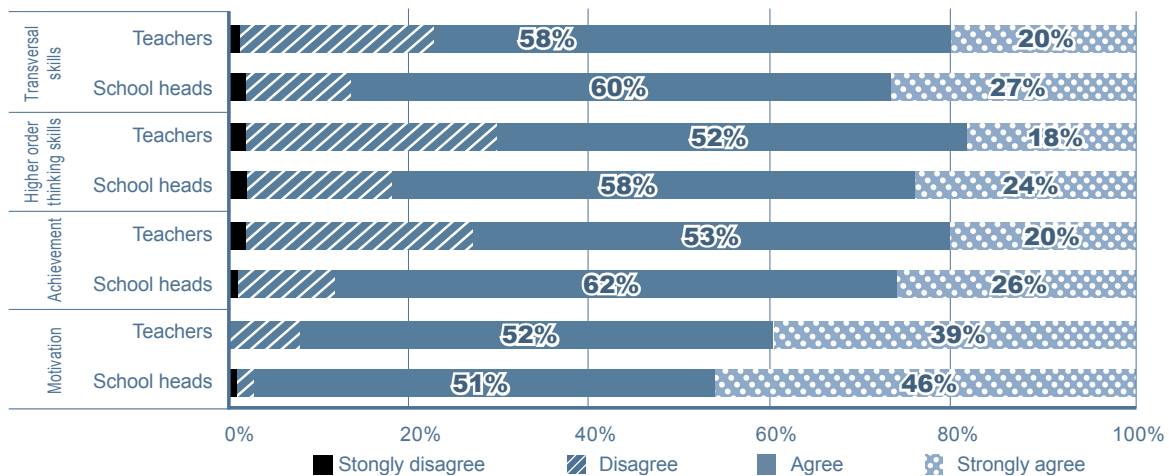
Around 95% of students or more are in schools where **school heads and teachers agree or strongly agree about ICT use in T&L being essential to prepare students to live and work in the 21st century**, with no difference between grades and with a majority in both groups even strongly agreeing about this (see Fig. 6.3 illustrating the situation at grade 8).

Around 85% of students are in schools where **school heads and teachers agree or strongly agree about the need for a radical change at school level for ICT to be fully exploited in T&L**; teachers are slightly more frequently convinced of this, and strongly agree more frequently than simply agreeing at grade 4 and 8. The issue was addressed in the questionnaire to identify any first sign of a trend (in one direction or the other), using one single sub-question and not investigating this specific issue through a construct type approach where several sub-questions or questions examine the same issue. This finding certainly deserves more in-depth investigation to better qualify such an opinion and its clear meaning.
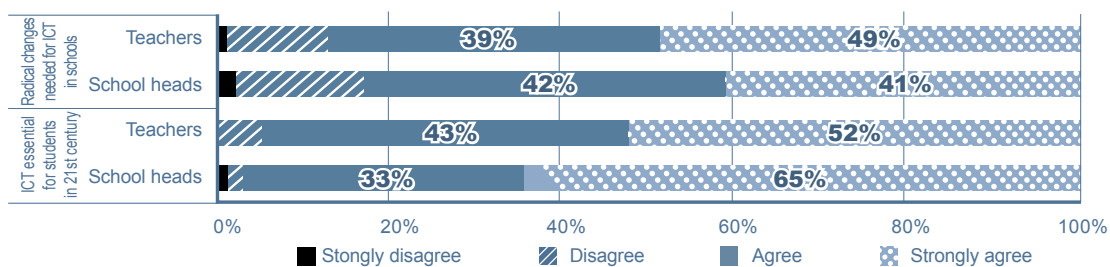
Fig. 6.3: School heads' and teachers' opinions about ....
(grade 8, in % of students, EU level, 2011-12)

		Stongly disagree	Disagree	Agree	Strongly agree
Radical changes needed for ICT in schools	Teachers			39%	49%
	School heads			42%	41%
ICT essential for students in 21st century	Teachers			43%	52%
	School heads			33%	65%

■ Stongly disagree   ▨ Disagree   ■ Agree   ⊡ Strongly agree

To investigate differences between countries at both school head and teacher levels, factor analysis of learning processes and the impact of ICT use on motivation, skills and achievement yielded a single scale, and still ranging from 'strongly disagree', 'disagree', 'agree' to 'strongly agree'.

At all grades (fig. 6.4a-d[95]), **school heads' opinions vary only to a very small extent depending on the country**, especially compared to the extent to which teachers' opinions vary; **the more the grade increases, the more teachers' opinions vary between countries**. Teachers less frequently agree about the relevance of ICT use for learning processes and its positive impact on motivation, skills and achievement in Norway, Finland, Spain, France and Sweden at grade 8, and even more at grade 11, but nevertheless resting on the 'agreement' side even if to a low level. At grade 11, teachers in Norway rather disagree about the relevance and positive impact of ICT use.

When looking in detail at the data for Norway (i.e. before any factor analysis), it appears that teachers in this country mostly disagree (and sometimes strongly disagree) up to a large extent (between 25% and 50% of students being

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95   Excl. LU teachers at grade 11. IE and MT are not included at grade 11 vocational as there are no separate vocational schools in these countries.

 taught by such teachers) about the use of ICT having a positive impact on transversal skills, higher order thinking skills, achievement, motivation, as well as collaborative and autonomous work; albeit to a lesser extent in these last three cases. Despite looking in detail at this phenomenon, particularly at grade 11 in general education and in comparison to Denmark, Lithuania, Latvia and Estonia where teachers also declare high frequency of ICT based activities but have a much more positive opinion about ICT impact on teaching and learning, no possible explanation was found for such an observation in Norway. Further investigation would be needed beyond the scope of the present survey, possibly through the national survey of ICT use in schools administered in Norway every two years, in order better to understand the reason for such a critical opinion as expressed in this survey.

Fig. 6.4a: School heads' and teachers' opinions about ICT use in teaching and learning
(grade 4, in % of students by country and EU, 2011-12)
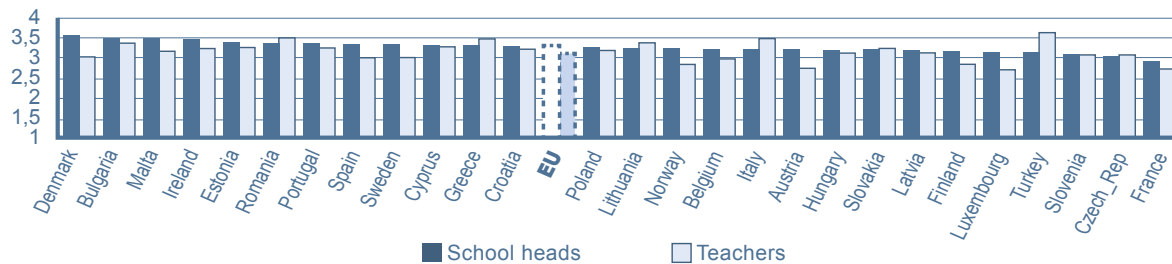
Fig. 6.4b: School heads' and teachers' opinions about ICT use in teaching and learning
(grade 8, in % of students, by country and EU, 2011-12)
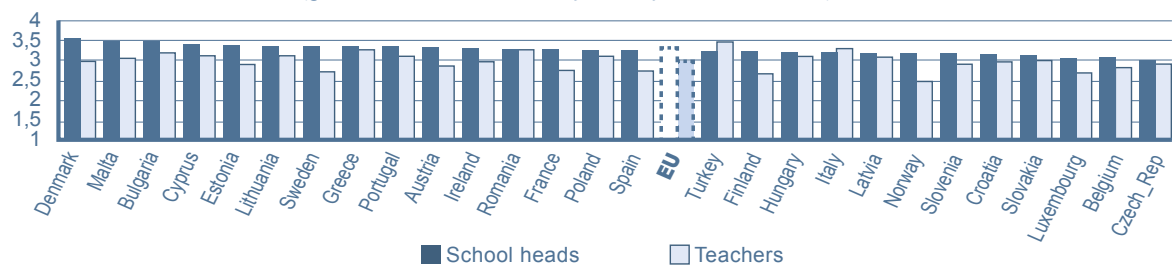
Fig. 6.4c: School heads' and teachers' opinions about ICT use in teaching and learning
(grade 11 general education, in % of students, by country and EU, 2011-12)
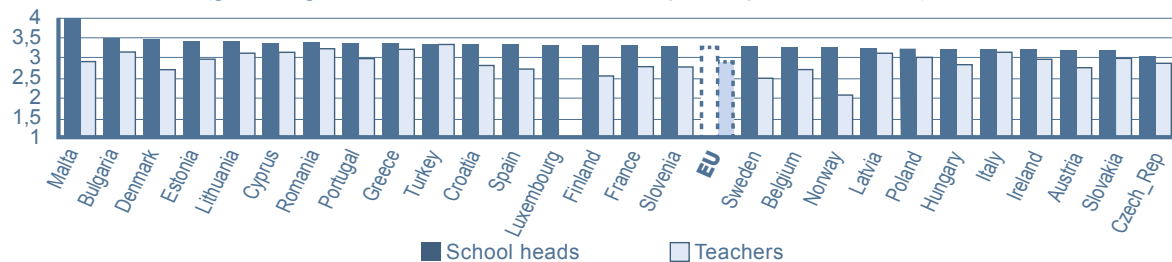
Fig. 6.4d: School heads' and teachers' opinions about ICT use in teaching and learning
(grade 11 vocational education, in % of students, by country and EU, 2011-12)
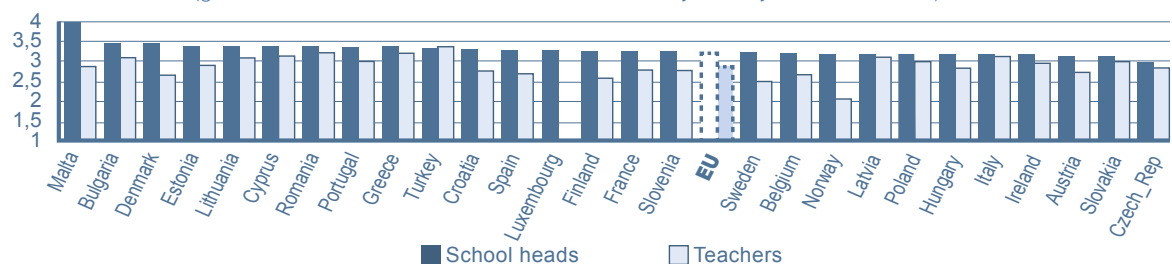
No significant correlation was observed at EU level concerning school heads' attitudes and opinions about ICT and their gender, age, number of years of experience, the school socio-economic background or type of location. Concerning teachers, positive (but tenuous) correlations at EU level are observed between their

opinions about ICT use, as detailed above, and a range of characteristics; that is: the more positive their opinion about ICT, the:

- longer they have been using ICT
- more ICT related training days they have participated in
- more they use ICT equipment in their lessons/classroom (particularly at grade 11general)
- more frequent their activities using ICT
- higher their self confidence in ICT related skills
- longer they have been teaching
- more likely they are to teach in a school where there is a shared vision about ICT use (mostly at grades 8 and 11 general).

Students

The student questionnaire (question ST16) investigates students' opinion about the impact of ICT use on their own learning on specific issues such 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-level Likert scale from 'not at all', 'a little', 'somewhat', to 'a lot'.

At EU level, a large majority of students agree or strongly agree about a positive impact of ICT use on various learning processes and on class atmosphere, and to a similar extent regardless of the issue or grade in question. **Between 70% and 75% of students**, with no major differences between grades, agree or strongly agree about this. At all grades, around 10% of students strongly disagree about the positive impact of ICT use on all of the issues concerned, and around an additional 15% disagree (see fig. 6.5a and 6.5b illustrating the situation at grades 8 and 11 general education).

Fig. 6.5a: Students' opinions about ICT use during lessons having a positive impact on...
(grade 8, in % of students, EU level, 2011-12)

	Stongly disagree	Disagree	Agree	Strongly agree
Class atmosphere	12%	16%	34%	38%
Collaboration	11%	18%	38%	34%
Remembering	8%	17%	39%	36%
Understanding	8%	16%	39%	37%
Independant learning	10%	18%	40%	32%
Trying harder	8%	17%	42%	33%
Concentration	11%	15%	41%	33%
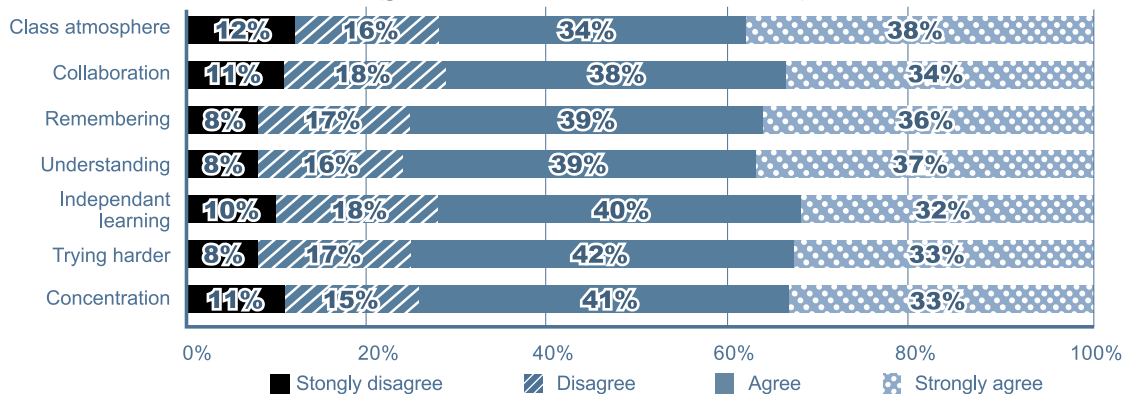
Fig. 6.5b: Students' opinions about ICT use during lessons having a positive impact on...
(grade 11 general education, in % of students, EU level, 2011-12)

	Stongly disagree	Disagree	Agree	Strongly agree
Class atmosphere	12%	18%	37%	34%
Collaboration	9%	17%	40%	33%
Remembering	9%	17%	42%	33%
Understanding	8%	15%	44%	33%
Independant learning	9%	17%	43%	32%
Trying harder	10%	19%	44%	27%
Concentration	11%	15%	49%	26%
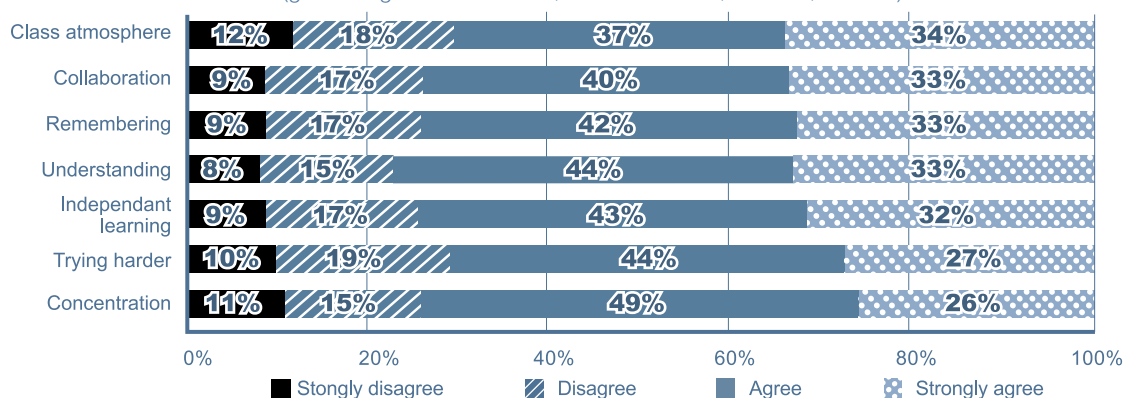
To obtain an overview by country, students' answers to all items were processed together in a factor analysis, out of which one scale emerged. As shown by figs. 6.6a to 6.6c[96], students' opinions in Portugal at all grades, in Romania at grade 11, and Italy at grade 4, are the most positive. On the other hand, their opinions in Finland and Croatia at all grades and in Norway at grade 11 are amongst the least positive (although still positive, i.e. on the 'agreeing' side as above 2.5). Students at grade 11 in Norway echo the critical opinions of their teachers about a positive impact of ICT use on learning, but to a lesser extent, as on average the students remain on the 'agreeing' side about a positive impact, even if to a very low level. Looking at detailed data for Norway (i.e. before any factor analysis), it appears that students in this country mostly disagree (and sometimes strongly disagree) to a large extent (between 35 and 45% of students thinking so) about the use of ICT having a positive impact especially on class atmosphere, trying harder and concentration in general education, and on class atmosphere and remembering in vocational education.

Fig. 6.6a: Students' opinions about ICT use impact on learning
(grade 8, mean scores on a scale from 1 to 4, by country, 2011-12)
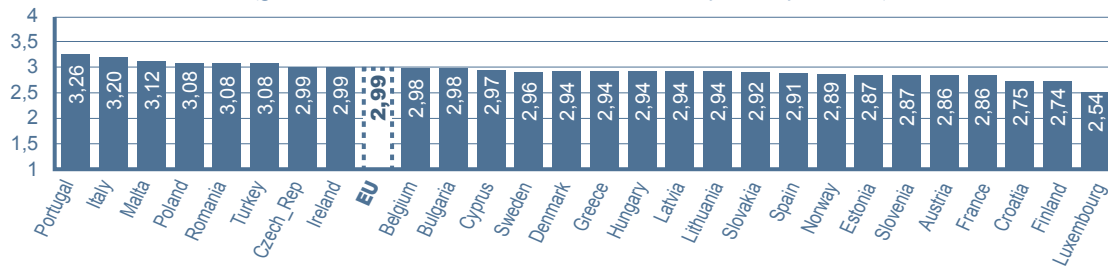

Fig. 6.6b: Students' opinions about ICT use impact on learning
(grade 11 general education, mean scores on a scale from 1 to 4, by country, 2011-12)
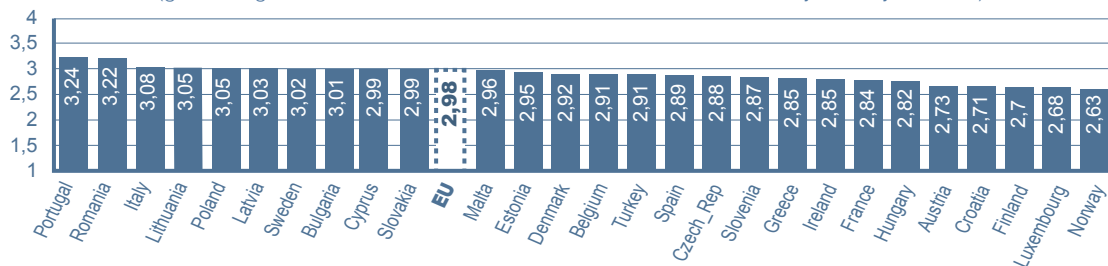
Fig. 6.6c: Students' opinions about ICT use impact on learning
(grade 11 vocational education, mean scores on a scale from 1 to 4, by country, 2011-12)
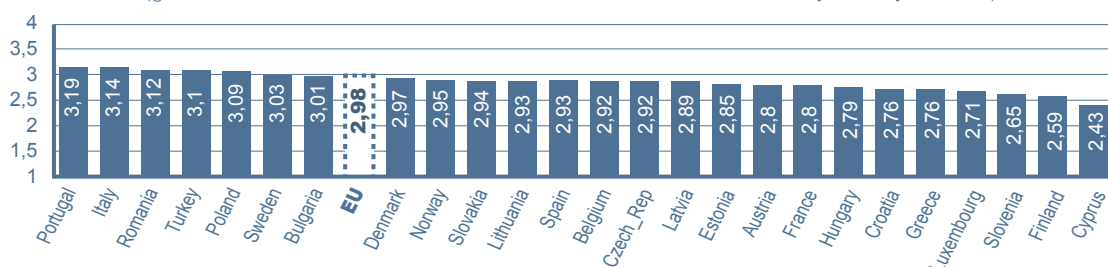
It should be noted that at EU level, a positive (but tenuous) correlation is observed between student opinions about ICT impact on their learning and their confidence in ICT related skills (taken as one scale). The more positive their opinion about ICT's impact on their learning, the more they report being confident in their ICT related skills, and vice versa.

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-level Likert scale from 'strongly disagree', 'disagree', 'agree' to 'strongly agree'.

Agreeing or strongly agreeing about the fact that **using a computer is really fun is the most frequently encountered student attitude towards computers**: around 75% of students think so. Slightly lower percentages of students (around 70%) agree or strongly agree about the fact that **using computers for learning will help them in their future life as adults**.

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96   IE and MT are not included at grade 11 vocational as there are no separate vocational schools in these countries.

Interestingly, the **lowest percentages of students** at all grades, 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 at grade 11 concerning the use of a computer for learning because of an **interest in computers** as such (see Fig. 6.7a to 6.7c).

Fig. 6.7a: Students' attitudes towards computers
(grade 8, in % of students, EU level, 2011-12)

	Stongly disagree	Disagree	Agree	Strongly agree
Further studies	11%	23%	40%	26%
Getting job	12%	24%	41%	24%
Working life	11%	25%	40%	24%
Adult life	10%	20%	42%	27%
Losing track	13%	26%	35%	26%
Interest	12%	25%	39%	25%
Fun	8%	15%	40%	37%
Important	13%	22%	43%	23%

Fig. 6.7b: Students' attitudes towards computers
(grade 11 general education, in % of students, EU level, 2011-12)

	Stongly disagree	Disagree	Agree	Strongly agree
Further studies	8%	24%	42%	26%
Getting job	7%	24%	45%	24%
Working life	8%	26%	43%	24%
Adult life	8%	20%	47%	26%
Losing track	10%	30%	37%	23%
Interest	12%	31%	37%	20%
Fun	4%	18%	47%	31%
Important	9%	25%	43%	23%

Fig. 6.7c: Students' attitudes towards computers
(grade 11 vocational education, in % of students, EU level, 2011-12)

	Stongly disagree	Disagree	Agree	Strongly agree
Further studies	10%	21%	42%	26%
Getting job	10%	21%	43%	26%
Working life	10%	23%	42%	26%
Adult life	9%	27%	45%	28%
Losing track	11%	27%	37%	24%
Interest	11%	28%	38%	23%
Fun	8%	19%	44%	29%
Important	12%	19%	42%	27%

Here again, to obtain an overview by country, students' answers to all items were processed using factor analysis out of which one scale emerged from the eight items. As shown by Fig. 6.8a to 6.8c[97], students' attitudes at all grades in Portugal and Bulgaria, as well as in Turkey in vocational education, are the most frequently positive, while students' opinions in Slovenia, Austria and Finland are amongst the least frequently positive at all or a minimum of two grades.

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97   IE and MT are not included at grade 11 vocational as there are no separate vocational schools in these countries.

Fig. 6.8a: Students' attitudes towards computers
(grade 8, mean scores on a scale from 1 to 4, by country, 2011-12)

Fig. 6.8b: Students' attitudes towards computers
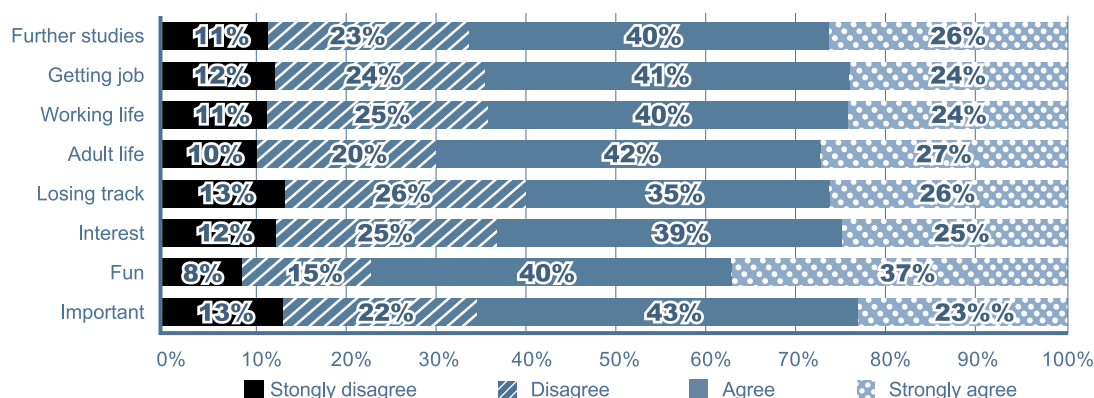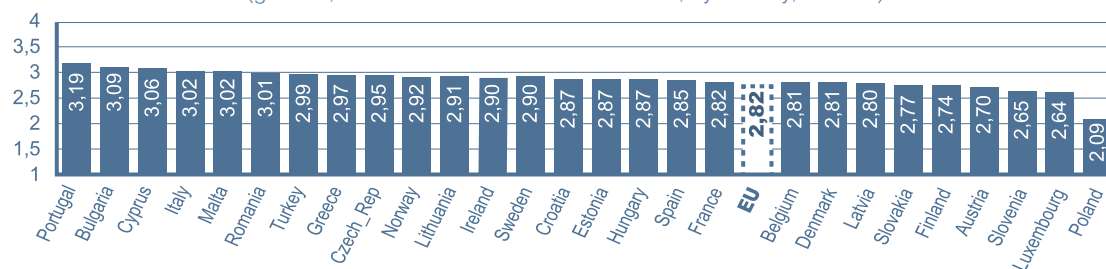(grade 11 general education, mean scores on a scale from 1 to 4, by country, 2011-12)
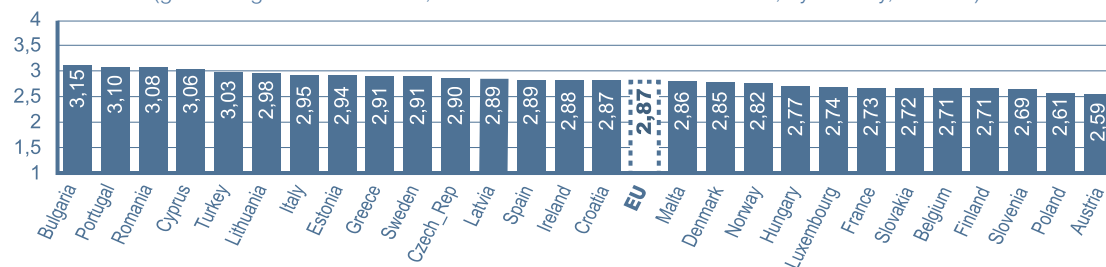
Fig. 6.8c: Students' attitudes towards computers
(grade 11 vocational education, mean scores on a scale from 1 to 4, by country, 2011-12)
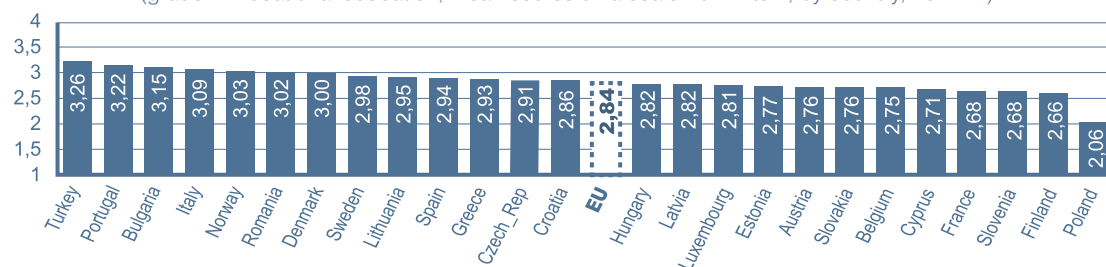
At EU level, positive (but tenuous) correlations are observed between students' attitudes towards computers and the number of years they have been using ICT, as well as gender at grade 11 in general education. The longer students use computers at school, the more they have a positive attitude towards computers, and vice versa. At grade 11 in general education, boys have a very slightly more positive attitude towards computers than girls.

In this section the opinions and attitudes of head teachers, teachers and students concerning ICT for teaching and learning as expressed through various survey questions have been analysed at both country and EU level. In the following section the evolution of these views is considered, as well as changes over time of a range of indicators relating to the provision and use of ICT.

7. Trends over time

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[98] 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. A few useful comparisons can be made with data from the preceding survey in 2002[99] concerning equipment provision, broadband and teacher use of ICT, and they are mentioned in the relevant sub-sections.

Summary of findings

- Comparing like for like as far as possible, **there are around twice as many computers per 100 students in secondary schools than 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 laptop computers**, from a focus on desktop computers in 2006 to laptops and personally owned devices such as mobile phones in 2011.

- **In 2011-12 broadband is almost ubiquitous in schools, but in 2006 was in less than three-quarters of schools**.

- **Percentages of connected schools – with websites, 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, **percentages of teachers using ICT in more than 25% of lessons are either stable or in decline at all grades since 2006.**

- Such an apparent reduction in ICT use is all the more surprising given that there are now lower levels of perceived obstacles to its use, as the 2011-12 survey shows: **percentages of teachers reporting resource or pedagogical obstacles to the use of ICT have declined, as have percentages stating that the benefits of ICT are unclear**.

- **Teachers' confidence levels in ICT skills such as word processing, using email, preparing a multimedia presentation and downloading and installing software have increased**.

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98   Empirica (2006)
99   European Commission (2002). This report drew on Eurobarometer data published May 2001. See also Commission staff working paper: "*eEurope 2002 benchmarking – European youth into the digital age*" SEC(2001)1583 of 2 October 2001

Provision of ICT

Table 2 below summarises 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 website and email.

Table2: Summary ICT infrastructure trends - EU mean

	Grade 4		Grade 8		Grade 11 general		Grade 11 vocational	
Indicator	**2011-12**	**2006**	**2011-12**	**2006**	**2011-12**	**2006**	**2011-12**	**2006**
Computers per 100 students[101]	16	10	20	11	24	13	33	16
Computers connected to the internet per 100 students[102]	15	8	19	10	23	12	31	14
% schools with broadband[103]	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[104]	37%	48%	43%	46%	45%	47%	42%	46%
% of schools with a web site[105]	72%	55%	88%	76%	90%	88%	92%	85%
Email for more than 50% of teachers[106]	60%	67%	57%	64%	66%	62%	66%	64%
Email for more than 50% of students[107]	23%	21%	29%	28%	33%	28%	31%	29%
% schools with a local area network[108]	64%	50%	69%	68%	82%	75%	86%	72%

Although the basis of calculation for 2011-12 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, caution should be exercised in interpreting the data. EU averages in 2006 were for the EU25 plus Iceland and Norway, in 2011-12 for the EU27 excluding Germany, Iceland, Netherlands and the United Kingdom, plus Croatia and Turkey. The survey methodologies are different, for example in 2006 data were collected not at grade level as in 2011-12 but by level of school (primary, lower secondary, etc.), each covering several grades. 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[108] shows the numbers of computers (all types) per 100 students at grade 4 in 2006[109] and 2011-12, ranked by 2011-12 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 fig 7.2. In 2002[110] there were on average in the EU (15 countries) four computers connected to the internet per 100 students and, as now, wide variations between countries, Denmark and Luxembourg having over 20 contrasting with Greece and Portugal with around two per 100 students.

100	Empirica (2006), table 4-9.
102	ibid Table 4-21
103	ibid Table 4-29
104	ibid Table 4-49
105	ibid Table 4-39
106	ibid Table 4-41
107	ibid Table 4-43
108	ibid Table 4-45
109	Excl. BG, HR, RO, TR (data not available in 2006)
109	Empirica (2006), table 4-9.
110	European Commission (2002). It is not clear which grades of student were used in the calculation.

Fig. 7.1a: Computers per 100 students
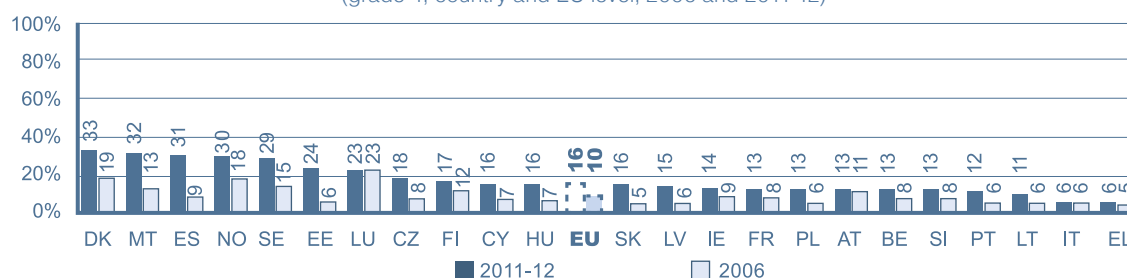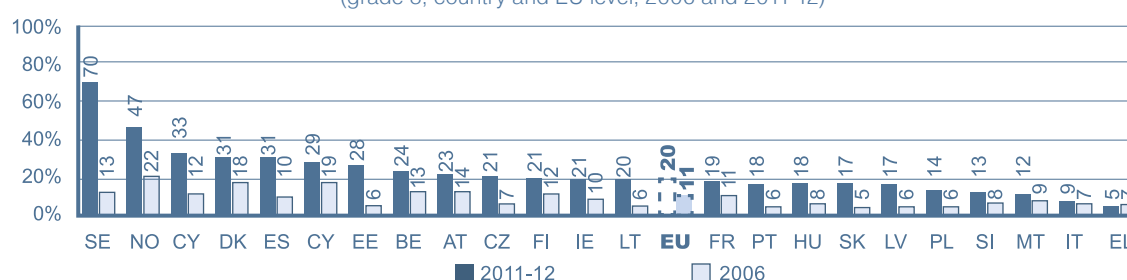(grade 4, country and EU level, 2006 and 2011-12)

Fig. 7.1b[111] shows the numbers of computers (all types) per 100 students at grade 8 in 2006 and 2011-12, ranked by 2011-12 figures, again showing a big increase in most countries for which there are comparable data.

Fig. 7.1b: Computers per 100 students
(grade 8, country and EU level, 2006 and 2011-12)

At grade 11 general the same pattern emerges (fig. 7.1c[112]), although there is a decline in Austria, Italy and Greece.

Fig. 7.1c: Computers per 100 students
(grade 11 general, country and EU level, 2006 and 2011-12)
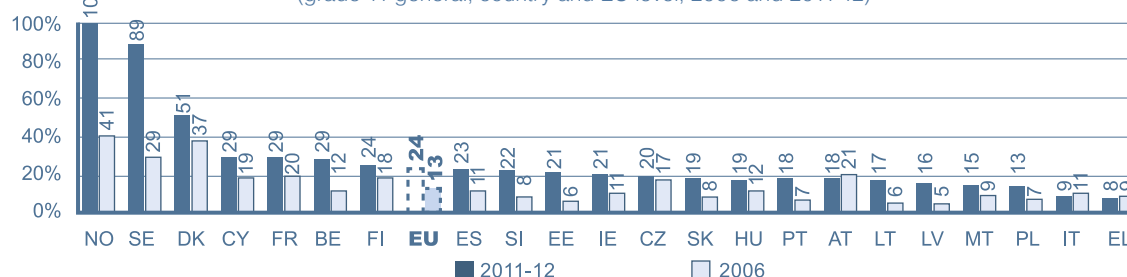
Finally, at grade 11 vocational the trend is more or less the same, as can be seen in fig. 7.1d[113].

Fig. 7.1d: Computers per 100 students
(grade 11 vocational, country and EU level, 2006 and 2011-12)

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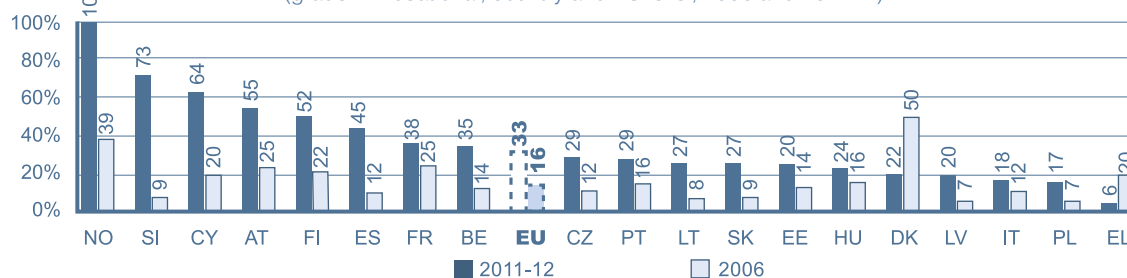
111   Excl. BG, HR, RO, TR (data not available in 2006)
112   In Norway there are 109 computers per 100 students
113   Excl. LU, SE (insufficient data); excl. BG, HR, RO, TR (data not available in 2006). In IE and MT there are no separate vocational schools at grade 11.

Broadband

Around 95% of schools are now (2011-12) connected to the internet via broadband, compared to 65 to 75 per cent in 2006. In 2006[114], between 42% (primary) and 54% (vocational) schools were connected via ADSL[115] on average in the EU; the figure is now around 52% for all grades. No figures are available for speed of connection in 2006. In 2002 over two-thirds of schools online were connected via ISDN and others via dial-up ('broadband technologies are marginal'[116]).

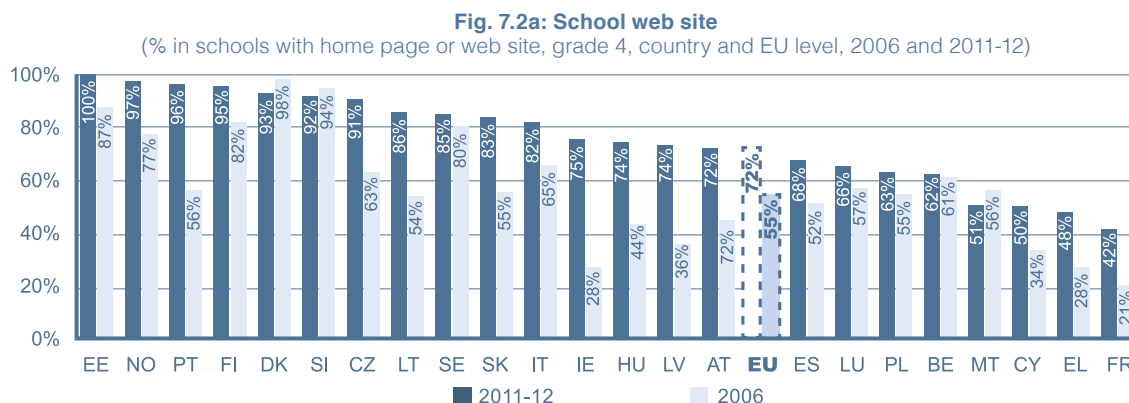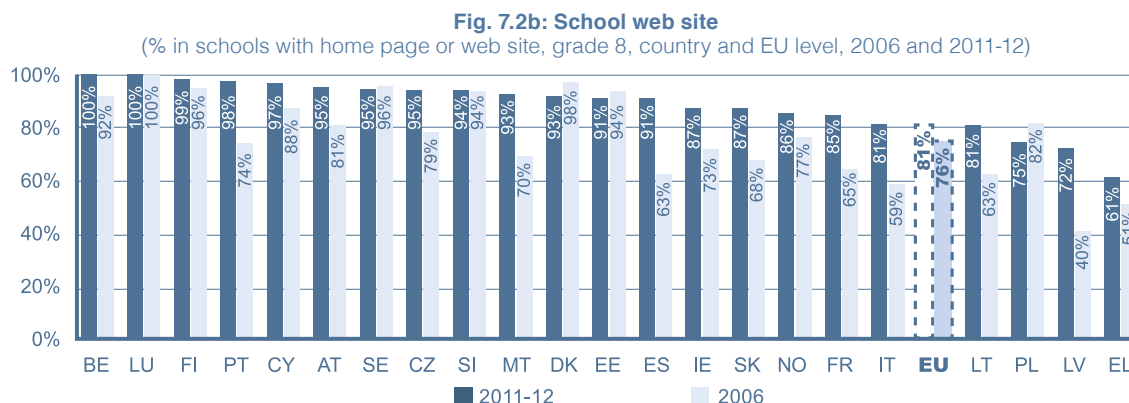# Connectedness

In 2006[117] 55% of primary schools in the EU27 had a website compared to 72% at grade 4 now (fig. 7.2a[118]).

Fig. 7.2a: School web site
(% in schools with home page or web site, grade 4, country and EU level, 2006 and 2011-12)

In 2006[119] 76% of lower secondary schools in the EU27 had a website (see fig. 7.2b[120]); the figure for grade 8 is now 81%.

Fig. 7.2b: School web site
(% in schools with home page or web site, grade 8, country and EU level, 2006 and 2011-12)

As fig. 7.2c shows, in 2006[121] 88% of upper secondary schools in the EU27 had a website, 90% in 2011-12 (grade 11 general).

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114   Empirica 2006, Table 4-29
115   It is not possible to calculate how many schools had no broadband connection in 2006 owing to the nature of the questions asked.
116   European Commission (2002), page 10.
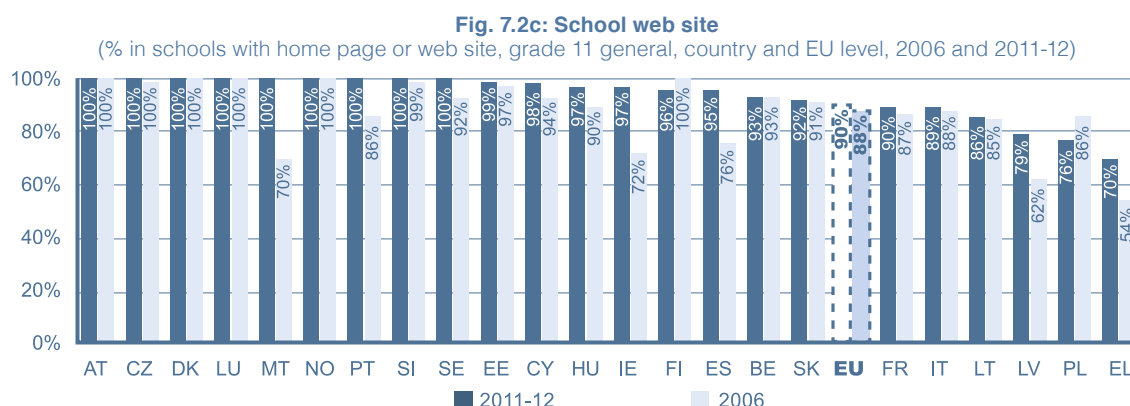117   Empirica 2006, Table 4-39.
118   Excl. BG, HR, RO, TR (data not available in 2006)
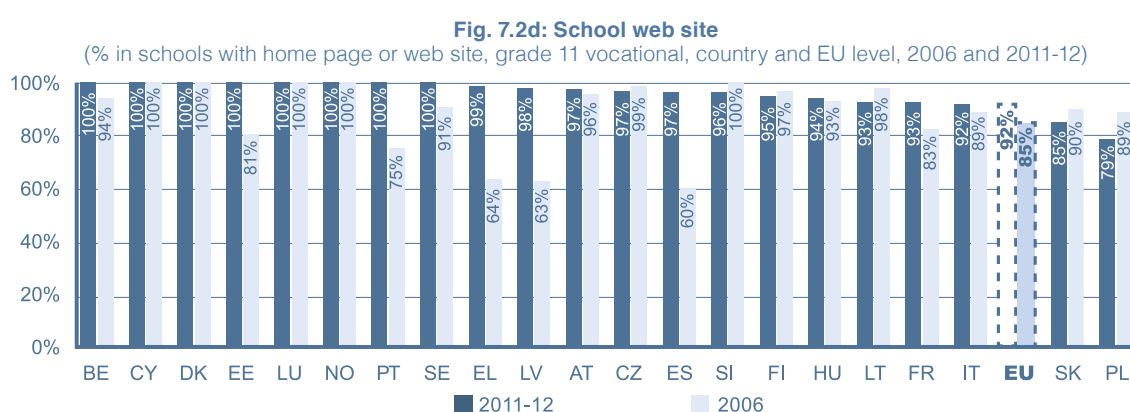119   Empirica 2006, Table 4-39.
120   Excl. BG, HR, RO, TR (data not available in 2006), excl. LU (insufficient data in 2011-12)
121   Empirica 2006, Table 4-39.

Fig. 7.2c: School web site
(% in schools with home page or web site, grade 11 general, country and EU level, 2006 and 2011-12)

Finally, in 2006[122] 85% of vocational schools in the EU27 had a website, 92% in 2011-12 (fig. 7.2d[123]).

Fig. 7.2d: School web site
(% in schools with home page or web site, grade 11 vocational, country and EU level, 2006 and 2011-12)

Teachers' Use (and non-use) of ICT

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 (table 3). 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. In 2002 it was said that 'computers are now used by a majority of teachers'[124].

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

There has been a clear drop in perceived barriers to ICT use reported by teachers since 2006, whether insufficient computers, lack of teacher skills, of content, or of interest by teachers. Most marked is the decline in percentages of teachers considering that the benefits of ICT are unclear.

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122   Empirica 2006, Table 4-39.
123   Excl. BG, HR, RO, TR (data not available in 2006), excl. LU, SE (insufficient data in 2011-12). There are no separate vocational schools in IE and MT.
124   European Commission (2002), p. 10.

Table 3: Summary ICT use and inhibitors trends – EU mean

Indicator	Grade 4		Grade 8		Grade 11 general		Grade 11 vocational	
	2011-12	2006	2011-12	2006	2011-12	2006	2011-12	2006
Use of ICT								
% teachers who used ICT for preparing lessons in past year[126]	96%	88%	96%	91%	95%	91%	97%	93%
% teachers who used ICT in class in past year[127]	86%	75%	81%	71%	84%	73%	87%	77%
% of teachers using ICT in more than 50% of lessons in the past year[128]	13%	15%	14%	13%	15%	23%	31%	25%
% of teachers using ICT in more than 25% of lessons in the past year[129]	29%	34%	32%	35%	32%	44%	50%	49%
Inhibitors								
% teachers reporting insufficient computers[130]	33%	51%	26%	46%	27%	49%	19%	47%
% teachers reporting lack of teacher skills[131]	10%	23%	11%	23%	11%	18%	10%	21%
% teachers reporting lack of content[132]	10%	21%	10%	20%	14%	18%	11%	22%
% teachers reporting lack of content in national language[133]	8%	9%	7%	9%	7%	7%	7%	8%
% teachers reporting lack of interest of teachers[134]	5%	9%	4%	10%	5%	9%	3%	9%
% teachers reporting unclear benefits[135]	2%	14%	3%	21%	7%	18%	3%	24%

Country level figures for frequency of use can be seen in fig. 7.3a[135] for primary (2006) / grade 4 (2011-12). 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.

Fig. 7.3a: Teachers' use of ICT in more than 25% of lessons
(grade 4, EU and country level, 2006 and 2011-12)

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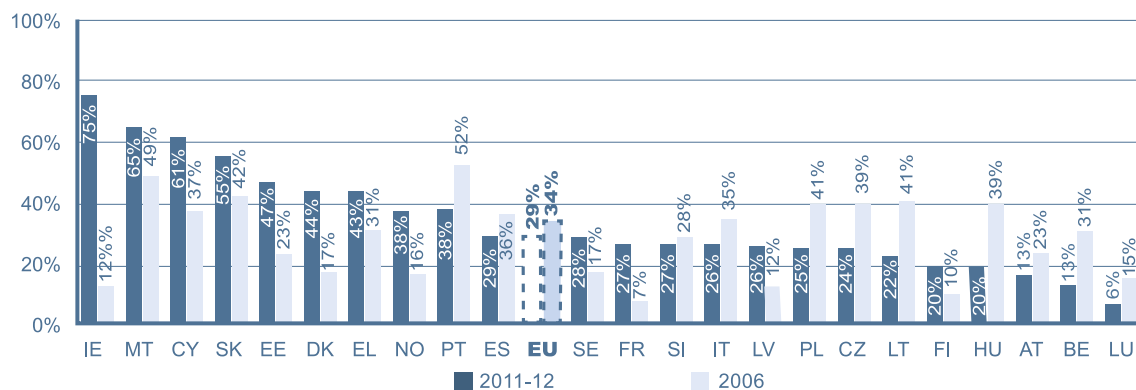
126   Emprica (2006) Table 5-5
127   ibid Table 5-9
128   ibid Table 5-37
129   ibid Table 5-33 + Table 5-37
130   ibid Table 5-93
131   ibid Table 5-105
132   ibid Table 5-97
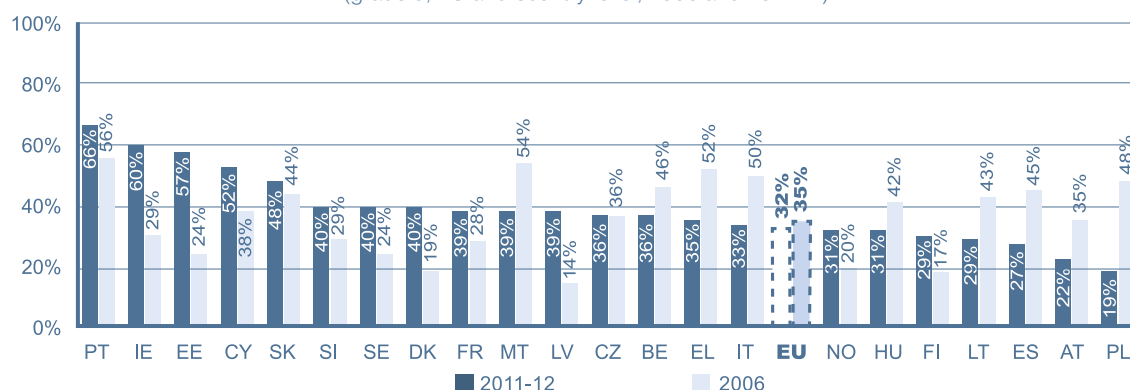133   ibid Table 5-101
134   ibid Table 5-113
135   ibid Table 5-109
135   Excl. BG, HR, RO, TR (data not available in 2006)

At grade 8 / lower secondary there has been an increase in use in 12 countries as seen in fig. 7.3b[136].

Fig. 7.3b: Teachers' use of ICT in more than 25% of lessons
(grade 8, EU and country level, 2006 and 2011-12)

At grade 11 general / upper secondary, an increase in use since 2006 is evident in nine countries, and a decline at EU level (fig. 7.3c[137]).

Fig. 7.3c: Teachers' use of ICT in more than 25% of lessons
(grade 11 general, EU and country level, 2006 and 2011-12)
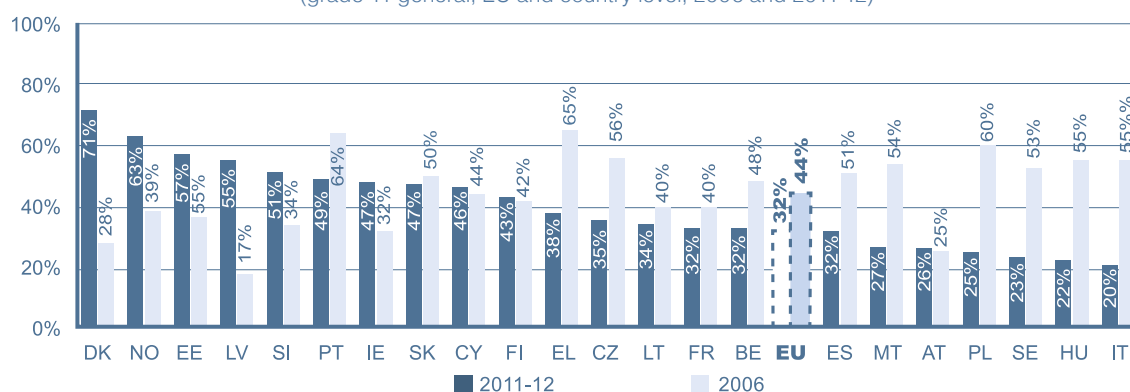
Finally, at grade 11 vocational (fig. 7.3d[138]), in eight countries there has been an increase, according to the data.

Fig. 7.3d: Teachers' use of ICT in more than 25% of lessons
(grade 11 vocational, EU and country level, 2006 and 2011-12)

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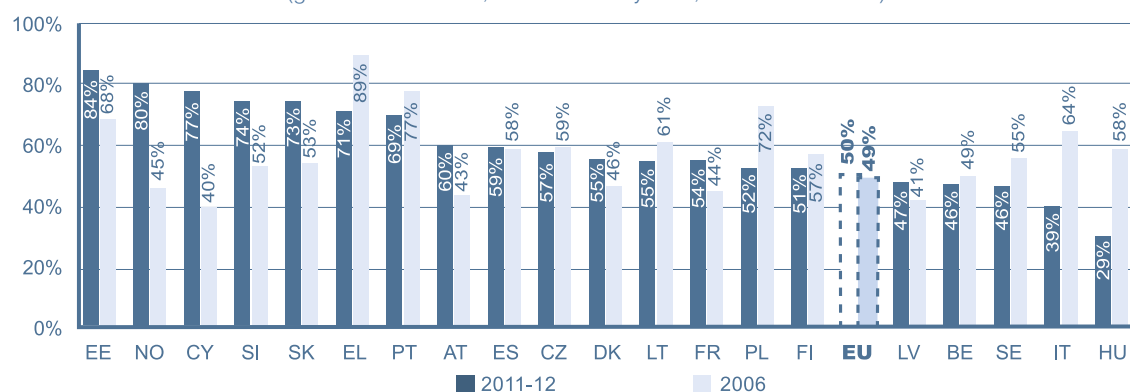
136   Excl. BG, HR, RO, TR (data not available in 2006), excl. LU (insufficient data in 2011-12).
137   Excl. BG, HR, RO, TR (data not available in 2006), excl. LU (insufficient data in 2011-12).
138   Excl. BG, HR, RO, TR (data not available in 2006), excl. LU (insufficient data in 2011-12). There are no vocational schools as such in IE and MT.

Teacher confidence

Table 4: Summary teacher confidence trends – EU mean

| Indicator	Grade 4		Grade 8		Grade 11 general		Grade 11 vocational	
	2011-12	2006	2011-12	2006	2011-12	2006	2011-12	2006
Teacher confidence								
% teachers confident at producing text[140]	78%	64%	77%	67%	81%	70%	83%	69%
% teachers confident at email[141]	81%	64%	79%	71%	84%	76%	87%	74%
% teachers confident at creating presentations[142]	40%	30%	41%	40%	41%	46%	52%	47%
% teachers confident at installing software[143]	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. 7.4).

Fig. 7.4: Teacher confidence
(% teachers, all grades, EU level, 2006 and 2011-12)
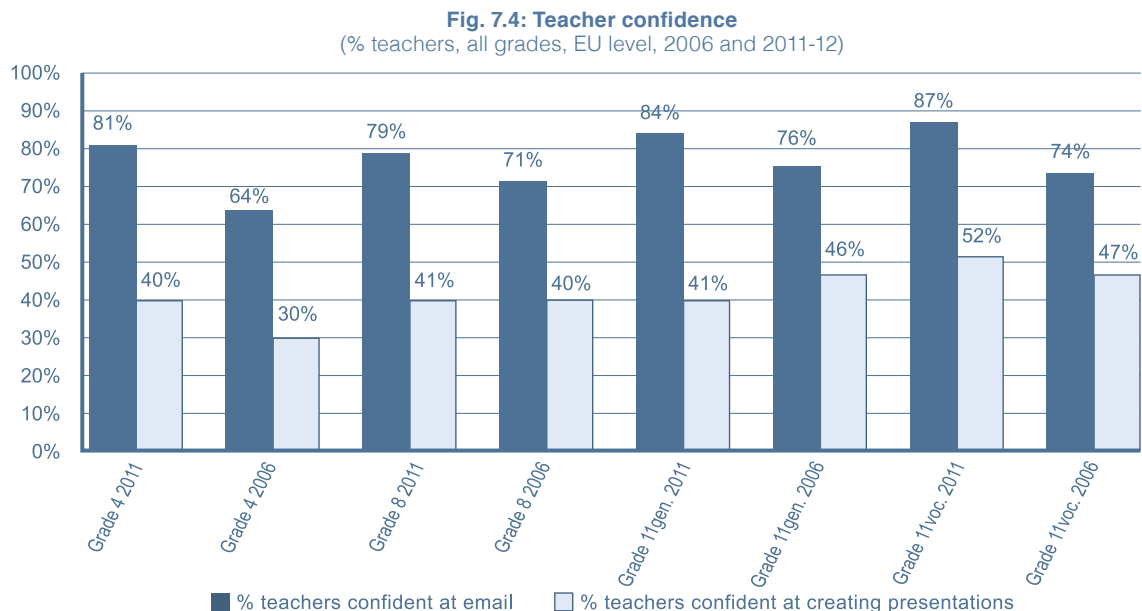
The 2006 survey pointed out the need for an 'ICT catch-up process' in schools (p20), calling for an increase in the number of computers, improvement of internet access with a move to broadband connection and the use of ICT for education in classrooms. While great strides have been made in the first two areas, it is the third that is proving more challenging.

In this section, comparisons have been drawn at EU and country level between the findings of this survey and those of previous ones, notably in 2006. The following section considers the 2011-12 results as a whole and what they tell us about digital schools, teachers and students.

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140   Empirica (2006) Table 5-61
141   ibid Table 5-69
142   ibid Table 5-65
143   ibid Table 5-73

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 and over time, the present survey also explored 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 confident and supportive teacher and finally the digitally confident and supportive student. These profiles can in turn be used to develop some interpretations and predictions about ways to optimize ICT use in T&L.

Summary of findings

- Scrutinising policies, strategies and concrete support measures (teachers' participation to training, availability of an ICT coordinator, etc.) developed by schools to integrate ICT in T&L, school heads' opinions, and what they consider as obstacles to the integration of ICT use in T&L, four school profiles were identified by cluster analysis:

  - strong policy and strong support
  - weak policy and strong support
  - strong policy and weak support
  - weak policy and weak support

Of these four school profiles, the one that could be considered at first sight as the most favourable, is the school which defines strong policy and implements strong support measures. This school profile indeed corresponds with the highest frequency of students' ICT use and activities. Interestingly, students in schools characterised by weak policy but strong support measures report a 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 teachers' use of computers/internet in the classroom. It nevertheless has to be noticed that, in several education systems, decisions about policies are made at central/national level and have not been reported by school heads because they are not decided at the level of their school.

As a result, the ***digitally supportive school*** at EU level is defined in the present survey as **the school developing strong concrete support measures *whether or not* associated 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. The situation appears less positive in some countries where fewer than 15% of students are in *digitally supportive schools* at some grades (Greece and Turkey at grade 11).

Boosting concrete support measures such as the provision of ICT coordinators, professional development opportunities for teachers, etc. is an option for schools wanting to develop ICT use in T&L (and not always knowing how/where to start or prioritize). **Progress in this specific area is still needed with the aim of scaling up provision to improve T&L conditions offered to a large majority of students, at EU level and more specifically in certain countries**.

- A second cluster analysis was processed concerning teachers' access to and use of ICT in T&L, their participation in 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 integrating ICT into T&L.

This cluster analysis reveals the following four types of T&L conditions:
  - high teacher confidence/attitude and high access/low obstacles
  - high teacher confidence/attitude and low access/high obstacles
  - low teacher confidence/attitude and high access/low obstacles
  - low teacher confidence/attitude and low access/high obstacles

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

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

Interestingly, confident and positive teachers working in schools with low access and many 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 attitudes towards ICT use in T&L.; when including students in T&L conditions characterised by low access to ICT and many obstacles but high teacher confidence and positive attitudes, the percentages of students taught by highly confident and positive teachers increase up to between 45% and 55%, regardless of whether access or obstacles are high or low.

The situation varies between countries and grades. A few countries are considerably above the EU average when looking at the percentage of students in T&L conditions characterised by high teacher confidence and positive attitudes as well as high access to ICT and low obstacles. This is the case in **Denmark** and **Norway** at grade 11, as well as **Portugal** in vocational education. 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 could be a potentially efficient – and evidence-based – way to boost ICT use in T&L through the development of highly confident and positive teachers. Focusing policies specifically on teacher professional development is supported by the fact that teachers' opinions about the impact of using ICT for learning purposes are 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 section 6 *Attitudes and opinions* of this report. **Convincing teachers and school heads about the relevance of using ICT for T&L is therefore no longer a priority or lever for change, but equipping them with the digitally based teaching competences they need for transforming positive opinions into effective practice in the classroom certainly is**.

- A third cluster analysis was processed about students' access to ICT, the number of years of experience with and frequency of ICT based activities at home in their free time, as well as at school during lessons. As a result, three student profiles appear, i.e. those having:
  – high access/use at school and at home
  – low access/use at school and high access/use at home
  – low access/use at school and at home

The student profile characterised by **high access/ use at school and at home** is defined as the *digitally confident and supportive student* in the present report. Such a profile is indeed associated with the **highest frequencies of ICT based activities at school, levels of confidence** in their operational ICT skills, use of social media, and ability to use the internet safely and responsibly, 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 and 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, correspond to the profile characterised by low access/use at school and 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 and at home profile.

These findings make the case for strengthening action at institutional, local, regional, national and European levels, to boost ICT use at school with the objective of reducing the gap between ICT use in and out of school, that still exists in 2012, and also give the opportunity to around 30% of 16 year old students who do not have 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 confident and supportive teachers, and (iii) digitally confident and supportive students.**
- **Correlation analysis reveals relationships between these profiles. Education systems characterised by a high percentage of digitally supportive schools include a large percentage of digitally confident and supportive teachers or students, and vice versa.**

To some extent at grade 4 and at grade 11 in vocational education (a correlation of 0.43 and 0.54 respectively), **as the percentage of digitally supportive schools increases, so does the percentage of digitally confident and supportive teachers**. There might be national/regional contexts that might favour the development of digitally supportive schools and teachers, or digitally supportive schools might encourage teachers to become supportive, or the reverse.

To a considerable 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 confident and 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** (a correlation of 0.26 and 0.19 respectively).

Finally, a relationship is also observed between the digitally confident and supportive teachers and students. **To a considerable extent at grade 11 in vocational education** (0.73 correlation), **countries with a high percentage of digitally confident and supportive teachers are also countries with a high percentage of digitally confident and supportive students** (even if the correlation is not statistically significant which, as mentioned previously, is not surprising because of the size of the population 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

Generally speaking. central authorities are responsible for policy formulation about ICT use in T&L as well as coordination, but in some countries this responsibility is shared with regional or local administration and institutions. Schools themselves are of course frequently responsible for implementing such centrally defined strategies (Eurydice, 2011). As a consequence, analysing policies, strategies, etc. at school level can be informative about the ICT based T&L conditions provided for students.

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

On the one hand, a cluster analysis of the school heads' answers to school policy related questions was processed, 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)

On the other hand, another cluster analysis of the school heads' answers to concrete support measures, opinions and obstacle related questions was processed, precisely concerning:

- percentage of school teachers that have undertaken professional development in the past two school years (question SC15)
- the availability of an ICT coordinator (question SC16)
- 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 reveal 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.

A more in-depth analysis of these graphs will be presented later on. For the moment it suffices to 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); there are **25%** of students 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);

- There are many differences between countries (and grades):

  – 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 same three 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, EU and country level, 2011-12[144])
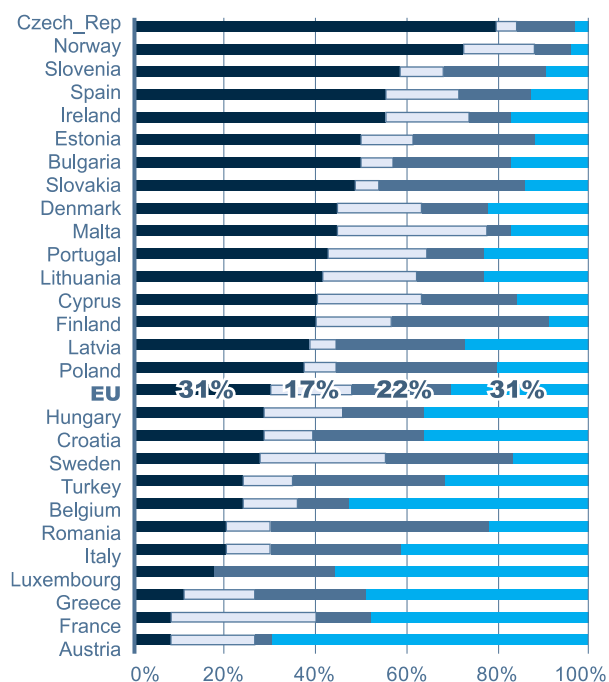
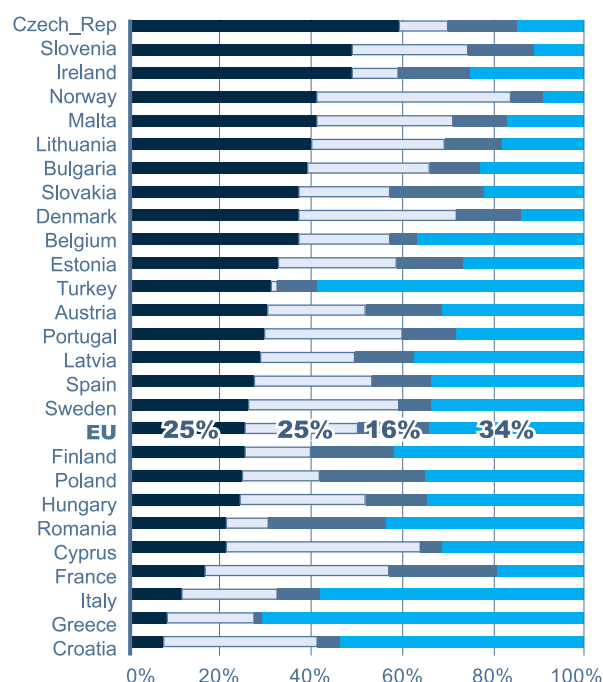### Fig. 8.1a - at grade 4

Fig. 8.1b - at grade 8

Fig. 8.1c - at grade 11 general education
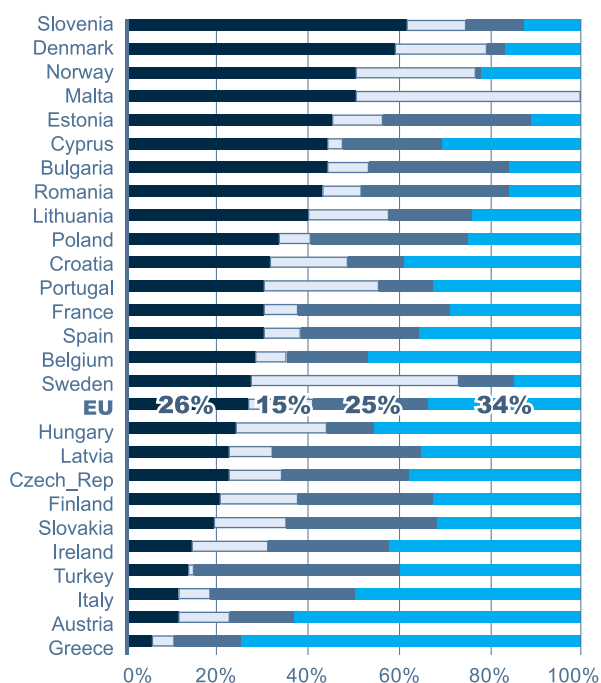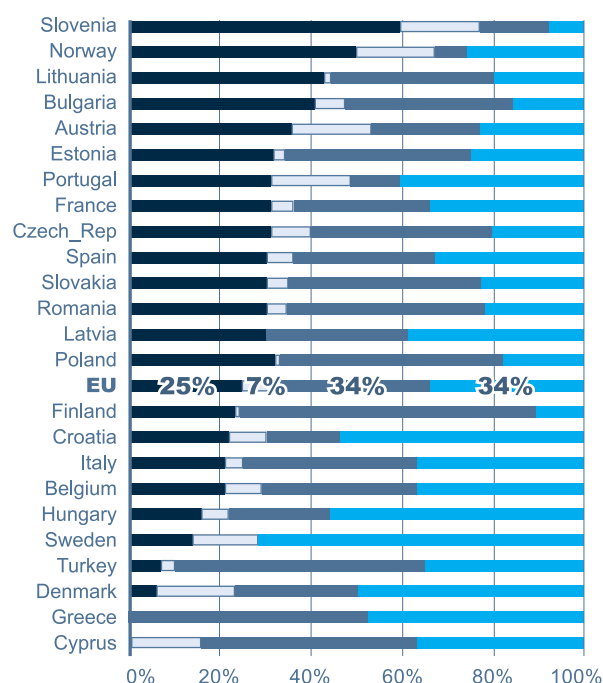

Fig. 8.1d - at grade 11 vocational education

- ■ School type 1: Strong policy & strong support
- □ School type 2: Weak policy & strong support
- ■ School type 3: Strong policy & weak support
- ■ School type 4: Weak policy & weak support

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144   At grade 8 and 11 LU is excluded (insufficient data). At grade 11 vocational there are no vocational schools as such in IE and MT.

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, students' 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: Frequency of students' ICT-based activities
(mean scores on a scale from 1 to 4, EU level, 2011-12)
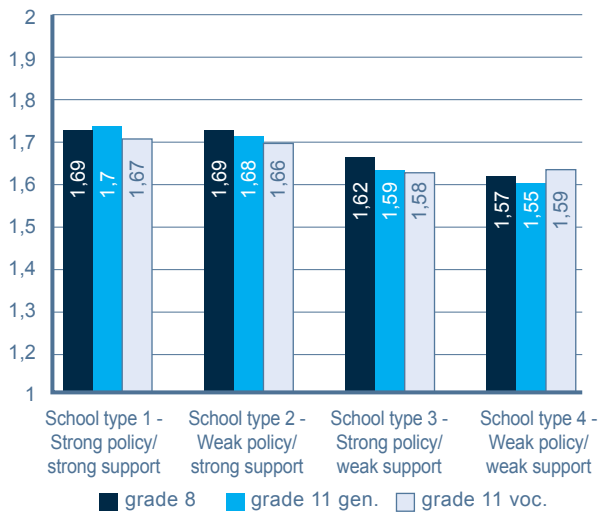
Fig. 8.2b: Frequency of students' use of ICT equipment
(mean scores on a scale from 1 to 4, EU level, 2011-12)
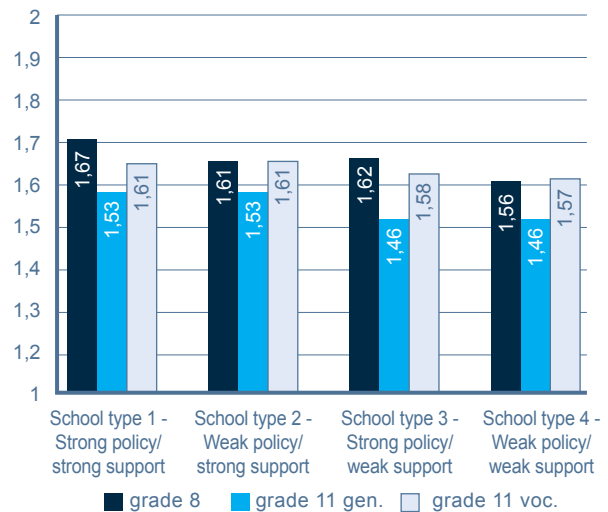
A similar situation is observed when comparing teachers' percentage of time using ICT in the past twelve months (question TE07) according to the four same school types mentioned above (see fig. 8.2c). Higher teacher use (represented by higher mean scores in the graph) is observed in school types 1 and 2.

Fig. 8.2c: Teachers' use of computer/internet in class during the last 12 months
(mean scores on a scale from 1 to 4, EU level, 2011-12)
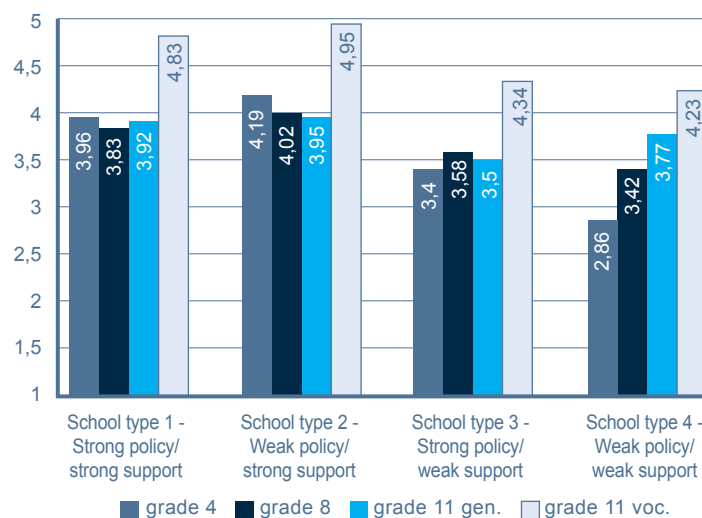
The *digitally supportive school* can therefore be defined as a school where policy and concrete support measures such as teachers' participation in professional development and the availability of an ICT coordinator are present, whether or not associated with a policy defined at school level (as a policy can be decided at central level and not reported by the school head in the present circumstances).

Looking back at figure 8.1 presented previously, showing the division of school profiles by grade at EU level and by country, we 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 and 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 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 with a strong policy but weak support (school profile 3);

- Compared to the other grades, higher percentages of students at grade 8 are in schools having a weak policy but strong support measures (school profile 2); this is the case in Denmark and Norway where percentages of students in schools with a strong policy and 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 at grade 4 in Greece), fewer than 15% of students are in *digitally supportive schools.*

The digitally confident and supportive teacher

The teacher questionnaire investigates, among other issues, teachers' 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 asks 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 teachers' answers to questions on these issues was processed, concerning:

- Percentage of teaching time using computers/internet in the past twelve months (question TE07)
- Teachers' access to ICT infrastructure (question TE09)
- Teachers' 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)
- Teachers' confidence in different ICT based activities (TE22)
- Teachers' opinions about the impact of ICT use on student learning (TE23)
- Teachers' 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 confidence/attitude and high access/low obstacles (T&L conditions type 1)
- High teacher confidence/attitude and low access/high obstacles (T&L conditions type 2)
- Low teacher confidence/attitude and high access/low obstacles (T&L conditions type 3)
- Low teacher confidence/attitude and 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.

A more in-depth analysis of these graphs will be presented later on. For the moment it suffices to underline that at EU level:

- Around **25% of students** at grades 8 and 11 are in T&L conditions characterised by 'teachers' high confidence/attitudes & high access/low obstacles' (T&L type 1); a slightly lower percentage of students are 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 'teachers' high confidence/attitudes & low access/high obstacles' (T&L type 2); around 20% of students are in this situation at grade 11 in vocational education;

- Around **25% of students** at all grades are in T&L conditions characterised by 'teachers' low confidence/attitudes & high access/low obstacles' (T&L type 3);

- **Between 20% and 28% of students**, depending on the grade, are in T&L conditions characterised by 'teachers' low confidence/attitudes & low access/high obstacles' (T&L type 4);

- Differences between countries (and grades) are significant:
    - Between 45% and 65% of students at grade 11 are in T&L conditions characterised by 'teachers' high confidence/attitudes & 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 'teachers' low confidence/attitudes & 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; and 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 are 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, EU level and by country, 2011-12[145])

Fig. 8.3a: at grade 4
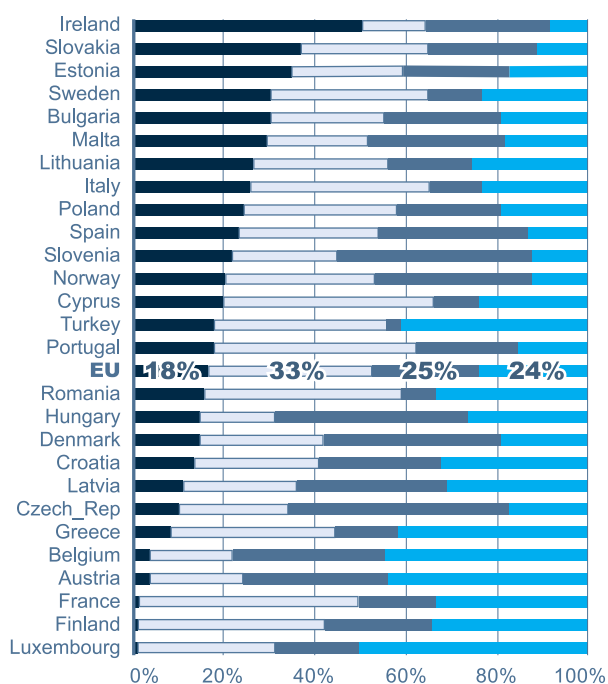
Fig. 8.3b: at grade 8
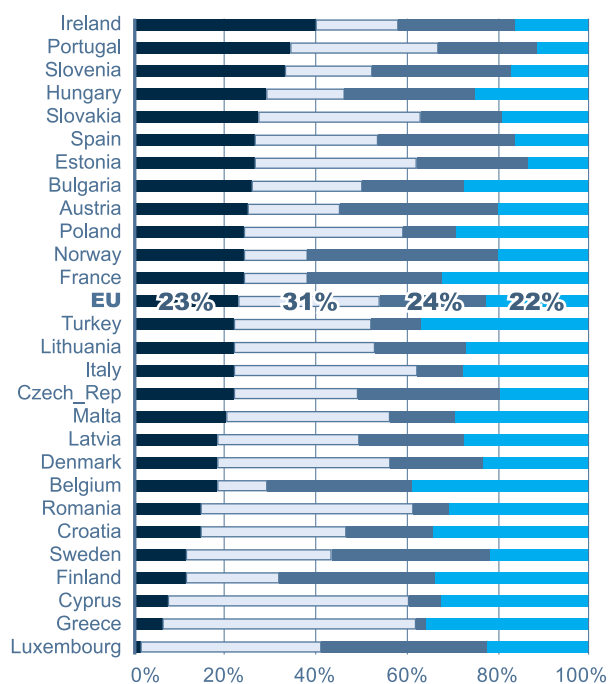
Fig. 8.3c: at grade 11 in general education
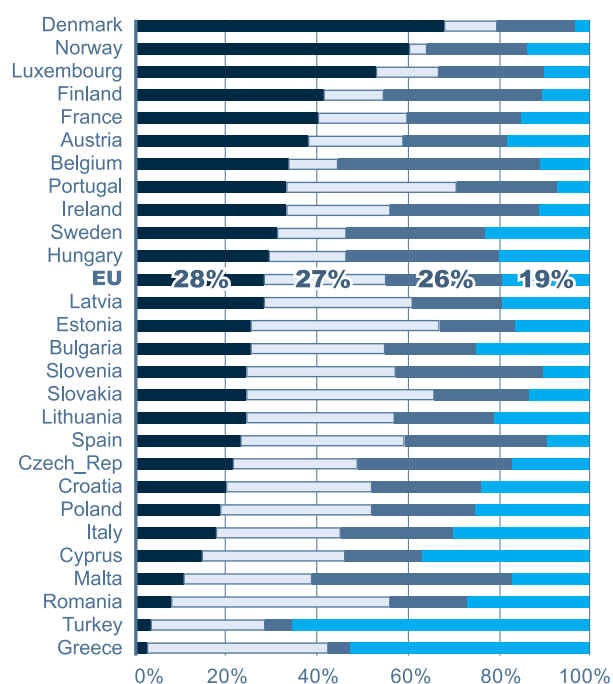
Fig. 8.3d: at grade 11 in vocational education
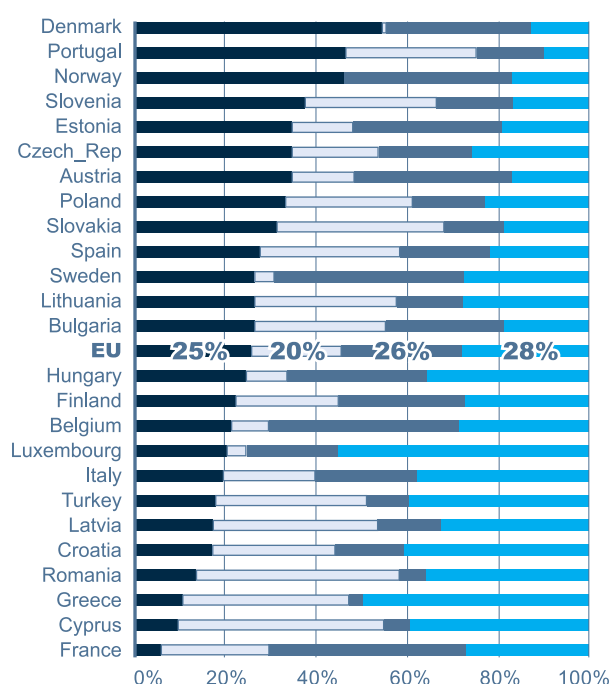
■ Type 1: high teachers confidence/attitude & high access/
low obstacles

■ Type 3: low teachers confidence/attitude & high access/
low obstacles

☐ Type 2 : high teachers confidence/attitude & low access/
high obstacles

■ Type 4: low teachers confidence/attitude & low access/
high obstacles

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145   There are no separate vocational schools in IE and MT.

Teacher profiles are also associated with the frequency of ICT based activities. At EU level, high teacher confidence/attitudes and high access/low obstacles (T&L conditions type 1) and high teacher confidence/attitudes and low access/high obstacles (T&L conditions type 2) show higher frequencies of ICT based activities compared to the other two types of T&L cond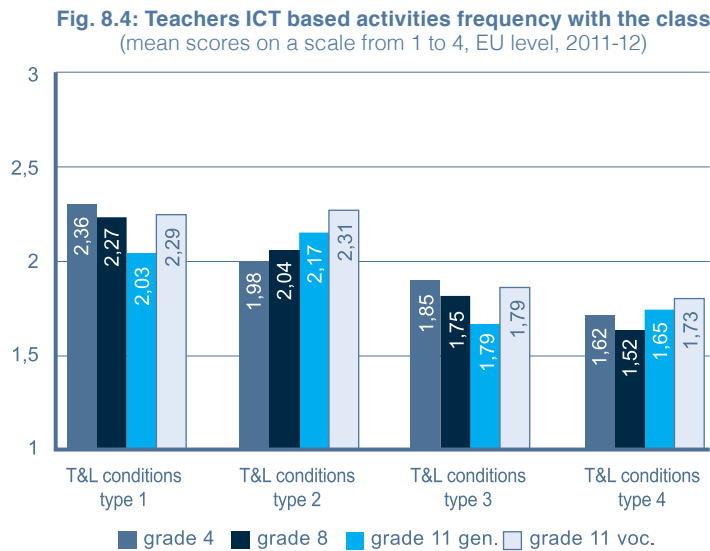itions. In other words, highly confident and positive teachers can overcome low access and high obstacles (see Fig. 8.4). At grade 11, such confident and positive teachers report a similar or even slightly higher frequency of ICT based activities compared to T&L conditions characterised by confident 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 confident and supportive teacher* at EU level can be defined as a teacher with high access to ICT and facing low obstacles as well as being highly confident and positive. In view of evidence supporting the fact that highly confident and positive teachers seem to be able to use ICT in T&L in an optimal way, even when access conditions are low and obstacles high, by looking back at figure 8.3 we can underline that:

- At EU level, between **45% and 55% of students** (depending the grade) are in T&L conditions of type 1 or 2 (high teacher confidence/attitude & high access/low obstacles or high teacher confidence/attitudes & low access/high obstacles);
- Differences between countries are again significant:
  - Knowing that teachers' high confidence and attitudes represent a way to overcome less favoured conditions of access to ICT, it is interesting to notice that around **35% of students** (and sometimes more depending the grade and/or country) are in T&L conditions characterised by high teacher confidence/attitudes even if low access/high obstacles are present 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 confident and supportive student

The student questionnaire investigates, among other issues, students' access to ICT, the number of years of experience using ICT, and ICT based activities in their free time at home. It also asks them about the same issues (access, number of years of experience and ICT based activities) at school during lessons. A cluster analysis of the students' answers to questions on these issues was 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 the impact of ICT use on learning (ST16)

This cluster analysis reveals three student profiles[146] that can be summarised as follows:

- high access/use at school and high access/use at home (student profile 1)
- low access/use at school and high access/use at home (student profile 2)
- low access/use at school and 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[147] The tables with precise percentages and their confidence intervals are presented in annex.

A more in-depth analysis of these graphs will be presented later on. For the moment it suffices to 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 integrating 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**.

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146   The cluster analysis (SPSS) did not reveal the existence of a fourth – hypothetical – student profile corresponding to 'high access/use at school and low access/use at home'.
147   At grade 11 vocational there are no separate vocational schools in IE and MT. The legend for grade 11 vocational applies to all three charts.

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

Fig.8.5a: at grade 8

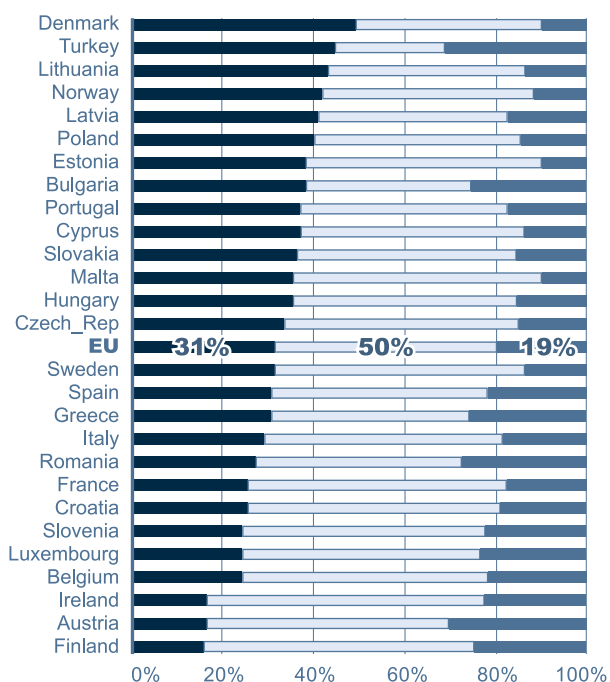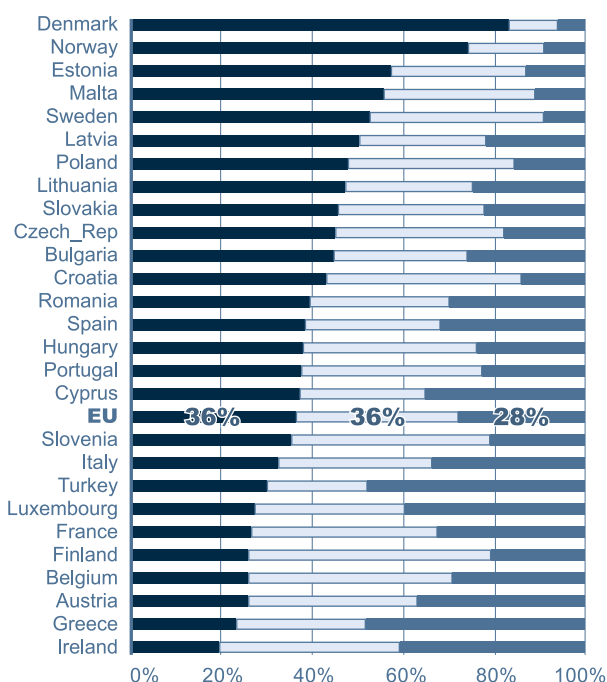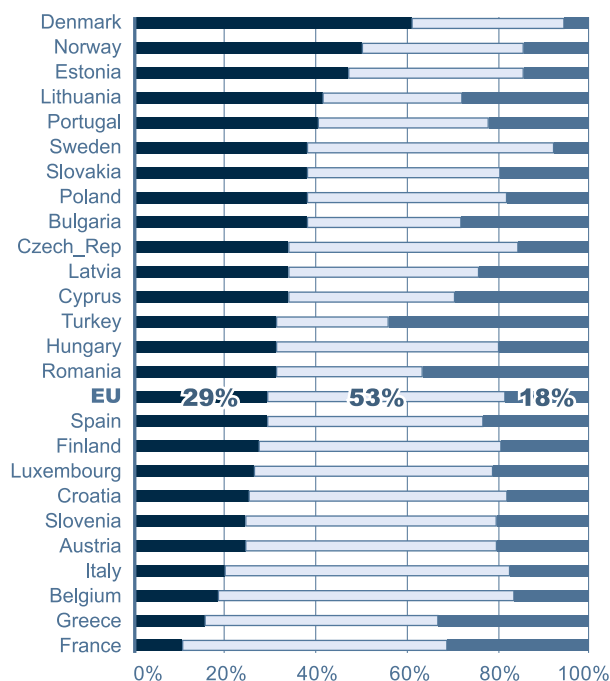**Fig.8.5b: at grade 11 in general education**

Fig.8.5c: at grade 11 in vocational education

■ Student profile 1: High access/use at school & home

□ Student profile 2: Low access/use at school & high access/use at home

■ Student profile 3: Low access/use at school & home

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

Fig. 8.6a: Frequency of students' ICT-based activities in lessons
(mean scores on a scale from 1 to 4, EU level, 2011-12)
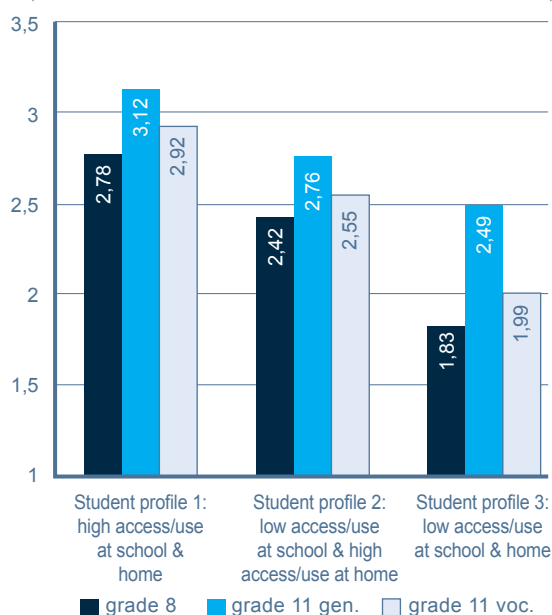

Fig. 8.6b: Students' confidence in their operational ICT competence
(mean scores on a scale from 1 to 4, EU level, 2011-12)
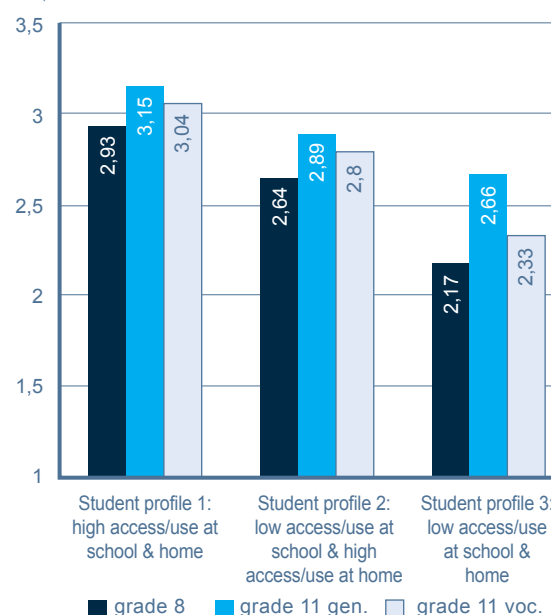

Fig. 8.6c: Students' confidence in their social media competences
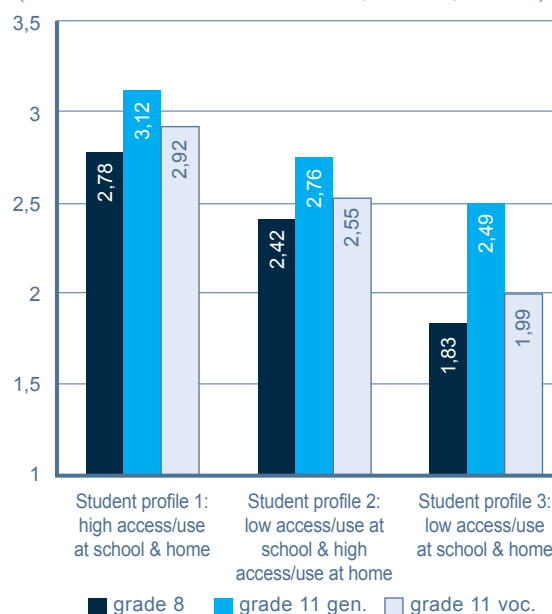(mean scores on a scale from 1 to 4, EU level, 2011-12)

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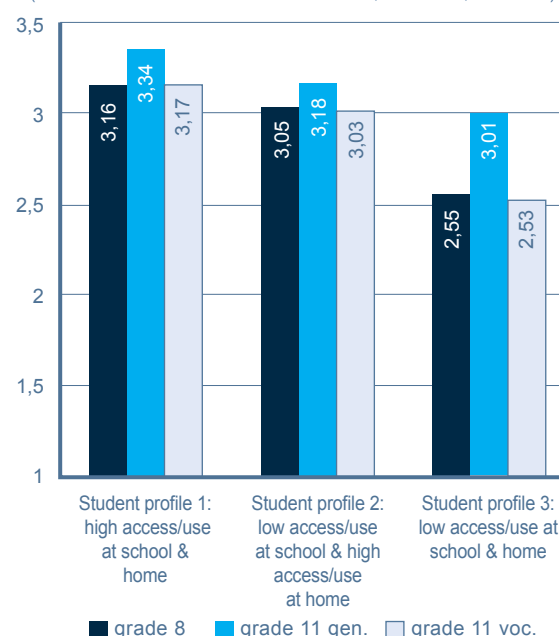(mean scores on a scale from 1 to 4, EU level, 2011-12)

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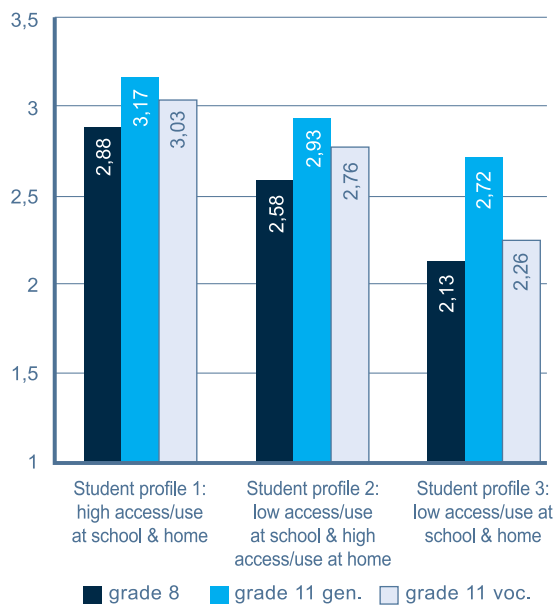(mean scores on a scale from 1 to 4, EU level, 2011-12)

Student profile 1: high access/use at school & home — grade 8: 2,88; grade 11 gen.: 3,17; grade 11 voc.: 3,03

Student profile 2: low access/use at school & high access/use at home — grade 8: 2,58; grade 11 gen.: 2,93; grade 11 voc.: 2,76

Student profile 3: low access/use at school & home — grade 8: 2,13; grade 11 gen.: 2,72; grade 11 voc.: 2,26

■ grade 8   ■ grade 11 gen.   ☐ grade 11 voc.

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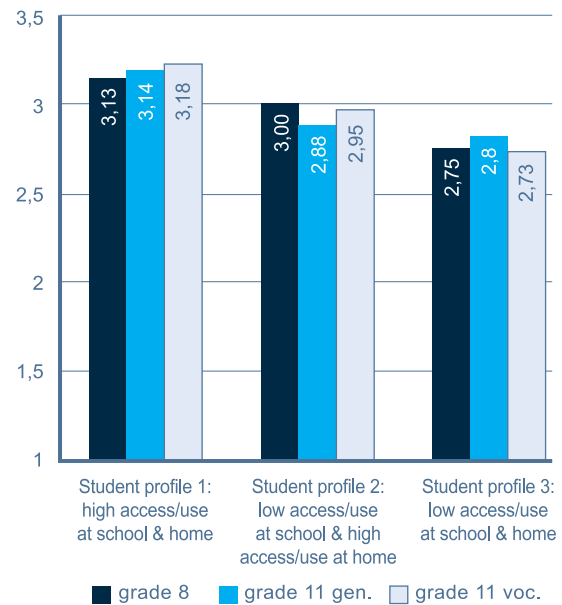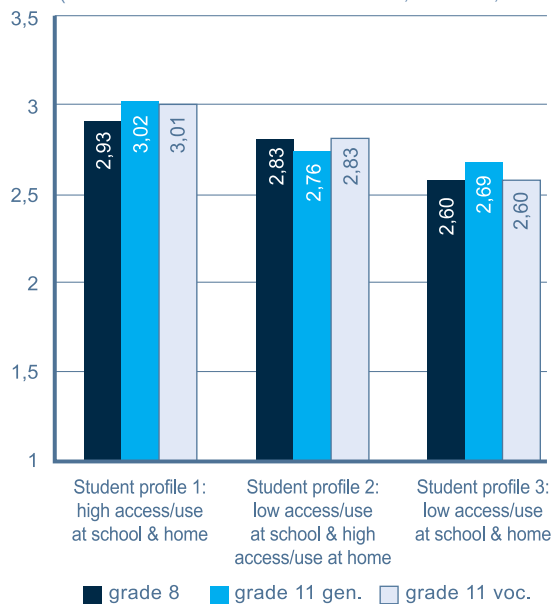(mean scores on a scale from 1 to 4, EU level, 2011-12)

Student profile 1: high access/use at school & home — grade 8: 3,13; grade 11 gen.: 3,14; grade 11 voc.: 3,18

Student profile 2: low access/use at school & high access/use at home — grade 8: 3,00; grade 11 gen.: 2,88; grade 11 voc.: 2,95

Student profile 3: low access/use at school & home — grade 8: 2,75; grade 11 gen.: 2,8; grade 11 voc.: 2,73

■ grade 8   ■ grade 11 gen.   ☐ grade 11 voc.

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

Student profile 1: high access/use at school & home — grade 8: 2,93; grade 11 gen.: 3,02; grade 11 voc.: 3,01

Student profile 2: low access/use at school & high access/use at home — grade 8: 2,83; grade 11 gen.: 2,76; grade 11 voc.: 2,83

Student profile 3: low access/use at school & home — grade 8: 2,60; grade 11 gen.: 2,69; grade 11 voc.: 2,60

■ grade 8   ■ grade 11 gen.   ☐ grade 11 voc.

Therefore, the *digitally confident and supportive student* at EU level can be defined as one having high access/use of ICT at school and at home, the highest level of confidence in their ICT based skills and the most positive opinions about the positive impact of ICT on T&L, as well as attitudes towards computers.

Looking back at figures 8.5a to 8.5c presented previously, showing the division of student profiles by grade at EU level and by country, we can notice that differences between countries are again significant:

- The highest percentages of students corresponding to profile 1 are 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 other extreme, 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 on the grade) and Turkey (between 30% and 50% depending on the grade); at some grades, 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).

Digitally confident and supportive students and teachers – digitally supportive schools

The three profile descriptions have provided, for each country, the percentages of (i) digitally supportive schools, (ii) digitally confident and supportive teachers, and (iii) digitally confident and supportive students. Are there any relationships between these profiles? In other words, do educational systems characterized by a high percentage of digitally supportive schools include a large percentage of digitally confident and supportive teachers or students, or the reverse?

To answer these questions, correlation coefficients were computed at the country level between these percentages.

Digitally confident and supportive teachers and the digitally supportive school

To some extent at grade 4 and at grade 11 in vocational education (a correlation of 0.43 and 0.54 respectively), as the percentage of digitally supportive schools increases, so does the percentage of digitally confident and supportive teachers. There might be national/regional contexts that might favour 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 confident and supportive teachers also.
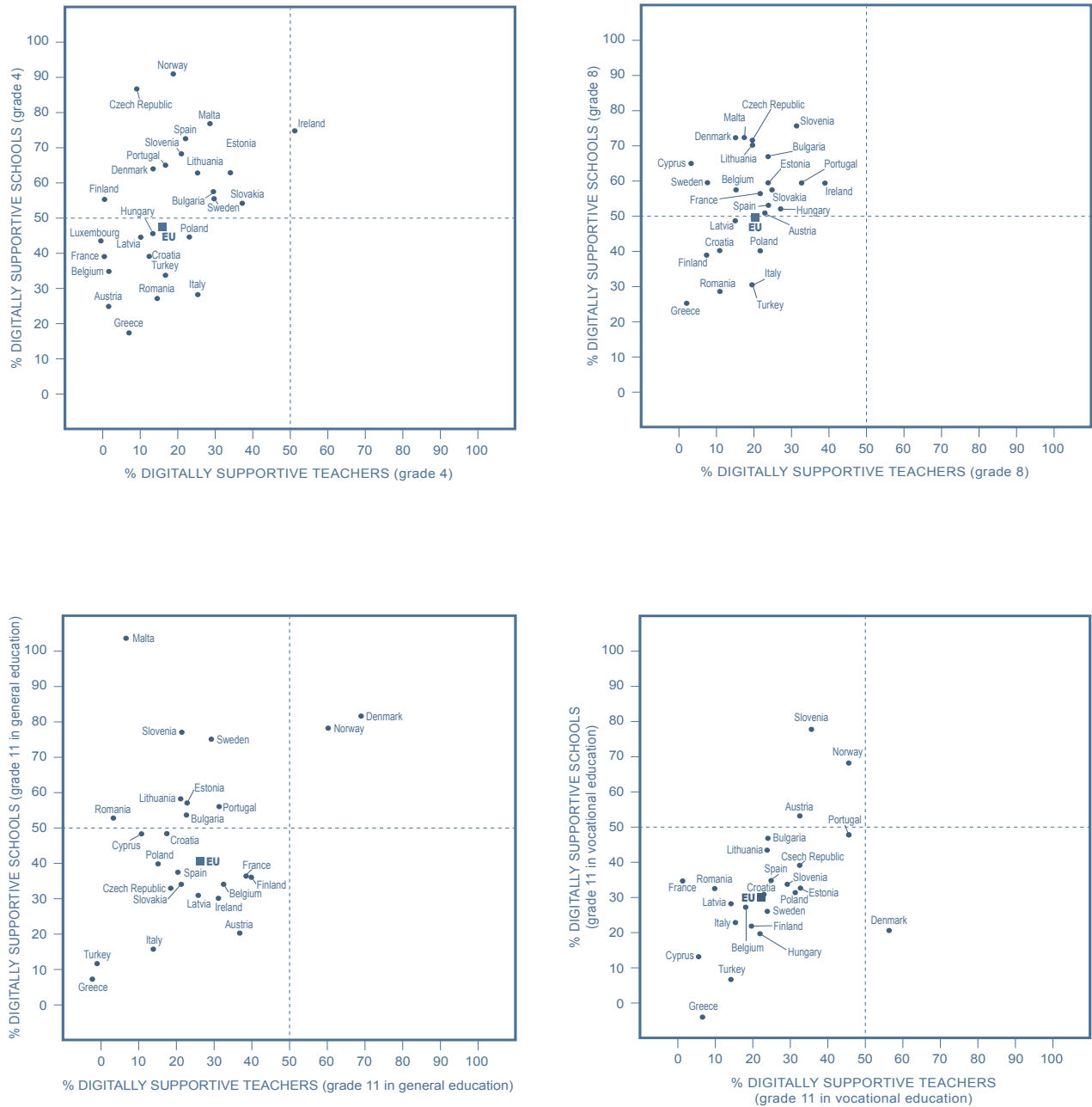
The **same trend** is observed **to a slightly smaller extent at grade 8 and at grade 11 in general education** (a correlation of 0,35 and 0,33 respectively).

These correlations are statistically significant at grade 4 and 11 vocational, but not at grade 8 and 11 general. This is not surprising because of the small size of the population concerned (consisting of the countries participating in the survey), and so the correlations are worth mentioning all the same.

Mapping of countries according to their respective percentages of students in digitally supportive schools and the percentages of students taught by digitally confident and supportive teachers is presented in Fig. 8.7. It 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 confident and supportive teachers (from less than 10% to a maximum of 50%) at grades 4 and 8; these differences are a little smaller at grade 11 in general education, and even smaller in vocational education, the number of countries having more than 50% of students in digitally supportive schools decreasing as grades increase;

- At grade 11 in general education, the percentages of students taught by digitally confident and 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 are more than 50% of students still in digitally supportive schools at grade 11 in vocational education; in Slovenia, the percentage of students taught by digitally confident and supportive teachers at this grade slightly increases compared to general education, while it decreases in Norway.

Fig. 8.7: Mapping of countries according to their respective % of students in digitally supportive schools and % of students taught by digitally confident and supportive teachers
(by grade, EU level and by country, 2011-12)

Digitally confident and supportive students and digitally supportive schools

To a considerable 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 confident and supportive students,** and **few digitally confident and 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** (a correlation of 0.26 and 0.19 respectively). These correlations are statistically significant at grade 8 and 11 vocational, but not at grade 11 general.

Mapping of countries according to their respective percentages of students in digitally supportive schools and percentages of digitally confident and supportive students is presented in fig. 8.8. It shows that:

- Percentages of digitally confident and supportive students at grade 11 in general education are higher than 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% as opposed to other countries, and even increase in Denmark, Malta and Sweden, compared to grade 8;

- In Denmark at grade 11 in vocational education, the percentage of digitally confident and supportive students remains higher compared to all other countries, while the percentage of digitally supportive schools decreases a lot.

Fig. 8.8: Mapping of countries according to their respective % of students in digitally supportive schools and % of digitally confident and supportive students
(by grade, EU level and by country, 2011-12)
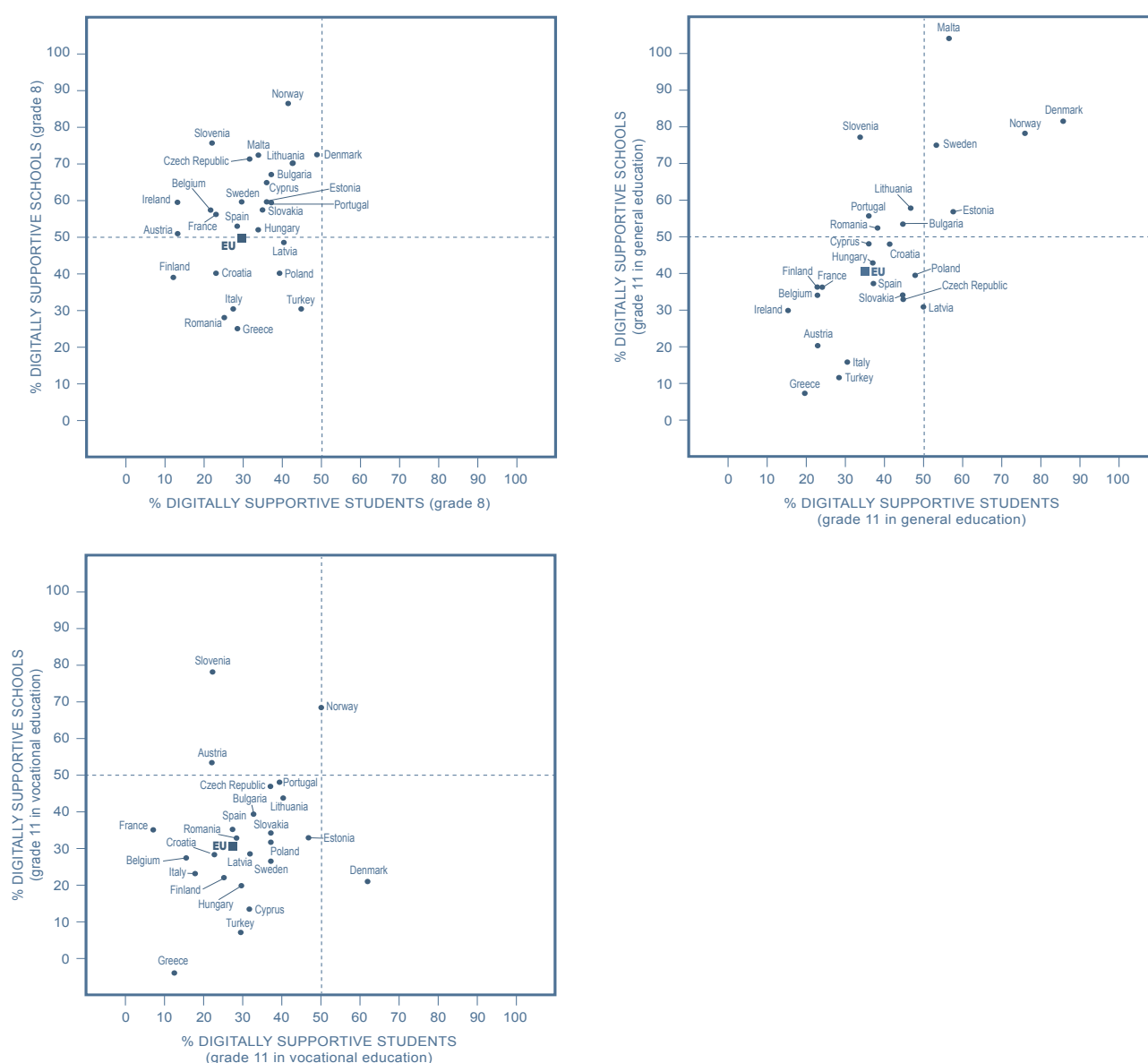
Digitally confident and supportive students and teachers

Finally, a relationship is also observed between the digitally confident and supportive teachers and digitally confident and supportive students. Up to a rather good extent at grade 11 in vocational education (0.73 correlation)**, countries with a high percentage of digitally confident and supportive teachers are also countries with a high percentage of digitally confident and supportive students** (even if the correlation is not statistically significant which, as mentioned previously, is not surprising because of the size of the population concerned here, 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**.

Mapping of countries according to their respective percentages of students taught by digitally confident and supportive teachers and percentages of digitally confident and supportive students is presented in Fig. 8.9. It shows that:

- In most cases, in all countries and at all grades, percentages of students taught by digitally confident and supportive teachers and percentages of digitally confident and positive students are below 50%;
- At grade 11 in general education, percentages of digitally confident and 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 confident and 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 confident and supportive teachers and % of digitally confident and supportive students
(by grade, EU level and by country, 2011-12)
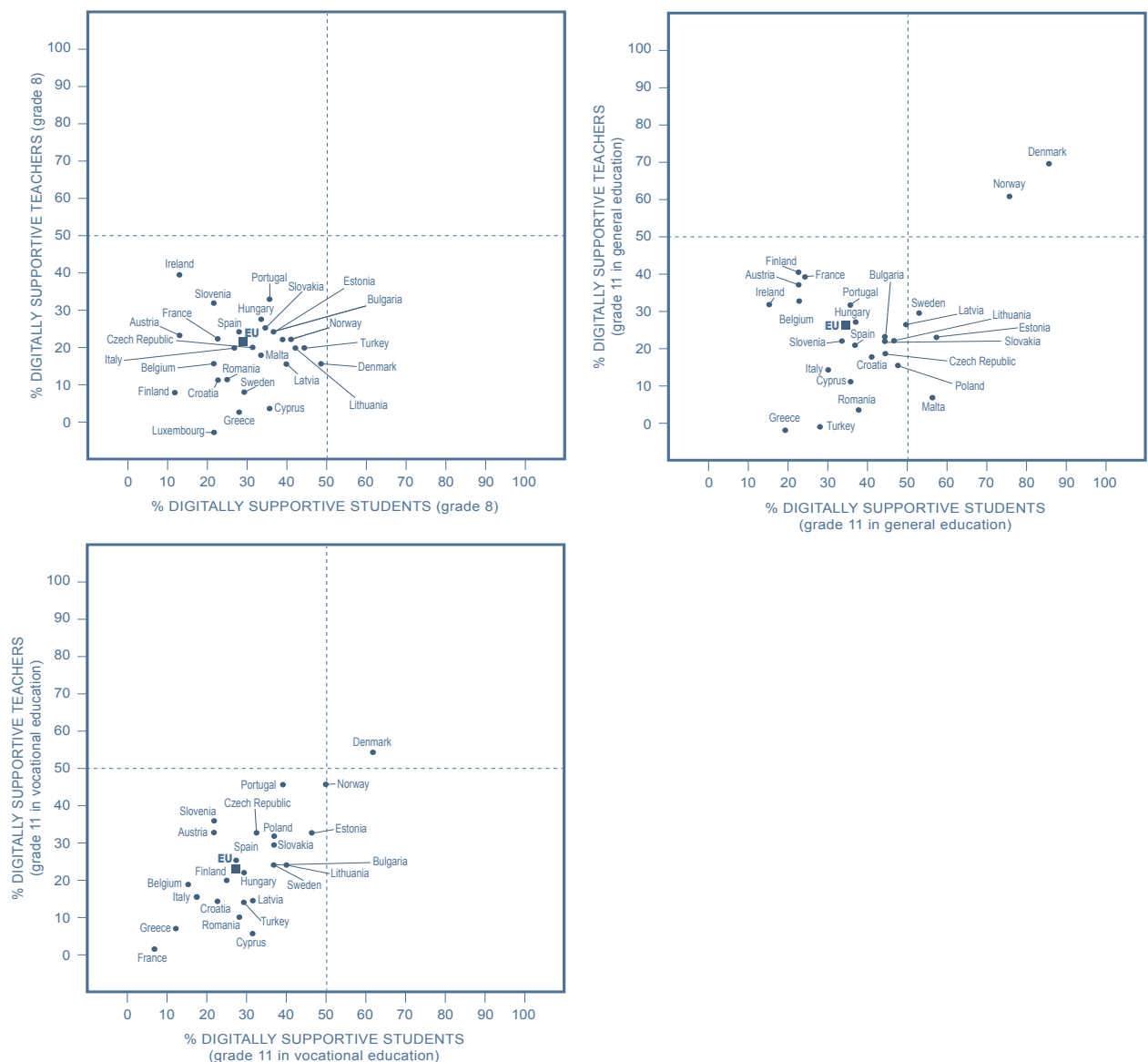
Preliminary conclusions

As the previous sections have shown, the *Survey of Schools: ICT and Education* provides up-to-date and reliable benchmarking of access, use and attitudes towards ICT in school level education. In addition it offers insightful analyses of relationships between ICT provision, use, support and digital confidence.

The results show that one in two grade 8 students in Europe is in a school where there is strong support for teachers using ICT, almost one in four in schools where teachers are confident in the use of ICT, have high levels of access to ICT and low obstacles to its use in class, and one in three has high levels of access and use of ICT both at home and school. Around two out of three grade 8 students in Norway, Slovenia, Denmark, Malta and the Czech Republic are in 'digitally supportive schools', one in three in schools with '*digitally confident and supportive teachers*' in Ireland, Portugal, Slovenia and Hungary, and over two in five can be categorised as '*digitally confident and supportive*' in Denmark, Turkey, Lithuania, Norway and Latvia.

Nearly one in two students at all grades is now in a '*digitally supportive school*' and between 20 and 25 per cent of students are taught by '*digitally confident and supportive teachers*'. Between 30 and 35% of grade 8 and 11 students can be considered '*digitally confident and positive students*'.

We have seen strong progress since the previous survey in 2006 in terms of provision of equipment and broadband access and levels of confidence in teachers. However a number of findings raise issues.

1. **Infrastructure provision at school level varies considerably between countries; lack of it is still an obstacle to greater use of ICT in schools.** In a difficult economic climate further investment needs to show its value for money. The SITES study[148] found that there had been an overall increase in computer density and in *Are the New Millennium Learners Making the Grade? Technology use and educational performance in PISA*[149], it was reported that despite increasing investment in ICT infrastructure in schools, student-computer ratios are still a handicap for ICT use in schools and that OECD average is five students per computer. In this survey the ratio at grade 11 vocational is three and at grade 8 five students per computer. In some countries (e.g. Norway) the survey indicates that there is system-wide 1:1 computing and in others it is clear that student-computer ratios are no longer a handicap, but this is by no means universal in Europe. In this survey the equipment items most frequently seen as holding back the use of ICT by both head teachers and teachers (more so than head teachers, typically one in three compared to one in two grade 8 students are in schools where this is the case) are laptops rather than desktop computers, and also interactive whiteboards. Insufficient or inoperative equipment is still the biggest inhibitor according to both teachers and head teachers in the survey, at grade 8 the issue being particularly acute in Romania, Turkey, Latvia and Italy. In the same study, "in most countries there is no difference or only a small one in the number of computers per student between schools in rural locations or towns and schools in cities." The survey results echoed this finding.

2. **Use of ICT, as measured in the surveys, may not have risen as much as might have been expected.** Given that obstacles seem to be less of a hindrance than previously was the case, it is of note that ICT use has remained at a fairly constant level since 2006, and that one in five grade 8 students has not used a computer in class in the past year. There is still a long way to go before ICT permeates schools and teaching. The slow growth is reported in SITES 2006[150] which found that use of ICT in teaching and learning by mathematics and science teachers (the main target audience of the study) remained generally low and highly variable across countries, with reported adoption varying from 20% to 80%.

3. **There is no overall relationship between high levels of ICT provision and student and teacher confidence, use and attitudes.** Surprisingly, the survey could find no relationship between numbers of desktop computers in schools and frequency of their use by students, either at EU or country level. This echoes SITES 2006 (Law et al, 2008) which also found no correlation between the level of ICT access (student to computer ratio) and the percentage of teachers reporting having used ICT in their teaching. Further analysis attempted to establish whether high levels of ICT provision and student and teacher confidence, use and attitudes were connected; no overall relationship could be detected. Rather, other factors as described elsewhere, e.g. practical support to teachers, have an effect on confidence, use and attitudes. Further work is recommended to explore this area.

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148   Law, N., W.J. Pelgrum and T. Plomp (eds.) 2008, Pedagogy and ICT use in schools around the world. Findings from the IEA International Comparative Studies
149   Are the New Millennium Learners Making the Grade? OECD 2010, p.12
150   Law, N., Pelgrum W.J., and Plomp T. (eds.) (2008), *Pedagogy and ICT use in schools around the world. Findings from the IEA International Comparative Studies Sites 2006*, CERC-Springer, Hong Kong.

4. Consequently, the **policy focus should be on effective learning management as much as on ICT provision**. As the OECD note, "There is a stronger correlation between educational performance and frequency of computer use at home than at school" and "With the right skill and background, more frequent computer use can lead to better performance." In the current study at EU level a positive but tenuous correlation is observed between students' attitudes to computers and the number of years they have used ICT.

5. **There is high, but not universal, use of ICT at home.** In most of the OECD countries more than 80% of 15 years olds use computers frequently at home but a majority do not use them at school, except in Hungary. In this survey between 30 and 35 per cent of students now have high access and use of ICT both at home and at school and no more than 50% are in the high access and use at home category. We found that between 40 and 60 per cent of students have used computers at home for more than six years.

6. **The presence of virtual learning environments in schools is increasing rapidly.** The 2006 benchmarking survey did not include an item on virtual learning environments and in 2009, Underwood[151] reported that the use of 'learning platforms' was still in its infancy for many schools in the UK, yet in 2011-12 across Europe over one grade 8 student in two is in a school with a virtual learning environment (VLE), and over 90 per cent of students in Luxembourg, Norway, Portugal and Denmark are in such schools. Well used, they offer a means of involving parents in students' education and enabling learning to take place outside classrooms and the school day. Evidence suggests (Underwood, 2009) that when a VLE became embedded in the school, it proved to be supportive not only of efficiency gains, but it also stimulated new ways of working. This was true for both teachers and learners. In this sense, the VLE was seen as a transformational technology. While interactive whiteboards were seen as an easy entry technology, VLEs were often seen as problematic innovations. In-depth case studies by Wastiau (2010)[152] confirm the longer adoption phase as regards the deployment of virtual learning platforms.

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:

1. In general terms, the survey findings make a case for **strengthening public action** at institutional, local, regional, national and European levels to boost ICT use at school so as to reduce the gap between ICT use out and within school – a gap identified many years ago but still persistent in 2012 - and give greater opportunities to about 30% of 16-year-old students lacking adequate home access to ICT to experience it at school. ICT use at school should take account of differences in home access and patterns of use by students. The survey findings (e.g. the digitally supportive student cluster) reinforced those reported in *Are the New Millennium Learners Making the Grade?*[153]: the digital divide in education goes beyond the issue of access to technology. A second digital divide separates those with the competences and skills to benefit from computer use from those who do not. These competences and skills are closely linked to students' economic, cultural and social capital.

2. Transform positive attitudes and sufficiency in ICT provision into effective and sustained classroom practice. Evidence shows also that increasing **professional development opportunities for teachers** is an efficient way of boosting ICT use in teaching and learning since it helps build highly confident and positive teachers. This seems only sensible given that teachers' opinions about the impact of using ICT for learning purposes is already very positive and about 80% of students are in schools where the school head also shares such positive views. Countries might consider making ICT a compulsory component of initial teacher education programmes and to seek to improve the quality and consistency of ICT training across institutions .

3. Despite having access and positive attitudes towards implementing ICT into their teaching and learning, teachers often find this difficult and require on-going **support - not only technical but also pedagogical**, for example providing ICT coordinators in school with a role to provide pedagogical as well as technical guidance Increasing the training provided by school staff and others to teachers of all disciplines should therefore be encouraged, including subject-specific training on learning applications. Online professional collaboration between teachers can also lead to effective changes in their practice, and a deeper awareness of their own professional development needs. Although online resources and networks are widely available in Europe, they are a relatively new way for teachers to engage in professional development, and only a minority is exploiting their benefits. There is a need therefore to further promote – starting with pre-service training – such online platforms and the opportunities they can afford to the European teaching community.

151   Underwood, J. et al. (2009), Understanding the Impact of Technology: Learner and School level factors, Nottingham Trent University, Becta Publishing.
152   Wastiau, P., Virtual Learning Environments in three European countries, the UK, Andalusia and Catalonia, 2010, European Schoolnet
153   OECD 2010

4. **Harness high levels of use of personally-owned mobile phones.** In the survey significant numbers of grade 8 and 11 students stated that they routinely used their own mobile phone in lessons for learning purposes. Whether this is sanctioned or not in schools is not known, but what is clear is that students are serious about the capacity of their mobile to support their learning. Since 2006 there is a strong trend from use of desktop computers to laptops and portable equipment brought into school by students.

5. **Use the dataset and lessons learnt from this survey for future investigations.** The free availability of the dataset (190,000 completed surveys) 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 always easily available.

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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 AND 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. In this report grades are used rather than ISCED levels. Thus ISCED1 = Grade 4, ISCED 2 = Grade 8, ISCED 3A = Grade 11 general, ISCED 3B = Grade 11 vocational
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
TIMSS	Trends in International Mathematics and Science Study
T&L	Teaching and Learning
VLE	Virtual Learning Environment
Voc.	Vocational education