

DIGITAL COMPETENCES IN THE DIGITAL AGENDA

- In 2011, 73% of EU 27 households had access to the internet, a 3 percentage point increase over 2010.
- A lack of skills is the second most important reason for not having access to the internet (after lack of interest) and it has increased in importance compared to 2008 by 9 percentage points. From a cross-country perspective, more than 1 out of 2 households without internet access in Cyprus, Estonia, Latvia, Portugal, Slovenia, and Slovakia reported a lack of skills as a reason for not having internet access at home.
- In terms of different levels of digital skills, on average 14% of Europeans have low level computer skills, 25% have medium level skills and 27% have high level skills. At the same time, 30% of Europeans have low level internet skills, 32% have medium level skills and 11% have high level skills. These figures have not changed significantly over the past 2 years, increasing by only 2 percentage points.
- Countries with a higher rate of regular and frequent computer or internet users tend to have a higher rate of medium and high-skilled people.
- Only 1 out of 3 students in Europe are taught by teachers for whom participation in ICT training is compulsory.
- Only 53% of the labour force said is confident that their level of computer and/or internet skills are sufficient if they were to look for a job or change job within a year. The Nordic countries, the Netherlands and the UK have levels of confidence in skills at or above 70%..
- Age, gender, and education remain the key challenges. Older people as well as those with lower levels of education tend to have lower level digital skills and the same is true for women in comparison to men. As a result, 'skilling up' European citizens requires a set of specific strategies that will address age, educational and gender gaps.

DIGITAL COMPETENCES IN THE DIGITAL AGENDA	1
1.1. RECENT EVIDENCE ON DIGITAL COMPETENCE IN EUROPE	5
1.1.1. Access to ICT.....	5
1.1.2. Operational Computer and Internet skills.....	8
1.1.3. Active application to aspects of life.....	15
1.1.4. Skills and use of eGovernment and eCommerce services.....	17
1.1.5. Personal attitudes.....	18
1.1.6. Skills and socio-economic factors	19
1.1.7. Ways of obtaining digital skills	23
1.2. ICT SKILLS IN EDUCATION	24
1.2.1. Schools' equipment and strategies.....	26
1.2.2. Use of ICT by teachers for teaching purposes (last 12 months).....	28
1.2.3. Use of ICT by students for learning purposes	28
1.2.4. Teachers' ICT competences.....	29
1.2.5. Student confidence in using ICT.....	33
1.2.6. The digitally supportive school - Policy and support.....	34
1.2.7. The digitally supportive teachers - learning conditions	36
1.2.8. The digitally supported student - home / school use of ICT by students	38
1.2.9. The 'e-equipped school'	39
1.3. CONCLUSIONS.....	40

Information and Communication Technologies (ICT), in their various forms, permeate our lives from our youngest years. We learn and use ICT in school and it supports life-long learning. In the work place, these technologies have spread so rapidly that it is estimated that by 2015, 90% of jobs will require at least a basic level of digital skills. We also use ICT in our private lives for leisure, entertainment, to communicate with others and to participate in the civil society. As such, we have contact with ICT every day, or almost every day, and, in fact, we are required to build the necessary skills to be able to use them effectively.

Until not so long ago an individual's essential set of skills comprised the so-called 3 R's: reading, writing and arithmetic. In view of today's digital transformation this is no longer sufficient. For individuals to benefit from the Information Society, as well as to respond to its challenges, they must enhance their set of skills to include *Digital Skills*.

Digital skills are the basis of *Digital Competence*, "the confident and critical use of information Society technology (IST) for work, leisure, learning and communication".

Furthermore, to reap the benefits of ICT for growth and employment, ensuring the adequate availability of skills is essential. Academic research shows that to make the most of the productivity and growth potential of ICT, investment in human capital is central. In particular, investment in digital competences plays an important role. Countries that have invested in digital competences, alongside their ICT investments, have seen and benefited from a larger impact on productivity and growth.

Looking to the future, ICT continues to be a growth sector due to the development and roll-out of new ICT innovations such as cloud computing, 'smart' applications, and green ICT (including "smart" infrastructures to increase energy efficiency). To achieve the growth potential of these technologies we must equip our workforce with the adequate skills, especially since the emergence and rapid development of new technologies could lead to significant skill shortages and mismatches. Forecasts suggest that by 2015, there may be as many as 700 000 unfilled job vacancies in the area of ICT. Indeed there is a declining interest of young people in ICT careers, despite the sector's good career prospects and the recent historically high youth unemployment rates. Recent statistics show that although the number of ICT graduates increased from 71,000 per year in 2000 to 127,000 in 2006, it decreased in the following years, dropping to 114,000 by 2009.

The importance of digital competence was recognised by the European Parliament and the European Council in 2006 in their recommendation on key competences for lifelong learning. The recommendation identified digital competence as one of eight key competences essential for all individuals in a knowledge-based society¹. Since then the European Commission has undertaken a number of initiatives recognising the importance of ICT. As a result, one of the pillars of the Digital Agenda for Europe (DAE) is devoted to digital literacy/competence, skills and inclusion, with a number of actions in this area.

The purpose of this chapter is to present up-to-date evidence on levels of digital competence in Europe (for convenience an overview of the conceptual framework that was developed one year ago is reproduced in Box 1 below). Additionally, the chapter explores the socio-economic variables that are associated with the computer and internet skill level of individuals; namely age, gender, educational level, employment status, household income, citizenship and type of locality. Finally, the chapter provides new evidence on the use of ICT in education, including on the digital competence of students and teachers, gained from the

¹ <http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2006:394:0010:0018:en:PDF>

study "*Survey of Schools: ICT in Education*"². The latter is funded by the European Commission Directorate General Information Society and Media and is being undertaken by European Schoolnet and the Service d'Approches Quantitatives des Faits Educatifs in the Department of Education of the University of Liège. It aims to benchmark progress in ICT availability and its use in 31 countries (EU27, Iceland, Norway, Croatia and Turkey) by surveying students, head teachers and teachers. Hence, it will contribute to the development of up-to-date and relevant indicators and to the establishment of a continuous monitoring system on ICT access, use and impact in schools.

All data in this chapter are sourced from *Eurostat's Community Survey on ICT Usage in Households and by Individuals*, except for the data presented in the section "ICT in education" that are sourced from the *Survey of Schools: ICT in Education*.

² The Survey of Schools: ICT in Education, SMART 2010/0039 is still ongoing and the results presented here are preliminary and based in the draft final report. The final report is expected during the summer 2012.

Box 1: A Conceptual framework for Digital Competence

The conceptual framework that is used in this chapter is the one developed in the Digital Agenda Scoreboard 2011, chapter 6, p. 5 and is reproduced here (table 1).

Table 1: Conceptual framework for digital competence

Environmental factors	(1) Access to ICT	<ul style="list-style-type: none"> •Computers •Internet •Mobile devices •Etc
Individual competence	(2) Operational skills	<ul style="list-style-type: none"> •Basic computers skills •Basic internet skills
	(3) Active application to aspects of life	<ul style="list-style-type: none"> •Work/professional •Learning (LLL) •Communication •Participation in society •Leisure •Collaborative networking
Personal attitudes	(4) Personal attitudes	<ul style="list-style-type: none"> •Critical/reflective use •Responsible use •Legal and ethical principles •Confident use •Creative use

1.1. Recent evidence on digital competence in Europe

1.1.1. Access to ICT

The first step for an individual to become digitally competent is to have access to ICT. Access to ICT comprises access to a computer and the internet but also to other more recently developed devices that rapid technological developments have made available such as laptops, smart phones, tablet PCs, games consoles, PDAs and digital television. Access to the internet is so important that according to a United Nations Report it should be a human right and *a priority for all states given that the internet has become an indispensable tool for realizing a range of human rights, combating inequality, and accelerating development and human progress*³. Indeed, in some countries, such as Estonia, Finland, France, Greece and Spain internet access has already been made a human right.

³ Report of the Special Rapporteur on the promotion and protection of the right to freedom of opinion and expression, Frank La Rue, General Assembly, 16 May 2011

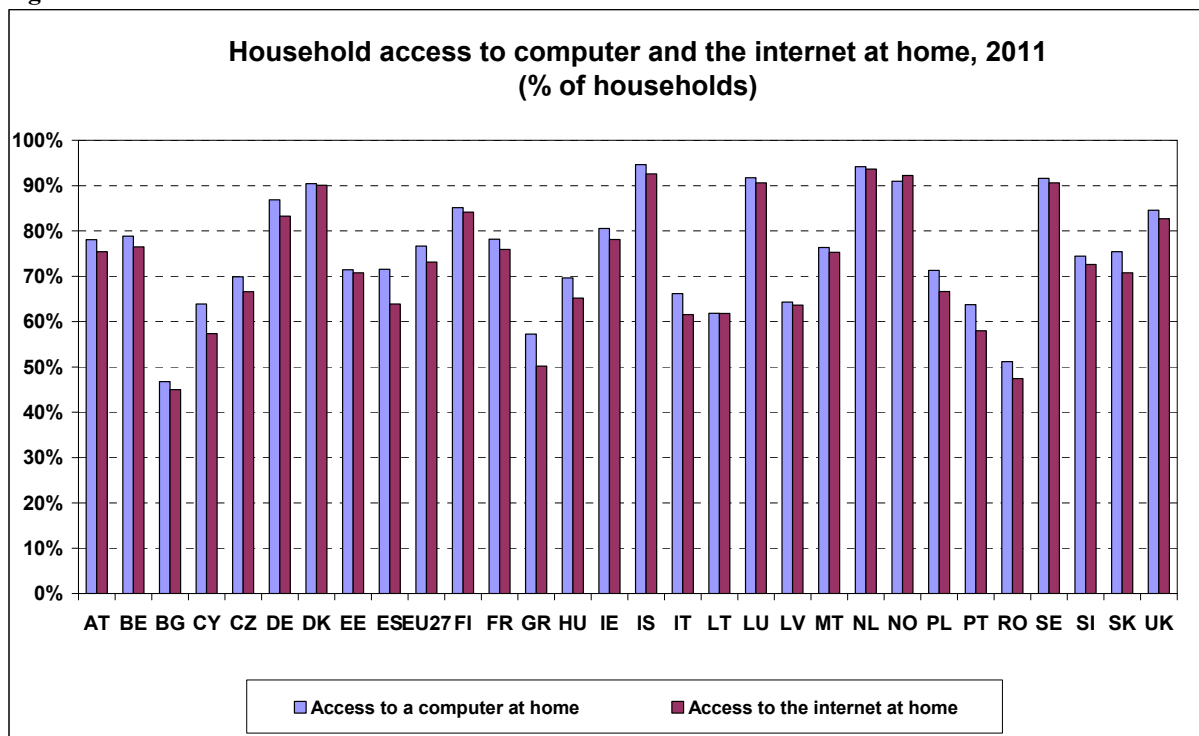
⇒ **3 out of 4 European households have access to the internet...**

On average in the EU27, 77% of households⁴ had **access to a computer at home** in 2011, a 3 percentage point increase since 2010, while 73% of EU households had **access to the internet**, also a 3 percentage point increase over 2010.

The highest rates for both indicators were observed in Denmark, Iceland, the Netherlands, Norway, Luxemburg and Sweden (around 90% or above).

The lowest rates were observed in Greece, Romania, and Bulgaria (close to 50% or below) (Figure 1).

Figure 1



Source: Eurostat

⇒ **...but 38 million households are not yet online**

Progress continues to be made, as evidenced by an increase in access levels across all EU Member States (MS). Only two Member States still have access rates below 50% (Bulgaria and Romania), although, remarkably, Bulgaria, has increased its rates of access very substantially in 2011 by 33% and 35% reaching 47% and 45% in computer and internet access respectively.

Nevertheless, access is only the pre-requisite for digital competence and there are still almost 1 out of 4 households without it.

⁴ Households with at least one member aged 16-74 years

As for infrastructure, 67% of European households reported that they had access to the internet **via broadband at home** in 2011, up from 61% in 2010 and 57% in 2009.

Among **mobile devices to access the internet**, smartphones and portable computers (laptops) are equally popular, with 30% of EU27 citizens using either of them to access the internet away from home or at work in 2011. The use of smart phones is becoming popular given that 19% of EU individuals⁵ already use them to access the internet, In some countries rates have reached more than 30% (Denmark, Finland, Luxembourg, the Netherlands, Norway, Sweden and the UK) showing that these countries not only have higher rates of access to the internet but also use a larger variety of devices for doing so. Nevertheless, these forms of access still represent a minority and are often used in addition rather than to replace more traditional forms of access.

⇒ ... **So millions of households in Europe do not go online. Why?**

1. **Lack of interest (45%)**
2. **Lack of skills (33%)**
3. **Equipment costs (26%)**
4. **Access costs (23%)**

For households *without access to the internet*, the most important **reason for not having internet access** at home was a lack of interest (45% of households with no internet access). The next most important factors were a lack of skills (33%) and cost factors (32%): equipment costs (26%) and access costs (23%).

An expressed lack of interest could relate to a number of things: lack of knowledge and skills, a genuine lack of interest, lack of an appropriate offer or not wanting to report financial reasons. Most reasons have remained fairly stable or decreased in importance over time given that the percentage of households that have no access to the internet has also decreased (Figure 2⁶).

In 2011 rates of households *without access to the internet*, reporting that lack of skills is a reason for no internet access at home, were very high in a number of countries: Cyprus (64%), Estonia (66%), Latvia (57%), Portugal (69%), Slovenia (63%), and Slovakia (49%). Access and equipment costs were considered particularly important in Belgium, Estonia, France, Hungary, Latvia, Malta, Poland, Portugal, Romania, and Slovenia. In fact, on average, 32% of Europeans reported that equipment or access costs were a hindering factor in accessing the internet and 18% of them stated that both of those aspects were significant as reasons. Only 14 % reported that they do not have access at home because they have it elsewhere, although this seems to be an important factor in Latvia (32%). Another 3% reported that broadband was not available in their area, 8% said they did not want access due to privacy and security concerns, and 2% due to a physical disability. Therefore, more needs to be done to overcome cost and skills barriers as well as to get behind the reasons for a lack of interest.

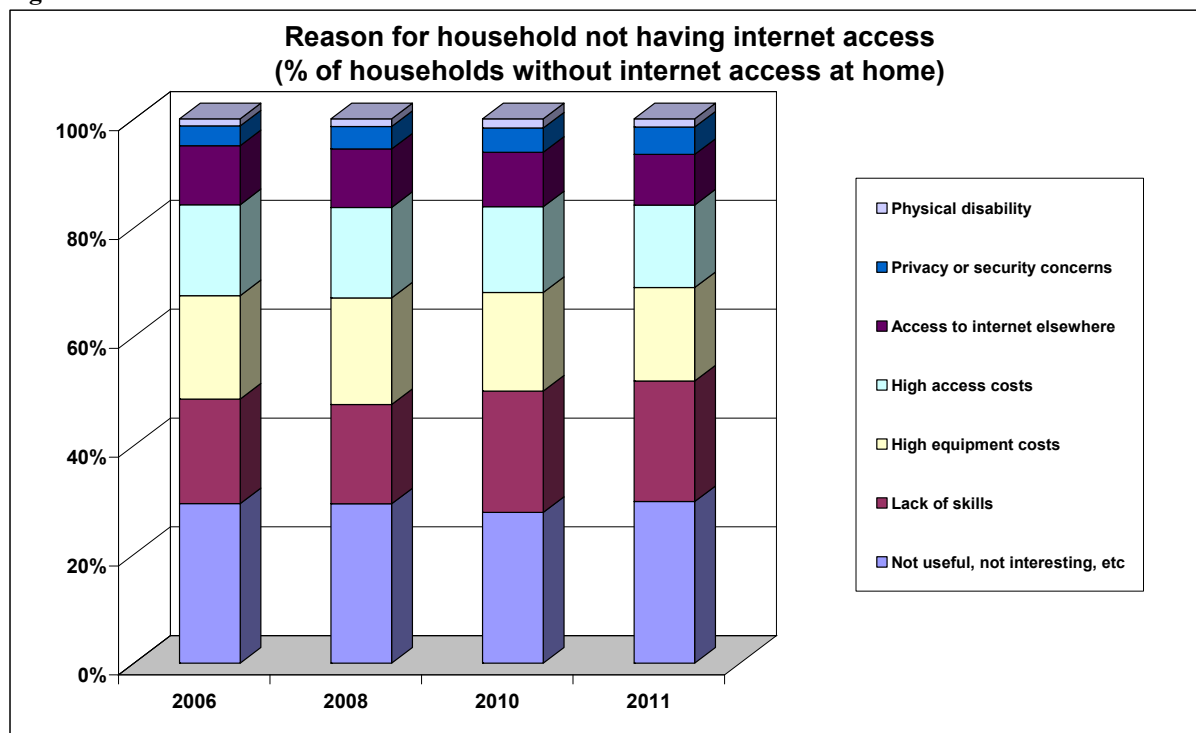
Lack of skills has become a relatively more important factor as a barrier to internet access: Skills has increased by 6 percentage points. between 2006 and 2011 as a reason for not having access. Lack of interest has also become relatively more important (4 percentage points increase). By the same token, high equipment costs and high access costs as reasons have remained virtually unchanged. Nevertheless, in absolute terms, the number of households not

⁵ Individuals aged 16-74 years

⁶ Data for broadband are available only for 2011 (3%)

having access declined by 23 percentage points and all other factors have also declined in absolute terms.

Figure 2



Source: Eurostat

1.1.2. Operational Computer and Internet skills

operational computer and internet skills form the form the basis for the functional use of ICT, particularly of computers and the internet. However, in view of rapid technological progress and the growing number of ICT devices, it may be necessary in future to consider an enhanced skills basket.

ICT skills are measured every year in the Eurostat Community Survey on ICT usage on the basis of a set of questions related to the respondents uses of computers and the internet (see Box 2 for a detailed description).

Box 2: The skills index

The Eurostat Community Survey on ICT Usage asks questions related to either 6 different internet or computer related skills. Individuals who have performed 1 or 2 of these tasks are considered to be low skilled; those with 3-4 are medium skilled and those with 5-6 are high skilled.

The computer skills included are the percentages of individuals who have:

- copied or moved a file or folder
- used copy and paste tools to duplicate or move information within a document
- used basic arithmetic formulas in a spreadsheet
- compressed (or zipped) files
- connected and installed new devices, e.g. a modem
- and, wrote a computer program using a specialized programming language

The internet skills included are the percentages of individuals who have:

- used a search engine to find information;

- sent an email with attached files;
- posted messages to chat rooms, newsgroups, or an online discussion forum;
- used the internet to make a phone call;
- used peer-to-peer file sharing;
- and, created a web page.

As this year's survey contained a special module on ICT skills, this year the survey also contained questions for both internet and computer related skills. Instead of the usual 6 questions on either computer or internet related activities, this year there were 10 computer related activities and 8 internet related activities. The extra questions relate to:

Extra computer-related activities

- Transferring files between computer and other devices
- Modifying or verifying the configuration parameters of software applications
- Creating electronic presentations with presentation software (e.g. slides)
- Installing a new or replacing an old operating system

Extra internet-related activities

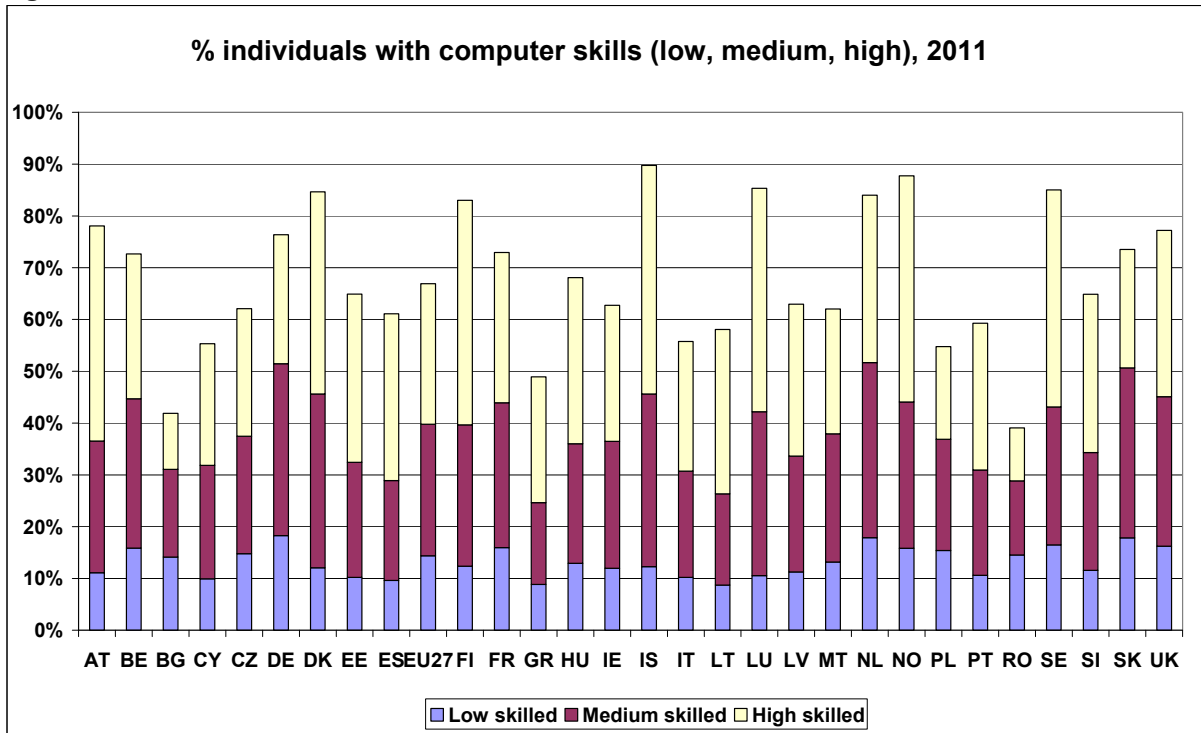
- Uploading text, games, images, films or music to websites
- Modifying the security settings of internet browsers

In terms of **operational computer and internet skills**, data for 2011 show that on average 75% of Europeans have performed at least one of the above six computer or internet activities, i.e. they have at least some level of digital skills. In particular, the percentage of individuals having at least some **level of computer skills** (i.e. those with high, medium, or low) has reached 68% in 2011, while the percentage of individuals having at least some level of **internet skills** has reached 73% in 2011.

⇒ **27% of Europeans have high level of computer skills...**

There has been no overall improvement in the level of skills of Europeans since 2010, except for a small shift from low to medium and high skills. On average in 2011, 14% of Europeans had low level of computer skills, 25% medium level skills and 27% high level skills. These figures have not changed significantly since 2009 (14%, 24% and 25% respectively). However, there appear important differences among countries with Bulgaria, Greece and Romania coming in at the bottom of the ranking (Figure 3).

Figure 3

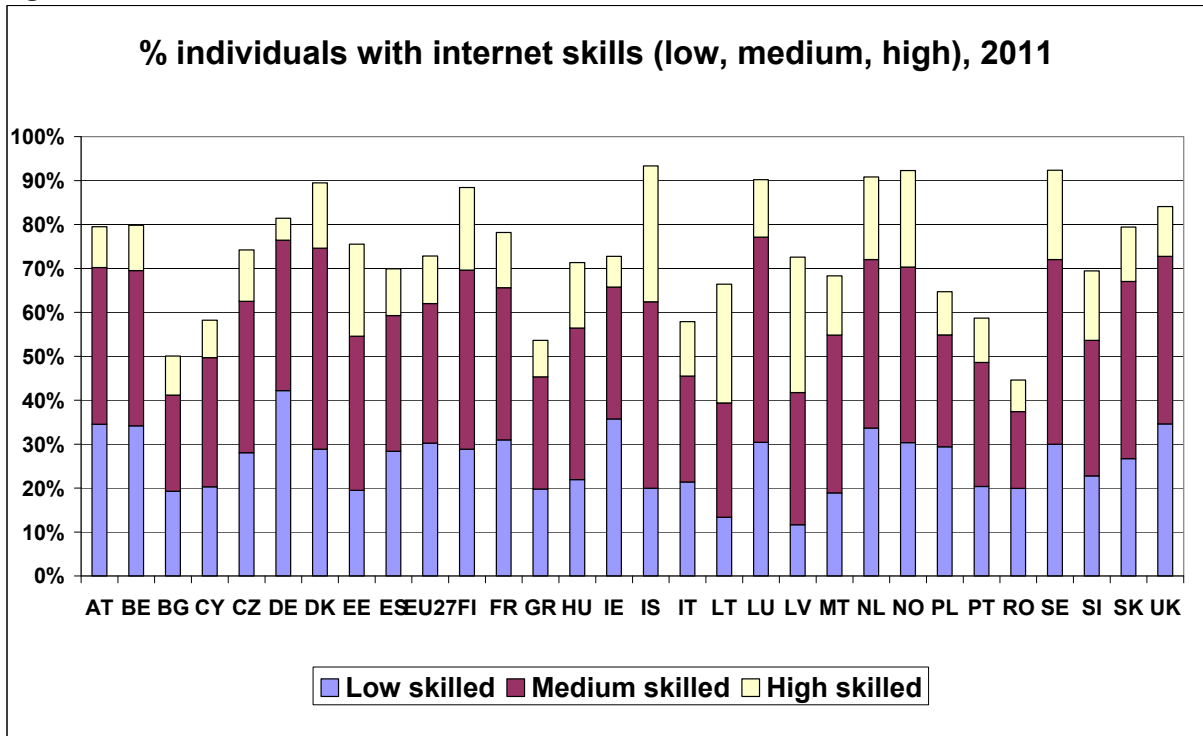


Source: Eurostat

⇒ **...But only 11% of Europeans have high level of internet skills**

Likewise, looking at **different levels of internet skills**, there is no overall improvement since last year except for a minor shift from low to medium and high skills. In 2011, on average, 30% of Europeans had low level skills, down from 32% in 2010, 32% had medium level skills, up from 29%, and 11% had high level skills, up from 10%. Again significant differences are observed among countries and the same three countries, Bulgaria, Greece and Romania, risk lagging behind in terms of their level of operational skills (Figure 4).

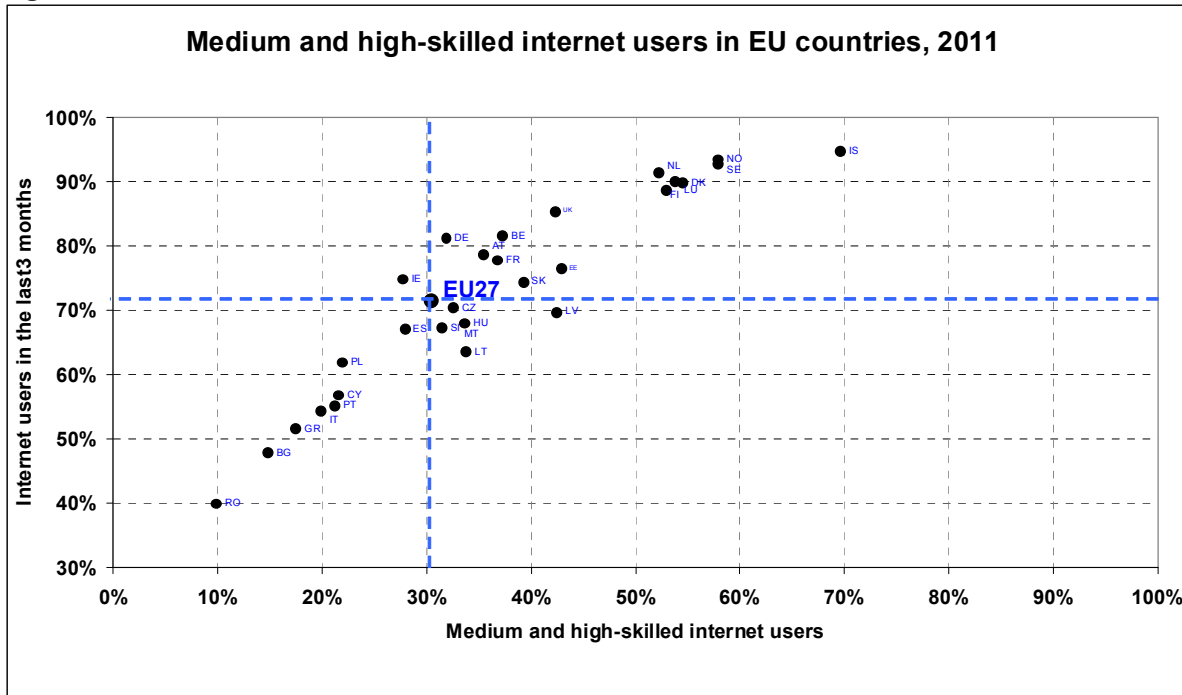
Figure 4



Source: Eurostat

Not surprisingly, there is a **positive correlation between the level of computer use and the level of skills** in the sense that countries with a higher rate of computer users tend to have a higher rate of medium and high-skilled people. In addition, on average for the EU27, the percentage of computer users in the last 3 months having **medium and high computer skills** is 38%. Similarly to computer skills there appears to be a **positive correlation between the level of internet users and the level of internet skills** in a given country. On average for the EU27, the percentage of internet users in the last 3 months having **medium and high internet skills** is 30% (Figure 5).

Figure 5



Source: Eurostat

⇒ **Achieving two DAE targets by 2015:**

A) 15% or less people who have never used the internet

B) 75% of regular internet users....

An increase in the rate of people who use ICT is normally accompanied by an increase in the rates of people with medium or high digital skills in a given country. One of the targets of the Digital Agenda for Europe is to *halve the proportion of the population that has never used the internet (to 15%) by 2015*. In 2011, the rate of people who have never used the internet reached 24% of the EU population, down from 26% in 2010. This implies that the DAE target is well on track to although more aggressive decreases are required during the next four years.

⇒ **... will result in significant increase of the number of high-skilled ICT users**

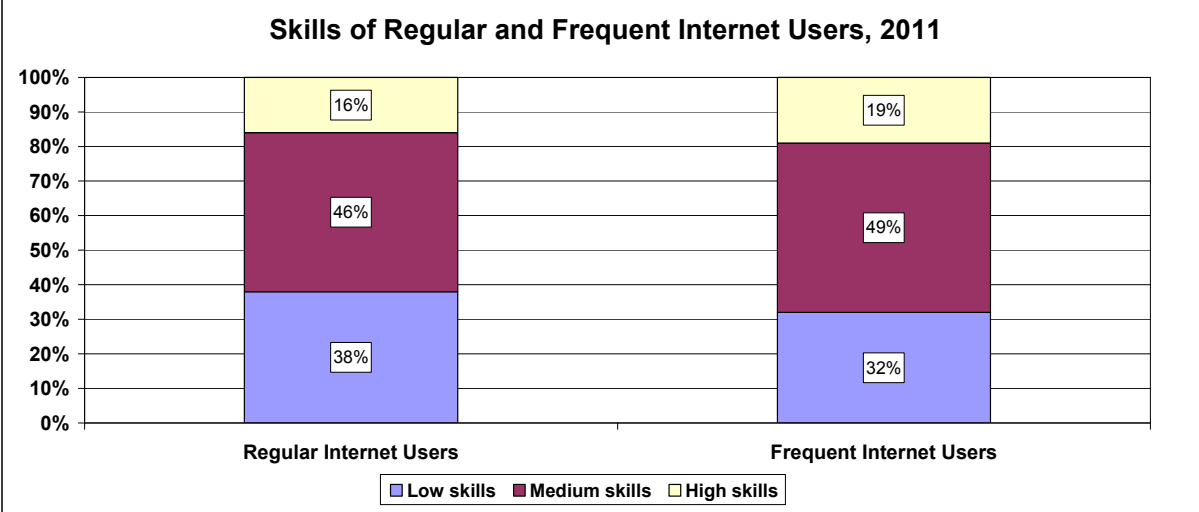
At the same time, the use of ICT is generally high but it has no significant impact on the level of digital skills of individuals unless this use of ICT is at least *regular* (once a week) or even *frequent* (once a day). The DAE aim is *reaching 75% of regular users in the EU by 2015*. Currently, *regular internet users* account for 68%, compared with 65% in 2010. As such, there is an increase, albeit moderate, which implies that a set of more intensive strategies should be adopted in order to increase the rates of regular internet users across EU countries⁷.

Interestingly, the distribution of skills among regular and frequent internet users demonstrates that most regular and frequent internet users (1 out of 2) have medium skills and a significant percentage of them (more than 1 out of 3) have low skills (Figure 6). This result is indicative

⁷ For a detailed overview of use of internet see Digital Agenda Scoreboard 2012, chapter "A Vibrant Digital Single Market."

of the necessity of training in technical internet skills so that more people will move towards the “high-skilled category”.

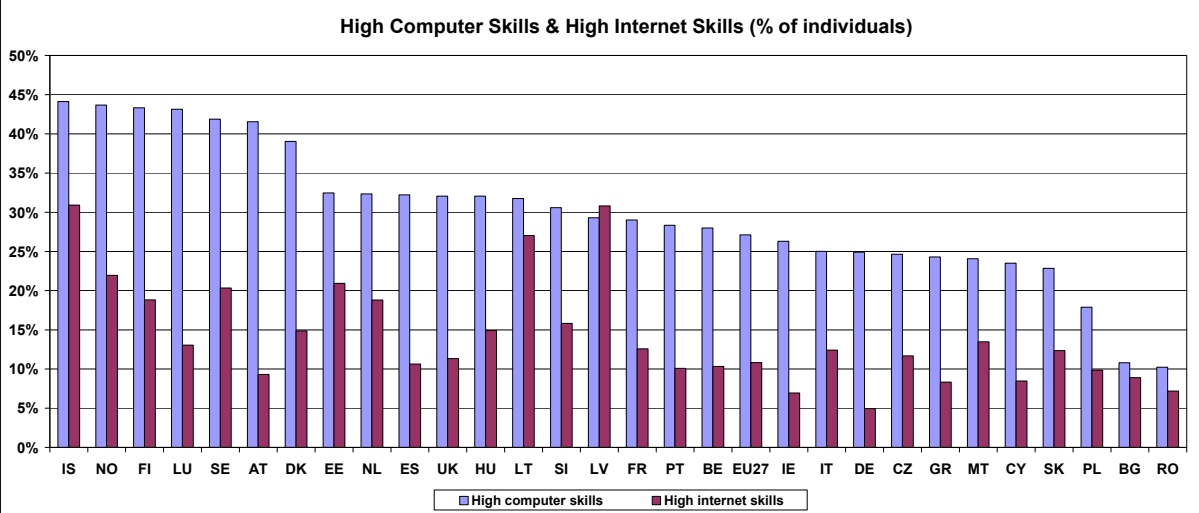
Figure 6



Source: Eurostat

Moreover, as mentioned above, in the EU27, 27% of individuals were **high-skilled in terms of computer skills**. The top performers in the EU were Austria, Denmark, Finland, Luxembourg, and Sweden (above 30%), whereas Bulgaria and Romania were at the bottom of the ranking with levels of 11% and 10% respectively. On the other hand, in the EU27, 11% of individuals were **high-skilled in terms of internet skills**. The top performers were Estonia, Latvia, Lithuania, and Sweden (above 20%), whereas Bulgaria, Cyprus, Greece, Ireland and Romania lay at the bottom of the ranking with less than 9% of high-skilled people in terms of internet skills⁸ (Figure 7)⁹.

Figure 7



Source: Eurostat

⁸ Germany also appeared at the bottom of the ranking in high internet skills. The reason is because the rate of individuals in Germany who ticked the item "using peer-to-peer file sharing for exchanging movies, music, etc" is extremely low, so the skills index "collapsed". This is probably related to the legal implications of this particular task, i.e., as in many other countries, the law imposes significant limitations to such activities.

⁹ The countries are ranked in terms of the rate of people with high computer skills as a % of individuals aged 16-74 years.

While this index calculates high, medium and low levels of internet skills depending on the number of listed activities carried out, it is also possible to determine levels of skill by looking at the **percentages of individuals that carried out each of the various activities**, which themselves can be considered as varying in complexity and therefore requiring a varying level of skill. In particular, in terms of internet skills, for example, while using a search engine and sending an email with attached files can be considered as requiring relatively low levels of skill, posting a message to a chat site etc. and uploading text etc. to websites might be considered slightly more complex and the remaining tasks even more so. This varying complexity is also reflected in the rates of use of this range of activities. By the same token, computer skills can be measured by looking at the percentages of individuals that carried out each of the various computer-related activities. Specifically, copying or moving a file or folder as well as using copy and paste tools to duplicate or move information within a document can be considered as requiring low level skills. On the other hand, compressing files and connecting and installing new devices require a higher level of skills, while writing a computer program using a specialised programming language involves an even more complex set of skills.

Assuming that the level of difficulty of a given activity is linked to the level of skills, high-skilled people (i.e. those performing more complex activities) represent a lower percentage of Europeans than the other categories (tables 2 and 3). An exemption is P2P file sharing which is probably underestimated and in terms of task complexity is considered similar to uploading files. The types of activities requiring high skills are also indicative of the types of training that Europeans need in order to use computers and the internet more effectively.

Table 2

Internet skills	Average % of individuals in EU27	Level of difficulty
Use a search engine to find information	71%	Low
Send emails with attached files	63%	Low
Post messages to chatrooms, newsgroups or an online discussion forum	33%	Medium
Use the internet to make telephone calls	26%	Medium
Upload text, games, images, films or music to websites	27%	Medium
Use peer-to-peer file sharing for exchanging movies, music, etc	15%	Medium
Create a web page	11%	High
Modify the security settings of internet browsers	23%	High

Source: Eurostat

Table 3

Computer skills	Average % of individuals in EU27	Level of difficulty
Copy or move a file or folder	63%	Low
Use copy and paste tools to duplicate or move information within a document	61%	Low
Transfer files between computer and other devices	51%	Low
Use basic arithmetic formulas in a spreadsheet	43%	Medium
Compress (or zip) files	37%	Medium
Connect and install new devices, e.g. a modem	43%	Medium
Create electronic presentations with presentation software (e.g. slides)	31%	Medium
Modify or verify the configuration parameters of software applications	26%	Medium/High ¹⁰
Write a computer program using a specialised programming language	10%	High

¹⁰ The classification depends on the type of parameters

Install a new or replace an old operating system	21%	High
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Source: Eurostat

⇒ **Individuals use the internet to carry out various activities depending on their level of digital skills as well as their socio-economic background.**

This indicator has its limitations. The percentage of individuals that undertake certain activities depends largely on the *age* group to which they belong as well as on their educational level. Moreover, it is obvious that senior people use ICT to perform types of activities that are substantially different from the ones performed by younger individuals. That said, while 35% of persons above 55 years old have copied or moved a file or folder, only 11 % of them have created electronic presentations with presentation software and only 8% have installed a new or replaced an old operating system. Likewise, while 35% of senior individuals (above 55 years old) have sent emails with attached files, only 8% of them have uploaded text, games, images, films or music to websites and an even lower rate 3% have created a web page. This observation could simply be attributed to the fact that older people do not need or do not want to undertake certain activities rather than that they are not skilled enough. Consequently, the rates associated with the above activities are notably influenced by the fact that different people of different socio-economic backgrounds like or need to carry out different activities irrespective of their level of digital skills.

1.1.3. Active application to aspects of life

People are increasingly using the internet as the chief tool to perform various everyday activities. Without a doubt, the range of **activities which individuals are performing using the internet** is broad, such as communicating, looking for information, participating in blogs and social networks, taking courses, looking for a job, making travelling and leisure arrangements, etc. A number of common activities are listed in the Eurostat survey, most of which require some level of internet skills. These can be categorised as follows:

- Communication
- Access to information
- Civic and political participation
- Learning
- Professional life
- Leisure or business travelling
- Use of online services
- Use of e-Government
- Use of e-Commerce

Popular activities among people who have used the internet in the last three months are those related to access to information, as well as using travelling or accommodation online services, consulting wikis and participating to social networks¹¹. In fact, to a large extent Europeans go

¹¹ The analysis is based on indicators on the use of the internet in the last three months for various purposes collected via the Eurostat survey of ICT use in Households and Individuals. While the questions on skills

online in order to discover different types of information, such as information about goods and services, news, health or any other subject. On average 79% of individuals who have used the internet in the last 3 months have searched for information about goods and services, 56% have read or downloaded online newspapers and 54% have consulted wikis or looked for health information. In addition, 54% of internet users are keen on making travel and accommodation arrangements online, such as buying airplane tickets, renting cars and booking hotels. Participating to social networks is equally popular since about 1 out of 2 (54%) individuals who have used the internet in the last 3 months reported that they have created user profile, posted messages or made other contributions to Facebook, Twitter, or other social network.

On the other hand, professional networks are not as popular as social networks, since only 10% of individuals used the internet in the last 3 months to create user profile, post messages or make other contributions to LinkedIn, Xing, or other similar network. Likewise, although 20% of internet users are keen on reading and posting opinions on civic or political issues via websites, only 10% are taking part in online consultations or voting to define civic or political issues (e.g. urban planning, signing a petition). This is probably attributed to the fact that most people prefer to undertake such activities through traditional (offline) ways instead. Finally, subscribing to news services or products to receive them regularly and doing an online course are also less popular activities, with rates of 8% and 7% respectively.

The table below lists a number of activities which individuals are performing online. These activities have been ranked, starting from those performed by the higher average rate of individuals who have used the internet in the last three months (table 4). As such, finding information about goods and services is the most popular activity among internet users whereas doing an online course is the least popular one. Activities related to eGovernment and eCommerce are presented separately.

Table 4

Activities	% internet users (last 3 months)	Type of activity
Finding information about goods and services	79%	Access to information
Reading/downloading online newspapers/news	56%	Access to information
Travel and accommodation services	54%	Leisure or business travelling
Consulting wikis (to obtain knowledge on any subject)	54%	Learning
Seeking health information	54%	Access to information
Participating in social networks (creating user profile, posting messages or other contributions to Facebook, Twitter, etc.)	53%	Communication

analysed above usually do not stipulate a time period, but simply ask about accumulated experience and whether the individual has done any of the activities at any time of the past, skills, especially ICT skills, become quickly obsolete, therefore if one does not stipulate a time period it can not be determined whether the skill is actually still present. While three months is perhaps a shorter period than desirable, it nevertheless ensures the skill is actually present, being used and is strengthened by the evidence that most internet users go online every day, or at least every week.

Internet banking	53%	Use of online services
Looking for information about education, training or course offers	40%	Access to information
Telephoning or video calls	29%	Communication
Selling goods or services	24%	e-Commerce
Job search or sending an application	23%	Professional life
Reading and posting opinions on civic or political issues via websites	20%	Civic and political participation
Participating in professional networks (creating user profile, posting messages or other contributions to LinkedIn, Xing, etc.)	10%	Professional life
Taking part in on-line consultations or voting to define civic or political issues (e.g. urban planning, signing a petition)	10%	Civic and political participation
Subscribing to news services or products to receive them regularly	8%	Access to information
Doing an online course (of any subject)	7%	Learning

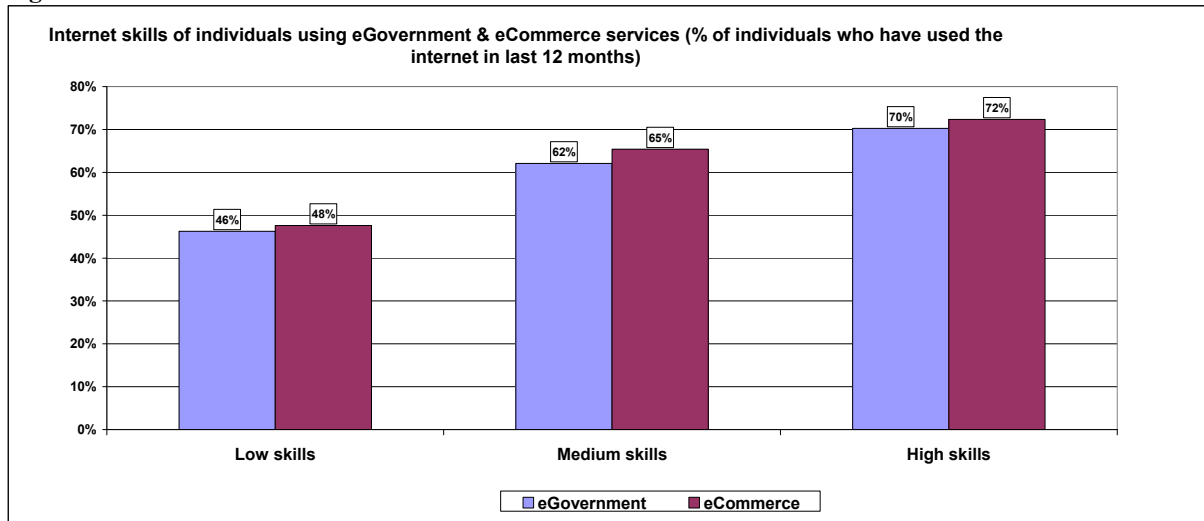
Source: Eurostat. * Calculated as an average EU 27 percentage of individuals who have used the internet in the last 3 months (2011)

1.1.4. Skills and use of eGovernment and eCommerce services¹²

The use of online government services appears to be strongly related to individuals level of skills. As such, among individuals who have used the internet in the last 12 months, those with higher skills are more likely to have used it for interaction with the public authorities (Figure 8). Interaction with the public authorities involves a variety of activities such as obtaining information from public authorities's web sites, downloading official forms and sending filled in forms, including for the purpose of tax declaration. Similarly, regarding the use of e-Government services, people with higher skills are more likely to engage in e-commerce activities (Figure 8).

¹² For a detailed analysis of the use of eGovernment and eCommerce see Chapters 1 and 7 respectively of the Digital Agenda Scoreboard 2012

Figure 8¹³



Source: Eurostat

1.1.5. Personal attitudes

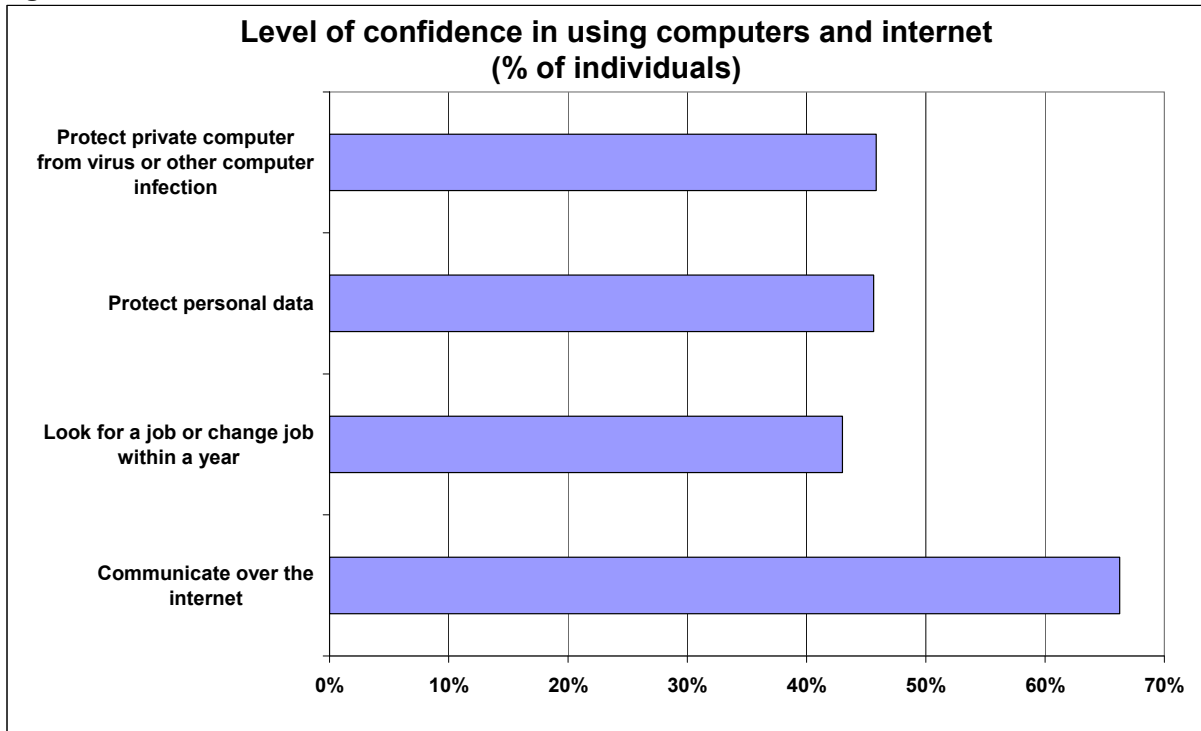
Personal attitudes refer to the manner in which individuals use ICT. Digital competence encompasses the ability to select information and to analyse it creatively, critically, constructively, confidently and responsibly. While direct measures of the personal attitudes required to be digitally competent are not available, some can be proxied.

In particular, responsible use is proxied by the following user statement: "I have modified the security settings of internet browsers". On average, only 23% of individuals in the EU were able to modify the security settings of internet browsers, to protect their privacy and security. While, a number of countries -- Austria, Denmark, Estonia, Finland, Luxembourg, and Sweden exhibited rates near to or above 40%, in Bulgaria, Cyprus, and Romania, rates were below 10%.

Confident use can be proxied by the **level of confidence** individuals say they have to perform various activities using a computer or the internet. The Eurostat special module on ICT skills includes this question for the first time this year. Only 43% of Europeans said they were confident that their level of skills is sufficient if they were to look for a job or change job within a year (Figure 9). The Nordic countries, Luxemburg, the Netherlands and the UK have the highest levels; close to 60% or above but no more than 80%. Cyprus, Romania, Greece and Italy exhibit rates of below 30%. At the same time, 66% of individuals believe that they have sufficient skills to communicate with friends, colleagues and relatives over the internet. Again the Nordic countries, the Netherlands, Luxemburg and the UK are the leaders in this indicator with rates above 80%, whereas Romania, Greece, Bulgaria, Italy and Cyprus are at the bottom end with rates equal to or below 50%. Concerning privacy and security, 46% said they trusted that they were adequately skilful to protect their personal data and to protect their personal computer from viruses and other computer infections. The Nordic countries along with Austria, the Netherlands, Luxemburg and the UK are the top nine countries in both indicators (close to 55% or above but no more than 70%), while Lithuania, Italy, Greece, Romania and Bulgaria are the bottom four countries (equal to or below 30%).

¹³ The percentage of individuals who have used the internet in the last 12 months for interaction with public authorities and for ordering goods or services over the internet for private use as a percentage of individuals who have used the internet in the last 12 months

Figure 9



Source: Eurostat

Furthermore, looking more specifically at only those individuals in the active labour market (i.e. individuals either in employment, self-employment or actively looking for a job) shows that on average in EU27 53% are confident their IT skills are sufficient if they were to look for a job or change job within a year. The Netherlands, Sweden, and the UK exhibit the highest levels of confidence with rates of 85%, 86% and 80% respectively. Denmark and Finland are also high at the ranking with rates above 65%. Conversely, five countries, Cyprus, Greece, Italy, Lithuania, and Romania, lay at the bottom of the ranking since the levels of confidence do not exceed 40%.

Finally, **creative use** proxied by data on the uploading of text, games, images, films or music to websites and to the creation of web pages. s such, Only 11% of individuals have created a web page while 27% have uploaded text, games, images, films or music to websites (Iceland has exceptionally high rates of 32% and 57% respectively).

1.1.6. Skills and socio-economic factors¹⁴

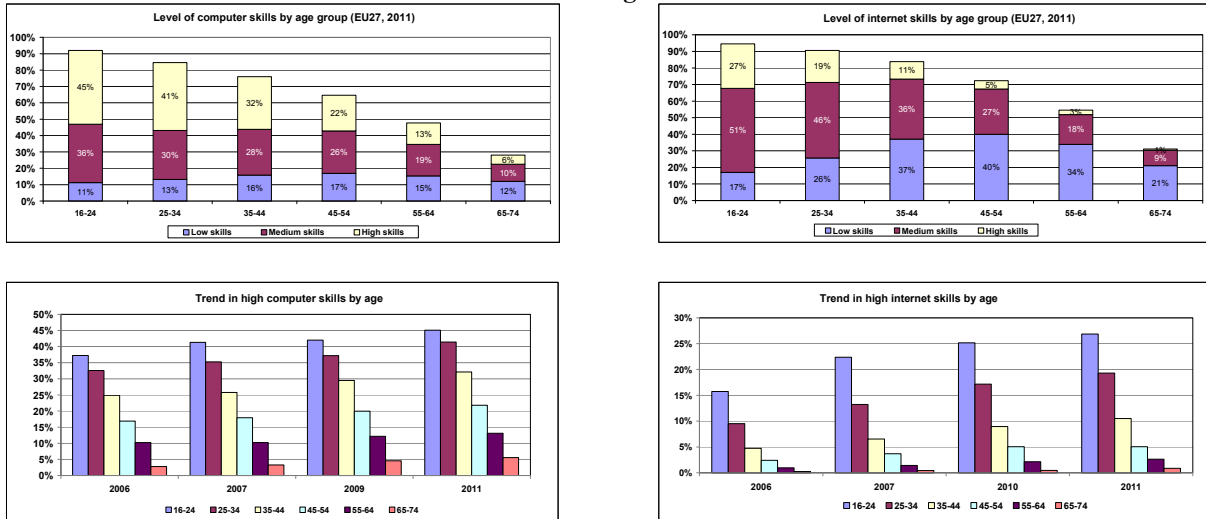
A number of **socio-economic variables** are associated with the computer and internet skill levels of individuals: age, gender, educational level, employment status, household income, citizenship and type of locality. The following section examines the computer skill level of Europeans in terms of each of the above socio-economic factors.

AGE

Senior individuals are more likely to have a lower level of computer and internet skills but the percentage of individuals with high computer and internet skills tends to increase over time and in all age groups (Figure 10).

¹⁴ The data in this section do not include the UK and NL. These will be added in due time.

Figure 10

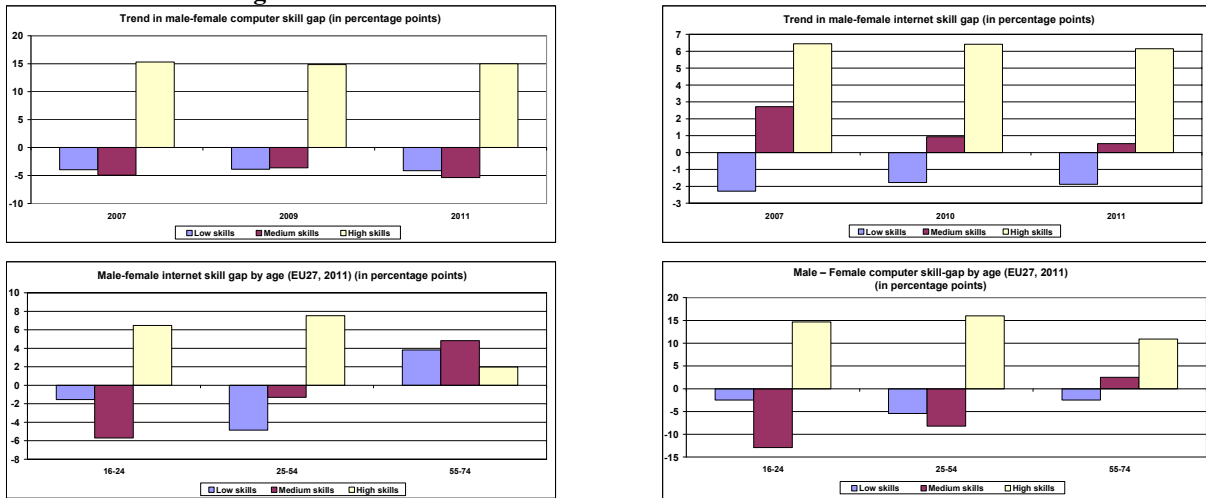


Source: Eurostat

GENDER

The male-female skills gap has been decreasing over time at all skill levels with more and more women acquiring higher levels of computer skills. The percentage of men that appear to have high skills is much higher than the respective percentage of women (by 14 percentage points) although the difference has been decreasing steadily between 2007 and 2011. At the same time, women tend to outnumber men in the low and medium skill levels, albeit by a few percentage points, but again the difference is gradually bridged over time. For high level of skills the male-female gap is bigger in younger age groups (Figure 11). This is partly related to the fact that the rate of internet users in older age groups is small.

Figure 11

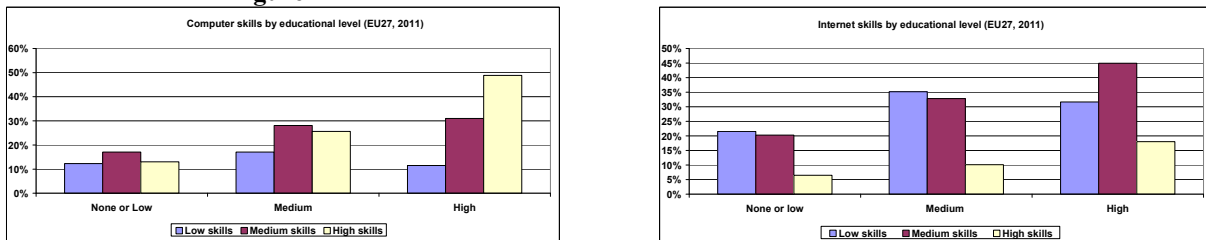


Source: Eurostat

EDUCATION

The majority of Europeans (48%) that have high skills have also acquired high formal education indicating a positive relationship between the educational level and the computer and internet-skill level (Figure 12).

Figure 12



Source: Eurostat

Overall, the rates of individuals with low, medium and high skills over time with any given level of education and at any age signify that eventually people seem to acquire higher digital skills, although the increase is moderate and differs among different age groups and levels of formal education. For example, the rate of older individuals (age 55-74) who have a high level of education and a high level of internet skills has not changed significantly over time but the rate of those with medium skills increased by 17 percentage points, meaning that over time, highly educated senior persons move from low to medium level skills. The same is not true though for senior individuals with low and medium levels of formal education. In particular, the increase of the rate of low-educated seniors with high skills is trivial. Furthermore, middle-age individuals (age 25-54), irrespective of their educational level, seem to move from a low to medium level of internet skills, whereas the increase of the rate of high-skilled middle-age persons is moderate, although higher for highly-educated ones (by 9 percentage points). Finally, the so-called "digital natives" (age 16-24) exhibit the highest increase among those with a high level of internet skills, irrespective of their level of formal education. Still, among the highly educated ones, the increase is the highest; 18 percentage points (Table 5).

⇒ **Seniors and low-educated Europeans are at higher risk of being left behind**

In brief, Europeans tend to become more digitally competent over time, probably because they acquire training to boost their digital skills. However, considerable efforts are required to reach elevated rates of high-skilled among persons above 25 years old, especially those with lower levels of formal education. On the contrary, 16-24 year-olds (natives of the digital era) are well on track to attain enhanced digital competence.

Table 5 Skills of different age groups and educational levels

		Low internet skills					Medium internet skills					High Internet skills				
		2006	2007	2010	2011	Δ (2006 - 2011) in p.p.	2006	2007	2010	2011	Δ (2006 - 2011) in p.p.	2006	2007	2010	2011	Δ (2006 - 2011) in p.p.
Individuals aged 16-24	Low formal education	27%	22%	21%	18%	-10	40%	43%	49%	51%	11	14%	18%	22%	22%	8
	Medium formal education	27%	24%	19%	17%	-10	40%	42%	50%	51%	11	16%	24%	26%	28%	12
	High formal education	32%	17%	16%	13%	-18	42%	46%	50%	47%	4	21%	35%	33%	39%	18
Individuals aged 25-54	Low formal education	21%	22%	29%	30%	9	9%	12%	18%	21%	12	2%	3%	5%	5%	3
	Medium formal education	39%	39%	42%	40%	1	19%	23%	33%	35%	16	5%	7%	8%	9%	4
	High formal education	45%	39%	33%	29%	-16	35%	39%	46%	48%	14	11%	14%	18%	20%	9
Individuals aged 55-74	Low formal education	8%	9%	15%	15%	7	1%	3%	4%	5%	4	0%	0%	0%	0%	0
	Medium formal education	24%	26%	36%	36%	12	6%	8%	13%	16%	10	1%	1%	1%	2%	1
	High formal education	43%	43%	48%	45%	2	16%	21%	29%	33%	17	2%	3%	4%	6%	3

Source: Eurostat

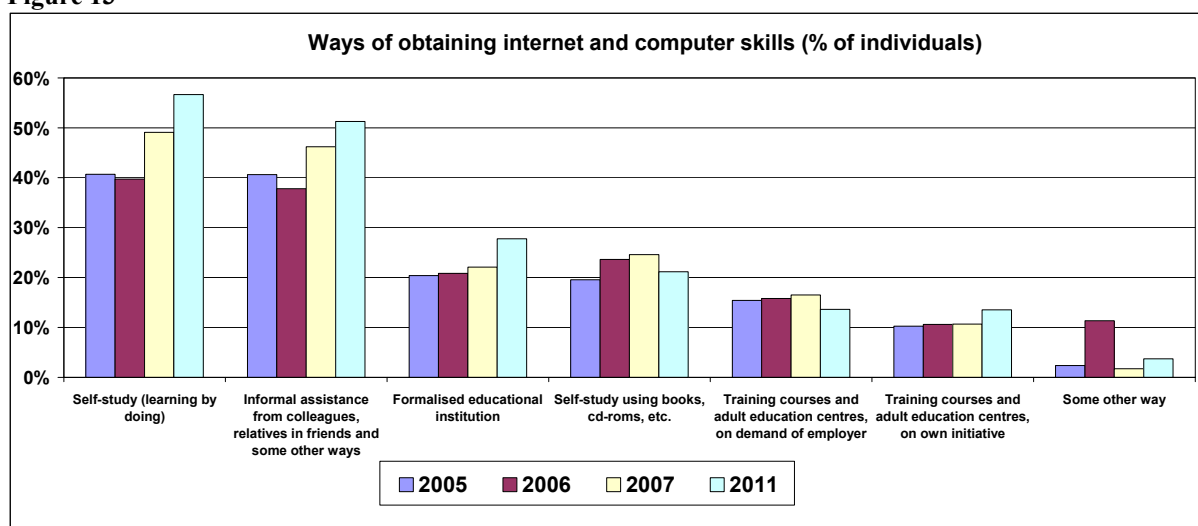
Moreover, the picture of employed and unemployed people with regards to their computer and internet skill level, demonstrates that employed people generally appear more skilled than unemployed ones. This indicates that there is a positive relationship between the level of skills and the **employment status**. Specifically, the rate of employed individuals of age 25-64 years old that have at least some level of operational skills is higher than the rate of unemployed individuals of the same age that also have at least some level of operational skills, by 17 percentage points. Similarly, considering the same two groups, but without taking into account age, the difference is 13 percentage points, with the rate of employed individuals being higher. The picture is very similar when considering individuals with at least medium skills (16 and 12 percentage points respectively) as well as when considering individuals with high skills (11 and 9 percentage points respectively).

Furthermore, looking at other socio-economic factors, there is a positive correlation between the level of digital skills and **household income**. It is also evident that in urban (densely populated) areas individuals have higher levels of computer and internet skills, i.e. the **type of locality** is related to the level of skills. Finally, there appears to be no strong relation between **nationality** and level of skills.

1.1.7. Ways of obtaining digital skills

There are a number of ways in which **internet and computer skills are obtained**. Among them, self-study (learning-by-doing) and informal assistance from colleagues, relatives and friends are the most popular with 57% and 51% of EU citizens obtaining their skills in these ways respectively. These are followed by learning through a formalised educational institution (28%) and self-study using books, cd-roms, etc (21%). Training courses and adult education centres, either by employer demand or by an own initiative, are less popular with rates of 14% for both of them in 2011 (Figure 13).

Figure 13

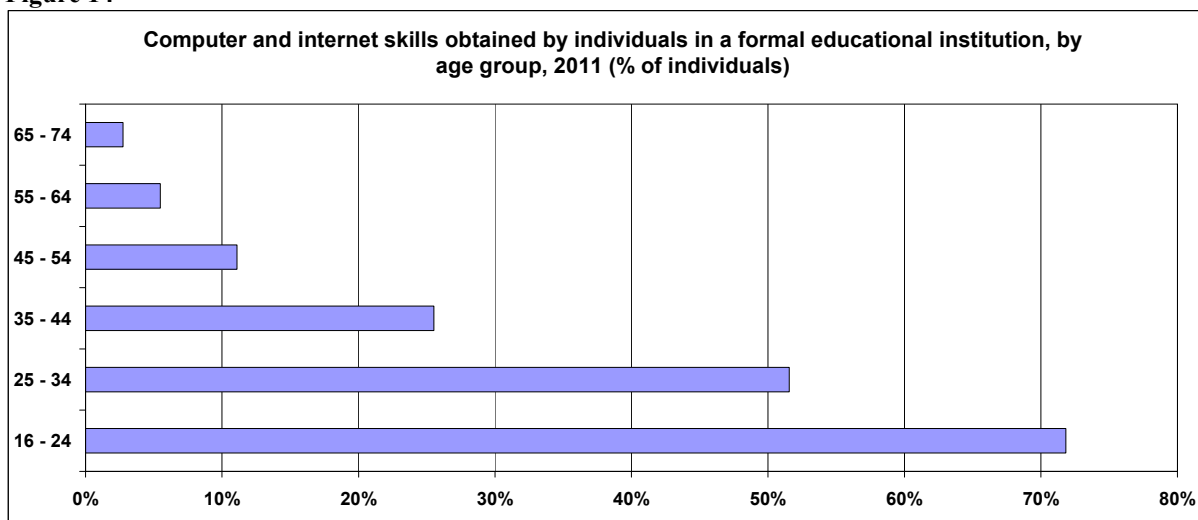


Source: Eurostat

The most popular ways of obtaining digital skills among senior people, above 55 years of age, are informal assistance from colleagues, relatives or friends (34%) and self-study (learning-by-doing) (32%). Training courses and adult education centres, either on demand of the employer or by own initiative, and self-study using books, cd-roms, etc. come second, while obtaining digital skills by a formal educational institution is trivial in this age group.

A formal educational institution, e.g. school, university etc. is a popular way to obtain internet and computer skills among individuals aged between 16-24 years old (72%) and among 25-34 year olds (52%). The older the individuals, the less likely they are to have obtained their skills at school, which is unsurprising given that the development and increased use of digital tools is a rather recent phenomenon (Figure 14).

Figure 14



Source: Eurostat

1.2. ICT skills in education¹⁵

ICT and Education is included in the action area of the Digital Agenda, enhancing digital literacy, skills and inclusion. It proposes a number of actions, at both EU and Member States level, to increase digital literacy and mainstream eLearning in national policies (for the modernisation of education and training, including in curricula, assessment of learning outcomes and the professional development of teachers and trainers.)

Indeed, the European Commission recognizes that it is essential to educate the young in the use of ICT and digital media and to attract them to ICT in education as well as to make the best use of ICT within education for improving educational outcomes. An important element of the Commission's contribution to the improvement of public services – amongst which is education – is benchmarking of progress. This is not a purely statistical exercise but aims to provide information to enable Member States to monitor their performance in relation to the use of ICT in schools. Benchmarking is also intended to orientate policy development in the field of ICT in education.

It has been observed that there is a lack of information on the availability, use and impact of ICT for learning in schools across Europe. For this purpose, in 2011, the European Commission Directorate General Information Society and Media launched the *Survey of Schools: ICT in Education*, the primary goal of which is to benchmark countries' performance in terms of ICT in Education. The aim of this study, therefore, is to benchmark recent progress made in ICT in education by surveying students and teachers on the availability and use, including competences and attitudes, of ICT in schools. The study shall as such contribute substantially to the development of updated, relevant and efficient indicators as well as to the establishment of a long-term and continuous monitoring system on the ICT use ranging from issues such as frequency, purpose and impact/effect. The survey comprises three questionnaires derived from an analytical framework and based on the results of a literature review. Compared to previous studies, this is the first time that students directly participated in the survey, answering a questionnaire that is specifically designed for them.

¹⁵ The results from the *Survey of Schools: ICT in Education*, SMART 2010/0039 that are presented here are provisional and based on the draft final report. The section "ICT in Education" will be finalised as soon as the final report is completed.

Box 3: Methodology of Survey of Schools: ICT in Education

Questionnaires

Three questionnaires:

- 1) Head teachers
- 2) Class teachers

At three levels:

- Primary (ISCED1 - grade 4 – 9.5 years old on average),
 - Lower secondary (ISCED2 - grade 8 – 13.5 years old on average),
 - Upper secondary academic (ISCED3A) and upper secondary vocational (ISCED3B) education (ISCED3 - grade 11 – 16.5 years old on average).
- 3) Students:

At two groups:

- ISCED2 (grade 8 – 13.5 years old on average)
- ISCED 3 (grade 11 – 16.5 years old on average).

The same questionnaire was administered to both groups of students and addresses ICT use both in and out of school with some differences between academic and vocational tracks at ISCED 3 level.

	ISCED1 grade 4	ISCED2 grade 8	ISCED3 academic grade 11	ISCED3 vocational grade 11	Questionnaire
SCHOOL	N=300	N=300	N=300	N=300	Principal
TEACHER	N=1	N=3	N=3	N=3	Teacher
STUDENT	/	N=all students in the selected class	N=all students in the selected class	N=all students in the selected class	Student

Academic and vocational tracks at ISCED 3 level

ISCED3 level is segmented into two tracks: the academic and the vocational one. Vocational education training (VET) differs to a large extent to general (academic) education in its educational goals and structure as it prepares students for specific workforce skills. Usually, vocational training relates to workplace training (to a lesser or bigger extent depending on the systems) and therefore involves job specific ICT tools (e.g. software programs, tools). Depending on the job to be trained for, these tools can vary a lot between the different professional strands. VET is also characterised much more than general education by cooperation of VET institutions with private sector partners.

Analysis

- Data collection ran from September to December 2011
- Data analysis began in January 2012 after the online survey system was closed down and the data exported.
- Unreliable data was identified, where numbers of responses to the survey were insufficiently high (i.e. below 40 per level). This had the effect of eliminating four countries because these countries exhibited low participation rates in the survey: Germany, Iceland, Netherlands and United Kingdom.

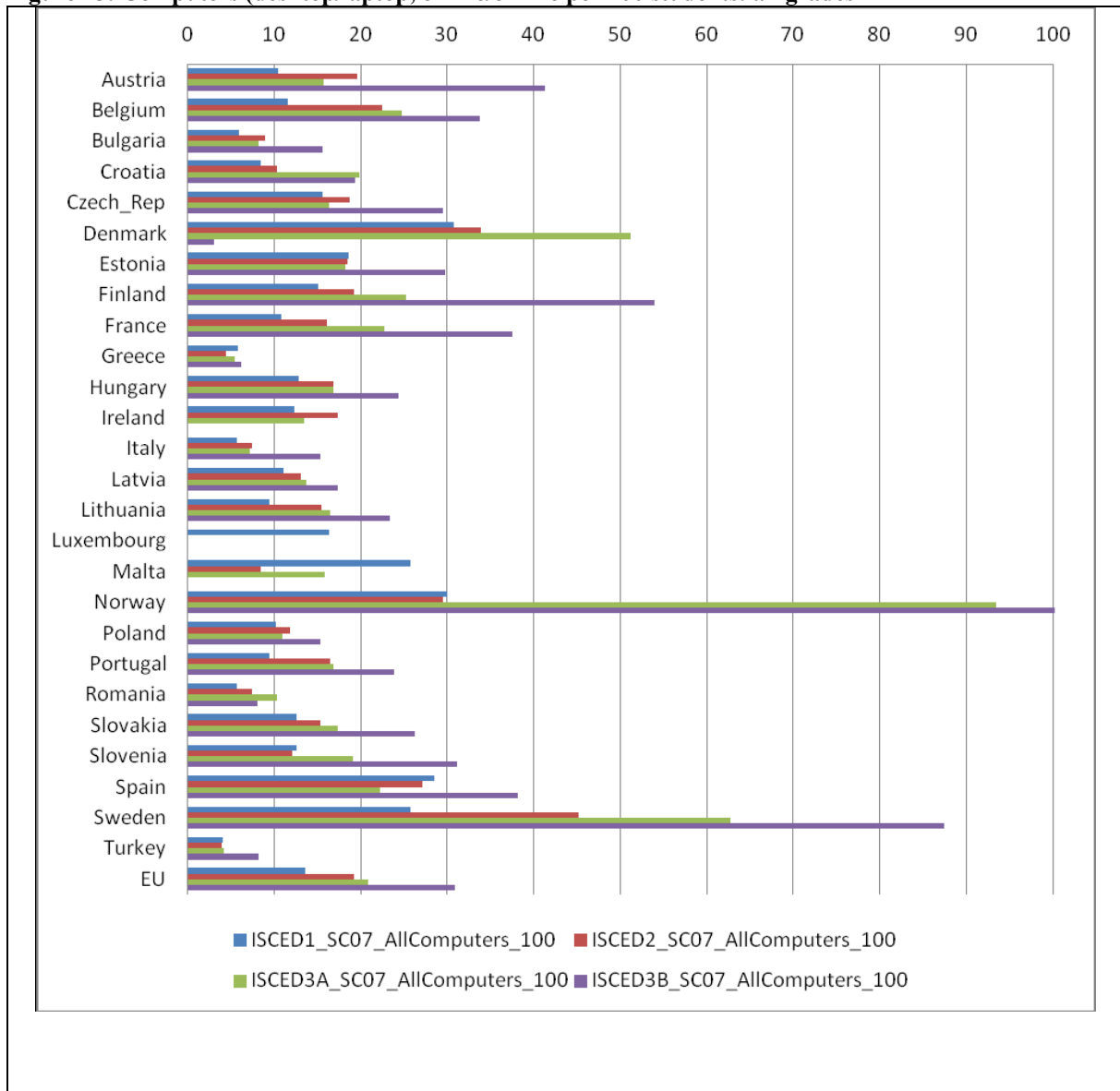
The final report is expected in the summer of 2012

1.2.1. Schools' equipment and strategies

⇒ **In Europe at all class levels there are between 14 and 31 computers per 100 students**

On average in Europe if both **desktop and laptop/tablet, connected or not to the internet**, are aggregated, there are 14 per 100 students at grade 4, 19 at grade 8, 21 at grade 11 general and 31 at grade 11 vocational. In Norway, at grade 11 vocational there are 101 such computers per 100 students (Figure 15).

Figure 15: Computers (desktop/laptop, online/offline per 100 students: all grades



Source: Survey of Schools: ICT in Education

Of these computers, almost all are internet-connected (less than one non-internet connected PC per 100 students at all levels). In the EU, there are from five to 12 students per online desktop computer: eight per 100 students at grade 4, 13 at grade 8, 14 at grade 11 general and 21 for every 100 grade 11 vocational students. The older the student, the more online computers are available.

Laptops (including tablets, netbooks and mini-notebooks) are becoming pervasive in Europe's schools, almost all internet-connected at every level.

Trends in schools equipment 2006 - 2011

- At **grade 4**, benchmark changes since 2006 as regards computers per 100 pupils show an increase in the numbers of such computers per 100 students from 9.5 (EU25+2 average) to 14.7.
- Benchmark changes since 2006 as regards computers per 100 pupils at **grade 8** show an increase in the numbers of such computers per 100 students from 10.9 (EU25+2 average) to 17.8.
- At **grade 11 general**, benchmark changes since 2006 as regards computers per 100 pupils show an increase in the numbers of such computers per 100 students from 12.7 (EU25+2 average) to 20.6.
- Benchmark changes since 2006 as regards computers per 100 **grade 11 vocational** pupils show an increase in the numbers of such computers per 100 students from 15.8 (EU25+2 average) to 29.5.

A number of **correlations** are observed at country level, but none at EU level. Interestingly, at grade 4 in Hungary, Norway and Portugal, the higher the percentage of students from low-income families in a school, the more online computers tend to be available.

- ⇒ **Over 9 out of 10 students in Europe are in schools with broadband** Finally, a European student is highly likely to be in a school with **broadband connectivity**, typically between 5 and 10 MBps at all four levels. In 2006, 65 to 75% of schools had broadband connectivity. However, between 4 and 8% of students in Europe were in schools with no broadband. At grade 4, 10% of students were in schools with no broadband at all, dropping to 5% at grade 8, 4% at grade 11 general and rising again to 7% in vocational schools. Therefore, the data suggests that in every country there are students at all four levels in schools with no broadband.

In terms of **school strategies to use ICT in teaching and learning** at EU level and depending on the grade concerned:

- around 60% of students go to a school where school leaders and teaching staff regularly discuss the use of ICT for teaching and learning
- between 34% and 38% of students go to a school where a written statement about the use of ICT specifically for teaching and learning exists
- between 45% and 56% of students go to a school with a policy which it enacts to use ICT for teaching and learning in specific subjects
- between 61% and 69% of students go to a school which has a policy for responsible internet behaviour
- between 32% and 43% of students go to a school with a policy about the use of social networks in teaching and learning

- between 47% and 57% of students go to a school where there is a policy to encourage teachers to cooperate and/or have time scheduled for such cooperation

1.2.2. Use of ICT by teachers for teaching purposes (last 12 months)

Turning now to the actual **use by teachers of the school infrastructure**, between 95 and 97% of students were 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 for class teaching in the last 12 months was 86 (grade 4), 81 (grade 8), 84 at grade 11 general and 87 at grade 11 vocational.

On average in the EU, at all four levels, 90 to 95 percent of students were in schools where teachers reported **using material found on the internet**, the most frequently used type of learning content. The use of online material from established educational sources was also frequently reported (75-89%). Interestingly, 52% of grade 4 students were in schools where teachers reported that they used content stored on the school network or database; higher than at other educational levels.

In the EU, 13% of grade 4 students are in schools where **teachers reported using computers and/or the internet** in more than half of their lessons; 30% were in schools where teachers used ICT in 5% or fewer lessons; that compares with 15% and 20% in 2006. At grade 11 general, these percentages were similar (15% and 24%). In 2006, the percentages for this grade were almost identical: 15% and 23%. At grade 11 vocational, the percentage doubles to 31% for use in over 50% of lessons, while 16% of students were in schools where ICT was used in 5% or fewer lessons. In 2006 the percentages were 13 and 25.

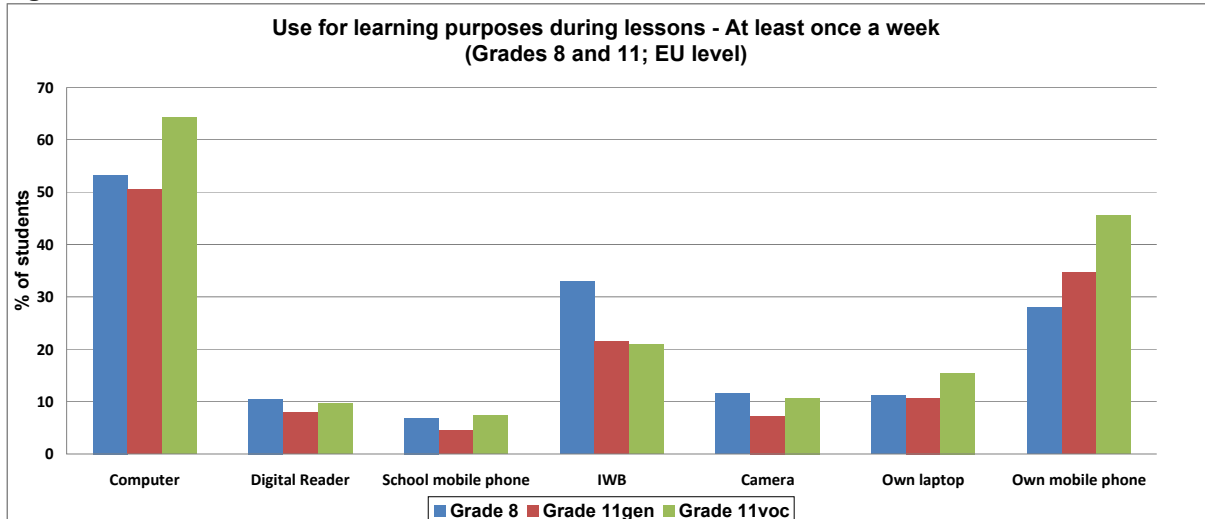
A virtual learning environment (VLE) or learning platform is arguably the strongest indicator of connectedness. Across the EU, one grade 4 student in three is in a school with a VLE. This figure is considerably higher in secondary schools, where more than one in two students are in schools with VLEs (56% of grade 8, 61% of grade 11 general and 63% of grade 11 vocational students).

1.2.3. Use of ICT by students for learning purposes

Across the EU, grade 8 students reported the highest use (at least once a week) of desktop computers connected to the internet, followed by the interactive whiteboard (IWB), their own mobile phone and online laptops/tablets. In addition, 21% of students reported using their mobile on a daily basis during lessons for learning, more than any other technology.

At grade 11 general, the online computer is mostly used, followed by the IWB. The same pattern appears at grade 11 vocational. On average, 27% of students at grade 11 general and 36% of students at grade 11 vocational reported that they used their own mobile phone in lessons on a daily basis (Figure 16).

Figure 16

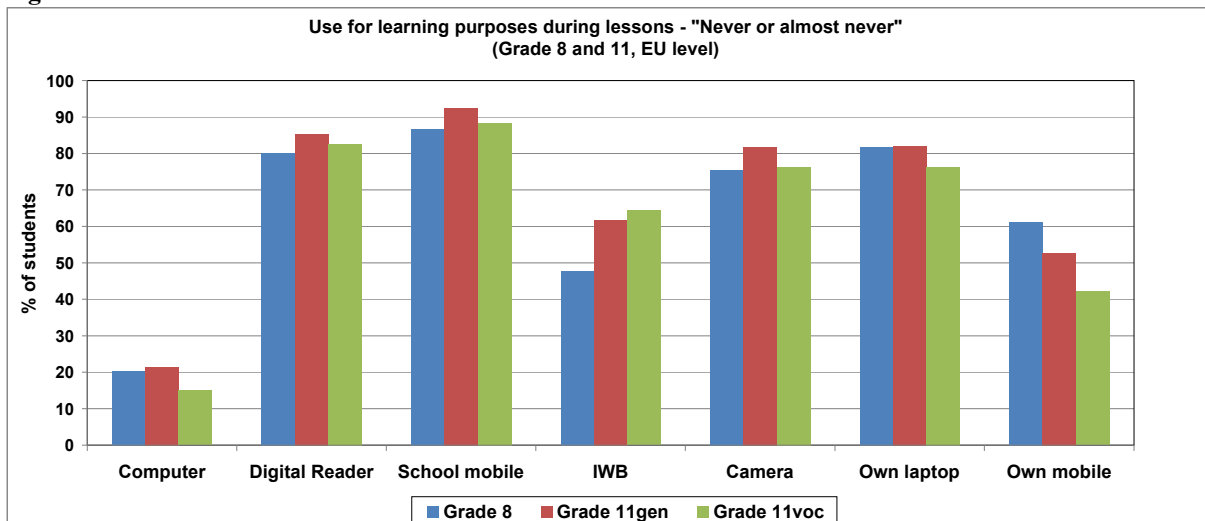


Source: Survey of Schools: ICT in Education

⇒ **About 1 out of 5 students in grade 8 never or almost never use an online computer**

Against this backdrop of relatively intense ICT use by students, there is a group which never, or almost never, uses these devices. Approximately one in five grade 8 students in the EU never, or almost never, uses a computer and one in two grade 8 and 11 students never uses an interactive whiteboard.

Figure 17



Source: Survey of Schools: ICT in Education

The highest levels of **ICT tools use** as reported by students appear to be in primary schools. At grade 8, more than 64% of students reported using multimedia tools (e.g. PowerPoint, video editing, digital recording) daily to several times monthly and almost half said they used exercise software, online quizzes and tests with the same frequency. Digital books and textbooks were used daily or almost every day by 25%.

1.2.4. Teachers' ICT competences

⇒ **At the EU level, between 24% to 31% of students at all grades are taught**

At the EU level, only about 25% of students at grades 8 and 11 both in general and vocational education are taught by teachers for whom it is compulsory to

by teachers for whom participation in ICT training is compulsory.

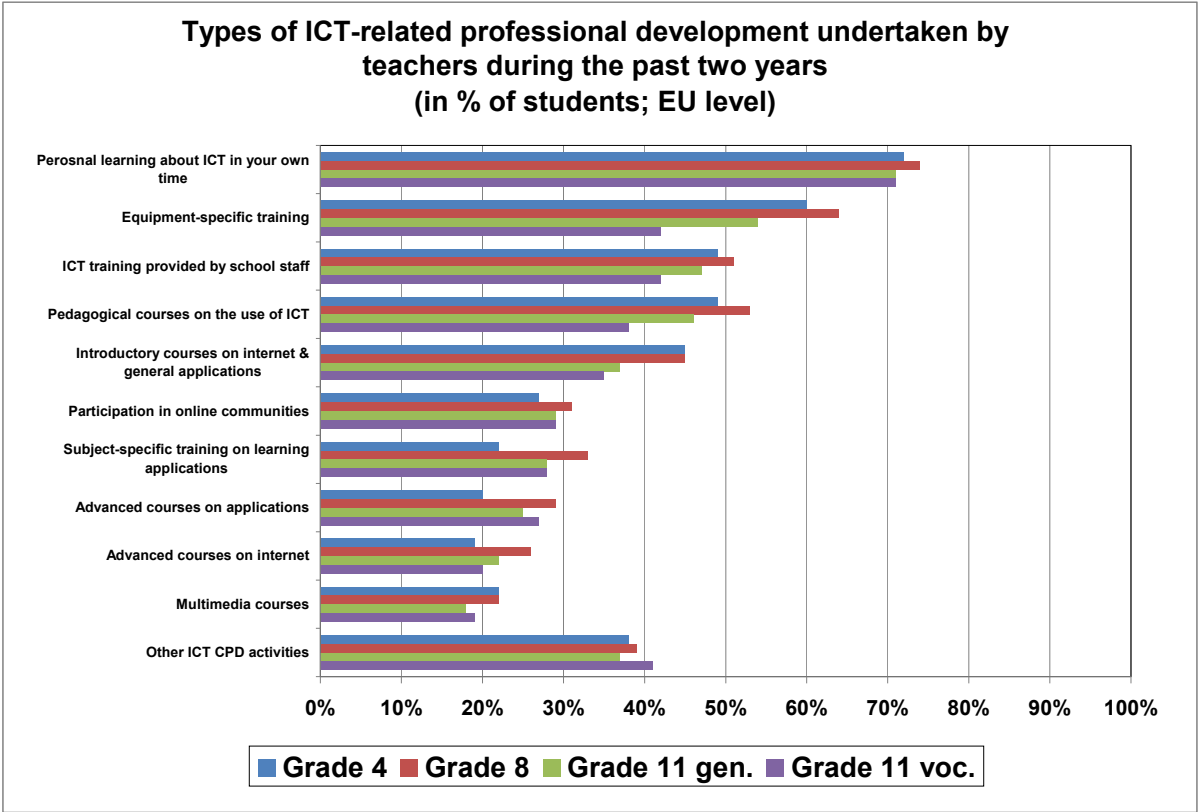
participate in some kind of ICT training. Interestingly, the figure is slightly higher for younger students at grade 4 with 31% of them being taught by teachers for whom it is compulsory to partake in some kind of ICT training.

Teacher training in ICT: country patterns

In Lithuania, a high percentage of students (between 74% and 80%) at all grades are taught by teachers for whom it is compulsory to participate in ICT training. Across grades, the percentage is also high in Romania with between 56% and 71% of students taught by teachers who are subject to mandatory ICT training. Conversely, 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 (below 3%), and is also very low in Austria and Italy, where only between 4% and 13% of students at all grades are taught by such teachers.

In terms of **teacher training in ICT** at the EU level and depending on the grade concerned it appears that the most common ICT-related professional development undertaken by teachers is carried out as "personal learning on ICT in their own time". The following graph is indicative (**Figure 18**):

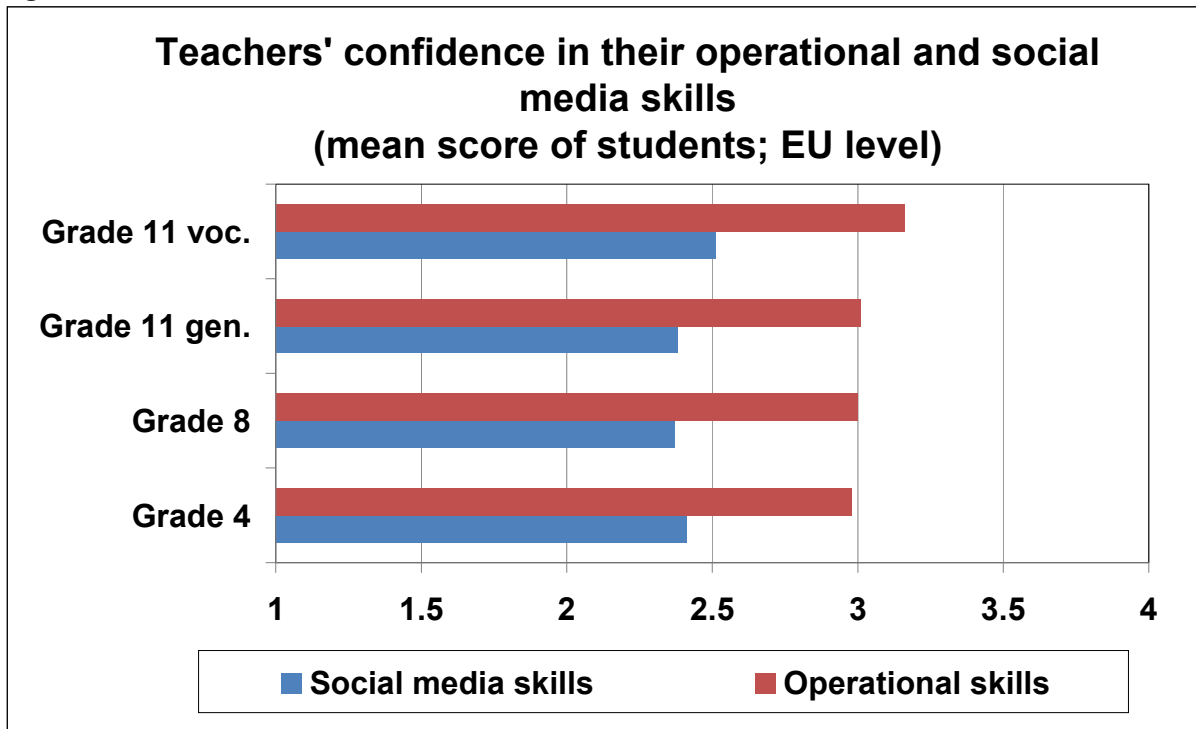
Figure 18: Percentage of students at EU level taught by teachers who have undertaken digital competence related professional development activities during the past two years



Source: *Survey of Schools: ICT in Education*

Teacher confidence in using ICT and the mean score across grades of students taught by teachers declaring confidence in using social media skills is consistently substantially lower than the mean score of students taught by teachers declaring confidence in their operational skills (see Box 4 for definition). The mean scores described in this section are on a scale from 1 to 4 with 1 being 'not at all' and 4 being 'a lot' (Figure 19).

Figure 19



Source: Survey of Schools: ICT in Education

Box 4: DEFINITIONS

Operational skills

For the purposes of this survey, operational skills were defined to comprise the following: production of text using a word processing programme; capturing and editing digital photos, movies or other graphics; editing online text containing internet links and images; creating a database; editing a questionnaire online; emailing a file to someone/another student or teacher; organising 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

Social media use and activities refer to recent internet tools and practices ranging from social networking and blogging, to “folksonomies” and “mash ups”. In a technical sense, Web 2.0 refers to an increased socialisation of internet tools, applications and services, as opposed to a transmission of content from “one to many” in web 1.0.

For the purposes of this survey, social media skills were 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.

In general terms, negative **correlations** are observed between teachers' confidence in their skills and the number of years they have been teaching at school as well as their age. By contrast, positive correlations are commonly observed between teachers' confidence in their skills and the number of years they have been using computers and/or the internet at

school, their participation in professional development, and the frequency of use of ICT based activities with the target class.

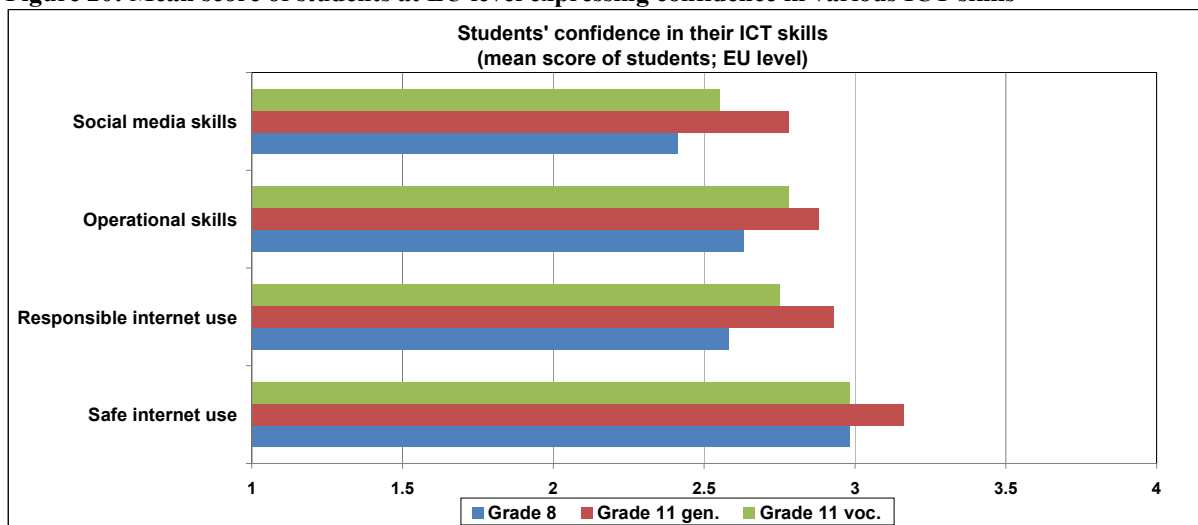
1.2.5. Student confidence in using ICT

The mean scores described in this section below are on a scale from 1 to 4 (1 being "not at all" and 4 being "a lot").

At the EU level and depending on the grade concerned (Figure 20):

- Regardless of the type of ICT skill in question, the mean score of grade 11 (general education) students in their confidence to use it was consistently the highest (ranging from 2.78 to 3.16) , while the score for grade 8 students was consistently the lowest (ranging from 2.41 to 2.98).
- Students across all grades have a higher mean score (ranging from 2.98 to 3.16) in their confidence to use the internet ethically than in any other ICT skill in which they were asked to express their level of confidence.
- Conversely, students across all grades have a lower mean score (ranging from 2.41 to 2.78) in their confidence to use web 2.0 skills, compared with any other ICT skill, particularly at grade 8.
- Students at grade 8 have a slightly lower mean score (2.63) in their confidence in their own technological skills than grade 11 (general and vocational education) students (2.88 and 2.78 respectively).
- Students at grade 11 (general education) have a rather high mean score (2.93) in their confidence to use the internet responsibly, while this mean score decreases somewhat at grade 11 (vocational education) (2.75), and even more so at grade 8 (2.58).

Figure 20: Mean score of students at EU level expressing confidence in various ICT skills



Source: *Survey of Schools: ICT in Education*

Considering the **attitudes of students towards ICT**, between 71% and 78% of students in the EU at all grades said they regarded using ICT during lessons as having somewhat or a lot of positive impact on concentration, trying harder, understanding, remembering, as well as on independent and on collaborative learning. Around 72% of students also said that using ICT during lessons has somewhat or a lot of positive impact on classroom atmosphere. Still at EU level, around 10% of students considered that using ICT during lessons does not have any positive impact at all on all the above mentioned issues. This result confirms a wide acknowledgment that ICT tools have a positive influence on students’ retentive memory, comprehension, attendance and concentration. This is because ICT enhances the use of images and enables interactivity between teachers and students as well as among students themselves.

Box 5: DEFINITIONS

Ethical use of the internet

For the purposes of this survey, the definition of the ethical use of the internet included the ability to use the internet safely to protect their privacy and online reputation, as well as to respect the privacy and online reputation of others. It also included the ability to use the internet to protect oneself against online bullying, spam and junk mail.

Responsible use of the internet

The ability to use the internet responsibly was defined in the following way, for the purposes of this survey: 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 plagiarising.

Four key cluster analyses explored the relationship between elements of ICT access, use and strategies in schools.

1.2.6. The digitally supportive school - Policy and support

A *digitally supportive school* at EU level could be defined as a school where not just policy but, even more importantly, concrete support measures such as training actions, the availability of an ICT coordinator, keeping obstacles to ICT use in T&L (Teaching and

Learning) low and positive attitudes from the school head towards ICT use in T&L are present.

school type 1: strong policy & strong support (school type 1);

school type 1: weak policy & strong support (school type 2);

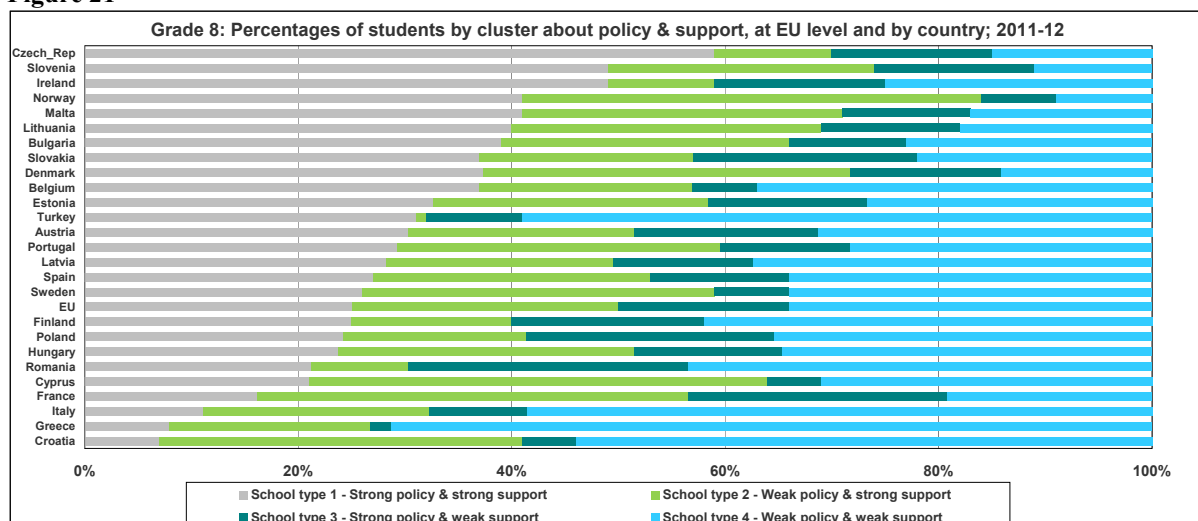
school type 3: strong policy & weak support (school type 3);

school type 4: weak policy & weak support (school type 4).

At EU level:

- At the EU level, around **half of students** go to a *digitally supportive school* having a policy but more importantly concrete support measures in favour of ICT use in T&L; slightly fewer students are in this situation at grade 11;
- around **one third of students** go to a school part of type 1 (strong policy & strong support);
- around **one fifth of students** (a little bit less at grade 11) go to a school part of type 2 (weak policy & strong support);
- around **one third of students** go to a school part of type 4 (weak policy & strong support);
- compared to the other grades, a larger percentage of students – around one third - go to a school part of type 3 (strong policy & weak support).

Figure 21



Source: *Survey of Schools: ICT in Education*

When comparing types of schools at the EU level in terms of student use of ICT (ICT based activities and equipment use), 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 policies. In fact, higher use (represented by higher mean scores in the graphs), especially related to ICT based activities, is observed in the two types of schools where the support is strong (school type 1 – Strong policy & strong support; school type 2 – Weak policy & strong support).

A similar situation is observed when comparing types of schools in terms of teacher use. Indeed, higher use (represented by higher mean scores in the graph) is observed in school types 1 and 2, at all grades.

1.2.7. *The digitally supportive teachers - learning conditions*

A *digitally supportive teacher* could be defined as teacher who is positive about ICT and confident and able to use ICT in T&L in an optimum way, even when access conditions are low and obstacles high. A cluster analysis of teacher characteristics (training participation, confidence, opinions and attitudes) as well as their conditions of access to ICT and what they consider as obstacles to ICT use in T&L, reveals four types of learning conditions that can be summarised in the following way:

- high teacher confidence/ attitude & high access/low obstacles (type 1);
- high teacher confidence/ attitude & low access/high obstacles (type 2);
- low teacher confidence/ attitude & high access/low obstacles (type 3);
- low teacher confidence/ attitude & low access/high obstacles (type 4);

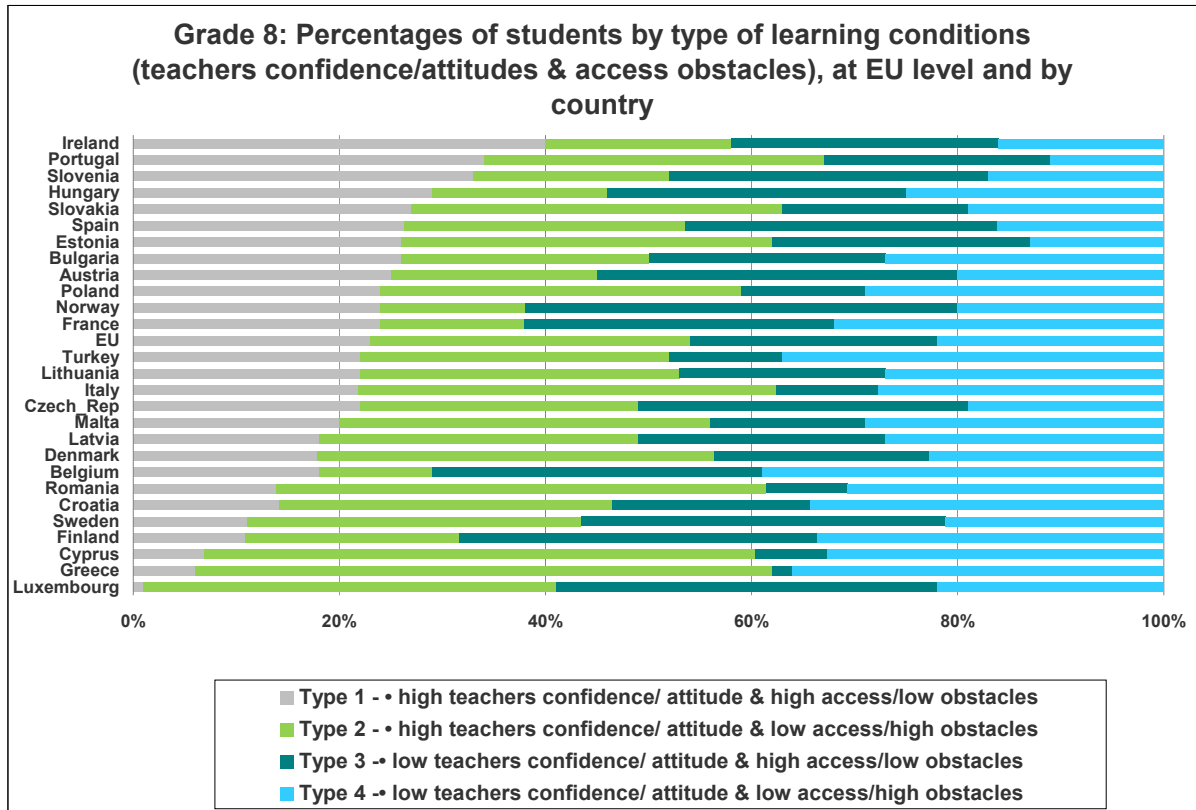
At the EU level:

- At the EU level, a lower percentage of students at grade 4 (around a fifth of students) are taught by teachers with a ‘high confidence/attitude & high access/low obstacles’ profile compared to grades 8 and 11 (around a quarter of students).
- In addition to the fifth of students at grade 4 and a quarter at the other grades that are offered the type of learning conditions characterised by high teacher confidence/ attitude & high access/low obstacles, around a third of the students (a little bit less at grade 11 in vocational education) are taught by digitally positive teachers who are able to optimise less favourable learning conditions (low access/high obstacles);

Differences between countries are very important:

- In Slovakia and Portugal, around **two thirds of students**, at several but not all grades, are offered learning conditions corresponding to type 1 (high teacher confidence/ attitude & high access/low obstacles) or 2 (high teacher confidence/ attitude & low access/high obstacles)
- In a few countries -- such as Austria, Belgium, Turkey -- and usually only at one specific grade, about no more than a quarter of the students are offered learning conditions corresponding to type 1 or 2, while around half the students are offered learning conditions characterised by low teacher confidence/ attitude & low access/high obstacles.

Figure 22



Source: Survey of Schools: ICT in Education

It appears that students taught in learning conditions corresponding to type 1 (high teacher confidence/attitudes & high access/low obstacles) and type 2 (high teacher confidence/attitudes & low access/high obstacles) demonstrate higher frequency of activities compared to students taught in learning conditions corresponding to type 3 (low teacher confidence/attitudes & high access/low obstacles) and type 4 (low teacher confidence/attitudes & low access/high obstacles). In other words, it supports the idea that confident and positive teachers can overcome to a certain extent low access and high obstacles.

When comparing types of learning conditions at the EU level in terms of student use (equipment use and ICT based activities), it appears that students taught in learning conditions corresponding to type 1 (high teacher confidence/attitudes & high access/low obstacles) demonstrate higher frequency of use. When comparing types of learning conditions at the EU level in terms of student confidence in a set of ICT related skills (web 2.0, safe internet use, responsible internet use and operational skills), students' opinions about the positive impact of ICT use in T&L and students' attitudes towards computers, it also appears – but to a lesser extent and less systematically - that students taught in learning conditions corresponding to type 1 (high teacher confidence/attitudes & high access/low obstacles) demonstrate more positive opinions and attitudes. To explain this result, an hypothesis is that confidence and attitudes are probably more influenced by ICT use at home than by use at school.

Students taught in learning conditions corresponding to type 2 (high teacher confidence/attitudes & low access/high obstacles) perform as well, and in some cases even better, than students in type 3 (low teacher confidence/attitudes & low access/high obstacles). This observation suggests that confident and positive teachers are able in a way to overcome low access and high obstacles, using what is available in an optimum way.

In fact, students' higher use and more positive opinions and attitudes (represented by higher mean scores in the graphs) are observed in learning conditions corresponding to type 2 compared to type 3. A similar, but less marked, pattern is observed concerning students' confidence in their various ICT related skills.

1.2.8. *The digitally supported student - home / school use of ICT by students*

A cluster analysis of access and use characteristics at home and at school during lessons reveals three student profiles that can be summarised in the following way¹⁶:

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

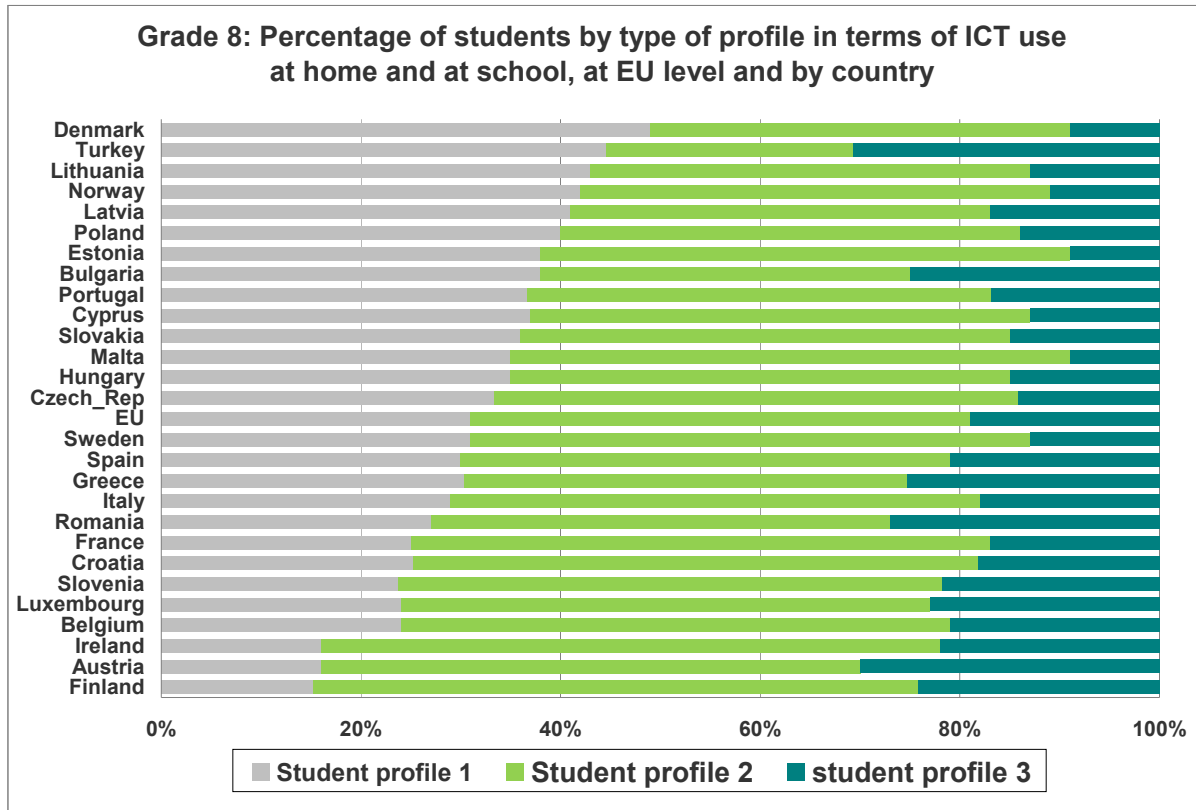
A *digitally supported student* at the EU level could be defined as one who is among the most regular users of ICT based activities in the school, shows the highest levels of confidence in ICT based skills and has the most positive opinions about the impact of ICT on T&L and the most positive attitudes towards computers, associated with a high access/use of ICT at school and at home.

At the EU level, we see that:

- around **one third of students** corresponds to profile 1, i.e. high access/use at school & high access/use at home.
- around **one fifth of students** (and a little bit more at grade 11 in general education) corresponds to profile 3, i.e. low access/use at school & at home.
- a higher percentage of students corresponds to profile 1 (high access/use at school & high access/use at home) at grade 11 in general education compared to vocational education and to grade 8; this could reveal that more attention is dedicated to integrate ICT in T&L at grade 11 in general education
- Unsurprisingly, the largest group of students (about 50%) correspond to profile 2, i.e. having low access/use at school & high access/use at home (at least at grade 8 and 11 vocational).
- Differences between countries are important

¹⁶ The two-steps cluster analysis with SPSS has revealed only three different student's profiles (i.e. those mentioned in the present report) and didn't propose any fourth category corresponding to an hypothetical 'high access/use at school and low access/use at home' that could be observed at all ISCED levels. In other words, no such student profile, different enough from the three others, has been identified among participating students.

Figure 23

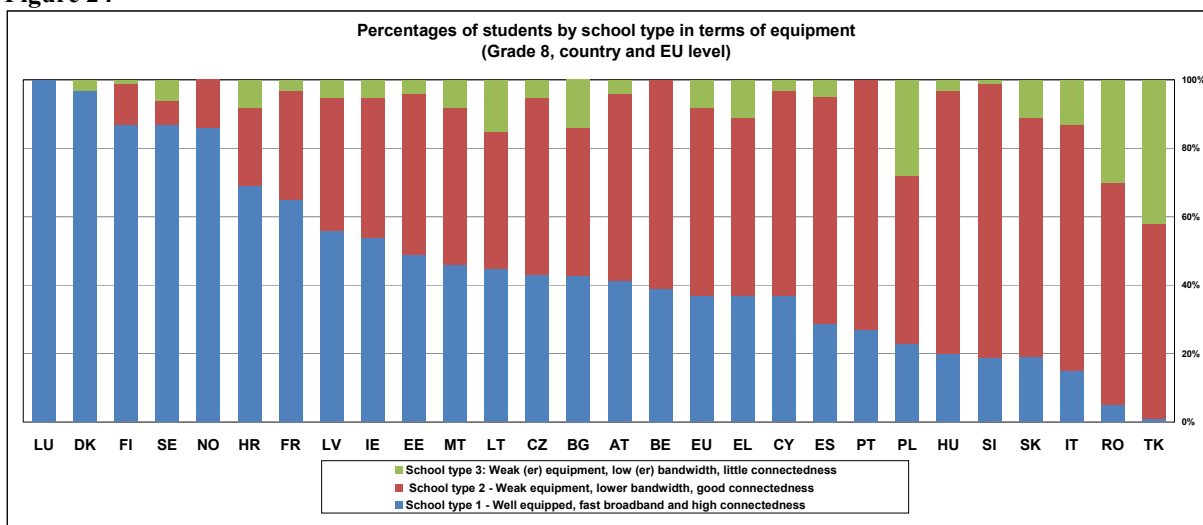


Source: Survey of Schools: ICT in Education

1.2.9. The 'e-equipped school'

E-equipped schools have high levels of equipment, connectivity, connectedness (i.e. an online presence in the form of a website, a virtual learning environment, email addresses for students and teachers) and technical support. The chart shows this data for grade 8 students, showing that 37% in the EU as a whole are in schools that are well equipped, have fast broadband and are connected.

Figure 24



Source: Survey of Schools: ICT in Education

1.3. Conclusions

This chapter has looked at recent evidence on the EU population's digital competence: "the confident and critical use of ICT for work, leisure, learning and communication".

In 2011, in the EU27 around 75% of households had access to a computer at home and the internet. In some more advanced countries these rates are above 90% and still growing. Among the reasons cited for not having access to the internet, a lack of skills appears as the second most important reason after a lack of interest. In terms of operational computer and internet skills in the EU27, the percentage of computer users having medium and high computer skills is 38%. In addition, countries with a higher rate of computer users tend to have a higher rate of medium and high-skilled people. A similar positive correlation applies to internet skills where on average, the percentage of internet users having medium and high internet skills is 30%.

With regard to the **socio-economic factors associated with digital skills**, correlations are observed between a number of factors: age, gender, educational level, employment status, household income, citizenship, locality, and the level of skills of individuals. Firstly, there is an inverse relationship between the age of individuals and their level of skills. Secondly, the male-female skills gap has been decreasing over time with more and more women acquiring higher levels of digital skills, although for a high level of skills, there is a bigger male-female gap even in younger age groups. Furthermore, education and household income are defining factors of the level of skills, showing a positive correlation, while in urban (densely) populated areas, individuals tend to have higher level of skills than their rural counterparts. However, it must be remarked that despite the positive trends on internet access and usage by the young age group or the so-called *digital natives*, recent research¹⁷ points out a few less positive trends, which need future attention. For example, young people generally lack critical ICT skills; in addition, there is a digital divide in the frequency, the use of internet and in the online risks assumed by young people, which are affected by socio-economic conditions; finally, the ICT skills of young people are inadequate to meet the requirements of the labour market. In terms of **how internet and computer skills were obtained** one in two Europeans reported self-study (learning by doing) and informal assistance from colleagues, relatives and friends, while one in three declared that they obtained their skills from an educational institution (28%). As expected, the older the individual is, the less likely it is that he or she has obtained their skills at school, since the development and increased use of digital tools is a rather recent phenomenon.

When turning to the deployment of ICT in the educational system, data obtained from the *Survey of schools: ICT in Education* show that the older the students are, the more confident they are in their use of ICT. This applies to a variety of skills including web 2.0 and technological skills. Meanwhile, only one in three students at all grades are taught by teachers for whom participation in ICT training is compulsory. However, it is encouraging that 70% of students at all grades are taught by teachers who have engaged in personal learning about ICT in their own time. In addition, teachers tend to feel more confident in using technological rather than web 2.0 skills.

In summary, there is optimism that Europeans are acquiring higher level of skills over time, despite the fact that there are still strong divides in digital competence both across countries and socio-economic lines. It is essential to increase rates of access and use of ICT as these factors are strongly and positively correlated with the level of digital competence across all

¹⁷ IPTS study ICTs for disadvantaged youth: Opportunities and Challenges. Evidence from literature and practice, Policy Report, Forthcoming 2012, <http://is.jrc.ec.europa.eu/pages/EAP/eInclusion/youth.html>

countries. Among socio-economic factors, age, gender, and education remain the key challenges. Older people as well as those with lower levels of education tend to have lower digital competence and the same is true for women. Finally, increased attention should be paid to certain countries that are exhibiting low rates in terms of most indicators of digital competence and, as a result, have a high risk of being left behind. These countries are Bulgaria, Cyprus, Greece, and Romania. As a result, 'skilling up' European citizens requires a set of specific and targeted strategies.

To this end, the Commission supports a number of initiatives, such as the Get Online Week and the e-Skills Week. In addition, there is relevant funding available from CIP ICT PSP programme 2012, while significant efforts are underway to improve the competence of ICT practitioners and users in the context of the European Qualifications Framework. Another high-profile program is the "Digital Champions" initiative that was announced recently by the President of the European Commission. The purpose of this program is for every member state to have its own "digital champion" – a high-profile, dynamic and energetic individual responsible for getting everyone in their country online and improving digital skills. The digital champion would work with education authorities, industry, and grassroots activists and would be independent of but reporting to central government. In the longer term perspective, digital literacy is becoming a priority in the European Social Fund (2014-2020) and will be translated into national plans. The European Commission is also launching a "Creative classrooms" initiative, which will help mainstream innovation in learning and teaching and hopefully providing a systemic impact. Moreover, increased attention is given to 'Open Educational Resources' and its contribution to an open sharing of ideas and knowledge.

Finally, the recent policy employment policy communication from the Commission, "Towards a job-rich recovery" (Employment Package), presents the Commission's plans to support job creation and much needed labour market reform in the light of the recession and the protracted sovereign debt crisis. Among others, this Employment Package includes dedicated documents addressing the employment potential of ICT. As part of its new employment strategy, the Commission announced its intention to establish multi-stakeholder partnerships in ICT for Employment in order to identify skill mismatches, intensify ICT training and raise awareness of the potential of ICT careers. As shown in the above analysis of the Eurostat data, only 43% of Europeans said they are confident that their level of skills is sufficient if they were to look for a job or change job within a year. Such figures need to increase since ICT skills are increasingly important in order to lower unemployment even among senior workers. Besides, the transition to a knowledge based and innovation driven economy suggests that the success of the EU's growth strategy, *Europe 2020*, itself depends largely on the skills, competences and resourcefulness of the European workforce¹⁸.

For example, one econometric study of the Italian labour market, monitoring age and education and following individuals over time, found that low-educated workers aged between 35 and 49 with no digital skills have a 5% higher probability of being unemployed than those with digital skills and that highly educated workers aged 50-64 with no digital skills have a 20% higher probability of being unemployed than those with digital skills¹⁹. ICT can also be used to improve one's skills, whether ICT or otherwise. In the EU, jobs held by

¹⁸ The Commission (JRC-IPTS and DG EAC) is also developing a framework for Digital Competence that provides a comprehensive overview of the sub-competences related to digital competence, applicable at all levels of education, including non-formal settings. For more information: <http://is.jrc.ec.europa.eu/pages/EAP/DIGCOMP.html>

¹⁹ The dataset used provides four different waves of data (2000, 2002, 2004, and 2006). For the illustration of the dataset see Main Report (Codagnone et al 2009), § 8.2.

highly qualified people in all sectors are expected to rise by 16 million between now and 2020, while those held by low-skilled workers will decline by around 12 million²⁰.

At the same time, ICT skills reduce the risk of exclusion among young people. A study on the role of ICT for young people at risk of exclusion²¹, relying on a survey of 61 ICT based initiatives for the inclusion of youth at risk, shows that the positive short-term outcomes reported by these initiatives refer inter alia to re-engagement in education and training and re-insertion into employment. The impact of ICT stems from the 'skilling', empowerment and social capital effects of their use, which are all relevant for employability. Another study found that people who have ICT skills on their curriculum vitae increase their probability of receiving a call-back by 1% or more²².

As a result, for Europe to gain and maintain a competitive advantage in the global economy the 'skilling up' of its population is a key opportunity and challenge that cannot be ignored. Undoubtedly, enhancing digital competence requires a concerted effort both at a European and national level in various areas, such as education, training, enterprise and employment policies, taxation, research, etc.

²⁰ "An agenda for new skills and jobs: A European contribution towards full employment" <http://europa.eu/rapid/pressReleasesAction.do?reference=IP/10/1541&format=HTML&aged=0&language=EN&guiLanguage=fr>

²¹ See IPTS study ICTs for disadvantaged youth: Opportunities and challenges, Policy Report, Forthcoming 2012, <http://is.jrc.ec.europa.eu/pages/EAP/eInclusion/youth.html>

²² *ICT Skills and Employment: A randomized experiment*, Mariana Blanco (Universidad del Rosario) and Florencia Lopez Boo (Inter-American Development Bank) (November 2010)