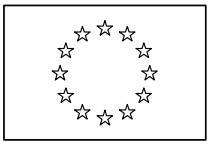

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The use of ICT to support innovation and lifelong learning for all - A report on progress

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EXECUTIVE SUMMARY

This document reports on how the use of e-learning has developed in Europe since the Lisbon European Council of 2000. It also draws conclusions for the next stage. It follows the e-learning priorities agreed by the European institutions and Member States, focusing first on teachers and schools and second on higher education, while taking other education sectors into account. It identifies the challenges posed by the need for quality and efficiency, and in particular for pedagogical, technological and organisational innovation.

In an environment of general but uneven progress, 3 findings are particularly striking:

- the impact of ICT on education and training has not yet been as great as had been expected despite wide political and social endorsement. In particular, the transformation of business and public services through ICT has not yet reached teaching and learning processes;

- embedding ICT in education and training systems require further changes across the technological, organisational, teaching and learning environments of classrooms, workplaces, and informal learning settings;

- although ICT has the potential to develop a "learning continuum" that would support lifelong learning and embrace formal, informal and workplace learning, this has not yet been realised.

There is broad agreement that ICT is helping learning in schools and that e-mature schools produce better results. Higher education is also reaping major benefits from ICT but has yet to come to grips with its potential for distance learning, virtual mobility and continuing professional development. Despite encouraging results from those who have used it, e-learning is still under-exploited in adult education. Large companies and public administrations report good results from e-learning in the workplace. However, it has had little effect on small and medium-sized enterprises, despite the flexibility it could offer them. The digital divide, with its increased risk of social exclusion, is a growing concern, despite the potential of ICT for disadvantaged learners.

The experience presented in this report appears to indicate a need for policies to focus on:

- embedding ICT-based tools in education systems for teaching and learning, for management and administration. This will make the best use of infrastructure investment;

- enabling lifelong learning by exploiting ICT's important advantages in providing easy access to learning resources; support to personalised learning paths; and scope for innovative learning tools and resources;

- leveraging innovation and change into the core functions of education. Innovative content and services are urgently needed, for if educational systems are to provide the necessary knowledge, skills and competences for an innovation-friendly society, they must themselves be innovative. The scope for innovative use of ICT in education and training is enormous.

INTRODUCTION

This document draws both on the experiences of the Member States and the contributions of the ICT Cluster[1] under the Education and Training 2010 Work Programme. It reports on developments achieved since the eLearning Initiative in 2000 until today; a period when the Member States invested heavily in the use of ICT for education and training.

The report aims at summarising the main trends on the use of ICT as a tool to support efficiently learning lifelong and life-wide. Its goal is further to feed directly into the upcoming discussions on 'An updated strategic framework for European cooperation in education and training' in line with the Lisbon strategy and the renewed Social Agenda. And to support better Member States' reforms integrating ICT for learning to support lifelong learning and innovation at all levels of education and training and all subjects. Education and training systems must ensure that what people know and can do corresponds to the fast changing learning needs of a knowledge based , digital society.

Launched following the Lisbon European Council, the eLearning Initiative[2] was, until December 2006 the instrument focused on developing the use of ICT in lifelong learning. It built on earlier actions in support of ICT in education and training[3] .

1. ABOUT E-LEARNING

1.1. e-learning: an evolving concept

eLearning is a learner-focused approach to *the use of new multimedia technologies and the Internet to improve the quality of learning by facilitating access to resources and services, as well as remote exchanges and collaboration*[4]. A decade of experience in Europe has proven its value as an innovative tool for education and training.

This document situates the use of ICT in the context of lifelong learning. It addresses both the use of ICT for learning and learning to use ICT. It includes formal, non-formal and informal education and training, whether in the workplace or elsewhere in everyday life.

Digital literacy, the basics of ICT use, is fast becoming as important for work, leisure and personal development as reading and writing. Further, digital literacy leads on to digital competence, *the confident and critical use of information society technology for work, leisure, learning and communication. It is underpinned by basic skills in ICT and the use of computers to retrieve, assess, store, produce, present and exchange information, and to communicate and participate in collaborative networks via the Internet*.

The report reflects the growing complexity of e-learning and its role as a basic tool for education and training. It concludes that e-learning should be seen as an important part of learning in general.

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1 Formerly the Working Group on new technologies. See also their report: 'First mapping of good practice of ICT use in the Member States' (2004)

2 COM (2000) 318

3 For full information on EU-funded research projects, see http://cordis.europa.eu

4 Definition used for the eLearning initiative and its successive developments

1.2. e-learning: a political challenge

a) The eLearning Initiative and Programme

The Lisbon Council identified ICT as a core component of the knowledge society and as a necessary instrument for adapting education and training systems to it. As a result the eLearning Initiative and Programme were adopted, with specific funding and the strong support of stakeholders[5]. This led to extensive networking activities through European-wide projects. Together with other E&T programmes[6] e-learning was put on the education agenda and an increasingly professionalised community developed. For example Open and Distance Learning (ODL) organisations demonstrated the ability to develop, deliver and transform education through e-learning[7].

Since 2007, ICT for education has become one of the four transversal lines of the Lifelong Learning Programme (2007)[8] and a general priority in the four vertical programmes (Erasmus, Comenius, Leonardo da Vinci and Grundtvig). In this way, ICT use in education and training has been mainstreamed, an important step towards its integration in lifelong learning policies.

b) Other EU initiatives and programmes

Following Lisbon, the eEurope Action Plan[6] for the information society Strategy identified eLearning as one of its key objectives, together with eHealth, eGovernment and generalisation of broadband[9].

The successive Framework Programmes have funded research on the use of ICT for learning as part of the Information Society Programme (FP5[10], FP6[11]) and on socio-economic research in education, while eTEN[12] supported the deployment and take-up of trans-European e-services, and eContent[13] supported increased accessibility and exploitation of digital content.

Support for use of ICT in education, in particular for innovation, is continuing through the 7th Framework Programme (where ICT is the largest research theme in the Cooperation programme); the Competitiveness and Innovation Programme, the activities stemming from the Commission's Communication[14] on "e-Skills for the 21st Century: Fostering Competitiveness, Growth and Jobs" for ICT and e-business skills; and the Structural Funds.

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5 eLearning Summit 2001 http://ec.europa.eu/education/archive/elearning/summit.pdf and annual EDEN conferences: http://www.eden-online.org/

6 Such as the Minerva action of Socrates; Leonardo da Vinci, Grundvig, Lingua, and Erasmus

7 ODL (2004) eLearning in European Policy and Practice: The Vision and the Reality http://www.odl-liaison.org/pages.php?PN=policy-paper_2004

8 Action Programme in the field of lifelong learning, OJ L 327, 24.11.2006

9 eEurope 2005: An Information Society for all, COM (2002) 263

10 http://cordis.europa.eu/ist/telearn/fp5_home.htm

11 http://cordis.europa.eu/ist/telearn/index.html

12 http://ec.europa.eu/information_society/activities/eten/index_en.htm

13 http://cordis.europa.eu/econtent

14 http://ec.europa.eu/enterprise/ict/policy/ict-skills/2007/COMM_PDF_COM_2007_0496_F_EN_ACTE.pdf

c) National policy initiatives and programmes

All the Member States have programmes and actions to integrate ICT in education and training, and education has repeatedly featured among the top three priorities mentioned in the Lisbon reform programmes. This has often translated into an intensive effort to provide equipment and teacher training, which has then evolved into a wider use of ICT.

National initiatives broadly address the same issues - equipping schools, training teachers, facilitating digital content production - and similar urgency. As a result, they have much in common, even if progress varies. The Nordic countries and the UK took an early lead in the educational use of ICT.

This common experience has facilitated the exchange of information, and open debate. The ICT Working Group, which has also accompanied and monitored the eLearning Programme and ICT work under Education and Training 2010, has provided a forum for such discussion. So has the ICT Cluster. Their common conclusion is that ICT needs to be seen as a key tool for modernisation and improvement of all aspects of education and training. It is not enough to plan for the introduction of ICT. What is needed is to make the most of the potential of ICT to enable better provision of education and training.

2. ASSESSING THE IMPACT OF E-LEARNING: ICT FOR EFFICIENCY

There has been strong and sustained growth in the installation and use of ICT and internet equipment. Access to the internet and its use is general in higher education, while other educational institutions are well on their way to the same result. However, the qualitative impact of ICT is still being assessed. This chapter presents findings from a number of studies and surveys carried out by the Commission and the Member States.

Even though most of these studies are linked to traditional domains of education and training, the recent move towards post-initial, informal and non-formal learning paved the way for e-learning towards interactive learning, creative content, personalised and self-directed learning, etc. In other words, context, community, collaboration, competencies, pedagogy, and motivation of learners play an increasingly important role. This relates more closely eLearning to the Lifelong Learning agenda and the creation of a European Lifelong Learning Area.

2.1. School education

The use of ICT in schools across Europe has increased dramatically since 2000. A Commission survey[15], covering teachers and head teachers separately, confirms that the Lisbon targets for equipping and connecting all schools in Europe have been met.

The survey also shows that teachers are broadly familiar with computers, using them in and out of work. Unsurprisingly, it is the younger teachers who use ICT most readily.

86% of teachers think that pupils are more motivated and attentive when computers and the internet are used in class. 80% see advantages in using ICT in school, in particular for

[15] Benchmarking access and use of ICT in European Schools 2006, Empirica (2006)

exercises and practice. Only 20% of the teachers surveyed think that the use of computers in class does not have significant learning benefits for pupils.

However, it is more difficult to assess the impact of e-learning tools and content. Although evidence is starting to emerge in countries with longer experience of ICT, such as the UK and the Nordic countries[16], there is much less experience to go on. An important observation comes from PISA surveys showing that in OECD countries ICT use is positively correlated with student performance in mathematics.

BECTA reports that schools with higher levels of *e-maturity*[17] demonstrate a more rapid increase in performance scores than those with lower levels, and that pupils, teachers and parents think that ICT has a positive impact on the learning of pupils. Although strong students benefit more, ICT also helps weak students. Schools with good ICT resources achieve better academic results than those that are poorly equipped. Broadband access in classrooms results in significant improvements in pupil performance in national tests taken at age 16. Introducing interactive whiteboards also results in improved pupil performance in national tests in English (particularly for low-achieving pupils and for writing), mathematics and science.

A review of studies carried out for the Commission[18] confirms broad positive benefits of ICT for learning modes such as cognitive processing, independent learning, critical thinking and teamwork and that ICT enhances a student-centred learning approach. However, while these benefits would lend themselves to new pedagogical approaches, the majority of teachers have not used ICT in such a way.

If ICT has a positive impact on learning, it has yet to revolutionise processes at schools. But the digital generation is learning by using ICT in everyday life. Teachers need to be part of this and education and training institutions need to take it fully on board.

2.2. Higher education

ICT use is most widespread in higher education. Practically all universities now have websites and 9 out of 10 have intranets, so the basis for ICT use is in place. This has been reflected in a steady growth of satisfaction among students.

However, the sector has been slower to take advantage of the potential of ICT to redesign curricula and programmes. Early evidence[19] pointed to non-radical change, with ICT used to support traditional learning approaches. It was campus-based, with little sign of distance learning. But by 2004, 3 out of 4 EU universities were experiencing high or very high rates of increase in the use of ICT for teaching[20]. By 2005, individual modules, and in some cases whole programmes were being offered online, with a slow shift to more collaborative, problem-based and project-based learning methods. This has changed the role of both students (e-learning makes them more autonomous) and teachers[21]. Other higher education colleges

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16 See BECTA and eLearning Nordic reports

17 E-maturity is "the capacity of a learning institution to make strategic and effective use of technology to improve educational outcomes" at http://feandskills.becta.org.uk/display.cfm?page=1897

18 A review of studies of ICT Impact on Schools in Europe, EUN for DG EAC (2006)

19 Centre for Higher Education, Rotterdam (2002)

20 Virtual Models of European Universities, Ramboll Management (2004), for European Commission

21 OECD (2005)

too, reported[22] that ICT was bringing improvements to teaching methods and assessment processes, and motivating learners. A wide range of e-learning programmes are now being offered by universities across Europe, and the number of cooperation projects to design and promote innovative e-learning practices is increasing.

ICT is fostering the growing internationalisation of higher education. Networking is enabling shared courses and learning services and is pointing the way towards virtual mobility[23].

By 2006 the importance of sustainable business plans, including customer-focused objectives, was becoming evident[24]. Accurate assessment of the student market, quality assurance and strong student support in service provision and robust, accessible technology with good technical support were identified as key features of successful plans.

2.3. Adult learning

The growing use of internet and ICT-based tools[25] opens up new learning opportunities for adults. In particular, it can help support the informal learning which is so important to them.

Evidence that 1 in 8 adults outside formal education use the internet for formal learning activities, such as research and downloading learning content[26], comforts this view. Online availability certainly meets the needs of some learners who accept formal training, for nearly half adult learners consider it as a necessary condition. Further, the results seem to have been encouraging, with 2 out of 3 users satisfied and 5 out of 6 saying they would take online courses again. This may reflect the user-focus of ICT-based adult education, which allows individuals to choose appropriate learning paths. Interactive forms of e-learning can lead to a more reflective, "deeper" learning and more empowered discussion, better suited to and more motivating for adult learners[27].

However, 2/3rds of participants see adult learning as the chance to meet people with similar interests. Home-based e-learning does not meet this social motive. Also, more than half of participants prefer guided learning to self-direction.

Nonetheless, e-learning may offer ways to attract social groups that do not traditionally engage in formal training, such as the 80 million low-skilled. Any progress on this front would clearly be very valuable.

2.4. Learning at the workplace

Many large companies have invested heavily in e-learning and content management systems, reporting high levels of satisfaction and significant cost reductions. Many large public sector organisations have also followed this path. Most of these large systems are run as web-based resource centres, which employees can access from work or from home. Home access to ICT opens the way to using them as learning resources, technical support and personal guidance.

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22 ICT Test Bed Evaluation Becta (2007)
23 See EADTU at www.eadtu.nl
24 Open University UK (2006)
25 Eurostat Community Survey on ICT usage in households and by individuals (2007)
26 eUser survey – Empirica (2006)
27 OECD (2006)

Many large organisations are now using web applications to support their business development by enabling informal learning and knowledge sharing. They often include partner SMEs in this process, so co-opting them into the learning process.

SMEs (99% of enterprises in Europe) have not followed this pattern of ICT use. Yet e-learning could help them organise training with reduced costs and less time off work. Lack of ICT skills seems to have been a significant explanation. Learning intermediaries, such as trade associations or chambers of commerce, could help reinforce the capacity of SMEs. This calls for more focus on the usability and actual outcomes of ICT-supported training solutions for learning at the workplace.

2.5. Informal and self-directed learning

One of ICT's main strengths is its capacity to support informal learning. Self-learning and informal peer-learning are by far the two most important mechanisms for obtaining skills and competences. Electronic networks of interests or professions provide important platforms to access and share information, to collaborate and collectively develop skills and competences. These new ICT tools not only present new opportunities for e-learning but also offer a great potential to reconnect groups at risk of exclusion to public services, learning and civic engagement.

Social networks and software tools[28] such as blogs and wikis can help develop key skills and competences. Projects that encourage individuals to share internet connectivity, to develop software, online content or virtual communities are examples of the added value of informal learning through ICT. Innovative companies and educational institutions are already tapping these online spaces and incorporating novel "open innovation" methods.

3. ADDRESSING THE DIGITAL DIVIDE: ICT FOR EQUITY

The strong growth in the use of ICT by enterprises and households is far from being evenly distributed[29] . The result is that while empowering some citizens, the inability of others to use ICT effectively creates a division in society, the so-called digital divide.

That is why the Riga Ministerial Declaration[30] drew attention to the broad importance of e-Inclusion. e-Inclusion would increase equity, create new opportunities for work and entrepreneurship, strengthen culture and encourage civic participation. Among those at risk of e-exclusion are around 50 million disabled people; the 98 million at risk of poverty, including the 10 million working poor; and the 15 million foreign-born residents.

Eurostat data shows that this digital divide is not closing and that education is a key exclusion factor[31]. Highly educated people are 3 times as likely to be internet users as the 33% of the population with a lower educational level. Also, the use of computers and the internet is general among young people, and nearly universal among students. 86% of those with higher education and 94% of students use the internet. Education and training systems cannot afford to ignore this.

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28 IPTS (2006)
29 Eurostat (2005)
30 http://ec.europa.eu/information_society/events/ict_riga_2006/doc/declaration_riga.pdf
31 Eurostat (2007)

Awareness of this challenge gave the e-European Information Society Strategy[32] a strong focus on digital literacy. The 2006 Riga Declaration gave this objective a specific target of halving the gap in internet usage by 2010 for groups at risk of exclusion, such as older people, people with disabilities, and unemployed persons.

Also, ICT can help those with special educational needs acquire greater autonomy. It can help hospitalised children keep in touch with their classroom[33]. It can encourage less performing pupils and, by allowing users to perform exercises at their own pace, can enhance self-esteem of those not used to formal learning.

The Commission has recently been undertaking a digital literacy review[34] as part of its commitments. The review has shown that despite all the efforts and progress made, digital literacy remains a major challenge and more effort needs to be dedicated to supporting disadvantaged groups. More should be done to increase the levels of confidence of both learners and teachers, upgrading the digital competences and to shift the focus from access to quality of use of ICT for learning.

An inclusive approach is therefore desirable. It is important to be realistic about the costs involved, whether met through public funding or measures such as public-private partnerships. Most success stories point to the need for continuing financial support if they are to deliver large scale results.

4. A KEY CHALLENGE: ICT FOR INNOVATION

ICT has transformed society and the economy. The challenge is now to achieve equally innovative transformation of the provision of education and training. e-learning has a key role to play in achieving this result.

4.1. Pedagogical innovation

ICT for learning is not only improving learning but has the potential to transform the learning and teaching processes and offer as such other and novel ways of education and training next and together with more traditional schooling.

The impact of ICT use on learners is closely related to its potential to innovate the teaching and learning approaches. The reviewed studies showed that learner-centred guidance, group work and inquiry projects result in better skills and competencies[35] and that interactive forms of e-learning can lead to a more reflective, deeper and participative learning, learning-by-doing, inquiry learning, problem solving, creativity, etc all play a role as competencies for innovation and can be enriched and improved by using e-learning. The challenge is to nurture new and innovative learning approaches, to ensure that teachers and parents are aware of their potential and to support them in curricula, teaching guidelines, and teacher training.

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32 i2010 - A European Information Society for growth and employment, COM (2005) 229

33 ICT and special education needs. A tool for inclusion. Maidenhead, Open University Press (2004)

34 Report on Digital Literacy in the EU, European Commission Staff Working Paper (2008). The review was based on a special measurement of digital literacy levels in the EU, carried out in 2007 by EUROSTAT as part of the Household Community Survey on ICT use.

35 Pedagogy and ICT use in schools around the world: Findings from the SITES 2006 study. IEA. (2008)

ICT-enabled social networks and improved connectivity provide also valuable new lifelong learning opportunities and models bridging the distinction between learning, work and leisure. In particular, young people are integrating ICT seamlessly in their everyday life and relying on their peers to develop their skills[36]. They call for bringing organised learning approaches closer to their everyday practices, emphasizing ICT as communication and collaboration media.

New innovative pedagogical and didactical approaches are needed to take into account the future learning needs and changing skills and competences necessary for employment, self-development and participation in a knowledge-based, digital society. ICT provides the means to support personalisation, where learners are also considered to be knowledge builders and creators and not just the recipients of transmitted knowledge.

4.2. Technological innovation

Technological innovation implies a need for new models of production, distribution and access to digital resources, both in the public and private sectors. The European Commission under the Research and Technological Development programmes has supported research on the educational use of digital content in projects that bring together the technological, pedagogical and organisational dimensions of the use of ICT. The uptake and commercial development of digital content for education is also one the priorities of the programmes eContent / eContentPlus and eTEN[37]. These innovative trans-national projects award a special attention to quality, interoperability and accessibility of digital learning resource[38].

The European Commission has supported programmes aimed at developing digital content and facilitating its commercial development, giving priority to education. It has also supported innovative trans-national projects addressing quality, interoperability and accessibility of digital learning resources.

Half the demand for publishing comes from education and training, yet e-learning has nothing like this share of the digital market. Costs may be high but digital learning materials have the potential to become a significant part of the digital sector. There is an opportunity here for Europe's creative industries[39] .If it can achieve the quality, usability and engaging capacity of digital games, this market has high growth potential. Clarifying intellectual property issues, interoperability standards, fiscal conditions and public procurement procedures may help market development. Development of quality criteria and standards is also essential for the development of a lively marketplace of digital learning resources respecting design, user friendliness and language management.

The emerging technologies with enhanced networking capabilities and personalization create opportunities for new mobile learning environments with phones, game consoles and MP3 players. The convergence of digital media will enable developments such as pod-casts, digital TV and radio and interoperability across platforms. Furthermore, new creative approaches, such as simulations, gaming, virtual reality and immersive environments, offer learning tools

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36 The New Millennium Learners. OECD (2008)

37 IST Education and Training programme (5th FP); Technology Enhanced Learning Programme (6th FP); eContent, eContent-plus; E-TEN

38 CELEBRATE, CALIBRATE, MELT, LIFE See the European Schoolnet website http://www.eun.org/

39 The economics of culture, PKA for the European Commission (2006).

from early school years to specialised professional training. These provide many opportunities for innovative tool and content developers.

Although learning resources are often regarded as key intellectual property, more and more institutions are sharing digital learning resources over the internet. The Massachusetts Institute of Technology[40] led the way and Open Educational Resources (OER-digitised materials offered for educators, students and self-learners to use and re-use for teaching, learning and research) now include learning content, tools and implementation resources including intellectual property licences. OER is growing strongly in Europe[41], showing the scope for new business models for education and training.

A quality assurance system is being assembled. The Commission is supporting the development of e-learning standards. Stakeholders have launched several initiatives to promote e-learning and quality. These include in particular the European Learning Industry Group (ELIG)[42] and the European Foundation for Quality in eLearning (EFQUEL)[43]. These initiatives will contribute to the quality of e-learning as well as developing educational systems as a whole.

4.3. Organisational innovation

Organisational change will increase the impact of ICT in education and training, as schools evolve towards open learning centres, universities towards learning service providers, companies towards learning organisations and cities and regions towards learning support environments. Changes in pedagogy and organisation will come with growing e-maturity. This will require innovative use of ICT, supporting new collaborative approaches. It will be important to involve users, i.e. learners, teachers and workers, who are players in organisational and operational innovation.

Assessment systems are essential to effective education. They need to address the impact of ICT in learning, and to make the best use of ICT for assessment. e-assessment can help both the management and the practical aspects, for example by enabling on-demand testing with immediate feedback for diagnostic purposes and providing interactive simulation-based testing. e-assessment strategies are being developed in several Member States and also the Commission is supporting research on e-assessment[44].

Innovative organisational approaches are needed to cater for changing learning needs. Lifelong learning requires updating and recognition of knowledge, skills and competences at all educational levels. E-portfolios[45] fit European policy on transparency and recognition of qualifications and competences. They could be used to provide a digital record of learning achievements in formal, non-formal and informal learning settings and offer a showcase for students' work.

Universities have a special role, and a special responsibility, in the development of the knowledge base required for a successful implementation of organisational innovation in

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40 MIT OpenCourseWare, http://web.mit.edu/ocw/

41 Educational Practices and Resources' OLCOS Roadmap 2012. Geser, G. (ed.) (2007)

42 http://www.elig.org

43 http://www.qualityfoundation.org

44 Towards a Research Agenda on Computer-based Assessment. CRELL, JRC, EC (2008).

45 http://www.eife-l.org/about/europortfolio; http://www.eife-l.org/about.

education and training, including and intelligent and innovative use of ICT for lifelong learning. Also the Commission is supporting the development of e-learning standards for different environments[46].

5. CONCLUSIONS: A RENEWED APPROACH TOWARDS ICT FOR EDUCATION AND TRAINING

ICT is pervasive in shaping all parts of our society, economy and culture. Since 2000, the European Union has stepped up its activities to improve e-learning and the development of digital competences through education. This has continued under the Renewed Lisbon Agenda and the July 2008 Communication on the Renewed Social Agenda for Europe[47] which have highlighted ICT as a key mechanism to create more social and economic opportunities for EU citizens and improve their access to quality services, also for education and training.

This report feeds into the ongoing discussions on the preparation of 'An updated strategic framework for European cooperation in education and training' which the Commission will adopt in December 2008. Overall the hope is to bring eLearning more closely to the task of creating a European Lifelong Learning Area.

In the last decade, the EU has had considerable success in introducing ICT to education and training. Yet if institutions have been ICT-equipped and teachers and trainers ICT-trained, ICT has not yet transformed teaching and learning as it has transformed processes in other key sectors such as enterprise or public services. Today, pedagogical, technological and organisational innovations demand a renewed and more comprehensive approach towards the role of ICT in education and training. This renewed approach should address the impact of technological change and innovation in society and education in the last decade.

5.1. ICT as a basic education and training tool

A first priority is to exploit infrastructure investments fully. The mainstreaming of e-learning is far from completed. ICT is not yet fully embedded in pedagogical practice or educational systems. A particular effort is called for on pedagogy, to develop the innovative teaching and learning tools made possible by ICT.

ICT is also an enabler of learning and teaching processes. It can empower learners in new ways. It can facilitate learning-by-doing, inquiry learning, problem solving strategies, creativity, and complex decision-taking and other competencies for innovation.

5.2. ICT as an enabler of lifelong learning

ICT can extend the scope of education and training and be instrumental in providing new educational services at all stages in life. The need for this is not in doubt. ICT-based tools can provide unprecedented accessibility to address these needs.

While existing developments need to be sustained, effort is needed in less well covered areas, which have high potential. These include helping the most disadvantaged groups - adult

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46 CEN-eLearning Technology Group

47 http://ec.europa.eu/social/main.jsp?catId=547&langId=en

learners, school drop-outs, older people, and groups with specific problems such as immigrants or ethnic minorities. ICT tools, appropriately used and supported, can benefit employability, personal development, and civic participation.

At the same time, ICT can help to build and support a learning continuum, including formal, informal and non-formal learning so helping achieve lifelong learning. More should be done to increase the levels of confidence, upgrading the digital competences and to shift from access to quality of use of ICT for learning.

5.3. ICT as a key driver for creativity and innovation

Innovation is today seen as one of the main engines of long-term economic growth and social development. ICT, a key driver for change in many fields, must also lever change in education and training. Intelligent use of ICT can scale up the core functions of education and build active learning communities in a networked society. A fresh impetus is needed to enable European education and training to better respond to the growing need for innovativeness. This calls for more than just improving knowledge base and easily measurable knowledge levels.

System change has happened in other parts of our social and economic fabric and it can also happen in education and training. The May 2008 European Council conclusions on promoting creativity and innovation point out that "an increasing share of learning occurs at the workplace, in non-formal contexts and in leisure time - often through new ICT-based learning tools and methods"[48]. While this report focused more on formal domains of education and training, the shift towards informal and non-formal learning modes shows clearly that interactive learning, content creation, personalised and self-directed learning all play an increasing role in the ways people learn.

The role of technology in enhancing communication and community-based collaboration while supporting the constant development of personal competencies has a clear relevance for lifelong learning. The transformation of enterprises and public services through ICT and its social pervasion through developments like Web 2.0 point not only to its relevance for education and training but also to its potential for nurturing creativity and innovation in a more competitive and socially cohesive Europe.

[48] Conclusions of the Council and of the Representatives of the Governments of the Member States, meeting within the Council, of 22 May 2008 on promoting creativity and innovation through education and training

ANNEX

Part 1. REFERENCES

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Decision No 2318/2003/EC of the European Parliament and of the Council (December 2003)
http://eur-lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&lg=en&type_doc=Decision&an_doc=2003&nu_doc=2318

Results of the eLearning Initiative
Survey carried out by the TIME Center, Grenoble School of Management, 2007
http://ec.europa.eu/education/more-information/moreinformation139_en.htm

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For further information relating to the EU's work in the field of education and training, please consult the following web-sites:

DG EAC (Directorate-General Education and Culture):
with links to the e-Learning portal and e-twinning portal
http://ec.europa.eu/education/index_en.html

CEDEFOP (European Centre for the Development of Vocational Training):
http://www.cedefop.eu.int/

ETF (European Training Foundation):
http://www.etf.eu.int/etfweb.nsf

EURYDICE (The information network on education in Europe):
http://www.eurydice.org/

EFQUEL (European Foundation for Quality in eLearning)
http://www.qualityfoundation.org/

CRELL (Centre for Research on Lifelong Learning):
http://crell.jrc.ec.europa.eu/

IPTS (Institute for Prospective Technological Studies, Information Society Unit)
http://is.jrc.ec.europa.eu/

Framework Programmes, for further information, please consult:
http://cordis.europa.eu/en/home.html

Part 2. STATISTICAL ANNEX

Table of contents

A. Selection of tables from the Benchmarking Study on Access and Use of ICT in European Schools, empirica 2006

Table 1: Total number of computers per 100 pupils by school type

	Total	Primary schools	Lower secondary schools	Upper secondary schools	Vocational schools
European Union (25 countries)	11.3	9.4	10.8	12.5	15.6
European Union (15 countries)	12.1	10.2	11.8	13.6	16.8
New Member States (10 countries)	7.1	6.1	6.4	8.2	9.9
Belgium	9.7	7.7	13.3	11.9	13.6
Czech Republic	9.3	7.6	7.2	10.9	12.1
Denmark	27.3	18.6	18.4	37.3	50.3
Germany	8.9	10.6	8.3	8.0	9.4
Estonia	7.3	6.1	6.0	6.4	14.1
Ireland	10.3	9.2	9.6	10.6	14.6
Greece	6.5	4.8	6.6	9.0	19.9
Spain	9.5	8.6	10.0	11.3	11.8
France	12.5	8.1	11.4	19.7	25.1
Italy	8.0	5.7	6.9	10.7	12.4
Cyprus	12.4	7.3	12.1	18.6	19.8
Latvia	5.9	5.5	5.6	5.4	7.0
Lithuania	5.9	5.5	5.9	5.9	8.3
Luxembourg	19.8	22.6	21.3	20.9	7.9
Hungary	9.6	6.8	7.8	11.6	16.4
Malta	11.0	12.8	8.9	8.9	12.2
Netherlands	21.0	15.4	19.7	22.4	27.5
Austria	16.2	11.4	13.8	20.6	24.3
Poland	6.1	5.6	5.7	7.3	7.2
Slovenia	8.0	8.0	8.0	8.1	9.0
Slovakia	6.7	5.4	5.0	8.3	9.2
Finland	16.8	12.2	12.3	17.5	22.2
Sweden	17.4	14.6	13.2	29.2	17.2
United Kingdom	19.8	15.9	25.0	26.4	28.5
Iceland	15.3	14.5	14.3	17.3	18.8
Norway	24.2	18.1	21.9	40.9	38.8

Source: empirica: LearnInd 2006 (HTS)

Table 2: ICT equipment and ICT use in schools in Europe, 2001 and 2006

	Use of computers for teaching in %		No. of computers/ 100 pupils		Broadband connection in schools in %		Own Web page in %		Own LAN in %	
	2006	2001	2006	2001	2006	2001	2006	2001	2006	2001
European Union (25 countries)	99	-	11	-	67	-	63	-	55	-
European Union (15 countries)	99	94	12	8	72	-	62	44	54	47
New Member States (10 countries)	97	-	7	-	43	-	67	-	60	-
Belgium	98	99	10	10	74	18	69	44	57	50
Czech Republic	100	-	9	-	63	-	75	-	81	-
Denmark	100	99	27	31	95	64	99	75	74	66
Germany	100	94	9	5	63	8	70	48	66	40
Estonia	99	-	7	-	95	-	87	-	72	-
Ireland	100	100	10	11	66	-	36	38	52	42
Greece	100	72	7	5	13	3	37	15	50	18
Spain	96	88	9	7	81	10	53	43	80	35
France	99	96	12	10	75	10	29	37	22	38
Italy	100	94	8	6	69	24	73	37	35	60
Cyprus	99	-	12	-	31	-	51	-	23	-
Latvia	98	-	6	-	67	-	41	-	54	-
Lithuania	97	-	6	-	33	-	60	-	50	-
Luxembourg	99	94	20	32	77	3	64	47	59	49
Hungary	97	-	10	-	77	-	56	-	56	-
Malta	100	-	11	-	95		63	-	60	-
Netherlands	100	100	21	13	92	27	87	44	87	44
Austria	99	90	16	11	68	23	64	43	68	45
Poland	95	-	6	-	28	-	68	-	56	-
Slovenia	100	-	8	-	85	-	96	-	88	-
Slovakia	99	-	7	-	40	-	65	-	72	-
Finland	100	100	20	14	75	15	73	50	65	63
Sweden	100	97	17	15	89	31	84	81	69	71
United Kingdom	100	100	20	14	75	15	73	50	65	63
Iceland	99	-	15	-	92	-	94	-	65	-
Norway	100	-	24	-	89	-	82	-	59	-

Source: empirica: LearnInd 2006 (HTS)

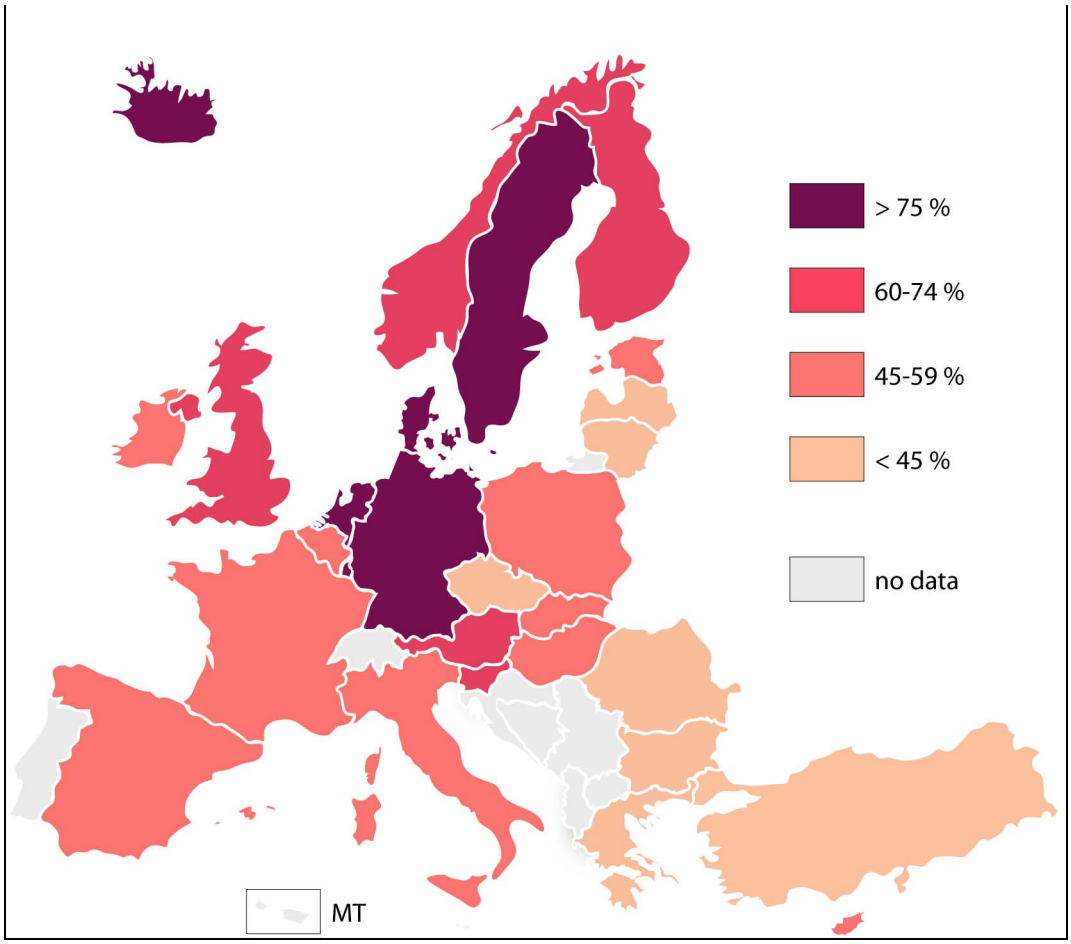
Table 3: Percentage of teachers who have used computers in class in the last 12 months in Europe

	Total	Primary schools	Lower secondary schools	Upper secondary schools	Vocational schools
European Union (25 countries)	74.3	75.2	70.9	73.0	76.7
European Union (15 countries)	77.2	78.0	74.8	76.1	78.8
New Member States (10 countries)	61.3	60.6	59.5	64.1	68.1
Belgium	69.0	66.9	73.7	74.8	78.3
Czech Republic	78.3	82.4	78.9	69.5	71.0
Denmark	94.6	95.7	94.4	97.8	93.5
Germany	78.0	78.0	77.2	80.4	78.6
Estonia	59.7	60.9	61.5	53.3	46.8
Ireland	81.7	86.5	64.1	64.2	69.9
Greece	35.6	32.8	38.0	44.1	58.0
Spain	68.2	68.9	66.6	65.5	67.5
France	65.5	65.7	56.1	72.1	78.9
Italy	72.4	71.6	71.9	72.4	81.6
Cyprus	75.0	87.2	39.8	50.7	58.2
Latvia	34.9	35.7	37.8	33.6	27.7
Lithuania	59.3	58.7	65.0	64.1	74.3
Luxembourg	70.2	74.4	54.2	43.6	61.8
Hungary	42.8	36.8	40.1	60.0	64.1
Malta	74.5	82.6	59.1	59.1	76.7
Netherlands	90.0	91.7	80.9	77.4	84.0
Austria	87.9	87.9	87.5	81.3	86.1
Poland	61.4	60.2	60.3	67.1	70.9
Slovenia	67.6	71.7	71.6	53.6	52.2
Slovakia	70.3	72.0	73.1	65.5	69.7
Finland	85.1	88.0	77.1	80.5	81.4
Sweden	90.9	90.0	91.7	94.6	87.7
United Kingdom	96.4	97.4	90.4	91.5	92.9
Iceland	79.5	78.6	84.7	84.2	83.3
Norway	89.4	90.4	89.4	79.4	82.4

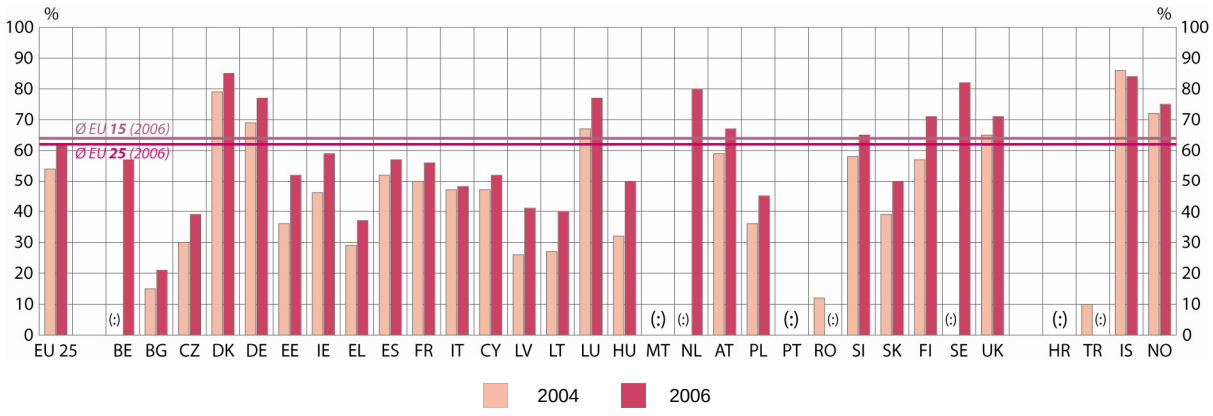
Source: empirica: LearnInd 2006 (CTS)

Chart 1: Availability of Computers

(Percentage of households having access to, via one of its members, a personal computer)



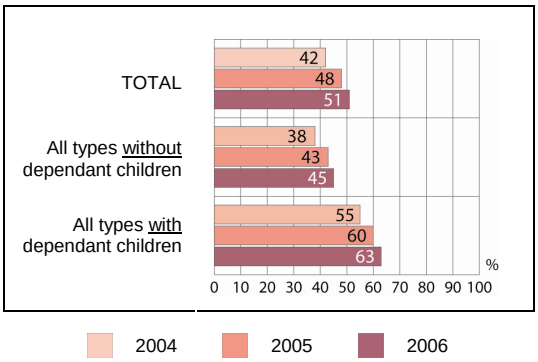
Data source : Eurostat New Cronos Database, 2007
Note : 2006 data (2004 for Romania and Turkey)



Data source : Eurostat New Cronos Database, 2007

Availability of ICT at home is increasing. However, it is still an important differential factor. In all European countries, pupils use ICT tools and internet more at home than at school (PISA 2006)

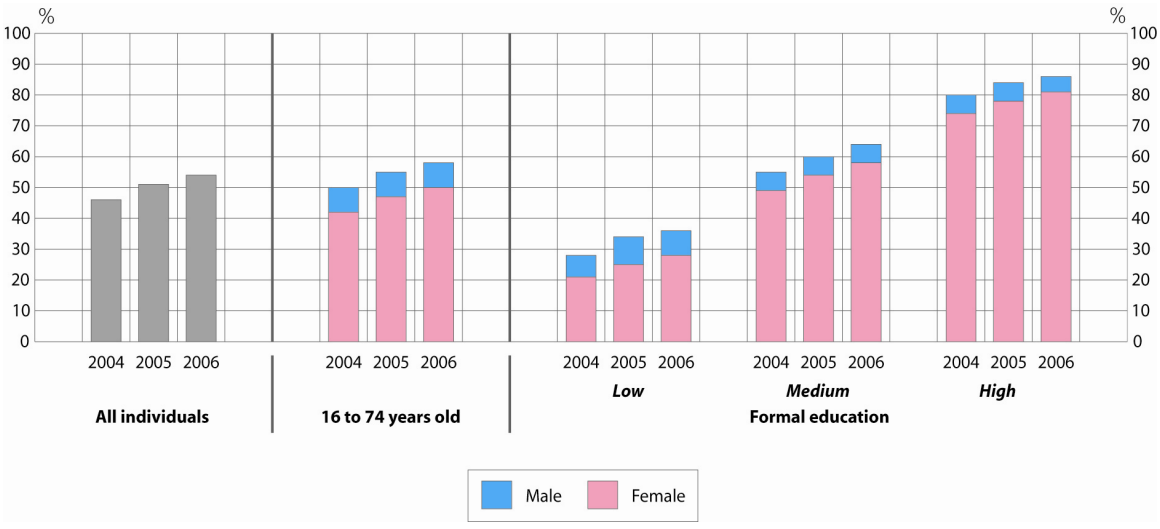
Chart 2: Households having access to the internet at home
(as a percentage of all households)



Data source: Eurostat New Cronos Database, 2007

Access to internet at home is higher for households with children. This might point to a higher use by young people as well as for an educational appreciation of its use by parents.

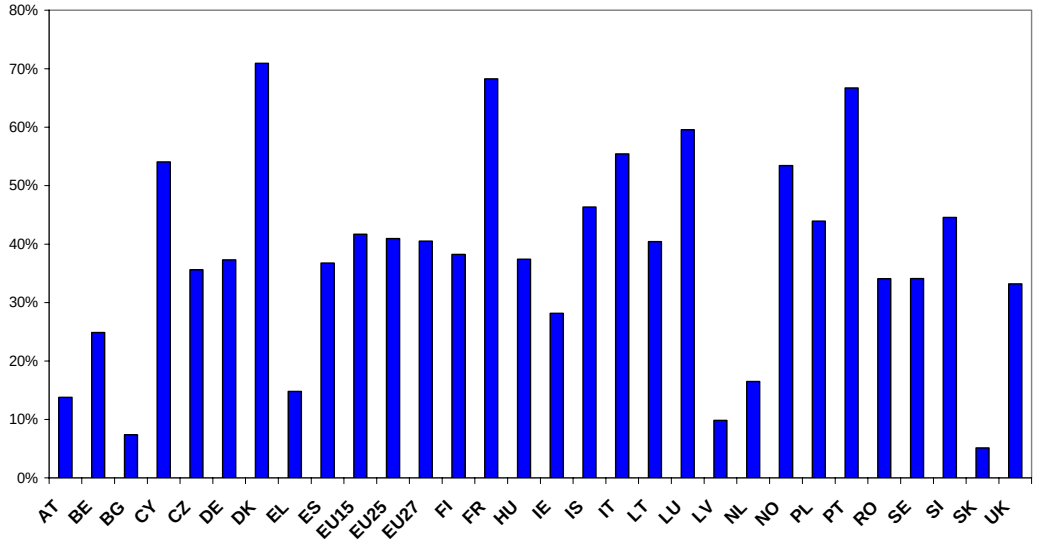
Chart 3: Internet use by gender, age and educational level
(as a percentage of all individuals)



Data source: Eurostat New Cronos Database, 2007

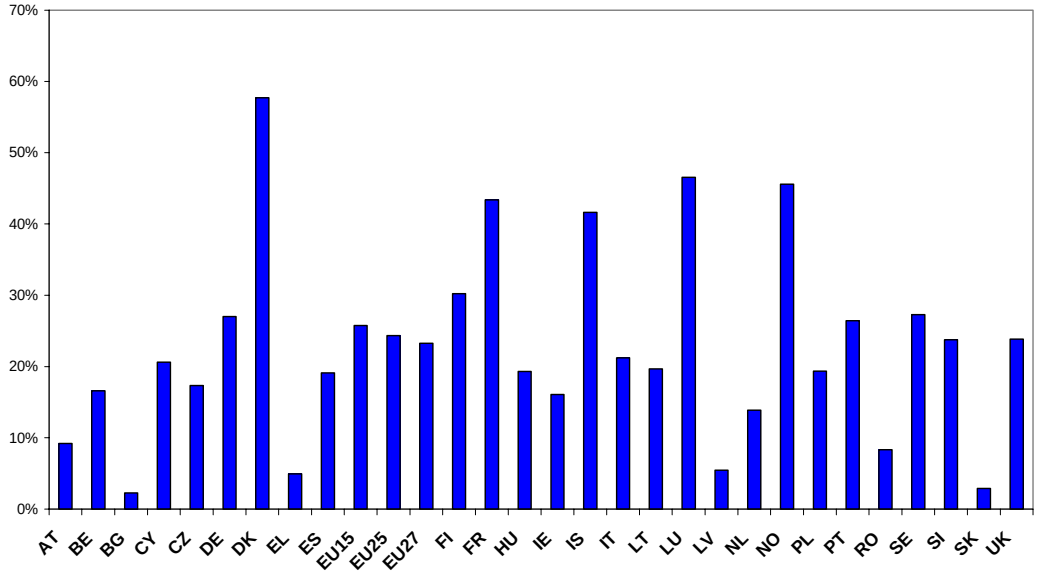
The gender gap in access and use of ICT and the internet is closing, in particular for the highly educated. However, this has not yet had an impact on the number of women choosing careers in technology.

Chart 4: Internet use with the purpose of learning
(as a percentage of internet users, 16-74 years old)



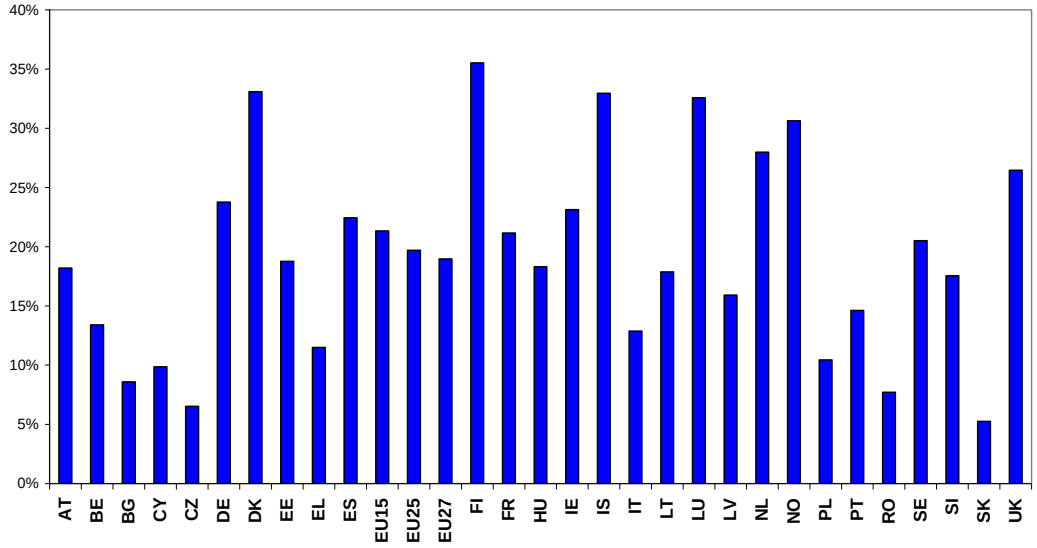
Data source: Eurostat New Cronos Database, 2007

Chart 5: Internet use with the purpose of learning
(as a percentage of all individuals, 16-74 years old)



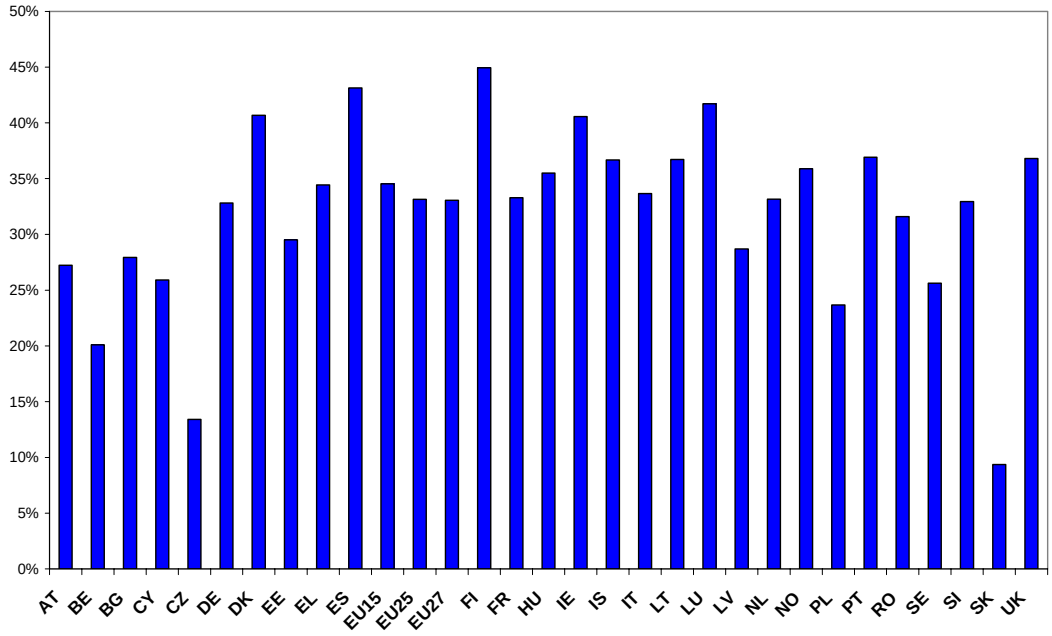
Data source: Eurostat New Cronos Database, 2007

Chart 6: Internet use for looking for information about education, training or course offers
(as a percentage of all individuals)



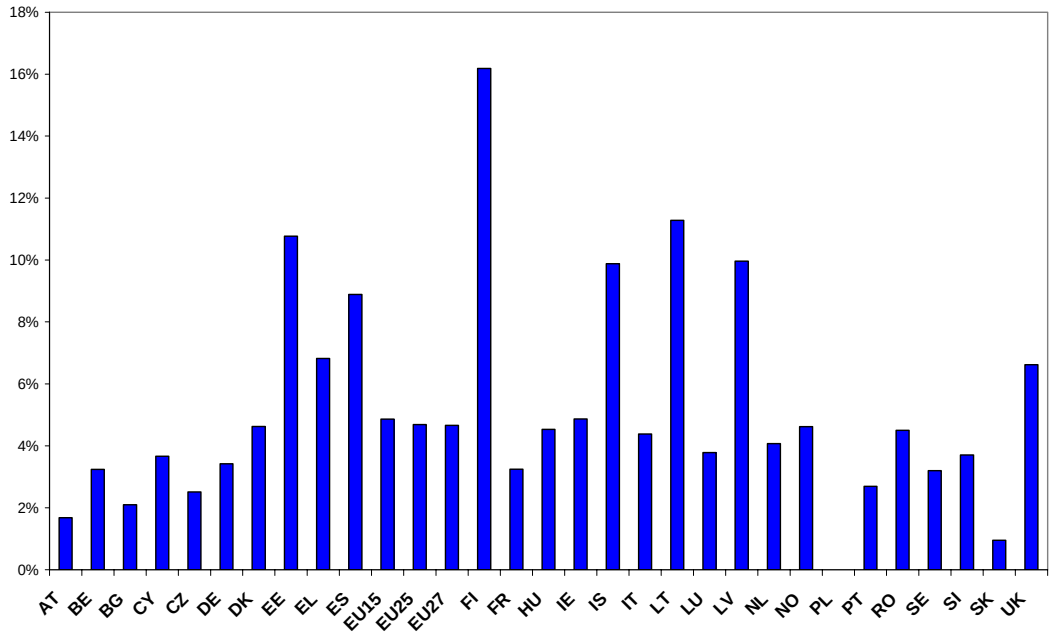
Data source: Eurostat New Cronos Database, 2007

Chart 7: Internet use for looking for information about education, training or course offers
(as a percentage of online users)



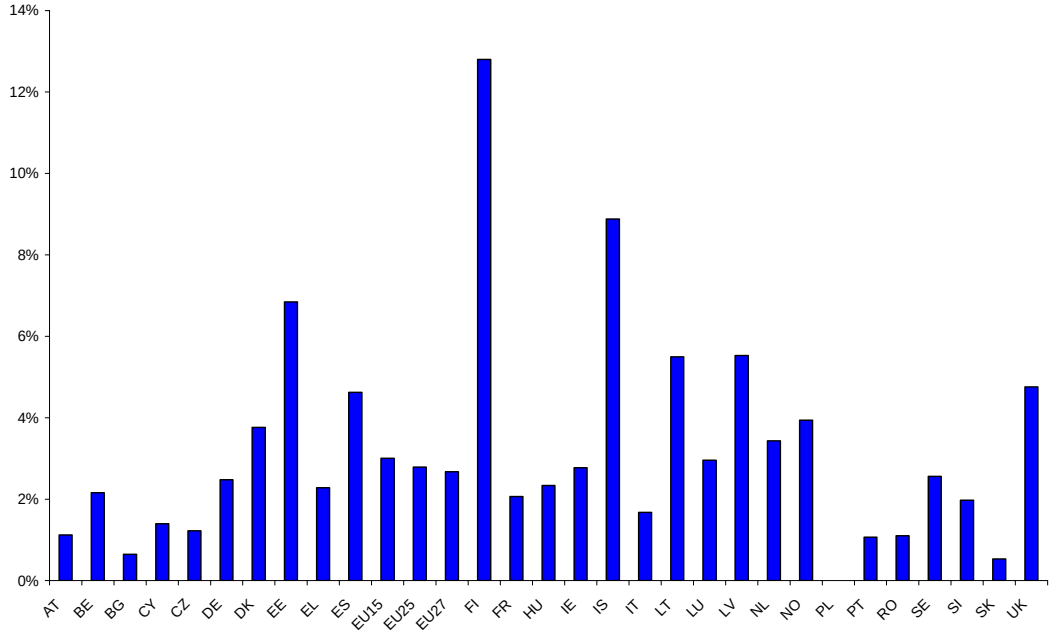
Data source: Eurostat New Cronos Database, 2007

Chart 8: Internet use for doing an online course (of any subject)
(as a percentage of online users, 16-74 years old)



Data source: Eurostat New Cronos Database, 2007

Chart 9: Internet use for doing an online course (of any subject)
(as a percentage of all individuals, 16-74 years old)



Data source: Eurostat New Cronos Database, 2007

Selection of tables from the Community Survey on ICT usage in households and by individuals, Eurostat 2006 and 2007

Table 1: Percentage of households having access to the Internet at home

	2002	2003	2004	2005	2006
European Union (25 countries)	-	-	42	48	51
European Union (15 countries)	39	43	45	53	54
Belgium	-	-	-	50	54
Bulgaria	-	-	10		17
Czech Republic	-	15	19	19	29
Denmark	56	64	69	75	79
Germany	46	54	60	62	67
Estonia	-	-	31	39	46
Ireland	-	36	40	47	50
Greece	12	16	17	22	23
Spain	-	28	34	36	39
France	23	31	34	-	41
Italy	34	32	34	39	40
Cyprus	-	-	53	32	37
Latvia	-	-	15	31	42
Lithuania	4	6	12	16	35
Luxembourg	40	45	59	65	70
Hungary	-	-	14	22	32
Netherlands	58	61	-	78	80
Austria	33	37	45	47	52
Poland	-	-	26	30	36
Romania	-	-	6	-	-
Slovenia	-	-	47	48	54
Slovakia	-	-	23	23	27
Finland	44	47	51	54	65
Sweden	-	-	-	73	77
United Kingdom	50	55	56	60	63
Turkey	-	-	7	-	-
Iceland	-	-	81	84	83
Norway	-	60	60	64	69

Source: Eurostat New Cronos Database, 2007

Table 2: Percentage of households having access to the Internet at home

	2004		2005		2006	
	EU 25	EU 15	EU 25	EU 15	EU 25	EU 15
Total	42	45	48	53	51	54
All types without dependent children	38	43	43	47	45	48
All types with dependent children	55	64	60	66	63	66
Households living in densely-populated area (at least 500 inhabitants/Km2)	45	48	52	54	55	56
Households living in intermediate urbanized area (between 100 and 499 inhabitants/Km2)	45	-	49	53	52	55
Households living in sparsely populated area (less than 100 inhabitants/Km2)	30	36	40	49	43	48

Source: Eurostat New Cronos Database, 2007

Table 3: Percentage of households with Internet at home using broadband access

	2003	2004	2005	2006
European Union (25 countries)	-	32	48	62
European Union (15 countries)	-	-	48	62
Belgium	-	-	81	89
Bulgaria	-	39	-	59
Czech Republic	10	23	27	57
Denmark	39	52	68	80
Germany	17	30	38	50
Estonia	-	66	77	80
Ireland	2	7	16	26
Greece	4	1	3	17
Spain	-	45	58	75
France	-	-	-	74
Italy	-	-	34	41
Cyprus	-	4	14	34
Latvia	-	37	46	53
Lithuania	27	32	73	56
Luxembourg	16	28	52	63
Hungary	-	41	49	68
Netherlands	33	-	69	82
Austria	28	36	50	63
Poland	-	32	51	60
Romania	-	22	40	62
Slovenia	-	15	31	43
Slovakia	26	42	67	82
Finland	-	-	55	66
Sweden	19	28	52	70
United Kingdom	-	3	-	-
Turkey	40	56	75	87
Iceland	38	50	65	83
Norway	33	-	69	82

Source: Eurostat New Cronos Database, 2007

Table 4: Internet use - Percentage of individuals by gender, age and educational level

	Used Internet within the last year			Used Internet in the last 3 months		
EUR 25	2004	2005	2006	2004	2005	2006
All Individuals	49	54	56	46	51	54
Males, 16 to 74 years old	53	58	60	50	55	58
Females, 16 to 74 years old	46	51	53	42	47	50
Males with low formal education	31	36	37	28	34	36
Females with low formal education	23	27	29	21	25	28
Males with medium formal education	59	63	68	55	60	64
Females with medium formal education	54	59	62	49	54	58
Males with high formal education	82	86	88	80	84	86
Females with high formal education	77	81	83	74	78	81
EUR 15	2004	2005	2006	2004	2005	2006
All Individuals	53	58	58	50	55	56
Males, 16 to 74 years old	57	62	62	54	59	60
Females, 16 to 74 years old	49	54	54	46	50	52
Males with low formal education	31	37	38	29	35	36
Females with low formal education	24	28	29	22	26	28
Males with medium formal education	68	72	74	64	69	71
Females with medium formal education	61	66	68	57	62	65
Males with high formal education	83	87	88	81	85	87
Females with high formal education	79	83	84	76	79	81

Source: Eurostat New Cronos Database, 2007

Table 5: Internet use - Percentage of individuals by age and educational level

	Used the Internet in the last year			Used the Internet in the last 3 months		
EUR 25	2004	2005	2006	2004	2005	2006
All Individuals	49	54	56	46	51	54
16 to 24 years old	79	83	86	75	80	83
25 to 34 years old	65	70	74	62	67	70
35 to 44 years old	57	64	66	54	60	64
45 to 54 years old	45	51	54	43	47	51
55 to 64 years old	28	34	36	27	32	34
65 to 74 years old	11	13	14	11	12	13
With no or low formal education	27	31	33	25	29	32
With medium formal education	56	61	65	52	57	61
With high formal education	80	84	86	77	81	84
Employees, self-employed, family workers	61	66	69	57	63	67
Students	88	91	94	85	89	92
Unemployed	44	47	51	39	41	47
EUR 15	2004	2005	2006	2004	2005	2006
All Individuals	53	58	58	50	55	56
16 to 24 years old	80	85	86	77	82	84
25 to 34 years old	70	75	76	67	71	73
35 to 44 years old	62	67	68	59	64	66
45 to 54 years old	51	56	58	49	52	55
55 to 64 years old	32	38	39	30	36	37
65 to 74 years old	13	16	15	13	14	14
With no or low formal education	27	32	33	25	30	32
Medium formal education	65	69	71	61	65	68
With high formal education	81	85	86	79	82	84
Employees, self-employed, family workers	64	70	71	61	67	69
Students	89	92	93	87	90	92
Unemployed	51	54	56	46	49	52

Source: Eurostat New Cronos Database, 2007

Table 6: Individuals' level of Internet skills (2006)
Percentage of individuals by age and educational level

	1 or 2 of the Internet related activities		3 or 4 of the Internet related activities		5 or 6 of the Internet related activities	
	EU25	EU15	EU25	EU15	EU25	EU15
All Individuals	31	33	20	20	6	6
16 to 24 years old	28	27	42	43	16	15
25 to 34 years old	35	36	29	30	10	10
35 to 44 years old	41	42	20	21	5	5
45 to 54 years old	37	40	14	15	3	3
55 to 64 years old	26	29	8	9	1	1
65 to 74 years old	12	13	3	3	0	0
No or low formal education	17	18	12	12	4	3
Medium formal education	36	39	21	23	6	6
High formal education	45	46	31	31	10	9
Employees, self-employed, family workers	39	41	23	24	6	6
Students	26	25	48	49	20	19
Unemployed	27	29	19	21	6	6

Source: Eurostat New Cronos Database, 2007

Internet related activities

percentage of individuals who have used a search engine to find information;
percentage of individuals who have sent an email with attached files;
percentage of individuals who have posted messages to chat rooms, newsgroups or an online discussion forum;
percentage of individuals who have used the Internet to make phone calls;
percentage of individuals who have used peer-to-peer file sharing for exchanging movies, music, etc., and
percentage of individuals who have created a Web page.

Table 7: Individuals' Internet skills - Percentage of individuals by age group, gender and educational level

	Have carried out 1 or 2 of the Internet related activities		Have carried out 3 or 4 of the Internet related activities		Have carried out 5 or 6 of the Internet related activities	
EUR 25	2005	2006	2005	2006	2005	2006
All Individuals	31	31	18	20	5	6
Males, 16 to 74 years old	30	30	20	22	7	9
Females, 16 to 74 years old	33	32	15	18	2	3
Males with low formal education	18	19	13	14	5	5
Females with low formal education	17	16	9	10	1	2
Males with medium formal education	33	34	21	23	8	9
Females with medium formal education	38	38	16	19	3	3
Males with high formal education	45	40	29	33	11	14
Females with high formal education	52	49	25	29	3	5
EUR 25	2005	2006	2005	2006	2005	2006
All Individuals	34	33	18	20	5	6
Males, 16 to 74 years old	32	32	21	23	8	8
Females, 16 to 74 years old	35	34	15	18	2	3
Males with low formal education	19	20	13	13	5	4
Females with low formal education	18	17	9	10	1	2
Males with medium formal education	36	37	24	26	9	9
Females with medium formal education	43	42	17	21	3	3
Males with high formal education	46	41	29	33	10	13
Females with high formal education	53	51	24	28	3	5
Source: Eurostat New Cronos Database, 2007						

Internet related activities

percentage of individuals who have used a search engine to find information;
percentage of individuals who have sent an email with attached files;
percentage of individuals who have posted messages to chat rooms, newsgroups or an online discussion forum;
percentage of individuals who have used the Internet to make phone calls;
percentage of individuals who have used peer-to-peer file sharing for exchanging movies, music, etc., and
percentage of individuals who have created a Web page.

Table 8: Availability of Computers - Percentage of households having access to, via one of its members, a personal computer

	2002	2003	2004	2005	2006
European Union (25 countries)			54	58	62
European Union (15 countries)	50	56	58	63	64
Belgium					57
Bulgaria			15		21
Czech Republic		24	30	30	39
Denmark	72	79	79	84	85
Germany	61	65	69	70	77
Estonia			36	43	52
Ireland		42	46	55	59
Greece	25	29	29	33	37
Spain		47	52	55	57
France	37	46	50		56
Italy	40	48	47	46	48
Cyprus			47	46	52
Latvia			26	32	41
Lithuania	12	20	27	32	40
Luxembourg	53	58	67	75	77
Hungary			32	42	50
Netherlands	69	71		78	80
Austria	49	51	59	63	67
Poland			36	40	45
Romania			12		
Slovenia			58	61	65
Slovakia			39	47	50
Finland	55	57	57	64	71
Sweden				80	82
United Kingdom	58	63	65	70	71
Turkey			10		
Iceland			86	89	84
Norway		71	72	74	75

Source: Eurostat New Cronos Database, 2007

Table 9: Availability of Computers - Percentage of enterprises using computers

	2002	2003	2004	2005	2006
European Union (25 countries)			95	96	97
European Union (15 countries)		95	96	96	97
Belgium		97	98	97	97
Bulgaria			83	85	89
Czech Republic		96	96	96	97
Denmark		99	98	98	98
Germany		98	97	97	96
Estonia			93	92	94
Ireland		95	96	97	97
Greece		95	95	98	97
Spain		95	97	97	98
France		97			99
Italy		96	97	96	96
Cyprus			93	94	95
Latvia			87	86	92
Lithuania			91	93	92
Luxembourg		97	97	97	98
Hungary			91	88	89
Netherlands		97		93	
Austria		95	95	95	100
Poland		96	96	97	98
Romania		82	92	91	
Slovenia			85		
Slovakia			95	98	97
Finland			77	97	97
Sweden		99	98	99	99
United Kingdom		98	97	96	96
Turkey		89	93	94	96
Iceland		99			100
Norway		96	97	97	97

Source: Eurostat New Cronos Database, 2007

Table 10: Computer use - Percentage of individuals by age group, educational level and occupation

	Used a computer within the last year			Used a computer in the last 3 months		
EUR 25	2004	2005	2006	2004	2005	2006
All Individuals	58	61	63	55	58	61
16 to 24 years old	85	88	90	82	85	88
25 to 34 years old	73	76	80	69	73	78
35 to 44 years old	67	72	74	63	69	72
45 to 54 years old	55	59	62	52	56	60
55 to 64 years old	36	42	44	34	39	41
65 to 74 years old	16	18	19	15	17	17
No or low formal education	34	38	40	31	36	38
Medium formal education	66	69	73	62	66	69
High formal education	86	88	90	84	86	89
Employees, self-employed, family workers	70	74	77	67	71	75
Students	94	95	96	92	94	96
Unemployed	53	55	59	47	50	54
EUR 15	2004	2005	2006	2004	2005	2006
All Individuals	61	64	65	58	62	63
16 to 24 years old	86	88	90	83	86	88
25 to 34 years old	77	79	82	73	76	79
35 to 44 years old	71	75	76	67	72	73
45 to 54 years old	61	65	66	58	61	64
55 to 64 years old	40	47	47	38	44	45
65 to 74 years old	19	21	21	17	19	19
No or low formal education	34	39	40	32	37	38
Medium formal education	74	77	79	70	73	76
High formal education	87	89	90	85	87	89
Employees, self-employed, family workers	73	77	79	70	74	77
Students	93	95	96	92	94	95
Unemployed	60	62	63	54	57	59

Source: Eurostat New Cronos Database, 2007

Table 11: Computer use - Percentage of individuals by gender, age and educational level

	Used a computer within the last year			Used a computer in the last 3 months		
EUR 25	2004	2005	2006	2004	2005	2006
All Individuals	58	61	63	55	58	61
Males, 16 to 74 years old	61	65	66	58	62	64
Females, 16 to 74 years old	54	58	60	51	55	57
Males with low formal education	39	43	45	36	41	43
Females with low formal education	30	33	36	27	31	34
Males with medium formal education	68	70	74	64	67	72
Females with medium formal education	65	68	71	61	64	67
Males with high formal education	87	90	91	86	88	90
Females with high formal education	85	87	89	82	84	87
EUR 15	2004	2005	2006	2004	2005	2006
All Individuals	61	64	65	58	62	63
Males, 16 to 74 years old	64	68	68	62	66	67
Females, 16 to 74 years old	57	60	61	54	57	59
Males with low formal education	39	44	45	37	42	43
Females with low formal education	30	34	36	27	32	34
Males with medium formal education	75	78	81	72	75	78
Females with medium formal education	72	75	77	68	71	73
Males with high formal education	88	90	92	87	89	91
Females with high formal education	86	87	89	84	85	87

Source: Eurostat New Cronos Database, 2007

Table 12: Individuals' level of computer skills - percentage of individuals by age group, gender and educational level

	Have carried out 1 or 2 of computer related activities		Have carried out 3 or 4 of computer related activities		Have carried out 5 or 6 of computer related activities	
EUR 25	2005	2006	2005	2006	2005	2006
All Individuals	15	13	27	24	22	22
Males, 16 to 74 years old	15	11	23	22	30	29
Females, 16 to 74 years old	16	15	30	26	15	15
Males with low formal education	13	10	17	16	15	14
Females with low formal education	13	10	17	15	7	7
Males with medium formal education	18	13	25	26	30	30
Females with medium formal education	20	19	35	31	17	16
Males with high formal education	10	9	28	27	53	53
Females with high formal education	14	17	44	39	30	28
EUR 25	2005	2006	2005	2006	2005	2006
All Individuals	15	13	28	25	24	23
Males, 16 to 74 years old	14	11	24	23	32	31
Females, 16 to 74 years old	16	15	31	27	16	15
Males with low formal education	14	10	18	16	16	14
Females with low formal education	14	10	18	15	7	7
Males with medium formal education	17	12	27	28	35	35
Females with medium formal education	19	19	38	34	19	18
Males with high formal education	10	8	28	27	54	54
Females with high formal education	14	17	44	39	30	29
Source: Eurostat New Cronos Database, 2007						

Computer related activities

individuals who have used a mouse to launch programs such as an Internet browser or word processor ;
individuals who have copied or moved a file or folder ;
individuals who have used copy or cut and paste tools to duplicate or move information on screen;
individuals who have used basic arithmetic formulae to add, subtract, multiply or divide figures in a spreadsheet;
individuals who have compressed files; and
individuals who have written a computer program using a programming language.

Table 13: Individuals' level of computer skills – percentage of individuals by age group, educational level and occupation (2006)

	Have carried out 1 or 2 of the computer related activities		Have carried out 3 or 4 of the computer related activities		Have carried out 5 or 6 of the computer related activities	
	EU 25	EU 15	EU 25	EU 15	EU 25	EU 15
All Individuals	13	13	24	25	22	23
16 to 24 years old	13	12	38	38	38	39
25 to 34 years old	13	12	30	31	33	35
35 to 44 years old	15	14	28	29	25	27
45 to 54 years old	15	15	24	26	17	19
55 to 64 years old	13	13	16	18	10	11
65 to 74 years old	7	8	7	7	3	3
With no or low formal education	10	10	15	15	10	10
with medium formal education	16	16	28	31	23	27
With high formal education	13	12	33	33	41	42
Employees, self-employed, family workers	14	14	29	30	27	29
Students	12	11	40	39	43	45
Unemployed	14	14	23	26	19	22

Source: Eurostat New Cronos Database, 2007

Computer related activities

individuals who have used a mouse to launch programs such as an Internet browser or word processor ;
individuals who have copied or moved a file or folder ;
individuals who have used copy or cut and paste tools to duplicate or move information on screen;
individuals who have used basic arithmetic formulae to add, subtract, multiply or divide figures in a spreadsheet;
individuals who have compressed files; and
individuals who have written a computer program using a specialised programming language.

Table 14: Way of obtaining e-skills - Percentage of individuals by age group

	Formalised educational institution		Training courses and adult education centres, on own initiative		Training courses and adult education centres, on demand of employer		Self-study using books, cd-roms, etc.		Self-study (learning by doing)		Informal assistance from colleagues, relatives in friends and some other ways		Through some other way	
EUR 25	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
All Individuals	20	21	10	11	15	17	20	25	41	41	41	39	2	12
Age 16 to 24	65	65	7	8	4	6	26	31	60	58	56	56	3	15
Age 25 to 34	32	37	12	14	17	17	27	33	56	57	51	50	3	14
Age 35 to 44	14	15	13	15	21	24	23	31	50	52	47	46	3	14
Age 45 to 54	7	7	12	13	21	23	19	24	37	40	40	39	2	12
Age 55 to 64	5	4	9	9	18	19	13	16	24	26	29	27	2	10
Age 65 to 74	2	1	6	5	7	6	7	7	10	10	14	12	1	5
EUR 15	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
All Individuals	20	21	11	12	17	18	20	25	43	43	43	40	3	15
Age 16 to 24	61	61	8	9	5	7	26	31	63	58	58	56	3	20
Age 25 to 34	32	38	13	14	19	18	28	34	59	58	54	51	4	18
Age 35 to 44	15	16	14	15	23	25	24	32	53	54	49	48	3	17
Age 45 to 54	8	8	13	14	24	26	21	26	41	43	44	41	3	15
Age 55 to 64	6	4	11	10	20	20	15	17	26	28	32	28	2	12
Age 65 to 74	3	2	7	6	7	6	8	8	12	11	16	13	1	5

Source: Eurostat New Cronos Database, 2007

Table 15: Way of obtaining e-skills - Percentage of individuals by education level

	Formalised educational institution		Training courses and adult education centres, on own initiative		Training courses and adult education centres, on demand of employer		Self-study using books, cd-roms, etc.		Self-study (learning by doing)		Informal assistance from colleagues, relatives in friends and some other ways		Through some other way	
EUR 25	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
All Individuals	20	21	10	11	15	17	20	25	41	41	41	39	2	12
No or low formal education	14	13	5	5	5	7	10	14	24	24	26	23	2	5
Medium formal education	21	23	12	13	18	19	21	27	45	48	46	47	2	15
High formal education	31	33	17	19	30	31	35	41	62	61	56	55	3	19
Self-employed, family workers	12	14	11	13	9	12	23	30	46	49	42	43	3	10
Students	70	70	7	8	2	2	32	37	67	63	63	59	3	10
Unemployed	22	23	9	12	11	13	16	22	32	36	37	36	5	10
EUR 15	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
All Individuals	20	21	11	12	17	18	20	25	43	43	43	40	3	15
No or low formal education	13	12	6	5	6	8	10	14	25	24	28	24	2	5
Medium formal education	22	25	13	15	21	23	23	30	50	53	50	51	3	20
High formal education	29	32	18	19	31	31	35	41	64	61	58	55	3	22
Self-employed, family workers	13	14	12	14	11	13	25	32	49	52	45	44	3	12
Students	64	64	9	9	3	3	34	37	73	63	69	60	4	13
Unemployed	24	24	11	13	14	16	19	25	37	40	41	39	6	12

Source: Eurostat New Cronos Database, 2007