



COMMISSION OF THE EUROPEAN COMMUNITIES

Brussels, 09/10/2008
SEC(2008) 2629 final

COMMISSION STAFF WORKING DOCUMENT

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 Cluster¹ 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 Initiative² 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 training³.

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.

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 stakeholders⁵. This led to extensive networking activities through European-wide projects. Together with other E&T programmes⁶ 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-learning⁷.

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 Plan⁶ for the information society Strategy identified eLearning as one of its key objectives, together with eHealth, eGovernment and generalisation of broadband⁹.

The successive Framework Programmes have funded research on the use of ICT for learning as part of the Information Society Programme (FP5¹⁰, FP6¹¹) and on socio-economic research in education, while eTEN¹² supported the deployment and take-up of trans-European e-services, and eContent¹³ 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 Communication¹⁴ on "e-Skills for the 21st Century: Fostering Competitiveness, Growth and Jobs" for ICT and e-business skills; and the Structural Funds.

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, Grundtvig, 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 survey¹⁵, 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 countries¹⁶, 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 Commission¹⁸ 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 evidence¹⁹ 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 teaching²⁰. 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 teachers²¹. Other higher education colleges

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, reported²² 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 mobility²³.

By 2006 the importance of sustainable business plans, including customer-focused objectives, was becoming evident²⁴. 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 tools²⁵ 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 content²⁶, 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 learners²⁷.

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.

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 tools²⁸ 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 distributed²⁹. 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 Declaration³⁰ 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 factor³¹. 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.

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 Strategy³² 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 classroom³³. 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 review³⁴ 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 competencies³⁵ 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.

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 skills³⁶. 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 of the priorities of the programmes eContent / eContentPlus and eTEN³⁷. These innovative trans-national projects award a special attention to quality, interoperability and accessibility of digital learning resource³⁸.

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 industries³⁹. 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

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 Technology⁴⁰ 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 Europe⁴¹, 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-assessment⁴⁴.

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-portfolios⁴⁵ 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

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 environments⁴⁶.

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 Europe⁴⁷ 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

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

1. Official EU documents

a) eLearning

Evaluation of the eLearning Programme, ECOTEC, 2008

http://ec.europa.eu/dgs/education_culture/evalreports/training/2007/joint/elearning_en.pdf

eLearning (2004-2006)

Multi-annual programme for the effective integration of information and communication technologies (ICT) in education and training systems in Europe (eLearning Programme)

Decision No 2318/2003/EC of the European Parliament and of the Council (December 2003)

[http://eur-](http://eur-lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&lg=en&type_doc=Decision&an_doc=2003&nu_doc=2318)

[lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&lg=en&type_doc=Decision&an_doc=2003&nu_doc=2318](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

eLearning: Designing Tomorrow's Education - A Mid-Term Report

Commission Staff Working Paper (July 2003)

http://ec.europa.eu/education/archive/elearning/doc/mid_term_report_en.pdf

Using the Internet to develop twinning between European secondary schools

Report from the Commission to the Council (June 2002)

[http://eur-](http://eur-lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&type_doc=COMfinal&an_doc=2002&nu_doc=283/ofull%20text%20of%20the%20act&lg=en)

[lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&type_doc=COMfinal&an_doc=2002&nu_doc=283/ofull%20text%20of%20the%20act&lg=en](http://eur-lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&type_doc=COMfinal&an_doc=2002&nu_doc=283/ofull%20text%20of%20the%20act&lg=en)

eLearning – Designing tomorrow's education

Commission Staff Working Paper – An Interim Report as requested by the Council Resolution of 13 July 2001 (February 2002)

http://ec.europa.eu/education/archive/elearning/sec_2002_236_en.pdf

E-Learning

Council resolution (July 2001)

http://ec.europa.eu/education/archive/elearning/reso_en.pdf

The eLearning Action Plan – Designing tomorrow's education

Communication from the Commission to the Council and the European Parliament (March 2001)

[http://eur-](http://eur-lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&type_doc=COMfinal&an_doc=2001&nu_doc=172/ofull%20text%20of%20the%20act&lg=en)

[lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&type_doc=COMfinal&an_doc=2001&nu_doc=172/ofull%20text%20of%20the%20act&lg=en](http://eur-lex.europa.eu/smartapi/cgi/sga_doc?smartapi!celexplus!prod!DocNumber&type_doc=COMfinal&an_doc=2001&nu_doc=172/ofull%20text%20of%20the%20act&lg=en)

The eLearning initiative – Designing tomorrow's education

Communication from the Commission (May 2000)

http://europa.eu/eur-lex/en/com/cnc/2000/com2000_0318en01.pdf

Action programme in the field of lifelong learning (2007-2013)

Decision No 1720/2006/EC of the European Parliament and of the Council establishing an action programme in the field of lifelong learning (November 2006)

http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_327/l_32720061124en00450068.pdf

b) Education and Training 2010

Education & Training 2010: Main policy initiatives and outputs in education and training since the year 2000, European Commission (2007)

http://ec.europa.eu/education/policies/2010/doc/compendium05_en.pdf

Key competences for lifelong learning

Recommendation of the European Parliament and of the Council (December 2006)

http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/l_394/l_39420061230en00100018.pdf

Efficiency and equity in European education and training systems:

Conclusions of the Council and the Representatives of the Governments of the Member States, meeting within the Council

http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/c_298/c_29820061208en00030006.pdf

Communication from the Commission to the Council and to the European Parliament (September 2006)

http://ec.europa.eu/education/policies/2010/doc/comm481_en.pdf

Modernising education and training: a vital contribution to prosperity and social cohesion in Europe

2006 Joint Interim Report of the Council and the Commission on progress under the "Education & Training 2010 work programme" (February 2006)

http://eur-lex.europa.eu/LexUriServ/site/en/oj/2006/c_079/c_07920060401en00010019.pdf

Education & Training 2010 – The success of the Lisbon Strategy hinges on urgent reforms

Joint Interim Report of the Council and the Commission on the implementation of the detailed work programme on the follow-up of the objectives of education and training systems in Europe (February 2004)

http://ec.europa.eu/education/policies/2010/doc/jir_council_final.pdf

Implementation of the "Education & Training 2010" programme

Commission Staff Working Document

Supporting document for the draft joint interim report on the implementation of the detailed work programme on the follow-up of the objectives of education and training systems in Europe (November 2003)

http://ec.europa.eu/education/policies/2010/doc/staff-work_en.pdf

c) Other EC Documents

Communication "i2010 - Annual Information Society Report 2007", European Commission, 2007

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2007:0146:FIN:EN:PDF>

Commission Staff Working Paper as background for the i2010 Annual Information Society Report for 2007, Commission of the European Communities, 30.3.2007

http://ec.europa.eu/information_society/eeurope/i2010/docs/annual_report/2007/sec_2007_395_en_documentdet_ravail_p.pdf

i2010 – a European Information Society for growth and employment COM (2005) 229

<http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=COM:2005:0229:FIN:EN:PDF>

The Ministerial Declaration on eInclusion adopted at the ICT for an Inclusive Society Conference, Riga, June 2006. http://ec.europa.eu/information_society/events/ict_riga_2006/doc/declaration_riga.pdf and

http://ec.europa.eu/information_society/events/ict_riga_2006/index_en.htm

European i2010 initiative on eInclusion and Web Accessibility - "To be part of the information society" COM (2007) 694 final

http://ec.europa.eu/information_society/activities/einclusion/docs/i2010_initiative/comm_native_com_2007_0694_f_en_acte.pdf

eContent and eContentplus (European digital content) – Main policy and programme documents
<http://cordis.europa.eu/econtent/>

eTen (Trans-European e-services in the public interest) - Main policy and programme documents
http://ec.europa.eu/information_society/activities/eten/library/index_en.htm#about

Decision No 1982/2006/EC of the European Parliament and of the Council of 18 December 2006 concerning the **Seventh Framework Programme of the European Community for research, technological development and demonstration activities (2007-2013)** <http://cordis.europa.eu/fp7/>

European Commission's Communication on "e-Skills for the 21st Century: Fostering Competitiveness, Growth and Jobs" COM (2007) 496, adopted on 07.09.2007
<http://ec.europa.eu/enterprise/ict/policy/ict-skills.htm>

Full integrated Council Conclusions on e-Skills Strategy, adopted on 23.11.2007
http://www.consilium.europa.eu/ueDocs/cms_Data/docs/pressData/en/intm/97225.pdf

DG ENTR Standardisation policy initiatives and documents
http://ec.europa.eu/enterprise/standards_policy/index_en.htm

2. Reports and studies

2008

Active Ageing and the Potential of ICT for Learning. Ala-Mutka, K., Malanowski, N., Punie, Y. & Cabrera, M. Institute for Prospective Technological Studies (IPTS), Joint Research Centre, European Commission. EUR 23414 EN. 2008. <http://ftp.jrc.es/EURdoc/JRC45209.pdf>

The Becta Review 2008: Emerging Technologies for learning (update), UK, Becta, 2008
http://partners.becta.org.uk/upload-dir/downloads/page_documents/research/emerging_technologies08-2.pdf

Compendium of good practices cases on e-Learning: good practices identified by the ICT cluster Editor: Danish Technological Institute, to be published in October 2008

The New Millenium Learners. OECD, Paris, 2008
http://www.oecd.org/document/10/0,3343,fr_2649_35845581_38358154_1_1_1_1,00.html

Pedagogy and ICT use in schools around the world: Findings from the IEA SITES 2006 study. Law, N., Pelgrum, W.J. & Plomp, T. (eds.) (2008). <http://www.sites2006.net/>

Towards a Research Agenda on Computer-based Assessment – Challenges and needs for European Educational Measurement, Scheuermann, F. & Guimarães Pereira, A. CRELL, Institute for the Protection and Security of the Citizen, Joint Research Centre, European Commission. EUR 23306 EN. 2008.
<http://crell.jrc.ec.europa.eu/CBA/EU-Report-CBA.pdf>

2007

The Becta Review 2007: Emerging Technologies for learning, UK, Becta, 2007
http://partners.becta.org.uk/upload-dir/downloads/page_documents/research/emerging_technologies07.pdf

Evaluation of the ICT Test Bed Project: Final Report Centre for ICT, Pedagogy and Learning Education and Social Research Institute, Manchester Metropolitan University Division of Psychology, Nottingham Trent University June 2007. <http://www.evaluation.icctestbed.org.uk/reports/2006/summary>

Future Learning Spaces: new ways of learning and new digital competences to learn. Punie, Y., & Ala-Mutka, K. Nordic Journal of Digital Literacy, 2007, Vol 2, No. 4, pp. 210-225

The impact of ICT in schools: a landscape review, UK, Becta, 2007
<http://publications.becta.org.uk/download.cfm?resID=28221>

Open Educational Practices and Resources: OLCOS Roadmap 2012. Geser, G. (ed.), 2007.

http://www.olcos.org/cms/upload/docs/olcos_roadmap.pdf

What can Social Capital and ICT do for Inclusion? Zinnbauer, P., Institute for Prospective Technological Studies (IPTS), JRC, European Commission. EUR 22673 EN. 2007.

<http://ftp.jrc.es/EURdoc/eur22673en.pdf>

Community survey on ICT usage in households and by individuals, Eurostat, Luxembourg, 2007

http://epp.eurostat.ec.europa.eu/portal/page?_pageid=2973_64549069_2973_64554066&_dad=portal&_schema=PORTAL or

http://epp.eurostat.ec.europa.eu/portal/page?_pageid=1996_45323734&_dad=portal&_schema=PORTAL&screen=welcomeref&open=/science/isoc&language=en&product=EU_science_technology_innovation&root=EU_science_technology_innovation&scrollto=0

2006

Benchmarking Access and Use of ICT in European Schools 2006: Final Report from Head Teacher and Classroom Teacher Surveys in 27 European Countries, Empirica (Ed.), European Commission, DG Information Society and Media, 2006, http://ec.europa.eu/information_society/eeurope/i2010/docs/studies/final_report_3.pdf

The Economy of Culture in Europe, KEA, For the European Commission, 2006

<http://www.keanet.eu/ecoculture/studynew.pdf>

E-learning Nordic, Edited by Pedersen, S.G., Malmberg, P., Christensen, A.J., Pedersen, M., Nipper, S., Græm, CD., Norrgård, J. & Rambøll Management. Copenhagen: Rambøll Management, 2006 www.ramboll-management.com

European cooperation in education through Virtual Mobility, Europace, 2006

<http://www.europace.org/articles%20and%20reports/Being%20Mobile%20Manual%20-%20Internet%20version.pdf>

eUser survey- IST Programme: a survey of the adult population in 10 Member States, Empirica (Ed.), European Commission, DG Information Society and Media, 2006, <http://www.euser-eu.org/>

The future of ICT and learning in the Knowledge Society. Report on a Joint DG JRC-DG EAC Workshop held in Seville, 20-21 October 2005. Punie, Y., Cabrera, M., Bogdanowicz, M. Zinnbauer, D. & Navajas, E. Institute for Prospective Technological Studies (IPTS), Joint Research Centre, European Commission, EUR 22218 EN. <http://ftp.jrc.es/EURdoc/eur22218en.pdf>

ICT and learning supporting out-of-school youth and adults, OECD, Paris, 2006

http://www.oecd.org/document/26/0,3343,en_2649_33723_39166042_1_1_1_1,00.html

The ICT Impact Report, A Review of Studies of ICT Impact on Schools in Europe, Balanskat et.al, EUN, 2006 http://insight.eun.org/shared/data/pdf/impact_study.pdf;

<http://ec.europa.eu/education/doc/reports/doc/ictimpact.pdf>

Key data on Communication and Information Technology in Schools in Europe, Eurydice, European Commission Report, 2004. http://www.eurydice.org/ressources/eurydice/pdf/0_integral/048EN.pdf

A portrait of the internet's new storytellers. Lenhart, A. & Fox, S., Pew Internet & American Life project, 2006. http://www.pewinternet.org/PPF/r/186/report_display.asp

A preliminary study on the current state of e-learning in lifelong learning, Page K., 2006, CEDEFOP Panorama Series, 123, Luxembourg, Office for Official Publications of the European Communities.

http://libserver.cedefop.europa.eu/vetelib/eu/pub/cedefop/pan/2006_5169_en.pdf

Progress towards the Lisbon Objectives in Education and Training - Report based on indicators and benchmarks. 2006 Report (Annual Report, May 2006) *Commission Staff Working Paper - Detailed analysis of*

progress (Annex) <http://ec.europa.eu/education/policies/2010/doc/progressreport06.pdf>;
<http://ec.europa.eu/education/policies/2010/doc/progressreport06annexes.pdf>

A review of the Impact of ICT on Learning. Working paper prepared for DG EAC. Punie, Y., Zinnbauer, D., & Cabrera, M., Institute for Prospective Technological Studies (IPTS), Joint Research Centre, European Commission. 2006. <http://ipts.jrc.ec.europa.eu/publications/pub.cfm?id=1746>

Study of the e-learning suppliers' "market" in Europe. Directorate-General for Education and Culture. http://ec.europa.eu/education/archive/elearning/doc/studies/market_study_en.pdf

2005

14-19 and Digital Technologies: A Review of Research and Projects, Davies, Ch., Futurelab Report Series No. 13, 2005, Bristol: Futurelab. <http://www.futurelab.org.uk/>

Are Students Ready for A Technology-Rich World? What PISA Studies Tell Us Programme for International Student Assessment (PISA), OECD, 2005. <http://www.oecd.org/dataoecd/28/4/35995145.pdf>

The digital divide in Europe, Statistics in Focus, 38/2005, Eurostat, European Commission: Luxembourg. http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-NP-05-038/EN/KS-NP-05-038-EN.PDF

e-Learning in Continuing Vocational training, particularly at the workplace, with emphasis on small and medium enterprises, Unisys, A report for DG EAC, 2005
http://ec.europa.eu/education/archive/elearning/doc/studies/vocational_educ_en.pdf

ELearning in Tertiary Education. Where do we stand?, OECD, 2005
http://www.oecd.org/document/56/0,2340,en_2649_37455_34900984_1_1_1_37455,00.html

i2010: Fostering European e-Learning Content to Make Lisbon Target a Reality. e-Learning Industry Group , 2005. www.elig.org/downloads/i2010%20Fostering%20European%20eLearning%20Content.PDF

The impact of ICT on tertiary education: advances and promises. K. Larsen & S. Vincent-Lancrin, OECD, 2005. <http://advancingknowledge.com/drafts/Larsen-The%20impact%20of%20ICT%20on%20tertiary%20education%20-%20AKKE.doc>

Quality in e-Learning : use and dissemination of quality approaches in European e-learning. Ehlers U.-D. et al. 2005, A study by the European Quality Observatory, European Commission
http://www2.trainingvillage.gr/etv/publication/download/panorama/5162_en.pdf

The use of ICT for learning and teaching in initial Vocational Education and Training, Rambøll Management, Study for the European Commission DG Education and Culture, November 2005
http://ec.europa.eu/education/programmes/elearning/doc/studies/ict_in_vocational_en.pdf

2004

Studies in the Context of the E-Learning Initiative: Virtual Models of European Universities, Rambøll Management, Study for the European Commission DG Education and Culture, 2004
http://www.elearningeuropa.info/extras/pdf/virtual_models.pdf

Study on Innovative Learning Environments in School Education, Final Report Rambøll Management for European Commission, DG Education and Culture, September 2004
<http://www.upload.pls.ramboll.dk/eng/Publications/PublicAdministration/StudyOnInnovativeLearningEnvironments.pdf>

ICT and Special Educational Needs: a Tool for Inclusion, Florian, L. & Hegarty, J., Open University Press, Buckingham, 2004

Implementation of "Education and Training 2010", Group C 'ICT in Education and Training' final reports

- 2004 Overview of national developments: "Report on Mapping of Recommendations. Synthetic presentation of contributions". <http://ec.europa.eu/education/policies/2010/doc/infonational2004.pdf>
- 2004 progress report: <http://ec.europa.eu/education/policies/2010/doc/info2004.pdf>

Models of Technology and Change In Higher Education : An international comparative survey on the current and future use of ICT in Higher Education, CHEPS, The Netherlands, 2002
<http://www.utwente.nl/cheps/documenten/ictrapport.pdf>

ICT Working Group Report 2004 'Education and Training 2010'
http://ec.europa.eu/education/policies/2010/objectives_en.html#information

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

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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**

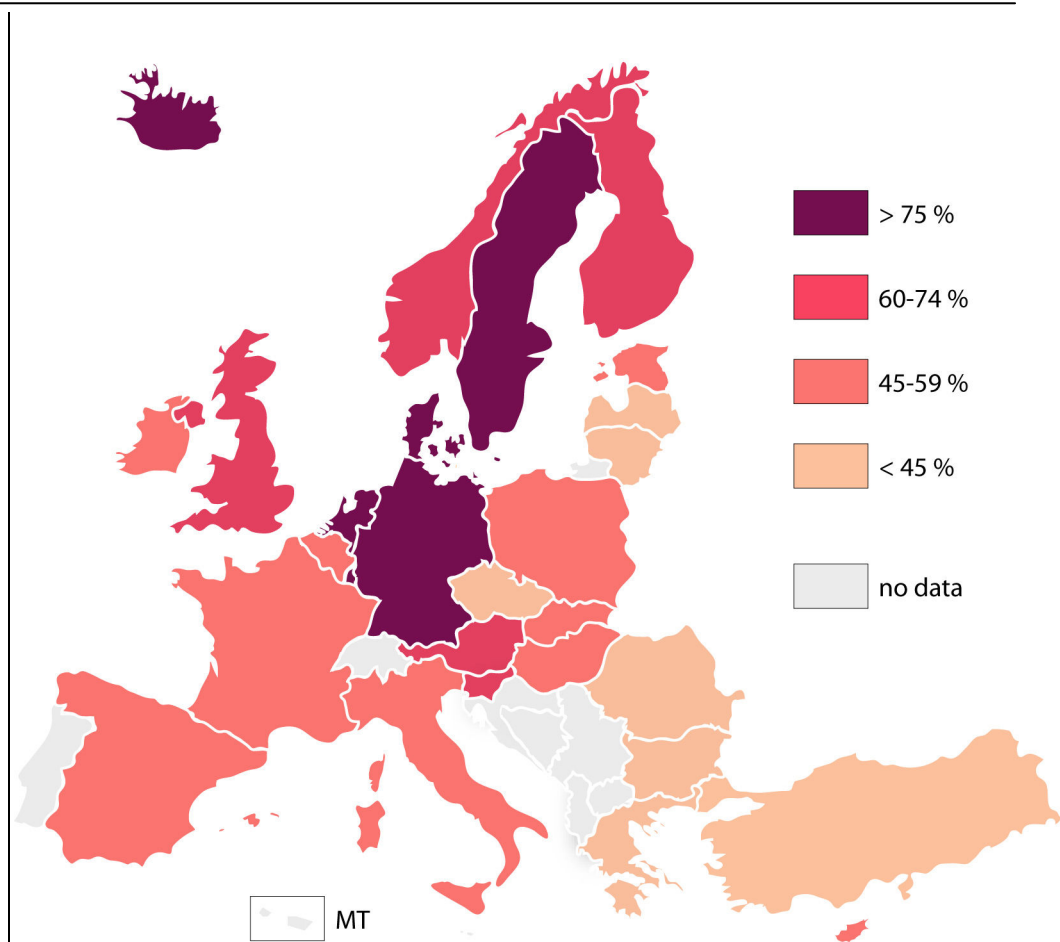
| | Use of computers for teaching in % | | No. of computers/ 100 pupils | | Broadband connection in schools in % | | Own Web page in % | | Own LAN in % | |
|--|------------------------------------|------|------------------------------|------|--------------------------------------|------|-------------------|------|--------------|------|
| | 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**

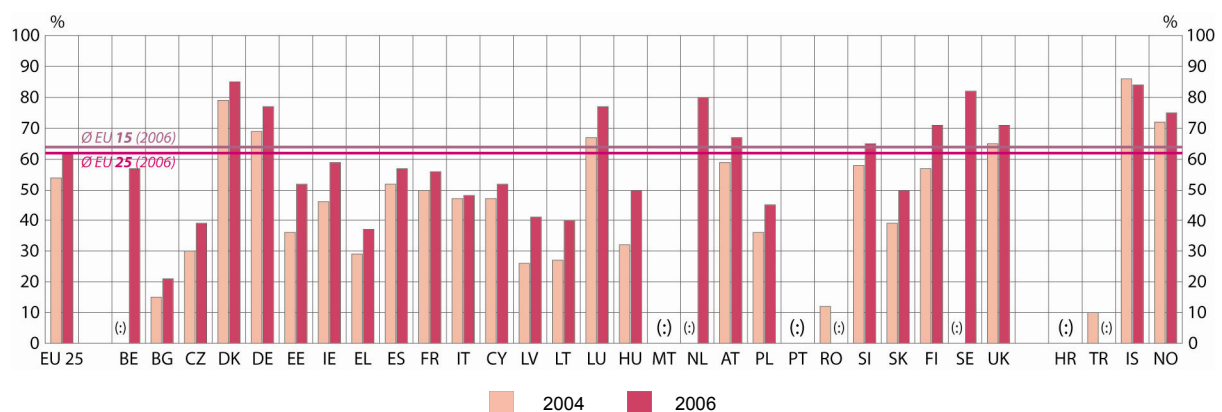
| | Total | Primary schools | Lower secondary schools | Upper secondary schools | Vocational schools |
|--|-------|--------------------|-------------------------------|-------------------------------|-----------------------|
| European Union (25 countries) | 74.3 | 75.2 | 70.9 | 73.0 | 76.7 |
| European 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)



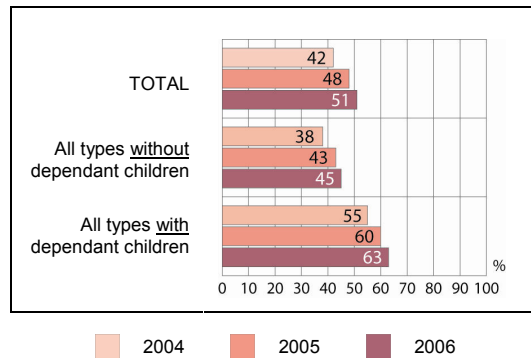
Data source : Eurostat New Cronos Database, 2007
 Note : 2006 data (2004 for Romania and Turkey)



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)

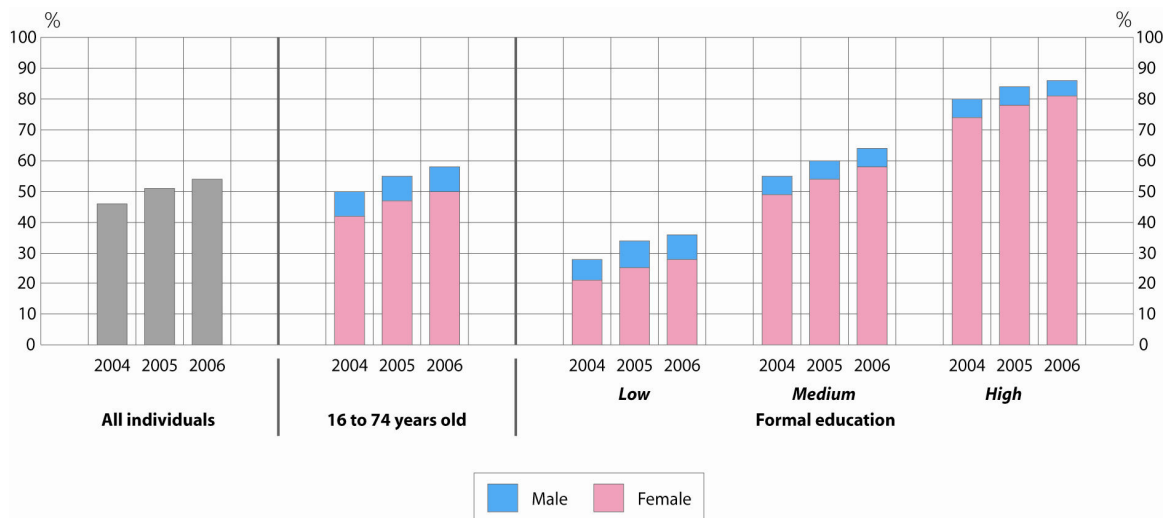
**Chart 2: Households having access to the internet at home
(as a percentage of all households)**



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.

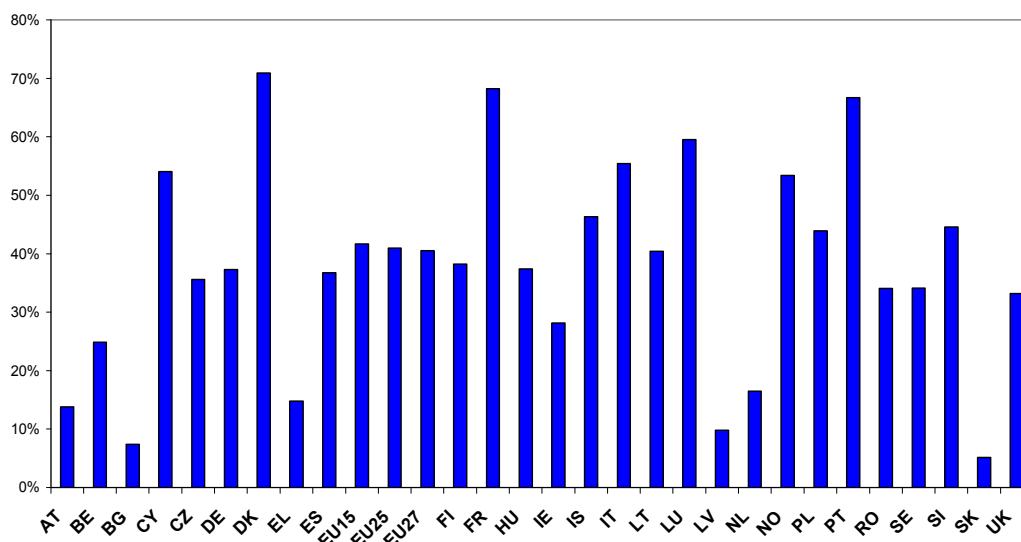
**Chart 3: Internet use by gender, age and educational level
(as a percentage of all individuals)**



Data source: Eurostat New Cronos Database, 2007

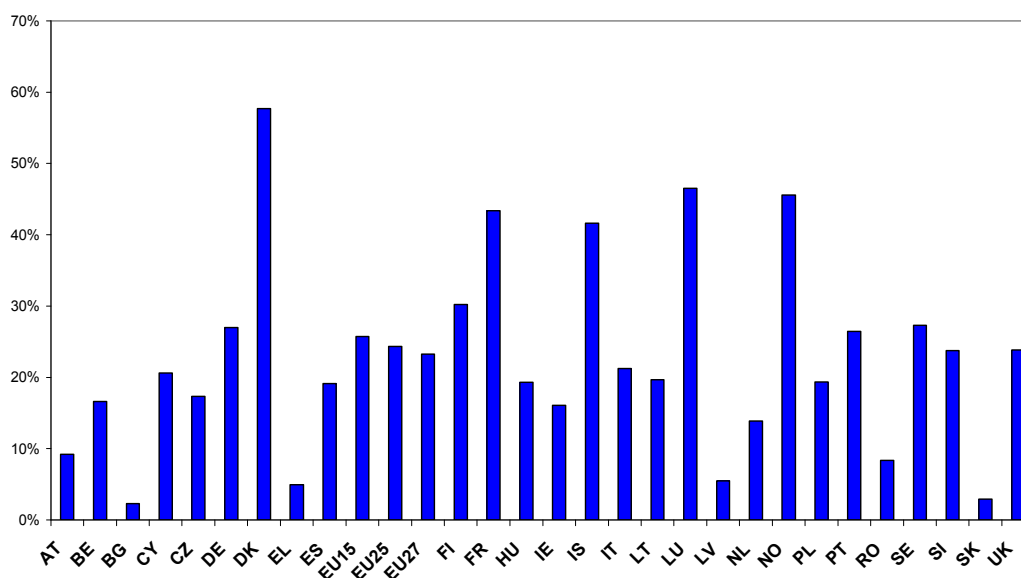
The gender gap in access and use of ICT and the internet is closing, in particular for the highly educated. However, this has not yet had an impact on the number of women choosing careers in technology.

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



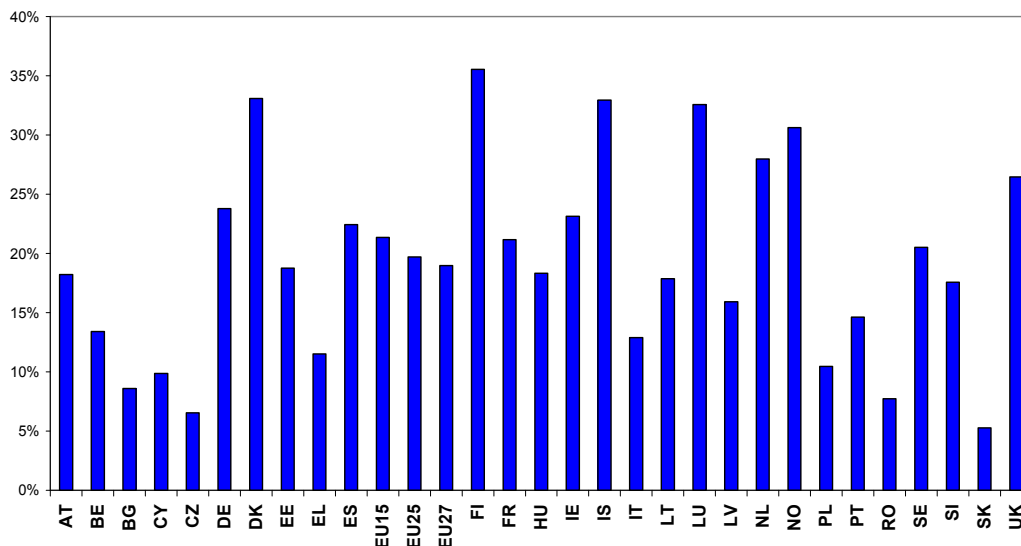
Data source: Eurostat New Cronos Database, 2007

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



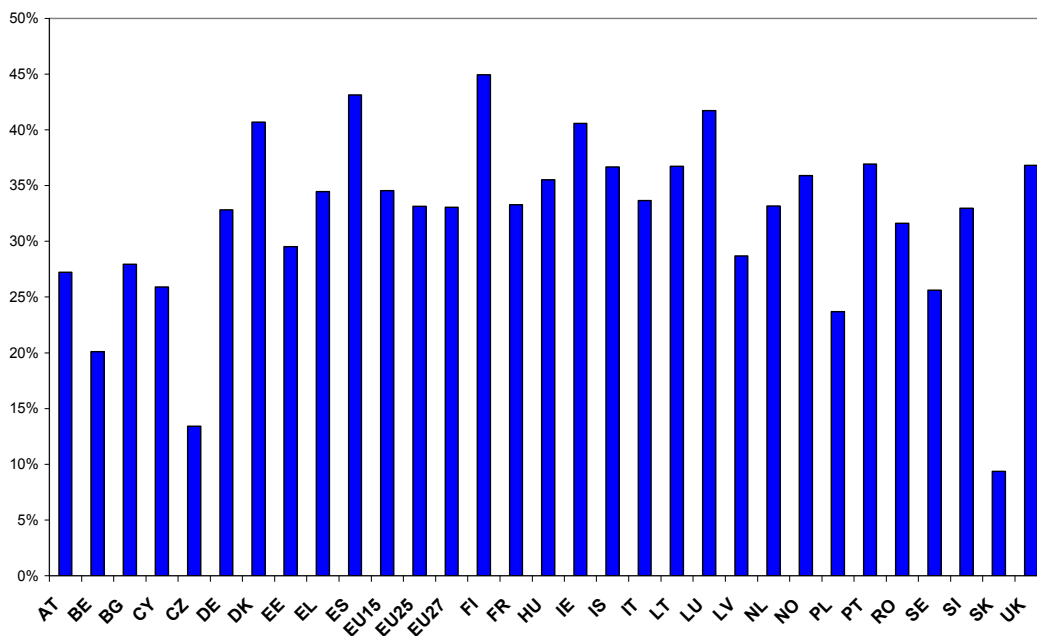
Data source: Eurostat New Cronos Database, 2007

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



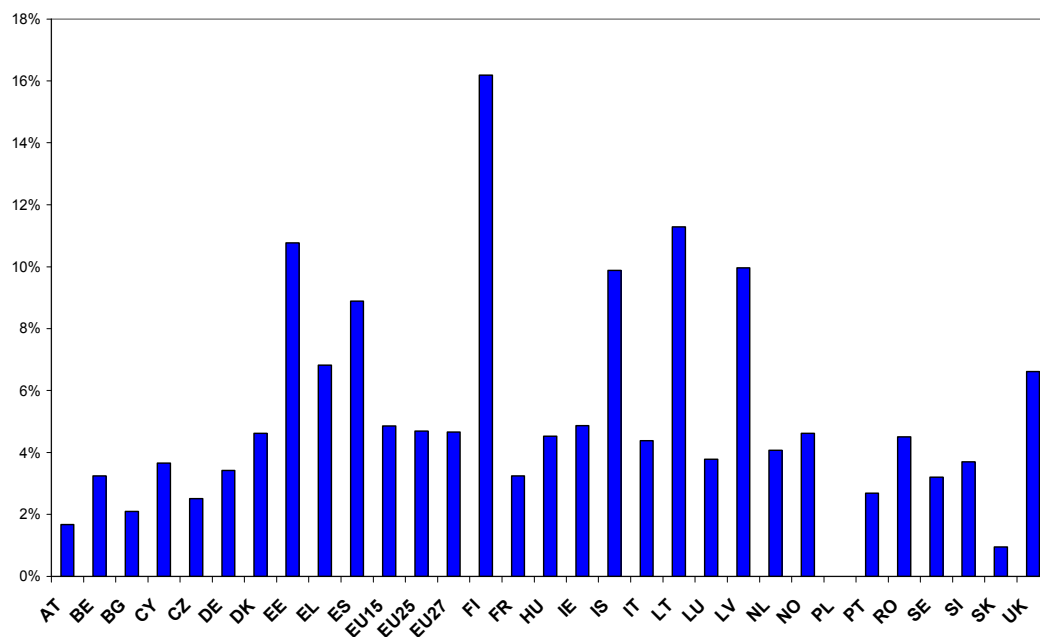
Data source: Eurostat New Cronos Database, 2007

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



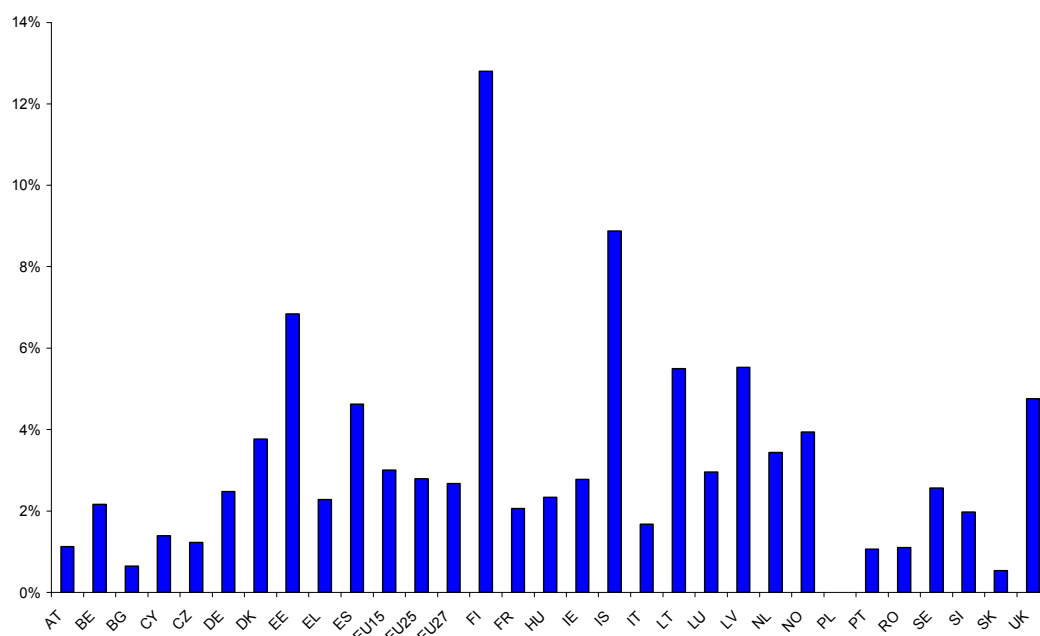
Data source: Eurostat New Cronos Database, 2007

**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 | | | | | | | | | | | | | | |