Introduction

As ICT can enable inclusion, better public services and quality of life, all citizens need to be equipped with the skills to benefit from and participate in the Information Society. Education and training systems play an important role in reaching these goals. Using the tools that ICT can offer to enable lifelong learning is an important way of fostering competitiveness and employability, social inclusion, active citizenship and personal development. The Education and Training 2010 Work Programme and the Lifelong Learning Programme aim to develop learning in the Knowledge Society, emphasising effectiveness, equity and quality. A recent Commission Staff Working Paper (2008b) stresses the role of ICT as a lever for transformation and innovation in education and learning so as to meet the needs of the European Information Society.

IPTS (Institute for Prospective Technological Studies, one of the seven research institutes that make up the European Commission’s Joint Research Center) has been researching developments in Information Society in acceding countries since 2002 and has launched a project to support eGovernment, eHealth and eLearning policy developments in the ten member states (EU10) that joined the European Union in 2004. These are Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia, and Slovenia. The research, which was carried out by a consortium led by ICEG EC in 2006–2007, focused on the three key application areas to assess the following: their current status and developments in the field, the most important opportunities and challenges they face, the lessons other member states may learn from them, and the related policy options. National experts from each country gathered the relevant qualitative and quantitative data for analysis with a view to developing an assessment of each country’s current state and trajectory, to determine their main factors, and draw conclusions. The situation of each country was captured through various sources and tools, such as desk research on both national and international data via literature and policy documents, and also by means of expert interviews in each country. A common framework was used to gather information from each country on a comparable basis. Furthermore, the intermediate results were discussed and validated in an international expert workshop held in Seville in 2007.

In this study, eLearning was defined as encompassing the aspect of learning through the use of ICT and acquiring the competences to make use of ICT in the knowledge society. For this reason, it considered the use of ICT in formal education (schools and higher education), in training and learning in the workplace.
(professional education), in non-formal education (including re-skilling and training for jobseekers) and in everyday life (digital literacy/digital competence and informal learning).

Based on the study, this article summarises the status and developments of eLearning in the EU10. Mapping the situation and needs in these countries not only serves for discussing policy suggestions for these countries but it also enables lessons to be learned in the whole of Europe. First, the article describes the context for eLearning in the 10 member states. Then, an overview of the status of eLearning in different educational environments in these countries is presented. Three country cases (Estonia, Hungary and Slovenia) were selected to illustrate differences and similarities between countries, as they represent countries with different levels of eServices development, ICT take-up and social background. This leads to a summary of the policy implications and research challenges for eLearning in the EU10. The national reports and the synthesis report developed in the study can be found on the IPTS website at: http://ipts.jrc.ec.europa.eu/publications/

Context for eLearning in the 10 new Member States

The economies of the EU10 are changing, with the decrease in the share of agriculture and industry being compensated by the growth of the tertiary sector both in employment and its output. Structural changes and rapid economic growth are, however, accompanied by deepening regional divides in income, age and employment. EU10 countries are often characterised by high concentration in larger cities, especially in the capital cities.

Educational Context

In most of the EU10 countries, public expenditure on education as a percentage of the GDP is typically on the same level as, or higher than in the EU15. In 2004, it was 5.4% vs. 5.2% in the EU15. A positive feature of the EU10’s education systems is the high rate of schooling, especially at primary and secondary levels. Table I shows that, in 2007, Slovenia, the Czech Republic, Poland were the best EU performers against the European benchmarks for Education and Training 2010 in the share of early school leavers and the upper secondary completion rate. Only Malta is behind the EU averages in this respect. The Maltese national report suggests that this comes from the traditional family oriented culture.

Participation in tertiary education has grown rapidly in many of the 10 new member states. Slovakia and Poland have shown the strongest growth in the whole EU with regard to the number of Mathematics, Science and Technology graduates in recent years and Lithuania is among the top ten in the EU. Many EU10 countries show good scores for their share of female graduates, with Estonia achieving 42.0% in 2006 (European Commission, 2008a). However, EU10 countries are generally behind the EU15 countries in the adult participation rates in lifelong learning, with the exception of Slovenia with 6th best performance in the whole of the EU (European Commission, 2008).

ICT Access, Use and Skills

Although many of the EU10 countries are still behind the EU15 in ICT development, the statistics regarding access, usage and skills are getting close to the EU15 average (see Figure 1). The example of Slovakia shows that lower household
### TABLE I. EU10 values for the E&T2010 benchmarks

<table>
<thead>
<tr>
<th>Benchmark area</th>
<th>Target for 2010</th>
<th>Three best performers in the EU, EU10 highlighted</th>
<th>EU27 average</th>
<th>The other EU10 countries according to their success in achieving the target, highlighted values better or equal to the EU27 average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early schools leavers (18–24, %) in 2007</td>
<td>No more than 10%</td>
<td>SI 4.3% PL 5.0% CZ 5.5%</td>
<td>14.8% SK 7.2% LT 8.7% HU 10.9% CY 12.6% EE 14.3% LV 16% MT 37.6%</td>
<td></td>
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<tr>
<td>Upper-secondary attainment (20–24, %) in 2007</td>
<td>At least 85%</td>
<td>CZ 91.8% PL 91.6% SI 91.5%</td>
<td>78.1% SK 91.3% LT 89.0% CY 85.8% HU 84.0% EE 80.9% LV 80.2% MT 54.7%</td>
<td></td>
</tr>
<tr>
<td>Ratio of low-achieving 15-year-olds in reading literacy (measured by PISA)</td>
<td>At least 20% decrease (to reach 15,5 %)</td>
<td>Change in the share of low achievers in % (2000–2006)</td>
<td>FI -31.4% PL -30.2% LV -29.6% +13.1% HU -9.3% CZ 41.7% SK, SI, LT, EE, CY, MT n.a.</td>
<td></td>
</tr>
<tr>
<td>Graduates in MST</td>
<td>Increase of at least 15 %</td>
<td>Average annual increase 2000–2006</td>
<td>PL +13.8% IT 13.8% SK 12.3% +4.4% CZ 8.9% CY +8.1% MT +8.1% EE +7.1% LT +6.3% HU +3.2% LV +2.4% SI +0.9%</td>
<td></td>
</tr>
<tr>
<td>Adult participation in lifelong learning (25–64) in 2007</td>
<td>At least 12.5 %</td>
<td>Graduates per 1000 population aged 20–29 in 2006</td>
<td>IE 21.4% FR 20.7% LT 19.5% 13.0% PL 13.3% EE 11.2% SK 10.3% CZ 10.0% SI 9.5% LV 8.9% HU 5.8% MT 5.0% CY 4.3%</td>
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</table>

**Source:** Commission working document: Progress Towards the Lisbon Objectives in Education and Training Report 2008 (European Commission, 2008a).
Internet access does not necessarily hinder the development of ICT use and skills. Many of the EU10 countries have invested in public Internet access points in order to improve their citizens’ access to ICT.

However, access and skills still remain a constraint for remote, usually less developed regions, and some user groups, such as ethnic minorities, the elderly, or the unemployed (see Figure 2). In most of the EU10 countries, these divides are larger than the EU15 average. ICT take-up is highest among the young and the well educated. For example, while in 2007, in EU15, 41% of the 55–74-year-olds had used a computer during the previous year, in EU10 this ranged between 12% in Lithuania and 25% in Hungary (Eurostat). However, the gender gap in computer usage in the EU10 countries is often smaller than the EU15 average.
Overall eLearning Developments

This section gives an overview of the developments in eLearning in EU10. It is based on both European statistics and the country reports developed in the project.

Primary and Secondary Education

Empirica (2006) provides a good data source for comparing computer use in schools in Europe. In EU10, schools provide separate ICT courses more often than in EU15, with an average of 91% vs. 46%. In EU10, only 54% of pupils use computers in class vs. 69% in EU15. Teacher usage reflects the same — in EU10, only 56% use computers in class compared to 65% in EU15. This seems to be related to the fact that, on average, there are only 6 computers per 10 students in EU10 and 11 in EU15. Teachers in EU10 (49%) mention lack of computers as a main barrier, as do teachers in the EU15.

The Empirica survey showed similar ICT skills levels for teachers in EU10 compared to those in EU15 and that fewer teachers in the EU10 countries considered ICT skills as a barrier for using computers in class than in the EU15 countries. Furthermore, those teachers who used computers in the classroom used them very actively. Survey responses also implied that teachers in EU10 were more interested in using computers in class than their EU15 counterparts. The EU15 average of teachers stating ‘lack of interest’ as a barrier for using computers was 11%, and all EU10 countries had values below that. The share of teachers who did not perceive clear benefits from using computers in class was 19.6% in EU15, while the EU10 average was 6.8% and only the Czech Republic had a value higher than EU15 average (Empirica, 2006). There are, however, considerable differences between generations, e.g. according to a Maltese national study, 59.5% of teachers aged 55–59 are not confident with ICT, while only 2.8% of teachers under 25 express the same concern (Restall, 2008). National studies reported that those teachers who had been using ICT in their own training made use of it most actively in their classes.

Higher Education

A common feature of ICT in higher education in EU10 is that all the countries provide distance learning courses with ICT. The Estonian report describes a distance learning programme of 17 courses developed by the Estonian Banking Association and the University of Tartu. In the Polish virtual university, more than 100 e-courses support traditional teaching or are offered as separate courses on the Internet. Universities often use learning management systems to support both their local and distance students.

The study reports did not find much quantitative or qualitative information on the ways in which ICT was incorporated into teaching and learning in universities. The national reports give the impression that the focus of eLearning has been on developing infrastructure, digital materials and online courses, rather than on innovative learning approaches for different types of settings. Furthermore, country reports do not show many networking activities or much collaboration between universities. In Estonia, with its national eUniversity (and eVocational school) networks, the opposite is true.
Adult Learning

The project found information about non-formal adult training to be scarce, both for enterprises and for general adult learning, therefore local expert estimations became important sources for information in this area. Besides this, some Eurostat surveys gather information in this area. Figure 3 illustrates the individual use of Internet for training and education in EU10. People aged 16–24 (including students) form a major group. Many reports show interest in ICT as a factor that has driven eLearning. However, they also suggest that adult learners and employers are suspicious of the quality of online courses, asking for quality assurance mechanisms for online courses in adult training.

Companies declare they use eLearning more in EU10 than in EU15 (see Figure 4), but the surveys regarding Internet use for education among people of a working age show much lower shares. The country reports assert that often employers are not very supportive of learning, which they consider to be the responsibility of the employees. Furthermore, they suggest that eLearning is unequally distributed among enterprises and employees; larger enterprises have more broadband connections and employees in higher positions have more opportunities for eLearning. With regard to types of training, enterprises seem to favour standardised online courses with internationally recognised certification, such as ECDL.

eLearning and Inclusion

The country studies also found that eLearning initiatives aim to improve inclusion in the knowledge society, supported by both public and private funding, and sometimes partnered by international companies. For example, the Hungarian Digital Secondary School helps adults to complete their secondary education through distance education. It is targeted at the Roma minority who has difficulty in accessing labour markets. In Latvia, the Latvia@World project provides training for the unemployed in poorer districts, rewarding participants who complete the

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Figure 3. Individuals using Internet for training and education, showing different age groups
Source: Eurostat

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course with a certificate and providing them with Internet access to help them to search for and find jobs.

**Heterogeneous Countries**

The EU10 is not a homogeneous group concerning educational context and developments in the information society. Comparing the EU10 average to that of EU15 would mask important differences, not least since weighted EU10 average reflects the fact that the Polish population makes up half the total population of the EU10. In order to illustrate various stories of EU10 countries, the following sections describe eLearning in Estonia, Hungary and Slovenia. These cases were selected because of the richness of the information gathered in their country reports and their specificities. Estonia shows diverse and broad developments in eLearning, based on the demand and interest of different actors. Slovenia shows high potential for lifelong learning and ICT use among individuals, but little deployment of these opportunities for eLearning developments. Hungary is an example of a country with large social and digital divides, facing several challenges for ICT, lifelong learning and eLearning developments.

**eLearning in Estonia**

The political will to build up an information society and a knowledge-based economy has been pursued as a priority, not only in the main national research and development, but also as innovation strategies since the late 1990s.

Various international comparisons have ranked Estonia very highly in the area of ICT, not only among EU10 countries, but also compared to EU15 countries and the global context (see e.g. The Global Information Technology Report 2006–2007, e-Readiness Rankings 2007, Web Based Survey on Electronic Public Services 2006). Compared to the EU15 average, Estonia shows both high ICT penetration and Internet usage rates increasing rapidly over the years and being rather homogeneous at the regional level. The highest rates in individuals’ Internet skills, however, are highly dependent on their educational background and activity in the labour market. As a result, the social groups which use ICT most, and

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**Figure 4. Enterprises using eLearning applications for employees**

*Source: Eurostat*
particularly the Internet, are students (99.3%), persons with higher education (80.4%) and the employed (75.8%) (http://www.stat.ee).

Besides the well-developed Estonian ICT market, another main stimulus for the provision of eLearning services has been the emergence, acceptance and usability of eServices. Estonia is a well-developed ‘e-country’, with an eGovernment system, local e-elections, Internet banking services, submission of income tax returns over the Internet, etc.

Status of eLearning in the Country

The first contributions to eLearning were made at the end of the 1990s. Several projects were undertaken by the public sector together with some leading actors in the private sector, such as ICT companies, banks, and telecoms, which improved considerably the ICT infrastructure and skills in schools and in regionally remote areas. These developments included (1) the implementation of Tiger programmes to provide schools and universities with computers and Internet connections, and teacher training; and (2) the implementation of projects such as Look@World which contributes to the improvement of people’s basic ICT skills. It is very important to note that these programmes have not just created a physical infrastructure for eLearning, but have also generated public interest.

Since then, core organisations in the field have been established. These are governmental non-profit organisations established under the auspices of the Ministry of Education and Research, such as: (a) the Tiger Leap Foundation (established in 1997) focusing on general education; (b) the Estonian Information Technology Foundation (2000) together with consortia under its authority: (c) the Estonian eUniversity consortium (2002) and (d) the eVocational School (2005). Since 2006, the eLearning Development Center has led the activities of both the Estonian eUniversity consortium and the eVocational School. It is important to note that Estonia has not only relied upon the aforementioned non-profit organisations, but also on schools, universities and local initiatives (both in the design and implementation of policies) rather than on central policy coordination and formulation by the government.

While contemporary eLearning policy has been largely successful in creating infrastructure (all Estonian schools have computer and Internet penetration rates of close to 100%), it has not affected the use of ICT as expected. Neither has the time students spend learning with ICT increased considerably, nor has the teachers’ use of ICT in the learning process been comparable to those in EU-25 (Suurna & Kattel, 2008). The existing ICT infrastructure in classrooms, other than special computer labs, is considerably poorer than the EU average: only 28% of Estonian schools that use computers for teaching use them in classrooms (Empirica, 2006). According to the teachers, the shortage of computers is still an issue, resulting in the need for further ICT infrastructure improvements in Estonian schools (Empirica, 2006).

The main target of the eLearning policy has been formal education, with the most interest at higher and vocational education levels, where over one third of university students (35%) who belong to the Estonian eUniversity consortium stated that they had participated in web-based courses (Suurna & Kattel, 2008). However, it could be said that such major developed services are closely related and influenced by the progress of eGovernment services to enhance administrative tasks in the sphere of education. As a result, ICT is used extensively as an
administrative tool; e.g. for enrolment in a course or school and for communication with the school and teachers and is very much limited to and closely associated with web-based courses and material delivery (Department of State Information Systems, 2007, p.92).

In the private sector, ICT-supported learning is used mainly by large companies, especially in the financial and telecommunications sectors. The number of enterprises using ICT for the training and education of employees has been increasing continuously since 2005 (See Figure 4). However, it seems that ICT applications are mainly used to deliver learning materials or evaluate employees’ qualifications.

The 2006 Eurostat survey on Internet use shows that only 8% of individuals used it in the last three months for training and education in Estonia, compared to 22% in EU15. Furthermore, the current eLearning policy has not tackled the wide digital divide and e-exclusion. This is especially evident when considering the elderly, those with a low level of education and income, and the Russian-speaking population. The web-based courses for these groups are still limited in numbers and in the scope of content and delivery has been entrusted to educational institutions. These developments correspond to overall trends, where society still suffers, although decreasingly, from the little recognition of the need for lifelong learning. The positive developments at the level of informal education include ICT skills training, the creation of Public Internet Access Points (PIAPs) and the ‘internetisation’ of libraries, often through public-private partnerships.

**Developments Led by Foundations and Initiatives**

eLearning developments have been based to a great extent on grassroot-level local initiatives, sharing of best practices, active involvement in European networks, etc. The overall ICT policy framework is set by the Estonian Information Society Development Plan for 2013, but with no specificities for ICT in education. The role of the specialised governmental non-profit organisations established under the auspices of the Ministry of Education and Research has been very important. The Tiger Leap Foundation, the Estonian Information Technology Foundation and the eLearning Development Center have developed strategies and programmes of their own. In addition, some universities and higher vocational schools have also developed or are developing their respective strategies. In general education, the eLearning-related activities started as far back as 1997 and have been relying since then on the support from the different educational programmes of the Tiger Leap Foundation. Its most noteworthy initiative is teachers’ in-service training, whereby 75% of teachers altogether had been trained twice in ICT skills by 2006. The developments at the general educational level include eLearning services like web-based grade-book eSchool, LMSs and CMSs like VIKO and KooliPlone, web-based learning materials and learning object repositories like Miksike and Koolielu (Suurna & Kattel, 2008).

This means that these strategies have been developed according to the local specifics and future needs. Only the Tiger University Strategy is strongly influenced by the eEurope 2005. The positive developments in higher education owe their success to the fact that the main initiative — eLearning Strategy of the Estonian eUniversity 2004–2007 — was born out of the Estonian eUniversity consortium and not at national level. This approach makes sense in relation to the legal autonomy and the independence of universities in Estonia. Positive features of this kind of
network inspired vocational schools to establish a similar network called Estonian eVocational School in 2005. Although the professional and vocational education institutions exercise their activity under the State’s supervision, this has not influenced the level of state intervention. Among people acquiring higher and vocational education, the consortium of the Estonian eVocational School covers 87% and the Estonian eUniversity 83% of the total number of learners at the respective educational levels (as of January 2007). As a result of the initiatives of the respective consortia, considerably greater emphasis has been laid on the creation and usage of LMSs (IVA, WebCT and Moodle, respectively) and the design and distribution of web-based learning materials (Suurna & Kattel, 2008).

The loose connections to the central government have created favourable conditions for the involvement of the private sector in the provision of eLearning services. Although involvement is through one-off initiatives and does not rely on an explicit scheme, it is clear that, especially in the late 1990s, the private sector’s initiatives and willingness to provide funds served as a catalyst for many public policy actions in ICT and eLearning areas (e.g. Tiger Leap programmes and the provision of financial support for the use of the web-based grade book service eSchool in general education). Furthermore, the financial contributions by the private sector, especially those related to the Look@World Foundation’s initiatives, were quite extensive. The Foundation also helped to provide PIAPs with computers and establish Internet connections where needed. Both have been of significant importance in terms of developing the digital skills of people in the rural areas.

Diversification as a Challenge

The progress in the field of eLearning in Estonia has been more demand-driven than policy-led and there are no signs of a change in this trend. The latter is illustrated by the adoption of the eMemorandum between the Estonian higher and vocational educational institutions and the eLearning Development Center in September 2006. It calls on students and teachers (not policy makers) to actively search for ways to take advantage of eLearning so as to raise the quality of the education provided. At the same time, it can be argued as to whether the reliance on demand-driven policy in eLearning is sustainable enough. Whether the current positive developments in the field of ICT have had enough spill-over effect on other closely related areas, including the educational sphere, is also questionable.

First of all, this extremely diversified, decentralised but also market-oriented organisational set-up has resulted in a myriad of strategies and programmes. These strategies and programmes do not share common goals and have not been able to create synergy and functional coherence between developments at the different levels and aspects of ICT education. In other words, in the current policy framework there is no overall consensus on the role of eLearning in education and in society as a whole. In fact, the term ‘eLearning’ or ‘web-based learning’ is not to be found in any legislative document related to education. Due to legal shortcomings, several basic questions and significant issues — such as better infrastructure/equipment, usage of ICT in learning process, content, standards, qualifications, training and remuneration system of teachers, financing, monitoring system, etc — have not been mandated by the State and therefore remain unconstrained. For instance, according the National Curriculum, ICT is not a compulsory course either at the basic or upper secondary educational level (it is a horizontal theme).
Secondly, there is a lack of cooperation between respective Foundations, schools at different levels and various actors at central and local levels. Until now, eLearning related projects have been much too centred on and led by the Foundations and respective consortia. The support from the Ministry of Education and Research is particularly important, because, apparently, without support, certain activities (especially of Foundations) remain limited. This means that no connection is created between new and current learning processes. So far, the role of the Ministry of Education and Research has been limited to allocating money to the Foundations, and more importantly, establishing several information systems in education. Further, there has been no cooperation in content production, and the main content owners (e.g. Estonian TV, radio, publishers) have not been involved in eLearning development projects (Suurna & Kattel, 2008). At the same time, it is clear that the Estonian educational and training market is too small to create a business potential for learning materials written exclusively in Estonian.

**eLearning in Hungary**

Hungary is a middle-sized country with a population of slightly over 10 million. When joining the European Union, its ICT developments were well behind the Western European level: Internet-connected computer penetration (38% vs. 59% in EU15 in 2007) and broadband Internet connection (33% vs. 46% in EU15) of households are still far below the EU15 average. The digital divide is still one of the main issues, as more than 40% of the population lack basic computer skills. The younger generation and wealthy, well educated people, living in the cities are mostly digitally literate. Citizens living in rural areas with poor ICT infrastructure have very limited access to electronic services.

The spread of mobile technology is very dynamic and could be a solution to providing recent ICT infrastructure in rural areas. According to the National Communications Authority, the penetration of mobile phones in November 2008 was 119.1%, meaning that there were more mobile phone subscriptions than citizens. Currently, there are three main providers, and in 2009 at least two new ones are expected to enter the market, enabling better quality of service and greater coverage of mobile data-communication services.

**Status of eLearning in the Country**

The figures relating to both digital literacy and the general use of ICT indicate that Hungary is not among the leader European countries in the field of ICT-supported educational activities. Regarding Education and Training 2010 benchmarks, it is catching up in almost all fields of education, except lifelong learning (European Commission, 2008a). In 2007, adult participation in lifelong learning was only 3.6% (in 2000 it was 2.9%). Of the 27 EU member states, only Hungary performs better than Greece, Bulgaria and Romania (European Commission, 2008a).

Still, Hungary is one of the best countries in the EU regarding the increase in public spending on education. Between 2000 and 2005, the increase was 0.95% of the GDP, ranking second best among EU-25 countries. This is much higher than the EU average of 0.35% (European Commission, 2008a) and was enough to provide a computer for every 10 pupils, cover 77% of the schools with broadband Internet connection and foster website development among schools (56% of public schools in 2006) (Empirica, 2006). There is a sufficient number of digital learning content available both in primary and secondary schools and every school
runs a compulsory course covering the basic topics of computer science. But despite these promising figures there are still serious drawbacks in schools using ICT in education, especially in rural areas, due to their weak ICT infrastructure.

There is no real infrastructural problem in higher education. Universities and colleges are well equipped with ICT and are slowly incorporating technology into their academic processes. Web-based learning is used extensively and there is a growing number of institutions providing eLearning-based distance education programmes (e.g. Dennis Gabor College or Szechenyi Istvan University), which include standardised digital content delivery. Learning Management Systems are also present (mostly open-source solutions), but they are not yet widespread.

11.7% of the Hungarian adult population participated in educational activities in 2005 (Magai & Simonics, 2008). This figure is very low compared to the EU15 average (43.9%) and if we consider the abovementioned lifelong learning participation, the figures become even lower. However, as there are no reliable data on the eLearning activities carried out by the private sector, where multinational companies are actively using ICT for employee training, experts assume that the private sector is also a dominant player of the eLearning sector. Many companies are developing Learning Management Systems, student administration systems, digital learning content, or offering consultancy. Large multinational companies are using ICT in their everyday training activities (Magai & Simonics, 2008).

Many Positive Developments

The intense investment in ICT in the Hungarian educational sector resulted in a quite good coverage of computers and broadband Internet connection in schools, universities and libraries. Only schools in the East — the least developed regions — have serious drawbacks. The government’s Information Society Strategy provides a general framework for the developments, which, in the last few years, have resulted in a significant elaboration of the society’s digital divide.

In public education great progress has been visible in the last few years. The most important development was the ministerial initiative Sulinet (Schoolnet) Digital Knowledge base, which contains and provides digital learning content in all fields taught in schools free of charge and acts as an important information hub for pupils and teachers. Digital content can be officially accredited by the government and there are also advisory bodies (like the Digital Content Accreditation Committee), whose main task is to foster the inclusion of eLearning in the public educational sector. Sulinet provides training and support for school teachers, helping them with digital content development and delivery that covers technical and pedagogical issues. Currently, teachers are trained to use ICT in the classroom during their studies, as ICT related subjects are incorporated in various educational BSc and MSc programmes. But despite these efforts, most teachers still have very limited knowledge of ICT-supported educational technologies, related methodologies and pedagogical approaches.

ICT is very well integrated in higher education where students use computers on a daily basis. Several institutions provide eLearning courses with standardised content available through Learning Management Systems. Student administration in higher education is almost completely digitalised and, in some cases, institutional back office and academic content delivery systems are integrated.

Another positive sign is the growing number of educational research activities in higher education. Mobile learning, for instance, is a new emerging field of
distance education where academic groups undertake cutting edge, world class research (e.g. Corvinus University of Budapest and Technical University of Budapest). There are also attempts to establish a new generation of content management which is driven by semantic applications.

The government initiated several programmes for the inclusion of citizens living in rural areas (mostly Roma). These include access to ICT infrastructure (computers or internet), mostly at no charge, where courses and tutoring activities are also offered. There is a positive discrimination towards Roma students, making their entrance to higher education programmes and institutions easier than for citizens from other ethnic groups. Despite all these efforts, there are no reliable data or independent studies on the efficiency of these projects.

Challenges for Content and Interest

One of the most important challenges is that the take-up of ICT-based educational services is still quite low, despite the well-established infrastructure. Current reports (Magai & Simonics, 2008) identified several hindering factors which need to be tackled:

- Higher education and adult education lack quality learning content. Most of the higher and adult education institutions have limited expertise in digital content development and delivery. Compared to schools, these sectors do not have a common repository with standard, sharable and reusable learning objects which may foster the development of eLearning-based courses. eLearning-related cooperation is also lacking.
- The digital rights of the learning objects already produced are not handled carefully enough. Content developers and owners are not used to sharing content, nor do they see its benefits. There are no general guidelines, legal support or explanations about the benefits of content sharing.
- In general, teachers’ motivation and expertise for using ICT for their work is still quite low. Teachers are reluctant and often experience difficulties in applying different pedagogies and tools compared to those of traditional classroom education. An attempt has been made to incorporate ICT driven education subject matters in teachers’ basic and further education, but so far they have not proven effective.
- The demand side of the educational market is very low, people do not understand this novel educational approach, which results in a lack of interest in eLearning. Another problem is the lack of a tradition of distance education, which also contributes to the fact that eLearning is not widely adopted.
- The low level of digital literacy in Hungarian society also hinders eLearning developments. The focal points of the digital divide are (1) the vast differences between the central (Budapest) area and the countryside and (2) the extremely low level of education among Roma people. In the first case, the main issue is to provide access to electronic services in small villages and townships that are far away from cities. One solution might be the spread of mobile broadband networks, which is a promising ongoing process. The problem with the inclusion of Roma minorities needs more attention, as cultural differences and their extreme poverty result in a peripheral social status. Roma people (8% of the population) still have very little access to education, which forecasts growth of social inequalities in the future.
There are no policies to promote ICT-supported learning. The government could do more to develop eLearning at all levels of the educational system. The efforts made at the beginning of this century were important and partly successful, but eLearning is still not being focused on by policymakers. Incorporating eLearning in official, national educational strategies would force local decision makers to help and promote the implementation of educational technology in mainstream education.

**eLearning in Slovenia**

Since gaining independence, Slovenian economic, social and political developments have been stable and relatively successful (compared to other NMS). In part, this is due to its starting position in 1991, which was radically different from that of other Central and East European E10 countries because it had open borders with the West for almost the entire period after the 2nd World War. It is therefore not surprising that Slovenia shows high economic growth (its exports amount 60% of GDP) as well as a general openness and flexibility to the neighbouring countries. Slovenians speak many languages (proficiency in English is one of the highest in the EU) and they are also prone to learning new technologies. In a contemporary global world these factors could outweigh aforementioned problems which normally arise because of the small size of the nation (2 million).

Rapid economic and social changes in the last 15 years have also been accompanied by an ageing population and a sharp decline in birth rates. While primary and secondary schools now have fewer and fewer pupils, pre-school (due to economic pressure on working mothers) and post-secondary education are rapidly expanding. The educational system has not responded fast enough or in a suitable manner to the changes in past decades.

Due to its specific developments, in the mid 1990s, Slovenia was slightly above the EU15 average with respect to basic ICT indicators (e.g. PC and Internet penetration). However, strategic measures were not taken to further these early achievements and so a slowdown occurred in the late 1990s. At that time, Slovenia missed the opportunity to position itself as an advanced information society by failing to build on and upgrade its technological position with the benefits of the flexibility and transparency of a small country. While Slovenia is rapidly closing the economic gap and has already surpassed the 80% of EU25 average GDP/capita (PPP), the information society indicators (e.g. Internet penetration, households with PC, broadband, services) are now typically around the EU27 average. However, it does share with other E10 countries a relatively high digital divide, particularly for older generations, but also for those with little education and the unemployed. Another problem, although rapidly disappearing, is a considerable lag in broadband penetration in rural areas.

**Status of eLearning**

The most general educational features that characterise all E10 countries are also, on the whole, true for Slovenia. The quality of the public education system is relatively high, often around or even above EU27 average. This is particularly true for secondary school enrolment, early school leavers, international test performances (e.g. TIMMS, PISA, SITES), percentage of GDP spent for education (above 6%) and high enrolment in tertiary education. In addition, Slovenia shows extremely strong results in lifelong learning, which is typically a rather weak
component in E10 countries. One characteristic which is somewhat below the EU target is the share of MST graduates (see Table I). The number of science and technology students has been stagnating or declining in recent years when the tertiary education sector expanded in the areas of economics, humanities and social sciences.

With respect to primary and secondary school infrastructure (e.g. schools with broadband, schools with webpage), Slovenia is extremely well positioned, which also holds true for the infiltration of separate courses on ICT. However, the general ICT use for educational purposes in primary and secondary schools shows similar deficiencies to those in other E10 countries: lack of computers and low level of PC/Internet usage in the classrooms.

The picture regarding eLearning activities in tertiary education is very mixed. Only one third of the institutions seems to understand the strategic importance of eLearning. The remaining majority is surprisingly slow in adopting eLearning practices. This can partly be attributed to a relatively rigid and monopolistic structure of the tertiary sector which is still awaiting a major transformation and modernisation and partly to a certain lack of initiatives, strategies, coordination and cooperation at the national level, which is particularly critical for the public universities. On the other hand, Slovenia shows strong evidence that ICT is used quite intensively for training and education by individuals, as well as by enterprises.

One specificity arising from the small size of the country is related to various eLearning tools. The complexities related to the production, development and maintenance of the software for a virtual learning environment (VLU) require a critical mass of users. This has not been the case so far. There are very few VLU tools that have been created by Slovenian organisations and adapted to the Slovenian language and those that do exist are relatively limited. Similarly, it is very expensive to create quality eLearning content for a relatively small audience (it is not surprising that English language eContent is among the most frequently used). This, in part, also explains a certain lack of eLearning activities in primary and secondary education. There, the implementation of open source platforms (e.g. Moodle) does not seem to be user-friendly enough for widespread use by teachers.

eLearning Pursued by Individuals

Lifelong learning in Slovenia is particularly well developed according to standard Eurostat LFS measures of the formal and non-formal educational activities. In this area, Slovenia ranks 6th among EU27 (European Commission, 2008a). These high levels of lifelong learning are accompanied by a relatively intensive individual use of ICT for educational purposes, as 22% of individuals used Internet for training and education in a 3-month period (http://epp.eurostat.ec.europa.eu/).

The reasons for these high figures are threefold:

- More than 5% of the total population participate in tertiary education. This is also in tune with the fact that private educational spending (in large part directed to the fees for tertiary education) is among the highest in EU27.
- Non-formal education is common. The certifications from educational companies (most typically this is related to some specific computer or language skills) count as a potential employment advantage and promotion.
Informal self-learning activities are linked to the high Internet usage. A recent survey on ICT use in 2008 revealed that 65% of regular Internet users (who have used the Internet in last 3 months) have used it for educational activities (http://www.stat.si/eng/novica_prikazi.aspx?id=2027). More specifically, those who fall in the younger age bracket (16–24) are increasingly computer literate and the share of 'very competent' ICT users is among the highest in EU27 according to the Eurostat survey on ICT households in 2007. These characteristics can be linked to the traditional openness to learn and to the willingness to use new technologies, which was discovered and confirmed on many occasions in international comparisons.

However, these figures alone do not tell the entire story. It is true that various educational activities are widespread and that Internet is intensively linked to these activities, particularly the informal ones. But it is also true that ICT usage in formal and non-formal educational system is still relatively low, considerably below EU average. Statistics show high figures in terms of eLearning applications in companies, but, for example, use of Virtual Learning Environments (VLE) is very rare among companies, even the large ones. On the other hand, companies usually have complex Intranets where they store many resources, manuals, instructions, descriptions of work, etc. which can be used for ad hoc training and informal learning among employees.

Among the advantages of eLearning developments in Slovenia we should include a core of enthusiastic teachers at all levels of formal education who have developed and disseminated their eLearning solutions. For example, Empirica (2006) showed that Slovenian teachers are well above EU25 average in their interest and willingness to apply eLearning in their teaching activities.

**Country Specific Challenges**

The study report (Vehovar, 2008) recognises the following challenges as the most critical for further developments of eLearning in Slovenia:

**The future of domestic eLearning tools and domestic eContent.** It is very difficult to compete in this field with global solutions. A lack of tailored and friendly eLearning tools in Slovenian has already caused considerable delay in eLearning developments. While this may be slowly overcome, the production of good quality domestic eContent will remain expensive (compared to global content) in the long run. In part, the balance between global and domestic production can be solved on the market, however, the question is whether the market outcome would have positive consequences for the public education sector.

**The problem of the Slovenian language.** The eLearning products in the Slovenian language experience strong competition from English language tools and materials. This is particularly problematic because, throughout history, Slovenian identity was largely preserved by its language. Hence, Slovenian became a compulsory teaching language at all levels of formal education and is currently under legal protection. The extent to which the cheap and high quality English materials could be used in formal education is thus a very problematic issue.

**The problem of a national eLearning strategy.** A clear contradiction exists between having a high general involvement in educational activities, a high motivation among learners and teachers, a good ICT infrastructure, good ICT literacy,
and considerable national educational investments on the one hand, and the increasing lag in eLearning usage in formal education on the other. This clearly points to the need for regulation and a national strategy. After the ambitious and successful school informatisation project ‘RO’ in the 1990’s, more than a decade has now passed, where eLearning was a very national priority. Long term planning, integration and formalisation of national eLearning activities need to be linked with systematic motivation and promotion. Of course, an explicit national strategy might not be needed if enough systematic and coordinated activities can be evoked by other means and measures.

Policy Implications

The three country case analyses demonstrated some of the differences and similarities between the countries, indicating how EU10 averages can mask great differences. Structural changes and rapid economic growth have been drivers for ICT investments and for a demand in eLearning, but they have also been accompanied by deepening regional, income, and age divides, as well as employment disparities. These partly explain the widening digital divide, which has been one of the hindering factors of eLearning developments in EU10. As demonstrated by the Hungarian case, although indicators for ICT infrastructure and skills have been catching up with EU15 rapidly, investments are still needed. Public policies should continue to improve the ICT infrastructure and promote digital literacy initiatives in order to close the gap between richer and poorer regions and different social groups. In their financial decision-making, the states should take into account the expected expenditure on future maintenance and a renewal of ICT equipment in schools. They should also invest in both ICT and human resources for user support. EU structural funds provide an opportunity for the EU10 countries for these purposes.

The Slovenian case and several other national studies have pointed out that the lack of knowledge about the opportunities brought with eLearning as such is one of the biggest problems. There is a need to better inform learners, teachers, and organisations about the benefits of ICT. Furthermore, policy makers themselves are not necessarily aware of the opportunities of eLearning either. Improving the visibility of existing eLearning solutions could contribute to solving this. For example, public institutions should provide and administer public research grants supporting innovative projects on eLearning at different educational levels. The results could be then made visible in a central portal giving access to interested stakeholders and learners, promoting existing materials and eLearning approaches in general. This could also support networking between educational partners.

Although several developments have been taking place in many countries, the Estonian case demonstrates how the absence of a comprehensive approach in developing ICT for education can be considered to be a barrier. Without specific approaches, eLearning can be absent or receive little attention as only a part of related other policies. As dispersed policies have been seen as a major barrier for the developments so far, many country studies called for national eLearning strategies or better coordination and focused effort for developing eLearning. Most experts in the project shared the opinion that there should be one institution with a comprehensive responsibility for eLearning and support of Internet and broadband penetration.
Lack of ICT skills and requirements for students, teachers and principals has been seen as a regulatory barrier, as these factors could improve the proficiency and interest in ICT-enabled learning approaches in educational institutions. Where present, mandatory basic informatics courses at schools have been considered as a means of encouraging ICT use, both for the young learners themselves and their families. Those who apply ICT in education become better prepared for eLearning after their formal education. In addition to the lack of ICT skills among older teachers, all teachers often lack the opportunities to develop new learning and teaching approaches that would be possible with ICT. The institutions should be able to provide flexible curricula and financing systems, which would enable and encourage teachers to develop ICT-enabled learning approaches. Attention should be paid to embedding eLearning aspects in teacher training curriculum and to promoting in-service training on ICT skills and eLearning didactics, possibly as part of a promotion system. Teacher networks, guidance materials, and best practice exchanges should also be developed in order to support teachers in implementing eLearning approaches and in being innovative with regard to developing new ones.

Research challenges for eLearning in EU10 are often not specific to these countries, but arise from the needs shared with other countries to develop and pool resources in the following: good practices, research on quality learning approaches, personal data management, material interoperability and sustainable models for partnerships. Specific EU10 R&D challenges arise mainly from the fact that these countries have inherited old models for their educational systems. Additionally, the business environment in EU10 is different from that of EU15, and the EU10 countries are mostly small nations with their own languages, which makes it difficult to find a critical mass of users for the services provided. The study suggests that more (although not only) EU10-specific research issues are:

- Access to technologies and learning opportunities is the main problem for a large number of potential learners in EU10. Research efforts should therefore concentrate on finding easily usable and achievable solutions, which, for example, take advantage of the opportunities offered by mobile technologies, and use the local language. Open source software may provide a cost-efficient solution for more easily obtainable tools that could be tailored to the target audience.
- Approaches to evaluating the impact and quality of eLearning projects need to be developed, as these would help in making investment and financing decisions. Quality certification systems for courses could increase the attractiveness of lifelong learning and eLearning solutions among the adult population.
- Lifelong learning participation is very low in EU10 despite a high basic educational attainment. Research is required to determine how ICT-enabled learning could be best used to reach new groups of lifelong learners in EU10. Furthermore, developing ways to collect and store information on adult learning is needed to support research and investments in this area.

**Conclusion**

Overall, eLearning is progressing in the EU10 countries, although information society developments started much later in most of these countries than in EU15. The take up of the Information Society has been fast and the development of other
eServices (eGovernment, eHealth) has also increased capabilities and interest in using ICT for learning. Because the expanding service sector is labour intensive and requires highly-qualified employees who have a growing need for ICT knowledge and skills, the demand for learning both to use ICT and ICT as a tool for lifelong learning has also been rising.

The three country cases presented here, as well as the overall study, show dispersed IS and education policy approaches to eLearning developments in EU10, which often lack coordination and common objectives. The policies have mainly concentrated on developing ICT infrastructure and digital literacy, and have considered eLearning mostly in terms of developing digital materials for online (often self-learning) courses. ICT has not been considered as a means to enable educational innovations, which was highlighted recently by the European Commission (2008) as a challenge for the whole of Europe. However, the countries do show many positive developments in this area, rising from individual actors or specific projects.

Compared to EU15, eLearning lags in its development in the E10 countries more than economic development, general educational achievements or even general ICT developments. As using ICT for learning is new (compared to education in general) and much more sophisticated and complicated than basic ICT diffusion, it cannot emerge just by itself, but needs active support by policies. The study shows that EU10 countries have been following EU15 policies, but a more active and proactive approach is needed to stimulate eLearning developments. However, the study suggests that eLearning is now receiving more policy attention in all these countries and its importance is starting to be recognised in connection with reforming educational systems.

Research challenges for eLearning in EU10 are often not specific to these countries, and collaboration and sharing of research developments should be encouraged. Specific challenges rise from the deep regional and social divides threatening to exclude a large portion of the population from the Information Society. The younger population is often on par with EU15 in ICT usage and skills and therefore demonstrates capabilities for new learning opportunities. Yet a specific effort needs to be made to engage new groups of people so that they benefit from the potential ICT offers for lifelong learning.

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