



The Development of eServices in an Enlarged EU: eLearning in Estonia

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PREFACE

Policy context

At the European Council held in Lisbon in March 2000, EU15 Heads of Government set a goal for Europe to become the most competitive and dynamic knowledge-based economy in the world, capable of sustainable economic growth with more and better jobs and greater social cohesion. The renewed Lisbon goals of 2005 emphasize working for growth and jobs, and include plans to facilitate innovation through the uptake of ICT and higher investment in human capital.¹

Information and Communication Technologies, and related policies, play a key role in achieving the goals of the Lisbon strategy. In 2005, the new strategic framework for Information Society policy - i2010² - identified three policy priorities: the completion of a single European information space; strengthening innovation and investment in ICT research; and achieving an inclusive European Information Society.

Education and training systems play an important role in reaching these goals. As ICT is a driver of 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. Enabling lifelong learning³ for citizens with the facilities that ICT can offer is an important way of fostering their competitiveness and employability, social inclusion, active citizenship and personal development. Policy actions such as the Education and Training 2010 Work Programme⁴ and Lifelong Learning Programme⁵ have set objectives for education and support the development of learning in the knowledge society. One of the special focus areas of the Lifelong Learning Programme is developing innovative ICT-based content, services, pedagogies and practice in order to promote better education and training throughout a citizen's life.

Research context

IPTS⁶ has been researching IS developments in acceding countries⁷ since 2002.⁸ The outcomes of this prospective research, which aimed to identify the factors influencing Information Society developments in these countries and the impacts these developments have on society and the economy, point to the need for better understanding the specific contexts in each member state for the take-up of e-applications, in particular eGovernment, eHealth, and eLearning. These key application areas have an impact not only on the relevant economic and public service areas but also on the development of the knowledge society as a whole.

Taking the above into account, IPTS launched a project to support eGovernment, eHealth and eLearning policy developments managed by DG INFSO and DG EAC. The research, which was carried out by a consortium led by ICEG EC in 2005, focused on the three application areas in the ten New Member States⁹ that joined the European Union in 2004, in order to build up a picture of their

¹ http://ec.europa.eu/information_society/eeurope/i2010/index_en.htm

² "i2010 – A European Information Society for growth and employment" COM(2005) 229

³ Lifelong learning means all learning activity undertaken throughout life, with the aim of improving knowledge, skills and competences within a personal, civic, social and/or employment-related perspective.

⁴ http://ec.europa.eu/education/policies/2010/et_2010_en.html

⁵ http://ec.europa.eu/education/programmes/llp/index_en.html

⁶ Institute for Prospective Technological Studies, one of the seven research institutes that make up the Joint Research Centre of the European Commission

⁷ Bulgaria, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia, and Turkey

⁸ For a list of complete projects and related reports see <http://fiste.jrc.es/enlargement.htm>

⁹ Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovakia and Slovenia

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, in order to develop a meaningful assessment of each country's current state, and trajectory, and to find out the main factors. This allowed them to derive the relevant conclusions in terms of policy and research.

The IPTS team designed the framework structure for the research, the research questions and methodology. This team and the consortium coordinator jointly guided the national experts in their work through workshops, extended reviews and editing of the various interim reports. Data sources such as international and national survey data, literature, policy documents, and expert interviews were used to capture the most recent situation of the country.

In addition to national monographs describing eGovernment, eHealth and eLearning developments in each country, the project has delivered a synthesis report, based on the country reports, which offers an integrated view of the developments of each application domain in the New Member States. Finally, a prospective report looking across and beyond the development of three chosen domains was developed to summarize policy challenges and options for the development of the Information Society towards the goals of Lisbon and i2010.

eLearning in Estonia

This report was produced by Tallinn University of Technology, the consortium member from Estonia, and it presents the results of the research on eLearning in Estonia.

First, the report describes Estonia's educational system and the role played by eLearning in it. Then, the major technical, economic, political, ethical and socio-cultural factors of eLearning developments, and the major drivers and barriers for them in Estonia, are assessed. These provide the basis for the identification and discussion of policy options to address the major challenges and to suggest R&D issues for facing the needs of the country. The report reflects the views of the authors and does not necessarily reflect the opinion of the European Commission. Its content has been peer reviewed by national experts, ICEG EC, and IPTS.

In this study, eLearning is defined as encompassing both learning through the use of ICT and learning the necessary competences to make use of ICT in the knowledge society. Hence, the study considers the use of ICT in formal education¹⁰ (schools and higher education), the use of ICT in training and learning at the workplace (professional education), the use of ICT in non-formal¹¹ education (including re-skilling and training for jobseekers) and the use of ICT in everyday life (digital literacy/digital competences and informal learning¹²).

All reports and the related Annexes can be found on the IPTS website at: <http://ipts.jrc.ec.europa.eu/>

¹⁰ **Formal Education** is typically provided by an education or training institution. Formal learning is structured (in terms of learning objectives, learning time or learning support) and leads to certification. Formal learning is intentional from the learner's perspective.

¹¹ **Non-Formal Education** is provided by any organised, structured and sustained educational activities outside formal education. Non-formal education may take place both within and outside educational institutions and cater to persons of all ages. Non-formal learning is intentional from the learner's perspective, but typically does not lead to certification.

¹² **Informal Learning** is learning that results from daily life activities related to work, family or leisure. It is not structured (in terms of learning objectives, learning time or learning support) and typically does not lead to certification. Informal learning may be intentional, but in most cases it is non-intentional (or "incidental"/random).

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LIST OF ABBREVIATIONS

ADSL	Asymmetric Digital Subscriber Line
ASPA	American Society for Public Administration
BEACON	Potential socio-economic impact of broadband access and use on new forms of pan-European trading, collaborative work and advanced public service provision, a project in the "Information Society Programme" of the European Commission
CEE	Central and East Europe
CMS	Content Management System
CP	Credit Point
ECDL	European Computer Driver's Licence
ECTS	European Credit Transfer and Accumulation System
EEA	European Economic Association
EEK	Estonian kroon
EEIS	Estonian Educational Information System
EFTA	European Free Trade Association
ERDF	European Regional Development Fund
ESF	European Social Fund
E&T	Education and Training
eTEN	Trans-European Telecommunications Networks
EU	European Commission
EU10	The new member states joining the European Union on 1, May, 2004
EU15	The member states of the European Union before 1 May, 2004
EU25	The member states of the European Union before 1 January, 2007
EUR	European Currency Unit
eUSER	Public Online Services and User Orientation, a project in the "Information Society Programme" of the European Commission
DNS	Domain Name System
FTP	File Transfer Protocol
GDP	Gross Domestic Product
ICA	International Council for Information Technology in Government Administration
ICEG	International Center for Economic Growth
ICQ	Instant messaging computer programme
ICT	Information and Communication Technologies
IEA	International Association for the Evaluation of Educational Achievement
IEEE	Institute of Electrical and Electronics Engineers
IMF	International Monetary Fund
IMS CP	IMS Global Learning Consortium: Content Packaging Specification
IMS LIP	IMS Global Learning Consortium: Learner Information Package Specification
IMS QTI	IMS Global Learning Consortium: Question & Test Interoperability Specification
INNOVE	Foundation for Lifelong Learning Development
INTERREG	European Commission's Community Initiative designed to encourage cross-border cooperation between adjacent regions aiming to develop cross-border social and economic centres through common development strategies
IIIA	
IPR	Intellectual Property Rights
IS	Information Society
ISCED	International System of Classification of Education
IT	Information Technology
ITL	Estonian Association of Information Technology and Telecommunications
LMS	Learning Management System
LOM	Learning Object Metadata

MSN	Instant messaging computer programme
MST	Maths, Science and Technology
NATO	North American Treaty Organisation
NDP	Estonian National Development Plan 2004-2006
NGO	Non Governmental Organisation
NMS	New Member States, see EU10.
OECD	Organisation for Economic Cooperation and Development
OSCE	United Nations and the Organisation for Security and Cooperation in Europe
PC	Personal Computer
PHARE	Pologne-Hongrie Aid a la Reconstruction Économique, the European Union's financial and technical cooperation programme with the countries of Central and Eastern Europe before the accession
PHARE ISE	The PHARE Information Systems in Education Programme
PIAP	Public Internet Access Points
PPP	Public Private Partnership
PPS	Purchasing Power Standard
PRAXIS	Center for Policy Studies, an independent not-for-profit think tank based in Tallinn, Estonia
R&D	Research and Development
REDEL	A project funded by European Union's structural funds to support the developments in eLearning in Estonia
RISO	Department of State Information System in Estonia
SAIS	Admission Information System
SCORM	Shareable Content Object Reference Model
SIBIS	Statistical Indicators Benchmarking the Information Society, a project in the "Information Society Programme" of the European Commission
SITES	Second Information Technology in Education Study
SME	Small and Medium Sized Enterprises
SMS	Short Message Service
SOE	Statistical Office of Estonia
SPD	Single Programming Document
TOEFL	Test of English as a Foreign Language
UN	United Nations
UNDPEPA	United Nations Division for Public Economics and Public Administration
UOE	Joint statistics of UNESCO Institute for Statistics, OECD, Eurostat
WAI	Web Accessibility Initiative
WTO	World Trade Organisation

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EXECUTIVE SUMMARY

Estonia's economic transition to a market economy started with a relatively low GDP per capita and low productivity. Since the restoration of independence, Estonia has intensively pursued integration with the West, aiming to achieve a free market economy with a balanced budget, a flat-rate income tax, a free trade regime, a fully convertible currency, a competitive commercial banking sector, and a friendly environment for foreign investment. Today, the Estonian economy is characterised by one of the highest GDP real growth rates in the EU which, in turn, has created favourable conditions for achieving a high employment rate. In addition, economic growth has been supported by continuous growth in productivity. Productivity, however, has not kept up with wage growth. In recent years particularly, the latter has outpaced productivity growth and Estonia still lags far behind the EU average. In addition, economic growth has been concentrated in larger cities and towns; this is also illustrated by internal migration trends.

The adult population's level of formal education in Estonia is relatively high compared to that of the rest of the EU. In 2005, 89.1% of people aged 25-64 had at least upper secondary education – whereas in the EU25, the equivalent figure was 69.1% and in the EU15, 66.2% (Eurostat, 2007). There is a high enrolment level in higher education and hence a relatively high level of education of the employed population. At the same time, similar to many other developed and developing countries, the population of Estonia has constantly declined since the 1990s. The decreasing population will have a considerable impact on the Estonian educational system as a whole – the number of potential students at educational institutions will start to decrease after 2007. At the same time, the Estonian school system is also suffering from an increasing number of students dropping out of school or having to repeat a school year at the basic educational level. There is a need to increase participation in lifelong learning and company-provided training, and to cope with the digital divide.

ICT skills and ICT usage in Estonia have been influenced by several factors. There has been continuous economic growth and a rising standard of living. ICT markets are highly developed, there is a telecommunications network and Estonians have reacted positively to eServices. The political will to build up an Information Society and a knowledge-based economy has been strong since the late 1990s. However, the downside is that regional development has been unbalanced and the social groups which most use ICT and particularly the Internet, are students and employees.

Various international comparisons made over the years measuring Estonia's e-readiness rank Estonia very high, not only among the EU10 countries but also among the 'old' EU member states and the leading ICT countries. Estonia's progress is illustrated by the fact that Estonia has (1) one of the highest broadband penetration rates in the EU. In 2006, 37% all of households had broadband access, compared to 34% in EU25 (Eurostat, 2006); (2) Internet usage – the most characteristic indicator of Information Society development — has been growing rapidly over the years. The share of individuals aged 16-74 regularly using the Internet in 2006 was 56% in Estonia, compared to 47% in EU25 and 49% in EU15 (Eurostat, 2006); and (3) eServices provided in co-operation between the public and private sectors are easily available and usable. The percentage of online availability of 20 basic public services (eGovernment) is 79% in Estonia and 50% in EU25 and 56% in EU15 (Eurostat, 2006). Consequently, new technical, intellectual and social skills are becoming essential for living, working and participating actively in the society. So far, however, ICT developments in Estonia have not had a positive enough spillover effect into related fields such as education. This is especially evident when considering the great digital divide and e-exclusion apparent among the elderly, the population with a low level of education and income, and the Russian-speaking population groups.

Interest in ICT-supported learning has been strong in educational institutions as well as in the private sector since the end of the 1990s. eLearning developments have mainly been concentrated on the formal education and the strongest interest in eLearning is at the higher education level. However, the

idea of eLearning is very much limited to and closely associated with web-based courses and material delivery.

There is no single policy document that combines all the aspects of eLearning in Estonia. Both in the formulation and implementation of policies, Estonia has relied upon non-profit organisations, schools, universities and local initiatives rather than upon the Government. This, in turn, has led to the establishment of various foundations and consortiums that implement policies independently, though technically they are under Government supervision. These institutions are [a] the *Tiger Leap Foundation* (focusing on general education); [b] the *Estonian E-university* consortium (focusing on higher education) established on the initiative of universities; and [c] *E-VocationalSchool* (focusing on vocational schools). In effect, the Government has not played a central role in developing eLearning, which means a legal framework for the initiatives is lacking. Therefore, several basic questions and significant issues such as standards, qualifications, training, infrastructure and content have not been mandated by the state and, hence, addressing them remains voluntary. The missing legal environment for eLearning means, above all, that there is no clear legal basis for financing eLearning initiatives. In terms of financing, the EU structural funds are of great importance and have strongly affected eLearning developments, especially at the higher and vocational education levels.

Several projects undertaken by the public sector together with some of the leading actors in the private sector such as ICT companies, banks, and telecoms, have immensely improved the ICT infrastructure and skills at schools and in regionally remote areas. In particular, these developments include (1) implementation of various *Tiger programmes* to provide schools and universities with computers and Internet connections; and (2) implementation of projects such as *Look@World* to contribute to the improvement of people's basic ICT skills.

Developments at the general educational level include in-service teacher training, introduction of eLearning services such as a web-based grade-book *eSchool*, Learning Management Systems (LMSs) and Course Management Systems (CMSs), and availability of digital learning materials and learning object repositories such as *Miksike* and *Koolielu*. ICT-supported learning is an increasingly popular form of study, especially in higher and vocational education where institutions develop web-based courses, materials and curricula, but also create and employ LMSs and CMSs for distributing materials, submitting homework and providing information on study results. At the higher educational level, however, ICT is also extensively used for administrative purposes, e.g. for enrolment in a course or a school and for communication with the school and teachers.

In the private sector, ICT-supported learning is mainly used by large companies, especially in the financial and telecommunications sectors. In the private sector, in-house LMSs have been developed. However, the eLearning applications for training and education of employees are quite often combined with traditional learning, using ICT mainly to deliver learning materials.

In lifelong learning, the main developments of eLearning include web-based courses for adults provided by educational institutions. To date, however, web-based courses have remained limited both in number and scope of content. Important developments for lifelong learning opportunities include, for example, ICT skills training, making the Internet available in libraries and the introduction of public Internet access points.

In sum, the progress in the field of eLearning in Estonia has been more demand-driven than policy-led. There is a great need to include eLearning in the educational and training systems, not as a goal in itself but as both a *goal* which aims to improve the quality and variety of learning methodologies and a *means* for building and supporting the Information Society and the knowledge-based economy. This is about supporting the use of new learning approaches in line with the ICT developments. In terms of educational practices, it is a challenge for the knowledge society that students, teachers, professionals, designers and researchers take part not only in knowledge acquisition, but also in shared knowledge and object creation for learning.

In Estonia, there is a need to find a consensus about the role of eLearning in the educational system and also, more broadly, the role of eLearning in the society as a whole. Here, legal and regulatory issues are of utmost importance. The goals of eLearning should be stated in a specific strategy, interconnecting ICT development at different educational levels. This strategy would be important to ensure the stability of eLearning developments and to make it possible for educational institutions to better plan their activities. In order to support the achievement of these goals, a favourable environment also needs to be established. This environment should be composed of elements such as sufficient financial resources, ICT infrastructure, a quality insurance system for digital learning materials, involvement of the current actors in the fields of education and culture in digitizing content, establishing centralised brokerage systems with digital rights management support as well as measures against piracy, and supporting further the training of teachers. It should be considered seriously whether there is a need for a special autonomous entity to co-ordinate eLearning concerns in all fields. A very important aspect in working out the framework for eLearning development in Estonia is that there is no single solution available for different problems, i.e. in developing policy options, distinctions must be made between different educational levels, including lifelong learning and workplace training.

There are two principal R&D challenges for eLearning in Estonia. Firstly, there is a need to implement mechanisms that will positively support the development of eLearning. These would include measures and institutions for organisational set-up, policies and strategies, and financial support for the field. And secondly, the question of how to support the usage of new learning approaches in line with current ICT developments in formal education and in lifelong learning needs to be addressed. These issues concern technological developments and the challenges posed by their application, financing schemes required in the use of eLearning and solutions for current IPR and data security problems.

INTRODUCTION

General data

Official name: Republic of Estonia

Area: 45 227 sq km

Administrative divisions: Estonia is divided into 15 counties, 227 rural municipalities, and 33 towns. Tallinn, its capital, has 0.4 million population.

Population: 1 344 684 (SOE, 2007)

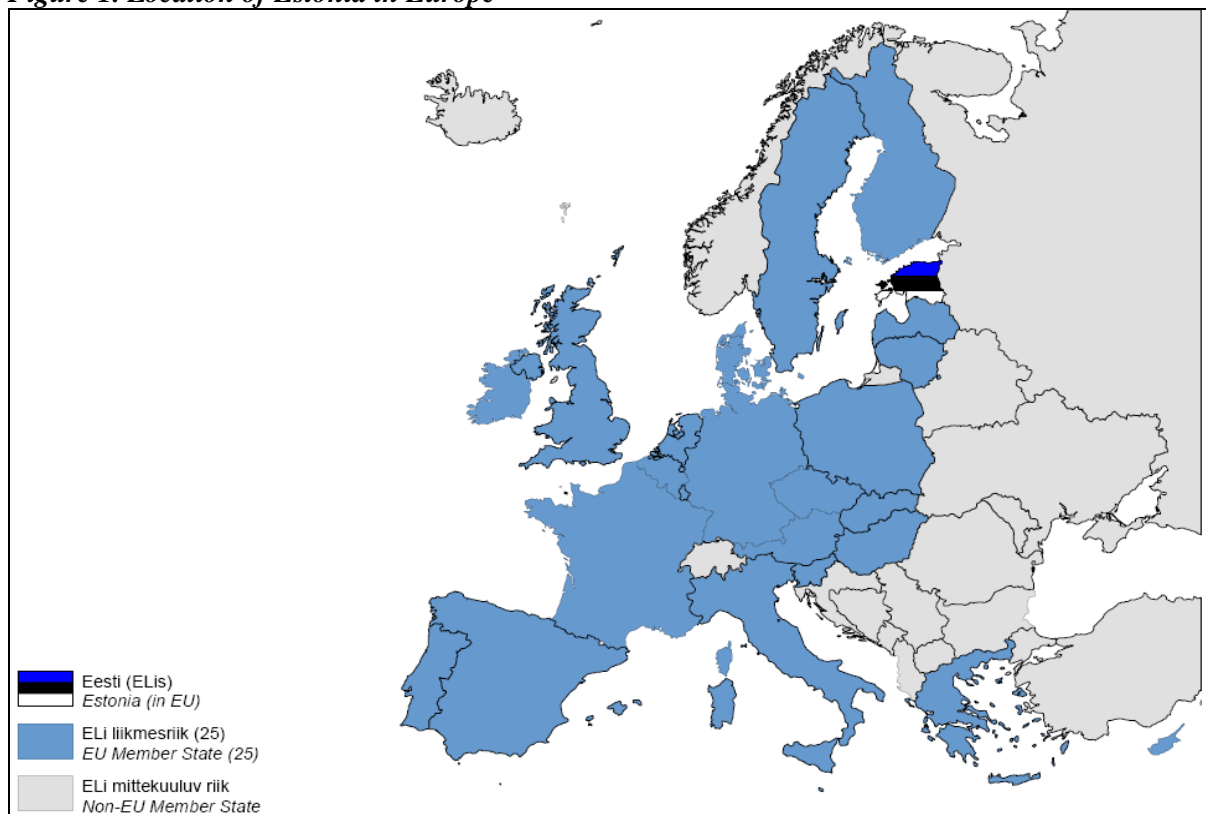
Households: 566 847 (SOE, 2006)

Ethnic divisions: Estonians (69%), Russians (26%), Ukrainians (2%), Belarussians (1%) and Finns (1%) (SOE, 2007)

Languages: Estonian (official), Russian, and others

State system: Estonia is a democratic parliamentary republic. Its Constitution was adopted in 1992.

Figure 1. Location of Estonia in Europe



Source: Statistical Yearbook of Estonia, 2006

The people elect the *Riigikogu* (parliament) and executive power is vested in the *Government*. The *President of the Republic* is the head of State.

Currency: The national currency is the Estonian kroon (1 kroon = 100 cent), which was issued on 20 June 1992. The Estonian kroon is pegged to the Euro at a rate 1 EUR = 15.6466 EEK.

International Organisations: Estonia is member of the *UN* and the *OSCE* since 1991, the *Council of Europe* since 1993 and the *WTO* since 1999. Estonia became a member of the *NATO* on 29 March 2004 and acceded to the *European Union* on 1 May 2004.

Brief History: In 1918, Estonia achieved its complete independence from German-Russian occupations. In 1940, Estonia was incorporated by the *Soviet Union*. In 1991, Estonia restored its independence from the *Union of Soviet Socialist Republic*.

Table 1. Key macroeconomic indicators of Estonia:

Indicator	Value	Reference
GDP (at current prices), billion EUR	13 073.5 (204 555.9 EEK)	2006 (SOE)
GDP per capita , EUR	9 732.1 (152 274.0 EEK)	2006 (SOE)
GDP real growth , %	11.4	2006 (Eurostat)
GDP per capita in PPS , EUR	59.8	2005 (Eurostat)
Economic structure , %	Services: 67% Industry: 29% Agriculture: 4%	2005 (World Bank)
ICT industry turnover , billion EUR	1.11	2005 (ITL)
Employment rate (15-64 years), %	68.1	2006 (Eurostat)
Unemployment rate (15-74 years, %)	5.9	2006 (Eurostat)
Labour productivity per person employed ¹³	58.5	2005 (Eurostat)

Sources: SOE; World Bank, World Development Indicators Database; Eurostat; ITL

Estonia in some indices:

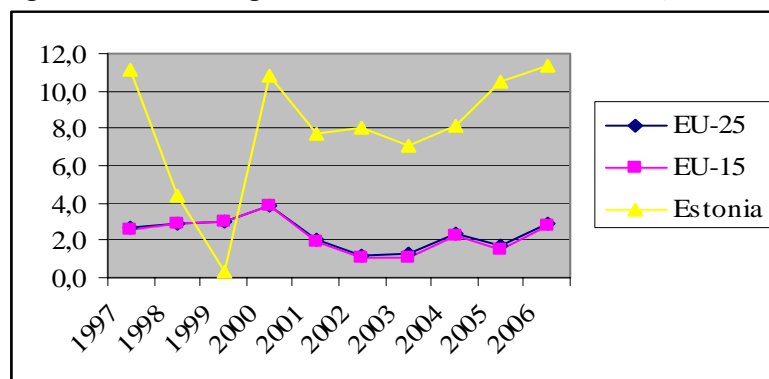
- World Economic Forum Country Competitiveness: Rank 20 in 2005, Rank 20 in 2004
- UN Human Development Index: Rank 38 in 2005, Rank 36 in 2004
- Transparency International Corruption Index: Rank 27 in 2005, Rank 31 in 2004
- World Economic Freedom: Rank 7 in 2006, Rank 4 in 2005
- UNDPEPA and ASPA E-government Index: Rank 32

Estonia's economic transition to a market economy started with a very low GDP per capita as well as productivity (European Commission, 2006a). Since the restoration of its independence, Estonia has aggressively pursued integration with the West as well as a free market economy, with hallmarks of a balanced budget, a flat-rate income tax, a free trade regime, a fully convertible currency, a competitive commercial banking sector, and a hospitable environment for foreign investment.

Since 1995, the Estonian economy has grown by an average of over 6% a year, making it a star performer in the EU together with Ireland, which averages 7.4%. The GDP real growth in 2006 was 11.4% compared to the EU25 average of 1.7% and to the EU15 average of 2.8% (Eurostat, 2007; see also Table 1 and 2). Furthermore, the economic growth in Estonia has been supported by continuous rapid growth of productivity, which has been in compliance with the wage growth. As a result, the Estonian GDP per capita, taking into account the purchasing power parity, has increased from one-third to one-half of the EU average (it was 51% of the EU average in 2004) (Action Plan for Growth and Jobs 2005-2007; Eurostat, 2006).

¹³ GDP in PPS per person employed.

Figure 2. Real GDP growth rate in EU25 and Estonia (1996-2006)



Source: Eurostat, 2007

However, since productivity and wage growth started remarkably low, the high growth rates at the beginning of the new millennium have not significantly decreased differences in terms of productivity between Estonia and the leading EU25 countries. Even in such high growth areas as ICT, Estonia's productivity has been falling behind EU member countries such as Denmark, Finland, and Sweden (for statistics on industry, see Eurostat databases). With its relatively low productivity of 50.6% in 2004, Estonia trails EU25 in the area of productivity as an economic indicator (Estonian Information Society Development Plan for 2013).

The economic growth in recent years has mostly been supported by remarkable increase in exports. In 2004, around 80% of Estonia's total trade was with EU member countries (Bank of Estonia, 2006) and real growth in exports of goods and services has increased to 17.4% in the first half of 2005 (Action Plan for Growth and Jobs 2005-2007). Especially impressive has been the growth in industrial production, which shows an upward trend starting from the year 2000. By January 2005, industrial production as a whole grew 12%, with manufacturing growing 11% (SOE, 2006).¹⁴ Domestic demand has also contributed significantly to economic growth, even though its expansion rate slowed down in 2004. But the growth of investments has slowed down due to decreasing private consumption and the completion of large one-time projects (Action Plan for Growth and Jobs 2005-2007; see also Table 2).

Table 2. Share of components of GDP by expenditure approach (by consumption)* (1995-2006)

	1995	2000	2001	2002	2003	2004	2005	2006
Private consumption expenditure	54.7	55.7	55.9	56.8	56.4	54.3	52.1	51.0
General government final consumption expenditure	27.4	20.2	19.3	19.2	19.4	19	18.2	16.7
Consumption expenditure of non-profit institutions serving households	1	1.1	1.3	1.6	1.6	1.7	1.7	1.4
Gross fixed capital formation	25.9	25.6	26.9	28.7	28.9	28.4	29.1	33.8
Change in inventories	0.7	2.2	2.2	3.1	3.1	2.8	2.7	4.3
DOMESTIC DEMAND	109.7	104.9	105.7	109.3	109.4	106.2	103.8	107.3
Exports of goods and services (f.o.b.)	68.5	88.4	84	74.3	74.3	78.4	84.2	79.8
Imports of goods and services (f.o.b.)	76.1	92	87.4	81.4	81.9	86.1	90.3	89.5
Statistical discrepancy	-2.1	-1.2	-2.3	-2.2	-1.9	1.5	2.3	2.4
TOTAL	100	100	100	100	100	100	100	100

Note: *At current prices, in percentages

Source: SOE, 2007

Estonia is one of those countries in the EU, which has already achieved a balanced or surplus fiscal position as determined by the *Stability and Growth Pact* (Action Plan for Growth and Jobs 2005-2007). In 2006, Estonia achieved a fiscal surplus of 3.8% of GDP, with -1.7 as EU25 and -1.6 as EU15 level indicator (Eurostat, 2007). The development of its fiscal position in recent years is characterised

¹⁴ However, some studies show that the technological structure of Estonia's manufacturing industry has evolved towards less complexity since the mid-1990s. 'This... highlights that, despite an enviable record of economic growth, Estonia's industrial structure in 1996 was in better shape than in 2000' (Tiits, Kattel, and Kalvet 2005: 27).

by a rapid decrease in the deficits of the local authorities, as well as by the reduction in the surplus of the Social Security Funds and the government sector (Action Plan for Growth and Jobs 2005-2007). In addition, government's debt as a percentage of GDP is considerably small compared to EU average. In 2006, Estonia had the lowest ratio of government debt to GDP (4.1%) compared to EU25 62.2% and EU15 63.3% (Eurostat, 2006).

In the 4th quarter of 2005 survey on the Estonian labour force, 614 600 of the population aged 15-74 were employed, 46 500 unemployed, and 387 500 economically inactive (SOE, 2006). Employment rate of the population aged 15-74 in 2006 was 61.6% (SOE 2007; cf. Eurostat 2007 where employment rate of population aged 15-64 in 2006 was 68.1%, which is almost the same as the EU15 average of 66.0%). With 56.1% share of older workers in the employment market it is one of the highest as especially compared to the Scandinavian countries (in 2006). Further, the 5.9% unemployment rate in Estonia is lower than the EU25 average of 7.9% and the EU15 average of 7.4%. The situation has considerably improved since 2000 with an unemployment rate of 12.8%, (Eurostat, 2007) continued unemployment largely reflects a mismatch of skills. Workers laid off in traditional sectors have not been able to find jobs in the new service and high-tech sectors (World Bank, 2006), especially in the Northeast region with 12.1% unemployment rate (see Table 3).

Table 3. Unemployment rate in Estonia in percentages (1995-2006)¹⁵

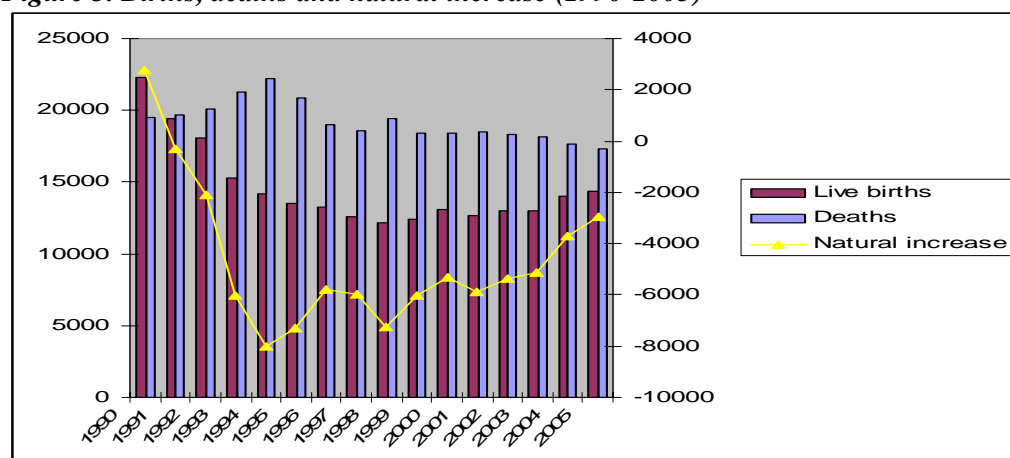
	1995	2000	2001	2002	2003	2004	2005	2006
Whole Estonia	9.7	13.6	12.6	10.3	10	9.7	7.9	5.9
Northern Estonia	8.4	11.5	11.6	8.6	9.6	9.6	7.5	4.3
Central Estonia	6.7	14.9	11	9.7	7.9	7.8	5.1	5.2
North-eastern Estonia	15	21.1	18	18.9	18.2	17.9	16.2	12.1
Western Estonia	5.8	11.8	11	9.2	7.8	5.6	5.7	4.0
Southern Estonia	12	13.4	12.8	9.3	8.3	8.1	6.3	6.6

Source: SOE, 2007

Demography indicators, population developments

The population of Estonia has constantly declined since the 1990s. If in the beginning the primary reason for this decline was migration, the age structure of the population has clearly changed in the last few years. The restoration of independence can be considered as the starting point for the ageing trend of the population through the constant increase of people aged 65 years old and older, and the sudden drop in birth rate (Action Plan for Growth and Jobs 2005-2007; see also Figure 3).

Figure 3. Births, deaths and natural increase (1990-2005)



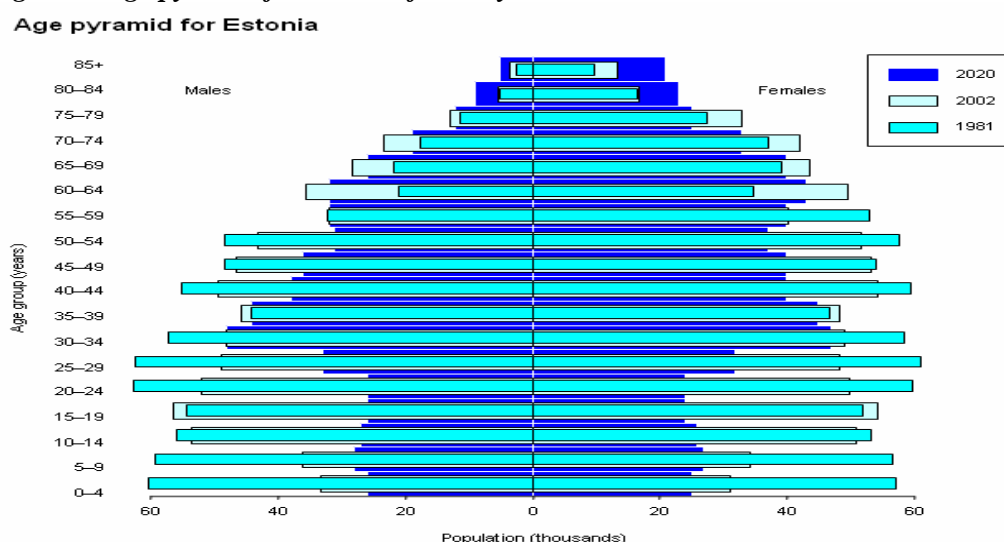
Source: SOE, 2006

¹⁵ See also Figure 1 in ANNEX III.

Decreasing proportion of young people is to a large extent due to a rapid decline in the birth rate from the 1990s. In 1995, people with the age of 0-14 formed 20.9% of the population, but by 2004 this percentage had sunk to 16.0%. At the same time, life expectancy has slightly risen since 1994, reaching 71.6 years in 2003 (Social Sector in Figures 2005). The decrease in the number of children and the increase in life expectancy have inevitably raised the number of older people in the population. If the percentage of people over 65 was 11.5% in 1990, recently they form 16.2%, and by 2050 it is estimated to increase to 27% of the population (Action Plan for Growth and Jobs 2005-2007).

According to the forecast of the *European Commission* and the *Estonian Ministry of Finance*, the population of Estonia will decrease approximately 17–18% within 50 years. The forecast assumes that the birth rate will increase compared to the current level, but it will not increase sufficiently to guarantee the 2.1 children per woman necessary to maintain the population (see also Figure 4). By 2050, the gross birth rate coefficient will reach 1.6 (in 2001 it was already 1.39). The average life expectancy of men born in 2050 will be almost 10 years longer than the ones born today. Women, however, will live 7 years longer. As a result of the low birth rate and sudden increase in the average life expectancy, the ratio of working people and pensioners is seen to decline (Action Plan for Growth and Jobs 2005-2007).

Figure 4. Age pyramid for Estonia for the year 2020



Sources: WHO Regional Office for Europe (2005) and United Nations (2005).

Source: World Health Organisation, Regional Office for Europe, 2005

In addition, there is a tendency of internal migration of the population towards bigger cities and towns of Tallinn, Tartu, and Pärnu. This internal migration is mainly for two reasons. First, the wealthier citizens are looking for a healthier environment for living, moving to an area at a convenient driving-distance from their place of work. And, second, people from rural regions, which have high unemployment rates, move to these areas where they hope to get jobs. A more general tendency is the movement of the population from the rural regions of Southern Estonia to Northern Estonia. The so-called *commuting* can be considered as a growing trend in Estonia: 18% of the total number of working population, or 115 000 people, work outside their hometown or parish; and 7% of the working population have jobs requiring movement from one place to another (Eurodice, Eurobase; see also Table 4).

Table 4. Population, area and density, by administrative unit (2001, 2006)

	2001			2006		
	Population	Area, km ²	Density, inhabitants per km ²	Population	Area, km ²	Density, inhabitants per km ²
Whole country	1 366 959	43 432.31	31.5	1 344 684	43 432.31	31
Cities	921 298	674.41	1 366.1	866 907	643.38	1 347.4
Rural municipalities	445 661	42 757.9	10.4	477 777	42 788.93	11.2

Source: SOE, 2007

Major education indicators

The level of formal education among the adult population of Estonia is relatively high compared with the EU member states. In 2005, 89.1% of people aged 25-64 had at least upper secondary education¹⁶ – given 69.1% as the respective indicator for EU25 and 66.2% as for EU15 (Eurostat, 2007). In 2004, 31% of the population attained tertiary education, making it higher than in most of the EU member states (Silla et al., 2006; see also Statistics in Focus, 19/2005). For the period 2000-2004, the overall literacy rate of adult (15 years and older) and youth (15-24 years) was 99.8%, where it was only lower (i.e., 99.7%) in the case of youth, especially male (Unesco, 2007).

Table 5. Key education indicators about Estonia for 2005

	Estonia	EU25	EU15
Youth education attainment level	80.9%	76.9%	74.1%
Total public expenditure on education as a percentage of GDP	5.67%	5.21%	5.20%
Enterprises providing training*	47%	53%	54%
Employees' participation in company-provided training*	19%	39%	40%
Overall participation in Lifelong Learning	5.9%	9.9%	10.6%

Note: *Data for 2004, source: eUSER, 2005

Source: Eurostat, 2007

The high enrolment level in higher education manifests that education is highly valued in Estonia – for example, more than 70% of upper secondary general school graduates continued their studies at higher level in 2004 (Silla et al., 2006). Even though the number of graduates in tertiary education increased between 20% and 25% in the beginning of 2000s, it has slowed down in recent years. In 2005, however, the increase compared to previous years was about 15% (SOE, 2006). Yet, despite Estonia's comparability to other EU NMSs in terms of relative share of graduates (per 1 000 inhabitants aged 20-29) in the spheres of science, mathematics and computing and in engineering, manufacturing and construction as well (i.e., 8.8% in Estonia with 12.2% as the EU25 average); the country still falls short innovative countries such as Finland (17.4%) and Ireland (24.2%) (Kattel and Kalvet, 2006; European Innovation Scoreboard, 2005). According to *Eurostat*, the graduates in 2004 in the fields of MST composed 16.9% of all fields in Estonia – with the corresponding figures of 23.6% in EU25 and 25.4% in EU15 (Eurostat, 2007; see also European Commission, 2006b). Estonia is relatively weak in the number of doctoral graduates with only 0.88% aged 25-29, as compared to 2.9% in the EU25 (Kattel and Kalvet, 2006). Interestingly, Estonia had 42.5% female engineering graduates in 2005 – the highest in the EU (European Commission, 2006c).

The enrolment in vocational education has been quite problematic in Estonia for quite a while now due to the rather low reputation of vocational education. Although the relative share of students choosing vocational education has increased over the last years (see also Table 6), it is still considerably lower than in most European countries.¹⁷ The inability of the educational system to adapt to the needs of the labour market is considered as a serious problem in the society – most of the young learners at both secondary and higher education levels decide for an academic branch of studies, while the society

¹⁶ In Estonia, upper secondary education is divided into the general upper secondary education to acquire upper secondary general education (ISCED 3A), and the vocational upper secondary education to acquire upper secondary vocational education (ISCED 3B) (Silla et al., 2006).

¹⁷ In 2004, the percentage of boys and girls in upper secondary education in Estonia enrolled in the vocational stream was: 40.8% boys (compared with 57.1% in EU-25) and 19.5% girls (compared with 53.9% in EU-25) (Eurostat, 2007).

needs more qualified labour force and specialists with acquired professional higher education (Ministry of Education and Research, 2004). This is also one of the reasons Estonia suffers simultaneously from unemployment (Estonian National Development Plan (NDP) 2004-2006).

Table 6. Pupils and students enrolled per 10 000 inhabitants in Estonia, by level of education (1995-2005)

	1995	2000	2001	2002	2003	2004	2005
Total	1 931	2 233	2 229	2 197	2 166	2 140	2 066
General education	1 539	1 596	1 567	1 522	1 472	1 416	1 344
Basic education	1 282	1 318	1 278	1 228	1 171	1 104	1 031
Secondary education	256	278	289	294	301	312	313
Vocational education	205	225	219	207	208	222	215
Higher education	191	412	443	469	485	502	507

Source: SOE, 2007

The decreasing population will have a considerable impact on the Estonian educational system as a whole – the number of potential students at educational institutions will start to fall from 2007.¹⁸ At the same time, the Estonian school system suffers with increasing number of students dropping out of school or having to repeat a school year, which is especially problematic at the basic education level (*Ibid.*). The percentage of early school leavers (i.e., aged 18-24 who have left education and training (E&T) with a low level of education) was 13.2% in 2006 – compared with 15.1% in EU25 and 17.0% in EU15 (Eurostat, 2007). The decreasing number of students will cause serious financial problems (as providers are funded through a capitation system) and will affect the quality of instruction (since having modern and high-quality facilities and teachers requires a certain number of learners). One of the serious problems is the closing down of small rural general schools. On the other hand, the need for further training and retraining will be growing (Silla et al., 2006). This is even more important today despite the high level of formal education in Estonia because participation in lifelong learning or in company-provided training has been below EU's average (see Table 5).

Still, the education level of the employed population is relatively high. The share of tertiary educated labour force has grown from 30% in 2000 to 34% in 2006; at the same time, the share of labour force without secondary education has fallen from 12% to 11%. The increasing number of higher education graduates (reaching 10 thousand per year) entering the labour market is surely the cause for such changes (SOE, 2007). At the regional level, the labour force in the counties of Harju and Tartu, which are also the main centres providing tertiary education, have the highest educational attainment (NDP 2004-2006).

The relative share of educational costs in GDP has been increasing over the years. Table 5 above shows that Estonia's expenditures in the educational sector are also relatively high compared with other member states (Silla et al., 2006). However, considering the low level of GDP, the absolute value of the expenditures is still lower than the respective figure in the EU (NDP 2004-2006).

General ICT usage indicators

Over the years various international comparisons measuring Estonian e-readiness have ranked Estonia very high, not only among Central and East Europe (CEE) countries, but even among old EU member states and leading ICT-countries (see Krull 2003). The picture remains similar in latest overviews (see, for example, *Information Society Benchmarking Report 2005*; *eEurope+ Final Progress Report, 2004*), although a lot of countries that have caught up can be found.

¹⁸ Furthermore, Estonia has not gained enough from inflow of foreign students to improve national demographic pressure on the educational system – in 2004, the number of foreign students (at tertiary level) from EU-25, EEA or candidate countries was 600, compared with 438 300 students in total in EU-25. The number of outgoing students from Estonia is a bit larger – 2 300 students compared with 353 300 students in total in EU-25 in 2004 (Eurostat, 2007).

Text Box 1: The *Global Information Technology Report 2004-2005* uses a comprehensive tool for measuring the progress of and identifying the obstacles to ICT development worldwide and has ranked Estonia generally on the 25th position among the observed 104 countries¹, but on the second place in the area of Internet banking and third on e-government.

Economist Intelligence Unit has ranked Estonia 26th among the observed 65 countries, while considering Estonia the leader in CEE. However, the report also states that while Estonia is excellent in e-government and online services, bottlenecks are related to limited infrastructure penetration and slow e-business and consumer adoption (The 2005 e-readiness rankings).

The 2005 Web Measure Index of the *UN Global E-government Readiness Report* placed Estonia among the top 22 countries (UN Global E-government Readiness Report, 2005: 88).

The major reason for this is not only the presence of a relatively well-liberalised market than the rest in the Baltic States,¹⁹ but also the strongly focused projects by the government (ICEG, 2005: 10, 13). In addition, the efforts of governmental institutions to build an Information Society (IS) in Estonia have been coupled with those of NGOs. The banking sector has played at least as big a role as governmental structures (Kalvet, 2004: 17). As a matter of fact, the Estonian banks are considered to be the 'informal' leaders of the Estonian software industry.²⁰

According to statistics from the *Department of State Information System in Estonia (RISO)* (under the *Ministry of Education and Communications*), 45% of Estonian households are equipped with a Personal Computer (PC) (RISO, 2007). According to *Eurostat*, in 2006, 52% of Estonian households are having computer access (Eurostat, 2007).

In 2002, Estonians spent about 5% of their income on telecommunications and about 3% on purchase of Information Technology (IT) equipment (BEACON, 2005: 2). According to the *SOE*, only 3.4% of respondents have a ready money to buy a computer (which amounts to about EUR 960) and 23.3% on installment basis in 2004. The most willing to buy a computer were urban households (24.2%; compared with 21% of rural households). The buyers were mainly in North-Estonia (30.1%) – the least in North-East Estonia (17.1%). Further, the most willing buyers were people with high education (35.1%), families with two or three children (42.7%), and even retired people (3.3%). Considering the relatively low living standards, Estonia stands out by the fact that 73% of households having a home PC have connected it to the Internet via broadband connection.²¹ This makes Estonia, together with Slovenia, a leader in broadband penetration among EU NMSs (ICEG, 2005: 8). In 2006, 37% all of households are having broadband access, compared to 21% in EU10 and 34% in EU25 (Eurostat, 2007).

In Estonia, broadband take up is mainly discouraged by relatively high costs in comparison with the average income level – because of high access costs over 60% of households do not have access to the Internet (see also Table 3 in ANNEX II). At the same time, the participation in the labour market has improved, as the unemployment rate was only 5.9 in 2006 (compared to that of 7.9 in EU25 and 7.4 in EU15 (Eurostat, 2007)), which is the lowest since 1998 (BEACON, 2005: 2). Also, costs for broadband in Estonia are one of the lowest in the world and without government subsidies (see World Development Indicators, 2005). ICT development, including in the area of wireless Internet, will decrease the price even more. The cheapest cost for broadband per month is about 5% of average

¹⁹ From 1 January 2001, the Estonian telecommunications market is completely open to competition and service is offered by a variety of companies (BEACON, 2005: 1-2). The major players include *Elion Ettevõtte*, *Uninet*, *Tele2* and *Microlink*, which have covered the entire country with mobile networks. In 2005, 473 400 households (87.3% of all households) are mobile phone subscribers (SOE, 2007). This makes good market for rapidly developing m-services like m-parking, m-tickets in public transportation, m-payments, m-banking, and m-learning.

²⁰ The software divisions of *Hansabank* and *Estonian Union Bank* have more personnel than the biggest Estonian software companies – approximately 250 of *Hansabank's* 2 245 employees are IT specialists, and 139 IT specialists in *SEB Estonian Union Bank* (Kalvet, 2004: 17).

²¹ The latest surveys show that already 81% of households with a PC have the Internet connection (Information Technology in Public Administration of Estonia Yearbook, 2005). The most popular is ADSL connection – 44%, 29% of homes having a PC have cable modem and 4% are using Wireless Internet (RISO, 2007; see also Table 1 in ANNEX II).

wage. In the beginning of 2005 over 90%²² of Estonian households lived in places where it was possible to have broadband immediately at a cost of EUR 22 per month. There are counties where the situation is not so good, because of, firstly, the average lower salary in country regions than the state average, and secondly, the lack of competition between service providers (Estonian Broadband Strategy 2005-2007). Although the representatives of the *Ministry of Economic Affairs and Communications* have promised to support the building of ICT infrastructure in all counties, they are not going to support the usage of the Internet and eServices (Democracy in Information Society Conference, 2006).

²² According to the Estonian version of the Information Technology in Public Administration of Estonia 2005, the present Internet penetration rate in the scope of all counties is over estimated (Information Technology in Public Administration of Estonia Yearbook, 2005).

I: CURRENT EDUCATIONAL SYSTEM AS THE PLACE OF ELEARNING

This chapter has two purposes. First, it gives a background on the E&T system in Estonia. And second, it gives an overview about the structure, functioning, major problems and issues of eLearning in Estonia.

I.1 Description of current education and training system

The principal objective in the development of the Estonian education system and policy is to advance the Estonian society into an open learning society where every person and institution adopts the principles of lifelong learning (INNOVE, National Resource Centre for Guidance, 2004). However, despite a decade of heated discussions and several (failed) initiatives over this objective, Estonia does not have a national strategy or policy for developing the educational system. Even political parties do not have respective educational reform agenda (Laanpere, 2006b).

The organisation, structure and management of the present education system were developed in the 1990s. The education system is administered by the *Parliament (Riigikogu)*, the *Government of the Republic (Vabariigi Valitsus)* and the *Ministry of Education and Research (Haridus- ja Teadusministeerium)*.

Text Box 2. The *Parliament* passes laws that determine the principles of forming, functioning and developing of education system. The government adopts national education programmes and, by providing guarantees for the implementation thereof, approves national curriculum for different levels of education (in the case of higher education, the government specifies general requirements for curriculum) and determines the bases for remuneration for the work of teachers. The main responsibility of the *Ministry of Education and Research* is planning, management and development of education, research, youth and language policy, the elaboration of national development programmes in the named fields, and the organisation of financing, implementation and evaluation of the results (The Education Act; Ministry of Education and Research, 2004: 17).

The *county governments (maavalitsus)* provide supervision at regional level of the educational activities of pre-school childcare institutions and schools. They formulate the education development plans of the county, provide information on public financing to the *Ministry of Education and Research*, and advise local government on educational concerns (*Ibid.*).

The *local government authorities* – a municipality or a town (*vald, linn*) – organize maintenance of pre-school childcare institutions, basic and secondary schools, hobby schools, school libraries and other local institutions. An important part of their work is to keep registers of children in the compulsory education age range and monitor the fulfillment of compulsory school attendance. They are also responsible for designing local development programmes (*Ibid.*).

In general, education (policy) development culture in Estonia can be characterised as highly decentralised, with minimal interventions from the Ministerial level (Laanpere, 2006b).

The education system in Estonia is divided into the following parts (see also Figure 2 in ANNEX III):

1. Compulsory basic education (*põhiharidus*), which is the combined primary and lower secondary education. Compulsory school attendance generally begins at the age of 7 and lasts until pupils acquire basic education or reach 17 years of age. Basic education is acquired in basic schools, with classes from 1st to 9th (The Basic Schools and Upper Secondary Schools Act; Ministry of Education and Research).²³

Schooling and education objectives, bases of organisation of studies, mandatory and optional subjects, subject volumes and syllabi, requirements to school levels and for finishing schools of the basic level

²³ Compulsory school attendance may also be fulfilled in special educational institutions or classes for disabled children as well as in the form of home study. Children in need of special conditions learn in specially created institutions or in classes for pupils with educational difficulties (European Agency for Development in Special Needs Education, 2005; Ministry of Foreign Affairs, 2005b).

have been provided for in national curriculum. Each school prepares its curriculum on the basis of the national curriculum (The Regulation of National Curriculum for Basic Schools and Upper Secondary Schools; Ministry of Education and Research).

2. Post-compulsory education has **upper secondary** and **post secondary level**. The first level is divided into the general upper secondary education (*üldkeskharidus*) for the pupils 16-18 years of age and the vocational upper secondary education for the pupils 16-18/19 years of age (*kutsekeskharidus põhihariduse baasil*) (studies last a minimum of 3 years). The second level is vocational post secondary education (*kutsekeskharidus keskhariduse baasil*) for students 19-21 years of age (studies last from 1 to 2.5 years) (Eurodice; see also the Standard for Vocational Education; Ministry of Foreign Affairs, 2005b).²⁴ The vocational education curriculum is developed by the schools on the basis of respective national curriculum (broad groups of study) as mandated in the *Vocational Educational Institutions Act* (1998), and is approved by the *Ministry of Education and Research* (Ministry of Education and Research, 2004: 18).

In the academic year 2005/2006, the total number of general education daytime schools²⁵ in Estonia was 598, including 91 primary schools, 225 basic schools, 236 secondary and upper secondary schools. From 598 general educational daytime schools, 32 are private. There are 46 schools for children with special needs. The importance of evening and distance learning schools/departments has risen from 31 in 1999 to 35 in 2005²⁶ (SOE, 2007). The number of pupils in basic and upper secondary schools where the language of instruction is Russian²⁷ is 42 530, which constitutes 23% of the total number of pupils in Estonia (Ministry of Education and Research). See also Table 8 in ANNEX II.

There are 48 vocational schools in Estonia, 11 of which are private in the academic year 2006/2007. The number of vocational schools has decreased considerably since 2001, when it was 84 (Ministry of Education and Research, 2007). A current administrative issue concerns the regulation of the school network and for this purpose a number of small vocational schools have merged to become a single regional vocational education centre.²⁸ 52% of the vocational schools (25 schools) are entirely based on the Estonian language. The number of vocational school where the language of instruction is Russian has decreased in the last years. Currently, the respective share is 15% (Ministry of Education and Research, 2007).

3. Higher education system is binary consisting of two branches – an academic branch (see Text Box 3) and a professional higher education. Institutions of professional higher education are offering applied higher education programmes (*rakenduskõrgharidus*). These programmes can be offered also by universities and vocational education institutions that operate on the basis of secondary education. The precondition for admission to higher education institutions is secondary education obtained in Estonia or qualification equal thereto obtained abroad (The Standard for Higher Education; Ministry of Education and Research; Eurodice).

²⁴ Afterwards these two levels on vocational education are dealt together.

²⁵ In reality, many basic schools and general upper secondary schools exist together under the same name and in the same buildings. The statistical overview of these two educational levels is given in the same place. These levels are dealt together afterwards under the term **general education**.

²⁶ In an upper secondary school, the provision of education may take place in the daytime, evening and distance learning study form. It is permitted to finish the school as an external pupil (Ministry of Education and Research).

²⁷ Russian is the most common minority language in Estonia. In basic school, the medium of instruction may be any language; the choice of the language is made by the manager of the school. In upper secondary school, the medium of instruction is Estonian but it may be any other language if the *Government of the Republic* approves it according to a relevant application (Ministry of Education and Research; Eurodice, Eurobase). However, reforms are scheduled for implementation from the 2007/2008 school year. From this point onwards, it will be statutory for the state and local authorities to make provisions for non-Estonian medium schools to offer Estonian-language teaching in up to 60% of classes. Some schools are already participating in a language immersion programme in which at least 50% of teaching is carried out in Estonian (Education in the News, Eurodice, 2005).

²⁸ The restructuring (merger) of vocational schools is claimed to be the only major structural change in educational system during the last 15 years, not to mention that these schools were state-owned – unlike basic, secondary and higher education institutions (Laanpere, 2006b). For other national priorities for reform in education in Estonia, see ANNEX III.

Text Box 3. At a university, higher education is acquired at three levels: *Bachelor's Study*, *Master's study* and *Doctoral study*. The standard period of Bachelor's study is three to four years, 120–160 credit points (is equal to 180-240 ECTS), Master's study one to two years, 40–80 credit points (equal to 60-120 ECTS) and Doctoral study three to four years, 120-160 credit points. The standard period of Bachelor and Master's study is at least five years in total. The standard period of study in professional higher education is three to four years (120–160 credit points) (The Standard for Higher Education; Ministry of Education and Research).

There are no harmonised requirements set out for the content of particular curriculum at higher educational level and hence educational institutions are autonomous in compiling their curriculum and courses (Ministry of Education and Research, 2004: 18). The general requirements are laid out in the *Standard of Higher Education* (2002).

In 2007, there are 11 universities, including five (5) private universities, and 20 professional higher schools (11 of them private ones). Four (4) vocational education institutions are also providing higher education programmes (Ministry of Education and Research, 2007; see also Table 9 in ANNEX II). The most relevant trend in recent years, mainly as a result of the development of private universities and post secondary institutions, is the continuous growth in the number of students pursuing higher education. The enrolment in public universities has also increased.²⁹

The medium of instruction for 6 891 students (or 10% of total enrolment) is Russian, and for 1 007 (or 1.5%) English. Two-thirds of those students are studying in private educational institutions. The proportion of Estonian, Russian and English as medium of instruction has remained nearly the same in the last years (SOE, 2006).

4. Adult education system provides the opportunity (1) to acquire **formal adult education** (from basic to higher education) in the form of part-time study, evening courses, distance learning or as an external student (the form depends on the level of education); (2) to acquire, develop and retrain professional, occupational and/or vocational knowledge, skills and experience (**professional E&T**); and (3) to develop knowledge, skills and abilities needed in life (**non-formal education**). Completion of formal and professional education acquired within the adult education system is certified by a certificate or diploma (Law of Adult Education). In-formal education means learning in informal situation (e.g., at home, at work, in free time activities).

Text Box 4. Adult education consists of the following options:

- In "adult upper secondary schools", basic education and upper secondary education in the form of distance learning, evening courses or as an external student can be acquired;
- In vocational schools, secondary vocational education on the basis of basic education in the form of evening courses or distance learning and secondary vocational education on the basis of secondary education in part-time study or as an external student can be acquired; professional training is also possible;
- Public universities and state institutions of professional higher education offer possibilities to study in the form of evening courses and distance learning; continuing education outside formal education may take place in these institutions;
- Adult education institutions offer continuing education or retraining courses or non-formal education. These schools are mostly privately owned. Private schools which organise professional E&T or non-formal education for adults whereupon the volume of study exceeds 120 hours shall apply for an education licence (Ministry of Education and Research).

The number of students in Estonia in autumn 2006 was 68 785 and 70% of these were splitting their time between university and work and/or other activities. In addition to this, tens of thousands of learners attend in-service training courses in institutions of higher education. The share of learners taking in-service training or retraining courses and adult learners participating in continuing training will increase in the future. Lifelong learning guarantees that many adult learners return to the acquisition of a formal education. More than 6 000 people study at adult upper secondary schools (Kiviselg et al., 2006).

²⁹ In academic year 2006/2007, 45% of enrolled students obtain higher education at state-financed study places, and 55% pay for their education themselves. The share of paid education is growing year-by-year first of all as a consequence of the change of proportions in public universities and higher schools (Ministry of Education and Research, 2006).

According to *Faktum* survey *Adult participation in education and training in 2004*, 22% of 15-74 year olds participated in professional training (i.e., approximately 230 000 people).³⁰ Non-formal education is less popular as only 16% (167 000 people) of 15-74 year olds participated in non-formal education (Kiviselg et al., 2006).³¹ By the *Eurostat*'s statistics in 2005, the trends in lifelong learning are contrary and the highest is the participation in formal learning (25.1), compared to participation ratio in non-formal (14.8) and in formal education (3.7). When compared to EU15 and EU10 (43.9 and 31.5, respectively), Estonia is showing comparable rates for lifelong learning with 31.4 (Eurostat, 2006).

At the same time, the rate of the working age population (25-64 age group) taking part in training in 2004 was only 6.7% (even lower, 5.9%, in 2005) (Eurostat, 2006) – compared to *Employment Guidelines* issued by the *European Commission* suggesting that member states should reach a level of participation in lifelong learning at least 12.5% of the adult working age population by the year 2010 (The Employment Policy Guidelines 2003-2005). Because of decreasing population, the need for efficient re-training system for adults that is accessible to all is also growing at the domestic level (NDP 2004-2006).

5. Workplace training. In Estonia, companies may decide on the training principles applied in organisation, on training plans and on whether to organise training in the company or outside. They can also decide on employees' exchange and rotation according to their needs and possibilities (Kiviselg et al., 2006; for overall developments in company provided training, see Text Box 5).

Text Box 5. According to the 2001 survey *Continuing Vocational Training in Enterprises*, based on 2 315 companies, 63% of companies interviewed offered in-service training for their employees. There was a direct correlation between company size and willingness to train: 56% of companies with 10-19 employees offered in-service training; the situation is similar in companies with 20-29 employees. 85% of middle size companies (50-249 employees) and all companies employing more than 500 people (52 in the sample) offered in-service training. Training costs were EUR 448 per participant (*Ibid.*). At the same time, according to *eUSER*, 19% of employees were participating in company-provided training in 2004.

1.2 Place of eLearning in the educational sector

eLearning is increasing its popularity. Since using ICT applications in classes will increase the students' interest towards school attendance (therefore class repetition and dropping-out of school should decrease), it makes knowledge acquisition more effective and establishes preconditions for knowledge-based community (State Audit Office, 2003). In addition, eLearning creates better learning opportunities for people with special needs and for those who live far away from educational institutions (Kiviselg et al., 2006). However, it is claimed that as the educational institutions are mostly the content suppliers of eLearning in Estonia, the target group of eLearning is primarily considered to be students and people operating in the educational sphere (Massy, 2004).

The number of national surveys in the field of eLearning is very small. To date, the best overview of ICT developments in general education is available thanks to *Tiger in Focus* surveys and also the activities of the *State Audit Office*. However, the use of eLearning as such at local level is not yet assessed, including an assessment about the role of ICT literacy and the use of ICT in classroom in basic, secondary, vocational, higher and non-formal education. The only survey that has analysed specifically the ICT-related curricula in Estonian higher education is the *Knowledge-based Economy and ICT-related education in Estonia: Overview of the Current Situation and Challenges for the Education System* conducted by PRAXIS.

³⁰ Middle managers and specialists, officials, aged 25-34, people with higher education, people with higher income, and native Estonians are highest represented in the figures (Kiviselg et al., 2006).

³¹ The participants were mostly 15-24 year olds, students, urban population, people with medium and high income, women and Estonians (*Ibid.*).

In the framework of the REDEL project (financed by EU's ESF), the political survey for universities is in the field of eLearning, which should be completed by the beginning of 2007 (Tammeoru, 2006b). eLearning study in vocational schools is still in the planning phase, and fresh data about primary and secondary schools is expected from IEA SITES study in 2007 (Laanpere, 2006b).

To date, eLearning is mainly understood as web-based courses, especially in vocational and higher educational level, lifelong learning and workplace training; and as the application of different web-based learning materials, especially in general education. In addition, eLearning practice is strongly associated with different learning and study information systems and e-applications.

Overall, the rate of computer-based learning in Estonia is 10.3, which is comparable to other EU10 countries, except Slovenia (showing participation rate of 29.9) (Eurostat, 2006).

At the general education level, the main aim has been the computerisation of Estonian schools – computers and Internet connections for schools, educational software development and teachers' in-service training. As a result of the different educational programmes (see overview of these in Chapter II.2), a number of interesting developments have been in place in 2006, to wit: all general schools in Estonia are connected to the Internet; several web-based learning materials in Estonian, and also local open source Learning Management Systems (*LMS*), Content Management Systems (*CMSs*), etc. have been created.

eLearning, particularly computer-based learning, is an increasingly popular form of study in higher, vocational and adult education. The main reason behind the success of eLearning at these levels is the initiatives of the *Estonian E-university (Eesti e-ülikool)*, the consortium of universities and applied universities supporting developments in Estonian higher education, lifelong learning, and the field of eLearning as a whole since 2002.³² Due to the positive outcome of these initiatives, the vocational schools have also created a similar network called *Estonian E-VocationalSchool (e-kutsekool)*. A memorandum of *E-VocationalSchool* was signed in February 2005. Among people acquiring higher and vocational education, the consortium of the Estonian e-VocationalSchool forms 87% of the total number of learners and the consortium of the Estonian E-University forms 83% of the total number of learners (as of January 2007) (Strategy of the Estonian eLearning Development Centre 2007-2012). Certain pressure towards the further use of ICT-supported learning can be seen also from international organisations.³³ For example, *PowerPoint presentations* are used in on-campus courses to support lectures – with projectors being decreasingly used. In many cases, however, the usage of eLearning applications is dependent on teachers.

The in-house web-based training of personnel is not very widely used in Estonia (Piin, 2004: 41). Rather, the private sector has made a contribution to training of their employees for general ICT skills. For a couple of years, there has been a movement from basic ICT skills towards teaching of specific programmes. One reason private sector web-based learning has not acquired much attention is the fact that ICT is incorporated deeply in everyday life and employees need more communication possibilities. The latter is possible more in traditional training (Interviews with Kuusemets and Väravas, 2006). In the private sector, large enterprises (especially banks and telecom companies) extensively use eLearning applications for training and supporting learning of their staff.³⁴ There are however little data on companies that belong to international networks and are owned by larger international companies.

³² It should be mentioned that many universities have been developing and are practising web-based courses both in formal and in continuing professional education since 1995, and then through the *PHARE Multi-Country Programme for Distance Education* two training centres were established. The first initiatives to start offering courses via e-mail and then via Internet were made in 1996 in the framework of distance education (see Table 9) (Ruul, 2004; see more about the history of eLearning in Estonia in ANNEX III).

³³ For example, starting spring of 2006 the international tests for English language skills, *TOEFL*, would become only computer-based. This also means the need to change the orientation of special training courses for this exam – from traditional training towards more computer-based training (Educational Advising Center at Tallinn University of Technology, 2006).

³⁴ For example *Hansabank, SEB Estonian Union Bank, Elion, EMT, Eesti Energia* (see *Eprojekt*, at <http://www.eprojekt.ee/>).

In the public sector, the *Law of Adult Education* states that all employers (including schools) in Estonia should annually spend at least 3% of their general salary budget for professional development of their employees. Teachers are obliged to pass relevant in-service training courses of at least 160 hours – four (4) Credit Points (CPs) during five years in order to keep their rank (The Framework for Teacher Training). These courses are generally provided in a traditional way, although several teacher training programmes (at three different levels) in the field of using ICT in the learning process and design of digital learning materials are available in the web as self-study courses.³⁵ Different ICT related courses are provided regularly for senior managers and policy officials. In addition, there are several workgroups and seminars, involving ICT managers of ministries, ICT managers of counties, among others, which gather to discuss matters concerning them and to pass on good experience to one another. A positive development here has been the founding of *eGovernance Academy* (eGA) (ICA Country Report, 2005).³⁶ There are also a couple of web-based courses introduced in a year in the public sector – for example, on general things like information about the EU (Interview with Rits, 2006).

An important aspect of eLearning in the workplace is the fact that in Estonia the need to have and develop (at least basic) ICT skills is seen as one crucial qualification for work, although the recognition level is lower than in EU25 – 43% of employed persons in Estonia use computers in their normal work routine, compared with 51% of EU25 average in 2005 (Statistics in Focus, Eurostat, 17/2006).

In the framework of lifelong learning, the main eLearning opportunities for adults are provided by educational institutions – the most important seem to be the web-based courses provided by *Estonian E-university* and by other universities. These courses do not give the certificate to the learner, but are mainly in-service training courses (Sule, 2003). The number of courses ordered by the private sector is very low. It can be said that web-based courses are still gathering their popularity and participation in those has been low. To date, the web-based courses both in numbers and in scope of content have remained limited. However, many private training institutions are offering computer training for adult learning. Some computer projects in cooperation between the private and public sectors (e.g., *Look@World project*, which is coordinated by *Look@World Foundation*) have been initiated to create training network and to provide basic computer and Internet training free of charge. The *Look@World project* was very closely connected to the creation of Public Internet Access Points (PIAPs) together with ‘internetisation’ of libraries. The role of libraries and other cultural establishments as a new learning environment is becoming more important in promoting the idea of lifelong learning and in offering learning opportunities in in-formal training (Kiviselg et al., 2006). These developments have made possible to start using Internet in rural areas, where people do not have much possibilities to get a PC and Internet access (Puusep and Ehendi). According to *Eurostat*, the percentage of individuals who used Internet in the last three (3) months for post educational courses is only 2.3 (Eurostat, 2006). This is primarily due to the overall low recognition of the need of lifelong learning in the society.

I.3 Presentation of ICT skills and attitudes towards ICT usage

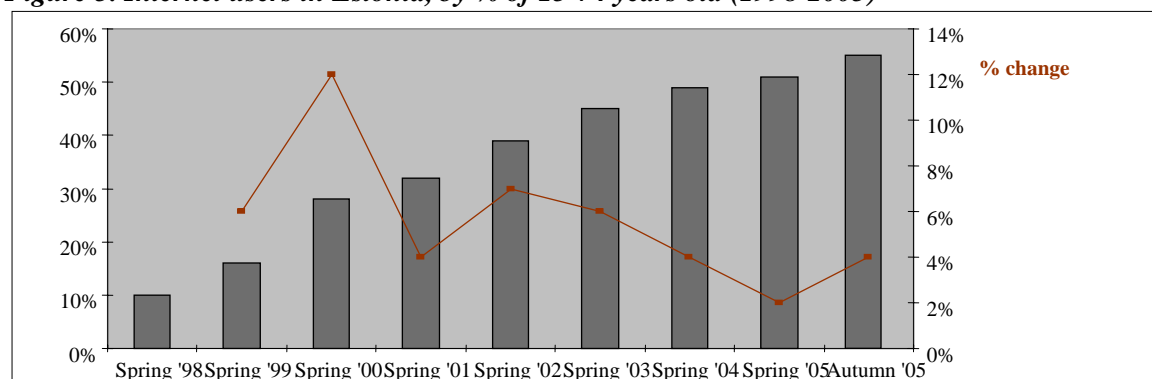
In the beginning of 2006, Estonia enjoyed a situation in which 54% of computer users (i.e., those who had used the computer in the last six months) were using it daily – with 50% of users saying the use of internet as the main motive in buying a computer, and 25% for studying purposes (RISO, 2007). The most characteristic figure on IS development – the Internet usage – has been growing rapidly over the years. Surveys from 2006 indicate that 58% of 15-74-year-old or 60% of 6-74-year-old Estonian inhabitants are using the Internet. Compared to the spring of 2005, the share of Internet users has increased by 65,000 people. In 2005, the growth of the group of Estonian population who became

³⁵ See also the web page of *Estonian E-university*, at <http://www.e-uni.ee/index.php?main=101>.

³⁶ The main objective of the *eGA* is to provide training in ICT coordination and use of IT for high-level officials, specialists, and representatives of the third sector of former Soviet republics, Southern and Eastern Europe, and Asia. The training project offers practical information and experience, know-how of EU experts, and exchange of experience between participants in training (ICA Country Report, 2005; also, see <http://www.ega.ee/>).

Internet users was 4% (TNS Emor e-Track survey, 2006; see also Figure 5). There are more than 700 000 Internet users in Estonia in June 2006. For young people, Internet has become an essential part of daily routine – practically all people (92%) aged 10-24 are using Internet and every second person in this age-group is a daily Internet user (TNS Emor e-Track survey, 2006; see also Table 2 in ANNEX II). In 2005, the share of elder people among Internet users has increased remarkably. At the moment, 43% of people aged 50-59 are using Internet, compared with only 29% of the same age-group who used the Internet in the previous year. Internet usage is lower among people over 60 – only every tenth among them has used the Internet (TNS Emor e-Track survey, 2006). The share of women among Internet users has also increased during the last years and there are more people aged 25-49, people with secondary education and inhabitants of smaller towns and rural settlements among Internet users (EMOR AS, 2005). According to the 2006 statistics, the share of individuals regularly using the Internet (all individuals aged 16-74 who access the Internet, on average, at least once a week) is 56% in Estonia, compared to that of 47% in EU25 and 49% in EU15 (Eurostat, 2007).

Figure 5. Internet users in Estonia, by % of 15-74 years old (1998-2005)



Source: TNS Emor, Gallup e-Ratings, 1998-2005

In 2006, the percentage of all individuals who accessed the Internet at home (as % of individuals aged 16-74) is 46% in Estonia and 43% in EU25 and 45% in EU15 (Eurostat, 2007). From the regional aspect, the share of home PCs and Internet usage are a bit higher in Tartu region and in Tallinn than in other parts of Estonia. The Internet connection of households in rural regions is in worse condition as in towns, especially in North-East Estonia. It is even claimed that while Estonia has been showing good computer and Internet connection penetration in the past five years, the digital divide between cities and rural areas has also increased – there are one-third Internet connections less in rural areas than in towns (Oviir, Eesti Postimees, 19.10.2006). The claims are illustrated by the statistics about having Internet connection and about Internet usage by place of usage (see Table 7). Overall, 72% of Internet users are using Internet at home; use of widely spread *PIAPs* has remained stable.³⁷ In addition, by the end of 2006 the number of *WIFI* areas should be increased to 1 000 (in October 2006 the exact number was 875). However, the most widespread is *WIFI* in Tallinn (326 areas), followed by other biggest counties like Tartu, Pärnu, Harju. In the worst situation is Hiiu County in West-Estonia (11 *WIFI* areas) (Eesti Postimees, 28.10.2006).

³⁷ In the beginning of 2001, there was about 200 *PIAPs* in Estonia (Puusep and Ehandi). Today, the number is over 700, 51 *PIAPs* per 100 000 people. Most of *PIAPs* are located in libraries and other municipal buildings across the country (Ministry of Foreign Affairs, 2005a), in which according to an agreement concluded between local government managers, citizens can use computers free of charge and all maintenance costs of leased lines are financed by local governments (ESIS, 2004).

Table 7. The share of home PC and Internet users in Estonia, by regions (2006)

Regions	Home PC*	Home PC in house-holds*	Having no Internet connection*	Internet users*	Internet usage at home**	Internet usage elsewhere**, ***
Tallinn	58%	47%	6%	63%	76%	27%
North-Estonia	48%	41%	8%	57%	66%	39%
West-Estonia	53%	48%	17%	54%	71%	36%
Tartu region	62%	51%	11%	65%	79%	42%
South-Estonia	53%	39%	29%	55%	64%	46%
Viru County	50%	40%	15%	49%	71%	33%

Notes: *% of all respondents; ** % of those having used the Internet in the last 6 months;

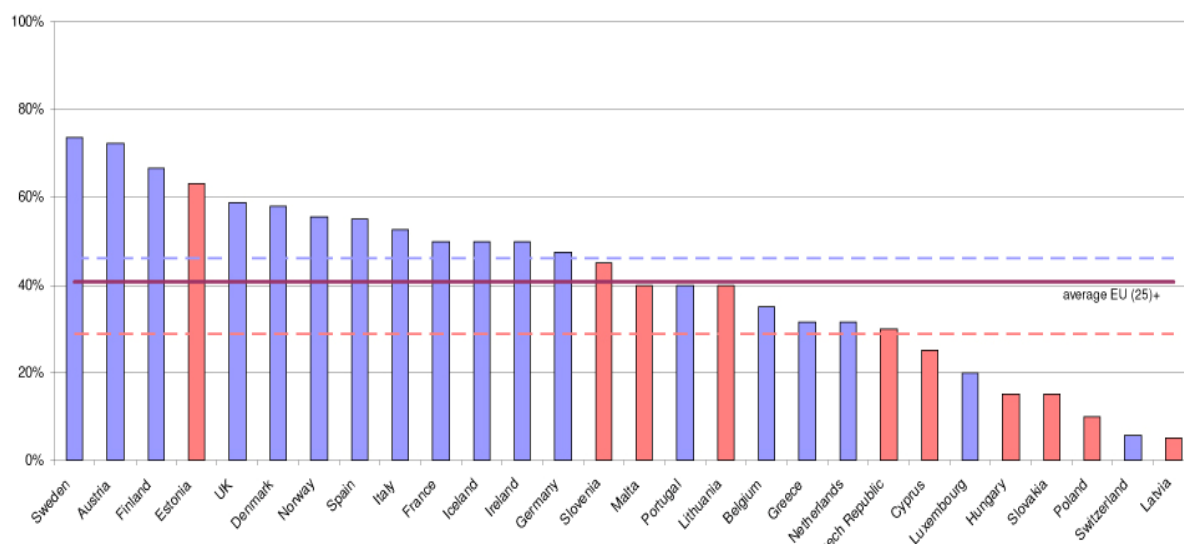
Source: RISO, 2007

*** besides usage of Internet at home, at workplace, at friend's home/work, at school, at PIAPs

Surveys from 2006 show that Estonians use the Internet mostly for sending/reading e-mails (75%), using search engines (71%) and seeking specific information from databases/web sites (70%), using Estonian Internet portals (e.g., delfi.ee, everyday.com, etc.) (67%), reading Internet publications (62%), for random surfing (61%), and using communication software (MSN, ICQ etc.) (49%) (RISO, 2007).

Estonia is very advanced when it comes to the number and sophistication of public services available in the Internet.³⁸ The country is not only ahead of all other NMSs, but also scores better than the majority of EU15 countries including France, Germany and the Netherlands (see Figure 6). The major reason for this is the variety of eServices being developed both by private and public sectors. The percentage of services that offer a complete electronic case handling is also very high, more than 60% of the services can be handled fully electronically which is above EU25 average (40%). The percentage of online availability of 20 basic public services (eGovernment) is 79% in Estonia and 50% in EU25 and 56% in EU15 (see Eurostat, 2007).

Figure 6. Public services fully available online (October, 2004)



Source: Capgemini, 2004

Among the eServices, submitting personal income declaration as well Internet banking are very widely used; 76% of Internet users were submitting their income tax declarations over the Internet and 75% were using Internet banking service in the first half of 2006 (RISO, 2006). Estonia is also the first country in the world to enable its citizens nationwide to vote over the Internet for political elections –

³⁸ A four stage framework is applied according to *eGovernment indicators for benchmarking eEurope* to measure the level of online sophistication of the services: 1. Information: online information about public services; 2. Interaction: downloading of forms; 3. Two-way interaction: processing of forms, including authentication; 4. Transaction: case handling; decision and delivery (payment).

the local elections of 16 October 2005. ID-card based casting of ballots was available and the number of e-votes cast during the local elections amounted to 9 287, representing 1% of total votes.

The number of companies connected to the Internet is also on the rise. In the beginning of 2006, 76% of Estonian companies had a broadband Internet connection (Eurostat, 2007), whereas ADSL connection is the most popular. 79% of the companies connected to the Internet also maintain a homepage (RISO, 2007). In 2005, enterprises used the Internet actively for interaction with the public sector — 63% of enterprises used Internet for obtaining information from public sector web sites, 60% for submitting enterprise related documents to public sector agencies and 35% for electronic case handling (RISO, 2005). Among enterprises, the Internet is mainly used for searching information and for banking and financial services (94.5% and 96.6%, respectively, in 2006 (SOE, 2007)). Yet, overall, according to the surveys only 16%-18% of Estonian enterprises have benefited from ICT means in cutting expenses, increasing turnover and introducing new products and services (RISO, 2006).

The areas of Internet usage are expanding. The use of the Internet for entertainment has doubled by year-on-year numbers. While in the first half of 2004, 15% of respondents used the Internet for playing games, the respective share was 32% in 2006 (Information Technology in Public Administration of Estonia Yearbook, 2005). However, purchasing or ordering of products/services via the Internet is still quite modest in Estonia – only 9% of respondents have reported such activity in 2006 (RISO, 2007).³⁹ In 2005, as can be seen in Table 8, eLearning materials among books and magazines had rather higher position compared with other commodities; however, they seem to have lost their high position in 2006. Using the Internet for phone calls is also relatively new (14% used the service in 2006 and 6% in 2004), but the number of users has more than doubled over the years, showing the growing popularity of the service (Information Technology in Public Administration of Estonia Yearbook, 2005). ANNEX II gives an overview of Internet and computer use in different age-groups (Table 12) and purpose (Table 13).

Table 8. Individuals aged 16-74 by buying/ordering goods/services over the Internet (2005, 2006)

	Number of individuals, thousand		Percentage of individuals using e-commerce, %	
	2005	2006	2005	2006
Books, magazines, eLearning material	24.0	21.3	33.9	29.1
Clothes, sports goods	25.5	28.4	36.1	38.8
Travel and holiday accommodation	22.7	14.2	32.1	19.4
Tickets for events	29.2	23.8	41.3	32.5

Source: SOE, 2007

The general profile of Estonian Internet users and non-users is close to those of other countries. Among the barriers are motivational, access and skill aspects (Kalkun and Kalvet, 2002). In general, the image of ICT use is very positive in the Estonian society and that could be the result of several large-scale awareness-increasing events (e.g., *Tiger Tour*, 1997-1999, which has won the *Global Bangemann Challenge* prize). Also, a web page introducing ICT education in Estonia was opened in July 2006 – with 30 000 people visiting the web page in its first two weeks.⁴⁰

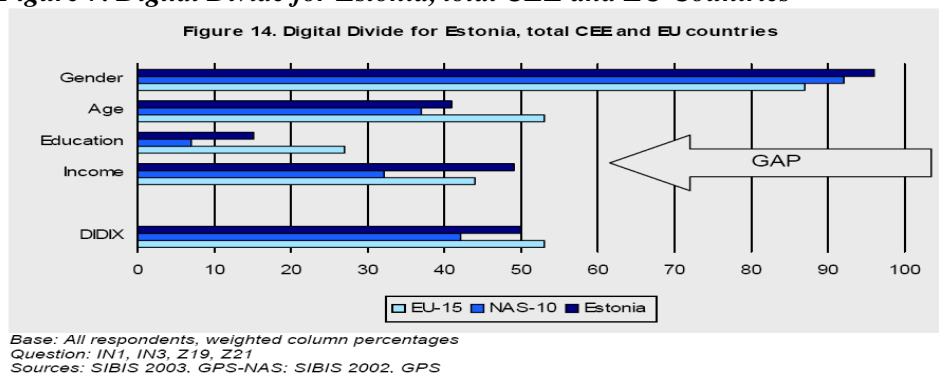
Although Estonia is showing rather good computer and Internet usage figures, there are still more than one in three (34%) of individuals who have never used a computer, and 46% who do not use the Internet regularly – the EU25 figures are 34% and 57%, respectively (see Figure 3 in ANNEX III). Accordingly, there are 37% of persons aged between 16 and 74 with no computer skills – the share of those with high skills in the same age range is 29% (Statistics in Focus, Eurostat, 17/2006).

³⁹ Generally, only 6.8% of persons who bought goods and services in the last 12 months purchased over the Internet (Statistics in Focus, 12/2006).

⁴⁰ See also <http://www.startit.ee/>. This promotion programme is initiated by the *Estonian Information Technology Foundation* (with support from *EMT*, *Elion*, *Skype Estonia* and *Tallinn University of Technology*) and is oriented to students to give overview of different learning possibilities in the area. It also gives overview of job possibilities in the field. The web page also contains tests and case studies.

According to *SIBIS*, digital literacy of the youth in Estonia is the highest *COQS index*⁴¹ among CEE countries. The overall index of digital literacy in Estonia is 0.7 (*SIBIS Pocket Book 2002/03*). In the *digital divide index*, Estonia has the lowest in the area of gender gap, and the highest in education (see also Figure 7).⁴² Furthermore, the education gap is considered to be two times lower than in CEE countries, but higher than in EU15 (*SIBIS Country Report, 2003*). Data from the *SOE* illustrate the differences in skills in using the Internet – the young and educated individuals have the most widespread and higher skills.⁴³ Moreover, according to the survey of Kalvet and Kalkun (2002), 26% of Internet non-users have reasoned out either poor skills or the complexity of use for not using the Internet.

Figure 7. Digital Divide for Estonia, total CEE and EU Countries



Source: SIBIS Country Report, 2003

The educational gap is also illustrated in a 2004 study that shows Internet usage to be highest among students (92%) and employees (59%) – the percentage of unemployed using Internet was 39% (Eurostat News Release, 2005). Furthermore, low levels of formal education appear to be the most significant reason people cannot participate in the IS (*SIBIS Country Report, 2003*). This is evident in statistics showing that the level of basic computer skills is highly dependent on a person's educational background (Statistics in Focus, Eurostat, 17/2006; also, see Table 12 and Table 13 in ANNEX II). However, the latest *Eurostat* survey shows that 24% of people with higher education do not have computer skills either (the respective average in EU is 11%), although those who have computer skills are better than EU's average level. The main reasons for that can be: firstly, the rather high age of Estonian population having higher education; and secondly, the state's modest financial support to enhance lifelong learning (Uusen, Eesti Postimees, 26.06.2006).

Since computer programmes are often in English, language is one important reason the Internet is considered to be difficult to use – that is, English for Estonians; Estonian and also English for non-Estonians in the case of content services. The language aspect is especially difficult for the elderly, and it is a very important concern for non-Estonians as well (Kalvet and Kalkun, 2002). In the education sector, principals are the ones especially very concerned about the deficit of educational software in the Estonian language – whereas using software in English worries only 4% of students (Toots, Plakk and Idnurm, 2004: 12). Yet, most web-based courses are in the Estonian language (The eLearning Strategy in University of Tartu; Content Village, 2005).

Finally, Estonia has been one of those among EU and CEE candidate countries as well (namely, Bulgaria and Hungary) with the lower level of concerns about data security and

⁴¹ The digital literacy index (COQS) is a measure that combines four types of skills in using the Internet: communication with others (by e-mail and other online methods), obtaining (or downloading and installing software on a computer), questioning the source of information on the Internet, and searching for the required information using search engines (*SIBIS Country Report, 2003*).

⁴² The Digital Divide Index (DIDIX) is a compound index that comprises four indices: gender, age, education and income. The lower the index value, the more severe is the divide (*Ibid.*).

⁴³ This relates to activities like using a search engine to find information; sending e-mails with attached files; posting messages to chatrooms, newsgroups; using the Internet to make telephone calls; using peer-to-peer file sharing for exchanging movies, music, etc.; and creating a web page. See more in Table 13 in ANNEX II.

privacy/confidentiality. Only 9% of regular Internet users are very concerned about data security in Estonia, compared with 24% in CEE and 26% in EU countries on average, 20% in Switzerland and 40% in the US. The situation is similar regarding concerns about privacy and confidentiality (SIBIS Country Report, 2003: 21). However, 64% of Estonian inhabitants have expressed distrust in the area of security of eServices, even though some have claimed to be very positive towards the eServices offered by public authorities (TNS Emor, 2005). The emerging security problems are also surprising because previous surveys have revealed that Estonians, both households and enterprises, are quite well aware of security issues in using computers and the Internet.⁴⁴ The occurrence of security problems should have decreased from 53% in spring 2005 to 44% at the end of 2005. This shows that Estonian Internet users have acknowledged potential risks to security and take measures to protect their computers. 79% of residents who have an Internet connection at home use antivirus software, while the respective indicator for enterprises was 84% (Information Technology in Public Administration of Estonia Yearbook, 2005). Nevertheless, the state (in cooperation with the private sector) has taken actions to address more actively IT security issues (see the Principles of the Estonian Information Policy).⁴⁵

In the area of eLearning, the greatest challenge seems to be the security problems in private sector. Although the private sector has developed their own LMSs (the *eKool*), there is still very much paper-based training. This is mainly the result of the restriction of access to LMS and to the databases from home. The main concerns are technical safety (viruses) in particular and data security in general.

Summary of Chapter I

In sum, although several big steps have been made in developing eLearning in Estonia, these efforts are mainly concentrated at formal education level – i.e., in basic, secondary and higher education, and are mainly related to computerisation, to web-based courses and materials, and to learning and study information systems. Since the first initiatives in the area of vocational education have started only recently, it is at the moment difficult to assess the developments in the area. Developments in eLearning are particularly recognisable at higher education level where blended learning is the most preferred form (eUSER, 2005). Web-based courses are provided also in the framework of lifelong learning, but their role has remained limited. Important developments at the informal education level include, among others, ICT skills training, ‘internetisation’ of libraries and existence of *PIAPs*.

It is difficult to find reliable information about workplace training, and especially about eLearning usage in the area. In the private sector, eLearning is mainly used by larger companies and especially in the financial and telecommunications sector. The usage of their LMSs is considered an important eLearning activity. Blended learning is the most preferable form in workplace training.

Although Estonia is showing good in computer and Internet penetration rates, there are several problems related to the use of ICT by different age groups and by groups in different educational levels, or individuals in different activities. Language poses some problems. And security issues are in the agenda of the private sector.

⁴⁴ This has also been confirmed by a study among Internet non-users – 1% of non-users mentioned security concerns as the reason for not using the Internet (Kalvet and Kalkun, 2002).

⁴⁵ For example, in 2006, leaders of the largest banks and telecoms (*SEB Estonian Union Bank, Hansabank, Elion, EMT*) as well as the *Ministry of Economic Affairs and Communications* of Estonia signed a cooperation agreement to launch a nationwide *Computer Protection 2009* initiative, pledging to invest up to EUR 3.8 million to increase end-user PC protection and awareness in Estonia. The aim is to make Estonia a country with the most secure IS in the world by year 2009. As a first step, a gateway to PC protection related information and discussions at <http://www.arvutikaitse.ee> (currently only in Estonian) has been launched (RISO News, 2006).

II: OVERVIEW OF E-LEARNING IN ESTONIA

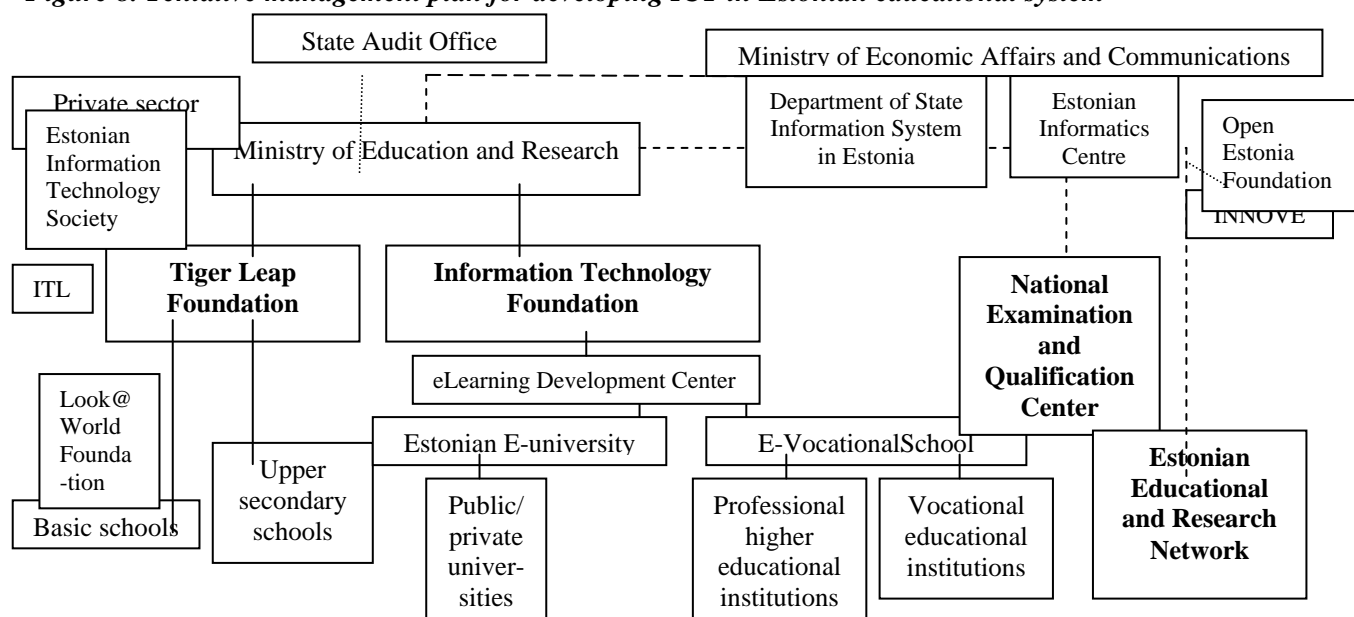
The purpose of Chapter II is to give an overview of the building blocks that affect the evolution of eLearning in Estonia. Within the broad range of the relevant factors, the country study focuses at assessing the institutional structure; current strategies, policies and projects; legal framework and dedicated specific ICT infrastructure in place and their significance in eLearning developments. Taking into account these factors, this chapter analyses the eLearning services available and their usage as well. Finally, it discusses the impacts of eLearning developments on the education system in particular and on IS in Estonia in general.

II.1 Institutional structures and resources for eLearning

II.1.1 Organisational structure for eLearning coordination

The importance of ICT and ICT-based education for governance and development is well-recognised in Estonia. **The Ministry of Economic Affairs and Communications** – specifically *the RISO* – is **responsible** for the overall coordination of IS in Estonia. The tasks of the department include the coordination of state IT-policy actions and development plans in the field of state administrative information systems: state IT budgets, IT legislation, coordination of IT projects, IT audits, standardisation, IT procurement procedures, and international cooperation in the field of state information systems. The *Ministry of Economic Affairs and Communications* also coordinates Estonian information policies which include, among others; e-educational issues (see Figure 8).

Figure 8. Tentative management plan for developing ICT in Estonian educational system



Source: Authors, 2006

The **Ministry of Education and Research** is the central coordinating unit of e-education in Estonia (see Text Box 6). The direct development of ICT-based education and respective ICT infrastructure falls mostly under the responsibility of **governmental non-profit organisations**, especially the *Tiger Leap Foundation* and *Information Technology Foundation*, both established under the auspices of the Ministry. Figure 8 shows that there is no concrete organisational structure and coordination system in place for eLearning activities, which are already rather decentralised at the ministerial level. A clear responsibility for dealing with eLearning issues is missing also at the level of the *Parliament*.

Text Box 6. The *Tiger Leap Plus Strategy* defines the following tasks of the *Ministry of Education and Research*:

- The Ministry guides the implementation of the development plans in the field of eLearning and their further elaboration, relates them to the other strategic documents in the field of education and creates the legal environment required for achieving the plans' objectives.
- Hence, upon the initiative of the Ministry, the preparation of ICT competency standards for school managers, teachers, students and education officials is organised/re-organised (this is especially the case of general education). The Ministry is also responsible for establishing standards and a legal base for electronic administration of information.
- The Ministry comes up with a plan of the annual budget for respective eLearning development projects (The Tiger Leap Plus Strategy, 2001-2005).

The tasks of **local authorities** are to support schools to acquire ICT equipment, to take responsibility for providing ICT support for schools, to coordinate and finance Internet connection according to local specificities and needs, and to finance in-service training for teachers (State Audit Office, 2003; the Tiger Leap Plus Strategy, 2001-2005).

Schools are responsible for the creation of a functioning financial and organisational system for procurement, upgrading and servicing of ICT resources (The Tiger Leap Plus Strategy, 2001-2005; see also ICT@Europe).

The development of eLearning and its activities in **higher education institutions** depend on their own plans for the future. However, the crucial role is played here by the eLearning Development Center to enhance the developments of the field.

There is no certain scheme in regard to the involvement of **private sector** in the provision of services for eLearning; rather it is through one-time initiatives. Even though it can be argued that the main role of the private sector in these initiatives has been the provision of finance, it is also clear that especially in the late 1990s private sector's initiatives and willingness to provide finance served as catalyst for many public policy actions in the areas of IS and eLearning. The main reason behind private sector's involvement may be considered as self-interest and the desire to push developments in educational sector in order to keep up with success in IS as a whole.

II.1.2 Main public institutions involved in the provision of services for eLearning

The **Open Estonia Foundation (OEF)**, a charitable foundation established in 1990 with the help and funding of Georg Soros, made a remarkable contribution to eLearning especially in the early stage during the 1990s.⁴⁶ OEF funded several extensive educational projects promoting ICT infrastructure in schools and universities and teacher training with a budget of about EUR 300 000 (The Tiger Leap Plus Strategy, 2001-2005).

As earlier mentioned, the main responsibility of implementation of services for eLearning is now in the hands of non-profit organisations – *Tiger Leap Foundation* and *Estonian Information Technology Foundation*. The activities of both institutions are based on special programs with respective budgets.

The **Tiger Leap Foundation**⁴⁷ is established under the *Estonian Ministry of Education* in 1997 with the purpose to offer support in procuring ICT equipment for general education schools which, according to the *Basic Schools and Upper Secondary Schools Act*, are obliged to ensure that they have the necessary teaching aids. In recent years, the *Tiger Leap Foundation* has been promoting the use of ICT in everyday learning process. As a result, a remarkable number of Estonian web-based learning materials, simulations and ePortfolio are created in the framework of *Tiger Leap programmes*. The

⁴⁶ See also <http://www.oef.org.ee/en/>.

⁴⁷ See also <http://www.tigrihype.ee/eng/index.php>, <http://klient.ok.ee/tigrihype/>.

main activities of *Tiger Leap Foundation* have been carried out through programmes like *Tiger Leap* (1997-2000) and *Tiger Leap Plus* (2001-2005). At the moment, a new programme, *Learning Tiger*, is being developed for the period 2006-2009. From 2004, the *Tiger Leap Foundation*, in partnership with the *European Schoolnet*, is also coordinating and funding several educational programmes of the *European Commission* such as *eTwinning*,⁴⁸ *Springday Europe* and *Netdays Europe*.

The funds of the *Tiger Leap Foundation* come from the state budget, various fund sources, donations from the private sector and the activities of the Foundation itself. Some resources have also come from PHARE ISE (in 2003) and from EU's structural funds. In implementing its projects, the Foundation will proceed from a co-financing requirement, establishing that the funds allocated by the local government will be enhanced by 1/3 of the sum from the *Tiger Leap Foundation*.⁴⁹ At the general education level, the *Tiger Leap Foundation* has financed eLearning activities between 1996 and 2006 with a total of EUR 18.36 million, from which 70% have been used for maintenance and improvement of schools' ICT infrastructure (including Internet connection); 15% for teachers' training; 10% for web-based learning materials and learning software development; and 5% for surveys/public communication (annual conferences) and management of the foundation (Mägi, 2006b).

The *Estonian Information Technology Foundation*⁵⁰ is a non-profit organisation founded by the *Ministry of Education*, *University of Tartu*, *Tallinn University of Technology*, *Eesti Telekom* and the *Estonian Association of Information Technology and Telecommunications (ITL)*. The Foundation's aim is to assist the preparation of highly qualified IT specialists and to support ICT-related development in Estonia. For these purposes, the *Estonian Information Technology College* is established; in addition, the Foundation administers the National Support Programme for ICT in Higher Education *Tiger University*. The Foundation also has a great role in initiating and developing eLearning possibilities through the *Estonian E-university* and the *Estonian E-VocationalSchool* consortiums. Since 2 May 2006, the *eLearning Development Center* has led the activities of both entities (*Estonian E-university* and *E-VocationalSchools*). Both consortiums are oriented on the development of eLearning (the main strength has given on development of web-based study materials, courses, curriculums, LMSs, CMS, and usage of course management systems) and on providing respective support and training. The *Estonian Information Technology Foundation* is financed by state budget, different funds, and donations from the private sector and the activity of the foundation. In 2004, from all the financial resources totalling EUR 1.85 million, about EUR 984 000 came from state financing (*Tiger University Plus Programme 2005-2008*).

- The *Estonian E-university*,⁵¹ established in the framework of the *Tiger University*, is the central institution giving advice to people who seek web-based courses for self-study and is supporting provision of web-based courses. It was founded in 2002 and operates as a project organisation under the umbrella of the *Estonian Information Technology Foundation*. The members of the consortium are the *Estonian Ministry of Education and Research*, *Estonian Information Technology Foundation* and Estonian Universities (*University of Tartu*, *Tallinn University of Technology*, *Tallinn University*, *Estonian Agricultural University*, *Estonian Business School*, *Estonian Information Technology College*). The *University Nord* and *Audentes University* are associated members of the consortium. The *Estonian E-university* is financed by membership fees as well by the state budget and by the funds from both local and international sources (especially EU's Social Fund).
- The *Estonian E-VocationalSchool*⁵² was founded in 2005 in cooperation of six (6) professional education institutions, 31 vocational education institutions, the *Ministry of Education and Research* and the *Estonian Information Technology Foundation* to promote

⁴⁸ *eTwinning* can be considered as an actor itself due to the collaboration in the framework of this project.

⁴⁹ The Foundation also organises public competitions to support the development of the most appropriate ICT solutions for schools and the acquisition of softwares that promote the quality of learning. The task of the school administrator is to support the procurement of ICT means for schools following the principle of co-financing (*The Tiger Leap Plus Strategy*, 2001-2005).

⁵⁰ See also <http://www.eitsa.ee>.

⁵¹ See also <http://www.e-uni.ee/index.php?main=120>. It is not a university in the usual sense.

⁵² See also <http://www.e-vet.ee/>.

lifelong learning under the principles of regional development and in the framework of the ten thematic networks. It functions under the *Estonian Information Technology Foundation* and is financed by the membership fees, the state budget and by Measure 1.1 of the EU's Social Fund.

For the period 2003-2005, eLearning projects at higher and vocational education levels have been supported with EUR 455 690. The two main consortiums of the *Estonian Information Technology Foundation* have been financed as follows:

- 1) *Estonian E-university* has been financed with a total of EUR 391 778 (i.e., EUR 127 823 in 2003; EUR 108 649 in 2004; and EUR 155 305 in 2005); and
- 2) *Estonian E-VocationalSchool* with a total of EUR 63 911 since 2005 (Anton, 2006a).

From the perspective of finance, the EU's structural funds are of great importance and have greatly affected eLearning developments at higher and vocational education levels.⁵³ In fact, the financial support for projects related to eLearning under ESF Measure 1.1 comprises one of the largest parts of the ESF budget where the *Estonian E-VocationalSchool* holds the biggest project financed with an overall cost of about EUR 2.288 million, from which EUR 1.7 million is covered by structural funds. The project is called *eKey* involving 33 vocational schools and will be for the period 01.07-2005 - 30.06.2008.⁵⁴ The *Foundation for Lifelong Learning Development (INNOVE)*, for instance, selects the appropriate projects to be financed by EU funds under Measure 1.1.⁵⁵

The main shortcoming of the financial system for eLearning activities in the public sector, chiefly relying on EU's structural funds, is its orientation on one-time projects. This suggests, considering the fact that the main activities in the field are organised by the Foundations and not by relevant ministries, that the clear responsibilities of ministries (especially of the *Ministry of Education and Research*) is missing in a supposed functioning organisational structure. In other words, the motivation of the state, upon which the availability of financial resources depends, is limited in the area of eLearning.

II.1.2.1 Academic institutions

The main providers of web-based courses in Estonia are the *Tallinn University of Technology, University of Tartu and Tallinn University* (previously *Tallinn Pedagogical University*) together with the private universities *Estonian Business School, Estonian Information Technology College, Concordia Audentes International University Estonia, Academia Nord and Mainor Business School*. *Tallinn University* has a great role in developing LMSs, CMSs and ICT-supported learning methodology. *Tallinn University* has also developed teachers' support system in the field of web-based learning.⁵⁶ The universities develop several digital learning materials for general schools.⁵⁷ Aside from the universities, the general educational schools themselves have been very active in developing digital learning materials.

The *Tallinn University of Technology* and the *University of Tartu*, together with the *Estonian Information Technology College*, are also the main providers of ICT education in Estonia. A large share of the first two emerges in the field of academic higher education and the latter plays an

⁵³ EU's funds have been used at higher and vocational education levels in addition to central financial resources. For example, web-based courses and video lectures of the *Tallinn University of Technology* and *University of Tartu* were at first financed by the *Ministry of Education and Research*, but recently it is mostly financed by the *Estonian E-university* and *REDEL project* under Measure 1.1 of EU's Social Fund.

⁵⁴ See also <http://www.INNOVE.ee/ee/?p=2&op=page&pID=377&action=search>.

⁵⁵ See also <http://www.INNOVE.ee>. Basically, the tasks of *INNOVE* include consultancy to those who want to apply for EU's financial support, evaluation of applications, and monitoring and evaluation of both funded and accepted projects.

⁵⁶ See also http://e-tugi.tlu.ee/esialgne_tegevuskava.htm.

⁵⁷ For example, web-based learning projects in the natural science, in cooperation between *5Dvision Llc* and *University of Tartu*. See more at <http://mudelid.5dvision.ee/>.

important role in the field of applied higher education (Kattel and Kalvet, 2006). For an overview about the main ICT education providing universities, see ANNEX III.

The universities are the main institutions (especially *Tallinn University* and *University of Tartu*) offering *initial teacher education*. Basic teacher training includes general courses on computer science, and instruction on methodology related to the use of ICT. *In-service teacher* training is mainly the responsibility of *universities*,⁵⁸ *the Tiger Leap Foundation*, *the Estonian E-university* and *the Estonian E-Vocational School*.

The university level is also the level where much of the R&D is carried through.

II.1.2.2 Other public players

The *Ministry of Education and Research* takes on the administrative task. It develops ICT based information systems like *Admission Information System* (SAIS), which has been the service through which applications for higher education admission are submitted electronically since 2005. It has also developed the new educational information system, the *Estonian Educational Information System* (EEIS), which replaces several separate databases. The *Estonian Informatics Centre* is responsible for the middleware system *X-Road* project, which enables the graduates of upper secondary school to see their national exam results in the Web.⁵⁹

In addition to governmental non-profit organisations like *Estonian Information Technology Foundation* and *Tiger Leap Foundation*, the *Estonian Educational and Research Network* (EENet), a governmental non-profit organisation established by the *Ministry of Education* in 1993, is active in the field of eLearning.⁶⁰ The state agency is responsible for a high quality national network infrastructure for the Estonian research, educational and cultural communities. The services of *EENet* also include permanent Internet connection as well as several other services – web hosting, e-mail services, FTP, DNS, consultations in case of security problems, hosting of teachers' digital learning materials, etc. (Standing Orders of Estonian Educational and Research Network). In 2004, the project *Estonian GRID* (*Eesti GRID*) was started.

The *National Examination and Qualification Center*, under the Ministry of Education and Research, has to create the system to support the professional development of teachers – to guide their training, retraining and in-service training (Founding Articles of National Examination and Qualification Center). It has carried out an annual national standardised test since the year 2002 to assess the *9-graders' ICT competencies*, from which all schools can participate on voluntary basis.

The *State Audit Office*, which is an external auditor for the Government, has the objective to audit the use of funds in the public sector and its performance (economy, efficiency and effectiveness).⁶¹ On the basis of audit results the Office advises the institutions of the public sector with respect to the use of public funds and performance of its tasks in an efficient manner. In the field of ICT, the *State Audit Office* has carried out six audits within the period 2001-2006. These audits mainly deal with evaluation, of which one of them is about ICT infrastructural issues in general educational schools (*The Tiger Leap Program in Estonian Schools of General Education*, 2003).⁶²

There is no concrete system for monitoring activities taking place regarding eLearning issues due to the missing official system for eLearning in Estonia. As the main responsibility of implementation of eLearning activities are in the hands of the non-profit organisations – *Estonian Information Technology Foundation* and *Tiger Leap Foundation* – they should carry out surveys in the field of

⁵⁸ Universities have organised ICT courses within the framework of in-service teacher training.

⁵⁹ See also <http://www.ria.ee/>. The subdivision of the *Ministry of Economic Affairs and Communications* which is in general responsible for the coordination and implementation of the development of state registers, computer networks and data communication, standardisation, IT public procurement, monitoring Estonian IT situation, etc.

⁶⁰ See also <http://www.eenet.ee/>.

⁶¹ See also <http://www.riigikontroll.ee/>.

⁶² See also <http://www.riigikontroll.ee/audit.php?audit=312>.

their responsibility. The main outcome has been annual reports. To date, only two (2) surveys have been carried out in the area of *Tiger Leap Foundation's* responsibility by Tallinn University:⁶³ *Tiger under Magnifying Glass – Study on Information and Communication Technology in Estonian Schools in 2000* and *Tiger in Focus – A longitudinal survey on ICT in Estonian schools 2000–2004*.

There are no specific public control mechanisms in place for eLearning activities in the private sector.

II.1.3 Involvement of private sector to the provision of services for eLearning

At the national level, the official involvement of the private sector in the field of eLearning is through the **ITL**, as member of *Estonian Information Technology Foundation*, which is of major importance in the area of eLearning.⁶⁴ ITL is also cooperating with other important actors of eLearning, like the *Tiger Leap Foundation* and the *Ministry of Education and Research*. However, ITL is rather concentrated on *eGovernment* and *eBusiness*. The main activities of the association include popularisation of ICT, promotion of vocational education and amendment of legislation.

The ***Estonian Information Technology Society***, which is a union of professionals, is responsible for the improvement of the qualifications and professional level of IT specialists, especially through the organisation of the vocational certification system in the information technology sector and formation of good communications and information exchange practices between IT companies and users.⁶⁵ Under this institution is the *AO Center (AO Keskus)*, an institution organised with the main aim of initiating *European Computer Driver's Licence (ECDL)* programme in Estonia.⁶⁶

In practice, the major role of the private sector has been the financing of public sector's initiatives (e.g., *Tiger Leap programmes*). Some large companies have likewise initiated their own financial support for developing IS, as well as the provision of corresponding training. As a matter of fact, the first LMS was established due to the initiatives of the banking sector, especially the *Hansabank* (see section II.4.2).

The most important institution of private sector in the field of eLearning is the ***Look@World Foundation***, founded in 2001 by ten leading major companies in the Baltic countries such as *Elion*, *Hansabank*, *EMT*, *Microlink*, *Baltic Computer System*, and *IT Grupp* with the aim to increase the number of Internet users, and thereby raising living standards of Estonians as well as the competitiveness of the Estonian economy in Europe. The ***Look@World Foundation*** has invested in computerisation through its *Look@World Project* over the three-year period 2001-2004 about EUR 2.55 million (Look@World Foundation's Internet Training Project Report, 2004).⁶⁷ The Foundation also helped to provide *PIAPs*⁶⁸ with computers and establish Internet connections where needed (Look@World Foundation). *PIAPs* are especially important for developing the skills of the people in the rural areas. *Look@World Foundation* also supports financially the use of web-based gradebook service *eSchool* in general education. The *eSchool* communication tool itself is developed and provided by *Koolitööde Ltd*.

⁶³ Surveys about the activities of the *Foundations*, especially the implementation of their development plans may be done by universities, research centres or companies selected in competition, and monitoring of different sub-projects can be executed by different institutions (The Tiger Leap Plus Strategy, 2001-2005).

⁶⁴ ITL is a voluntary organisation with the objectives to unite the Estonian information technology and telecommunications companies, to promote their cooperation in Estonia's development towards IS, to represent and protect the interests of its member companies, and to express their collective positions on issues of common concern (<http://www.itl.ee/english/general/index.asp>).

⁶⁵ See also http://www.eits.ee/index.php?section=ws_eits_eng.

⁶⁶ See also <http://www.ao.ee/keskus.htm>.

⁶⁷ See also http://w.hansa.ee/eng/supports_projects.html.

⁶⁸ The Estonian government (the *Ministry of Culture*) has also been very active in the spread of *PIAPs* – the *Ministry of Culture* ordered the establishment of Internet connection in public libraries and the opening of *PIAPs* in all Estonian libraries during 2002-2004 (Village Road II). The money for the Internetization of public libraries came mainly from the *Ministry of Culture* (Siil, 2000).

An important player in the local market of eCommerce applications is *Mindworks Industries Ltd.*⁶⁹ *Mindworks* is also an expert in eLearning and has developed corporate e-training environment *Eduitizer*. However, the number of companies in the Estonian market that are able to design digital learning materials from usual word documents and create interactivity is very limited today (Interview with Tammiste, 2006). For example, *eProject*⁷⁰ is considered to be the only professional company that develops SCORM-compliant educational/training content for private schools and industry (Laanpere, 2006b).

In the framework of different *Tiger Leap Foundation's* programmes, the private sector (next to universities) is seen as one of the leading actors developing virtual learning objects and new digital learning materials, supporting further development of LMSs (especially those in Estonian) and the creation of web-based test environment for controlling ICT skills of teachers and students, and supporting the purchase of new modern technologies for schools as well (Learning Tiger Action Plan 2006-2009; see Text Box 7).

Text Box 7. One of the best examples in the production of new eLearning objects is a firm called *5D Vision* (<http://www.5dvision.ee/tutvustus.pdf>) established in 1999. Especially important for general education as well as for lifelong communities is a repository of e-worksheets established and provided by *Miksike Llc* (<http://www.miksike.ee>) since 1994. In developing digital learning materials, contributions have also been done by firms like *Hurmaster Llc*, *Sarrup Llc*, *ApsProg Llc*, *Mathema Llc* and *Edusoft Llc* (also, see http://www.tiigrihype.ee/projekt/valmis_opi.php). *Microsoft* (Estonia) provides licence for educational software *Academic Edition* and *Alliance* for Estonian schools (certain requirements of qualification is needed) at all levels (<http://www.microsoft.com/eeesti/>). ICT firms like *Jucotec Llc* and *Pro-STEP Llc* (<http://www.jukotec.ee>; <http://zope.eenet.ee/cnc/partnerid/jukotec>) have also been involved in software provision (CAD-CAM systems).

However, the role of the private sector has in practice remained limited. A reason has been the private sector's high price in developing software due to a rather small market for Estonian digital learning materials. In other cases, private sector's involvement has been restricted due to the very essence of available local open source LMSs, CMSs, etc. – i.e., they are available without costs. An exception, to a certain degree, is the LMS *IVA*.⁷¹ The private sector also provides scholarships for different IT real life projects in cooperation with the *IT College*, *Tallinn University of Technology* and *University of Tartu*. The projects are implemented by small groups under the guidance of the private sector (Interview with Tammiste, 2006). Interestingly, this development is very important since it is usually perceived that while the private sector is willing to fund different IT projects, it does not cooperate with the public sector on R&D initiatives.

There are also some training and software enterprises in the market whose activities include the provision of services for eLearning. However, the number of this kind of firms remains limited (for an overview of the respective providers in the market, see overview in ANNEX III). Overall private sector's involvement in the provision, control, and finance of eLearning services is also limited (see Table 11 for major services provided within eLearning). Private sector involvement in general education through financing and providing specific software is greater than in higher and vocational education, where public sector activities (above all, financial resources, digital learning materials and environments) continue to prevail.

ANNEX III provides a summary of Table 4 about the roles and responsibilities of different actors in the field of eLearning in Estonia.

⁶⁹ See also <http://www.mindworks.ee/>.

⁷⁰ See also <http://www.eprojekt.ee/>.

⁷¹ The financial support from *Hansabank* went to *Tallinn University*, rather than to *IVA* (Interview with Laanpere, 2006).

II.2 Current strategies, policies, action plans and projects/programmes

II.2.1 Description and evolution of the major government policies that focus on eLearning

eLearning developments in Estonia are quite often based on grassroot-level local initiatives, sharing of best practice, active involvement in European networks, etc. The weakness of this approach is that developments in eLearning and related policy decisions/priorities behind the actions are often not documented (Laanpere, 2006b).

The first IS strategy was prepared already in 1998 and IS technologies have been a priority field since 2000 according to research, development and innovation strategies.

The overall ICT policy framework in Estonia, the *Principles of the Estonian Information Policy for 2004-2006*, approved by the Government in 2004, follows the objectives set out in the *eEurope 2005 Action Plan* and declares eLearning as a main priority (see the extracts of the strategy in ANNEX III; also, Text Box 8).⁷²

Text Box 8. Priorities in the field of eLearning:

- to increase digital literacy of the population;
- to continue the development of PIAPs through the provision of basic computer skills;
- to increase the computerisation level of schools at all levels to the average of the EU;
- to introduce web-based study forms in higher education and lifelong learning;
- to publish reference books, study materials and scientific articles in Estonian in the Internet;
- to develop vocational and continuing education system for training IT support personnel and equipping all graduates of educational specialties with ICT skills necessary for teaching their subject (Principles of the Estonian Information Policy for 2004-2006).

Actions have been undertaken in all the aforementioned fields. As eLearning activities are mainly regulated by its own domain's development plans (especially by *Tiger Leap* and *Tiger University programmes*, and the *Estonian E-university Strategy* derived from the latter) the main outcomes are described under these programmes. At the moment, a new development plan, *Estonian Information Society Development Plan for 2013*, has been accepted on the 30th of October 2006. Here, the eLearning objectives are stated more widely than in the previous one, concentrating on the further development of e-education (propagation of flexibility and individuality in the learning process, including enhancement of lifelong learning) and further developing knowledge about ICT and respective skills of the society.

Overall, the first documents mentioned above were rather oriented on state and state information system – that is, eGovernance, while the latest strategy (*Estonian Information Society Development Plan for 2013*) is rather oriented on society as a whole: 1) citizens and their ICT skills, 2) economy, 3) well functioning state.

The main driver for change at the general educational level is the action plan of *Learning Tiger for 2006-2009*. While the previous *Tiger Leap* programme (1997-2000) concentrated on computerisation of schools and its succeeding *Tiger Leap Plus* (2001-2005) focused on the modernisation of learning methodology and on increasing ICT competencies of teachers and students (see also overview of both development plans and their implementation in ANNEX III), the purpose of *Learning Tiger* is to

⁷² The *Estonian Broadband Strategy 2005-2007* is also important in developing IS. Its main aim is to make available online services offered by both the private and public sectors for all citizens, as well as to contribute to competitiveness, creating new jobs and reducing costs of transportation and communications. Further steps are done to enhance access to the Internet and hence to increase digital literacy. One aspect of the strategy is to stress the importance of eLearning in Estonian education system.

highlight the sustainable development of LMSs, CMSs, etc. and ICT usage in learning process (see Text Box 9).⁷³

Text Box 9. More specifically, *Learning Tiger for 2006-2009*:

- It gives emphasis to the creation and distribution of web-based learning materials and to the improvement of the access of schools to eLearning environments and to web-services with study-purpose.
- The other essential object is to develop further eLearning environments in Estonian and maintaining the free access to them of teachers and students.
- *Learning Tiger*'s aim is to increase the efficiency of studying through ICT and eLearning to become a natural part of everyday studies, giving great emphasis on *Virtual Learning Communities, LMSs, Learning Objects, Learning Object Repositories, Learning Object Brokerage Platforms* and *Virtual Community of Practice*. Researches foresee the need to promote the studies of design, technology and media on general education as the greatest challenge (Toots, Plakk, Idnurm, 2004).
- The stress is given to the creation of administrative and respective regulatory framework for eLearning (*Learning Tiger Action Plan 2006-2009*). More specifically, according to *Learning Tiger* programme the *Ministry of Education and Research* should assure through the amendments of respective legal acts that virtual learning (including financing) has a clear legal base during the next three years, and that the results of the virtual learning are accepted at par with traditional learning.
- In addition, school principals' competencies in the field of ICT should be stated and the students' and teachers' further developed. The training of teachers, school principals and ICT infrastructure are still among the other priorities. A crucial challenge is the need for updating the teacher training curriculum.
- Much attention should be given to teachers' networks to create the web-based courses, and also to establishing support centers in counties (*Learning Tiger Action Plan 2006-2009*).

At the higher education level, the trend is not only to support ICT-related education, but also eLearning (mainly in the form of web-based courses and curriculum). Another aim has been the development of web-based courses in distance learning and in-service training. However, the efforts in the latter cases have remained very limited. In addition, taking into account the small size of Estonia, there is a tendency not to design and use the courses based only on web-based learning very widely (Pilt, 2003). The strong goals have been stated towards internationalisation – the English web-based courses and the curriculum for international market.

The *National Support Programme for the ICT in Higher Education Tiger University* (2002-2004), which was approved in 2002 and continued by the programme *Tiger University Plus* (2005-2008), aims to support the development of the ICT infrastructure, the ICT academic staff, the degree courses and the ICT-related curriculum at higher educational establishments (see the overview about the implementation of the plan in ANNEX III; also, Text Box 10). A special section in this strategy is created for eLearning activities, the Estonian E-university.

Text Box 10. The priorities of *Tiger University* are:

- development of ICT infrastructure (upgrading the academic backbones and networks, PC procurements, equipping the labs, providing software);
- development of ICT-related curricula (new curricula, creation of study materials, E-university, eLearning, literature and electronic resources);
- motivating the academic staff (mentoring PhD students, academic sabbaticals, lecturers' and PhD students mobility scheme, internships, visiting lecturers)(The Estonian Information Technology Foundation).

The objective of the *eLearning Strategy of the Estonian E-university 2004-2007* is to increase the percentage of web-based courses as well as the percentage of modules and curriculum and the number of teachers involved in eLearning (see extracts of this strategy in ANNEX III). The strategy is followed by the *Strategy of the Estonian eLearning Development Centre 2007-2012*, here in addition to these objectives stated in previous strategy, it is emphasized also the importance of available infrastructure to support the developments in the field of eLearning and the popularisation of

⁷³ On the basis of the *Tiger Leap* developmental plans all counties have worked out their own developmental plans. Also many schools have developed detail plans of their own (State Audit Office, 2003).

eLearning in terms of improving of people's awareness of eLearning (see Text Box 11). In September 2006, the ***E-memorandum*** between the Estonian higher and vocational educational institutions and the *eLearning Development Center*, was signed. It calls on **students and teachers** (not policy makers) to actively search for ways to take advantage of eLearning in Estonian education so as to raise the quality of the education provided.

Text Box 11. According to the *Strategy of the Estonian eLearning Development Centre 2007-2012*, the milestones for 2012 are:

- At least 80% of full-time teaching staff in institutions of higher education and at least 60% full-time teaching staff in vocational schools and institutions of professional higher education are on the basic level of education technology proficiency, at least 50% of those who have passed the basic level have progressed to the advanced level. All trainers are on the expert level.
- There is always a contemporary, functioning, secure and uniform eLearning infrastructure in Estonia, which guarantees that the objectives of the *Estonian eLearning Development Centre* are achieved and new learning methodology is implemented in higher and vocational education.
- To always have an overview of the situation of eLearning and trends in higher and vocational education both in Estonia and abroad.
- 80% of curricula in institutions of higher education and 30% of curricula in vocational schools have eLearning support (materials in the learning information system (LIS), learning environment, forum/lists, grade system/feedback, etc.).
- The curricula of least 8 *Estonian E-university* and 5 *Estonian e-VocationalSchool* consortium members can be fully taken in the form of eLearning.
- Good cooperation with educational institutions of different levels, eLearning development units and other organisations (companies, social partners) in order to guarantee improvement of the ability to compete.
- eLearning and possibilities of eLearning are well known in Estonia and abroad.

Additionally, the ***Estonian Higher Education Strategy for 2006-2015*** sets out as one priority the increasing use of web-based learning. It sees the necessity to establish regional learning colleges to enable studying under the curriculum of *Estonian E-university* and *E-VocationalSchool* all over Estonia, as well as the need to support tutoring of eLearning. However, these priorities have already been implemented mainly under the previous strategy – more specifically, through the *eLearning Strategy of the Estonian E-university*. At the regional level, the merging of vocational schools and the establishment of the vocational training centres (*School Network Development Plan for 2005-2008*) has had the impact on the creation of the preconditions necessary for the provision of eLearning in vocational education institutions.

The ***University of Tartu*** and the ***Tallinn University of Technology***,⁷⁴ the two largest universities in the country, have created their ***own strategies*** for developing web-based learning possibilities in the provision of E&T services. The main goal is to upgrade the quality of education services by improving the access to learning materials and study courses. In *University of Tartu* all curriculum in Open University system (distance learning) and 30% at stationary level require the inclusion of some form of web-based learning. In *Tallinn University of Technology* the amount of courses that include some form of web-based learning element is projected to rise to 90% by 2010. The ***University Nord*** has also worked out its own ***eLearning Strategy for 2006-2008***⁷⁵ and ***IT Strategy for 2005-2008***, with the main aims to enhance individual learning, create flexible learning opportunities for foreign students as well as for distance learning and therefore create its own web-based courses, do cooperation with *Estonian E-university* and train its professors in order to develop web-based courses.

⁷⁴ See the web-pages of the respective universities here.

⁷⁵ See also http://www.nord.ee/UserFiles/File/e-oppe_akava.pdf.

What can be seen from these strategies (except *Learning Tiger*) is that eLearning is treated only as web-based learning: 'eLearning is an interactive studying, where the learning process is generally based on the web and where most of the studies take place also on the web' (eLearning Strategy of the Estonian E-university 2004-2007). This kind of orientation has affected also the activities carried on in the field. However, today the change in this kind of approach may be seen and in the latest strategies of eLearning it is stated that: 'eLearning does not mean copying the current learning process with the help of ICT, but redesigning learning according to new possibilities. Introduction of eLearning does not mean that current good learning and teaching methodologies need to be abandoned, but it allows them to be updated and broadened (Strategy of the Estonian eLearning Development Centre 2007-2012).

From the financial aspect, one of the most influential strategies on higher and vocational education has been the *Estonian National Development Plan for the implementation of the EU structural funds SPD 2004-2006* and especially because of its ESF measure 1.1 (see Text Box 12). The strategy is going to be followed by the *National strategy for using EU structural funds in 2007-2013*. Overall, the structural funds have financed the projects emphasising the developments at doctoral levels in higher education and the development of IT-related curriculum in vocational education (Interview with Targama, 2006).

Text Box 12.

- **Measure 1.1: Educational System Supporting the Flexibility and Employability of the Labour Force and Providing Opportunities of Lifelong Learning for all (ESF)** (*Riikliku arengukava meetme 1.1 "Tööjõu paindlikkust, toimetulekut ja elukestvat õpet tagav ning kõigile kättesaadav haridussüsteem" toetuse andmise tingimused*) foresees the availability of Internet-based application in education and in creating lifelong learning opportunities for adults. It also supports trainings in the field of ICT and digital technology for teachers and trainers to promote the implementation of ICT in the teaching process and development of eLearning materials (The Decree no 43 of the Minister of Education and Research, 24 October 2005).
- **Measure 4.3: Modernisation of Infrastructure for Vocational and Higher Education (ESF)** (*Riikliku arengukava meetme 4.3 „Kutse- ja kõrghariduse ning seda toetava infrastruktuuri kaasajastamine” toetuse andmise tingimused*) recognises the need for construction and renovation of buildings and research bases of vocational and higher educational institutions (regional colleges), including the development of the infrastructure of information technology (The Decree no. 29 of the Minister of Education and Research, 17 May 2004).
- **Measure 4.5: Information Society Development (ERDF)** (*Riikliku arengukava meetme nr 4.5 «Infoühiskonna arendamine» tingimused ja toetuse kasutamise kava koostamise kord*) is concentrated broadly on the further development of public sector eServices (The Decree no. 151 of the Minister of Economic Affairs and Communication, 9 June 2004).

With EU's new *Financial Perspective* and new *National Development Plan* for structural funds being currently discussed, new policy instruments are expected to be in place that will target eLearning as well (e.g., the development of common study information system, regional development especially of regional learning colleges which were part of earlier strategies, and provision of access to education for disabled persons through ICT means).

EU's programmes have played a great role in developing eLearning in Estonia – for example, the EU's Socrates Minerva and the appropriate programme of Estonia, *Creating network-based Estonian E-university model for the small countries in the context of eLearning in Europe 2003-2005*, which aims to create an *Estonian E-university*.⁷⁶ In general, eLearning activities are supported by the EU's *eEurope 2005 Action Plan*, *eLearning Programme, Education and Training 2010*, etc.. However, the effectiveness of these latter programmes remains to be investigated since they are only currently

⁷⁶ See also <http://www.e-uni.ee/Minerva/>.

referred to in several strategies like *Principles of the Estonian Information Policy*, *Tiger University Programme* and *Learning Tiger*.⁷⁷

Although several other political documents have stated eLearning (in terms of web-based learning) as a mean to solve overall problems and hence should have had positively affected eLearning developments, these priorities have often remained in words. This is particularly the problem in lifelong learning (see the list of policies affecting lifelong learning in ANNEX III).

II.2.2 Evaluation of possible international influence, especially of the European Union, on eLearning policies

The basic policy document in the field of IS in Estonia is *the Principles of the Estonian Information Policy 2004-2006*. This strategy was strongly influenced by the *eEurope+* and *eEurope 2005* policy documents. Its focus was primarily on the development of individual eServices, including the necessary infrastructure for it and the development of ICT sector. There is a growing understanding, both in the EU and in Estonia, that in order to gain success, mere use of technology is not be sufficient – the real impact is only achieved if implementation of modern technologies is accompanied by the reorganisation of processes and continuous upgrading of skills. These principles have been taken into account in the strategy *Estonian Information Society Development Plan* – a follow-up to the current *Principles of the Estonian Information Policy*. The new policy document does not only deal with the state information system, but also envisages activities for increasing the competitiveness of the ICT sector, widening the use of IT in the business sector, in education sector (including teaching the needed basic skills and widening the use of ICT-supported learning) and in the society at large, and for adapting to changes brought along by the introduction of new technologies (Information Technology in Public Administration of Estonia Yearbook, 2005).

The new strategy takes very directly into account the objectives and priorities of the EU information strategy *i2010*, and also of those, which were stated in the *eEurope* strategy documents. According to Karin Rits, head of *Information Society Division* of the *RISO*, the EU's strategies are, to a certain extent, adapted to the local situation (e.g., solutions like *X-Road*, available to all), and that the goals in the strategies have come from the local level. At the moment, at the eGovernment level a survey to detect bottlenecks and challenges is being conducted (Rits, *RISO* 2006).

In the field of education, the *Ministry of Education and Research* has not carried out any analyses to assess the EU's effect on the national eLearning strategies. Neither has the EU's effect on the Estonian legislation in the field been analysed. However, in the process of elaborating the respective strategies, local socio-economic reality and international practice have been arguably taken into account (Anton, 2006b). In the framework of the project *REDEL* (financed by EU's ESF) the political survey is under this field, which should be completed at the beginning of 2007 (Tammeoru, 2006b).

eEurope 2005 has had strong influence in promoting the usage of ICT in education – an example in the case of Estonia is the *Tiger University Strategy*. Other development plans in education (e.g., *Learning Tiger* and *eLearning Strategy of Estonian E-university*) seem to be developed according to local specifics and needs. Furthermore, this is supported by the fact that the activities towards eLearning on general education started already in 1997 with the *Tiger Leap programme*. Also, the universities' strategies for eLearning are derived from their own needs for the future. The influence of the *i2010* has been great at the level of lifelong learning. Here, the main objective of the *Lifelong Learning Strategy 2005-2008* is derived from *Education and Training 2010*: to increase the participation in lifelong learning amongst 25-64 year old participants by 10% in 2008 (see Kiviselg et al., 2006).

⁷⁷ Estonia is also related to the programmes like *eTEN* and has applied to take part of the project *eCONTENT*. The coordinator of these programmes in Estonia is the *RISO (Ministry of Economic Affairs and Communications)* and the support center at the national level is *Archimedes Foundation* (Information Technology in Public Administration of Estonia Yearbook, 2005).

In sum, although EU's influence in developing policies on eLearning in particular and IS in general has been significant, it is not plausible to argue that Estonia has followed specific best practices. As Estonia has been actively developing policies in the eLearning area since mid-1990, it has been emphasising local specifics and needs rather than compliance with EU guidelines. Today, the *National Lisbon Strategy* is designed in large scale on national strategies, and not in the prescribed EU ways. However, international practices are followed in certain scope (*ECDL* mainly) in the framework of general ICT skills' training and of teacher training. In the case of the private sector, being part of international corporations has not influenced training either (Kahn, 2006; Interviews with Kuusemets and Väravas, 2006).

II.2.3 Implementation of eLearning policies

The other question is how national strategies in the area of eLearning have been implemented and what have been the main results. This is important because while there has been generally a consensus among all political parties on the goals stated above, linkages between political rhetoric and policies/action plans often remain non-existent.

The action plans (especially the ones for the year 2006) of the *Principles of the Estonian Information Policy 2004-2006* are very general from the standpoint of education, bringing out only a few fields to be developed. Furthermore, as the main priorities are stated by *RISO* (although in cooperation with the *Ministry of Education and Research*), which is under the jurisdiction of the *Ministry of Economic Affairs and Communications*, it has no real power to evaluate the implementation of the strategy.⁷⁸ Hence, the strategy's value (especially in the education sphere) is questionable.

The deepest and well-elaborated plans (also for teacher training) have been worked out at the general education level. However, a careful analysis of the respective action plans makes one realise that although legal issues have been among the top priorities in all action plans, a total solution for these have not yet been found.

The implementation of the *eLearning Strategy of the Estonian E-university 2004-2007* in higher education has been positive, although the need for further development is obvious (web-based curriculum, the number of web-based courses, especially in the case of distance and in-service training, advanced curriculum for teacher training, and most of all the expected role of eLearning in higher education). Behind the positive developments is the fact that the main initiative – the *eLearning Strategy of the Estonian E-university 2004-2007* – was born out of the universities and not at the national level. This means that behind the Strategy are universities themselves, and thus taking on the strong responsibility of implementation (Laanpere, 2006b). This approach is also logical due to the legal autonomy and independence of universities in Estonia. At the same time, given that the *Estonian E-university* consortium is composed only of biggest universities in Estonia, the Strategy is not applied to those universities or higher educational institutions outside the consortium (Laanpere, 2006b). Furthermore, it can be argued to what extent does the Strategy reflect the future plans of universities for eLearning – considering how rarely the representatives of universities meet in the framework of this consortium, and how big a role they can actually play (noting that the *Estonian E-university* has been under another organisation, the *eLearning Development Centre*, since spring of 2006).

In addition to the main strategy for higher education, eLearning development has been supported by the EU's structural funds, based on the *Estonian National Development Plan for the Implementation of EU Structural Funds – Single Programming Document 2004-2006*. As a result, largely the development in the area is depended on the availability of specific financial resources. This means that to date the developments in eLearning are mainly based on single projects.

⁷⁸ eLearning goals in strategy are the result of cooperation between the *Ministry of Education and Research* and *RISO* – how IT could bring benefit in education through a synergy approach. *RISO*'s role was to take overall direction in IT (Interview with Rits, 2006).

Lifelong learning is in the poorest condition in the field of eLearning. The respective objectives for lifelong learning in the action plan of *Lifelong Learning Strategy* are quite few (the most important one related to the *E-VocationalSchool*). One of the main problems in the field is the lack of recognition of learning as essential part in everyday life in the whole society; and secondly, the lack of legal and organisational system for lifelong learning at the state level to support the implementation of the set priorities.

Another very serious problem is that the few existing national strategies and policies addressing eLearning (*Tiger Leap*, *Tiger University*, *ICT Policy Framework*, and *National Development Plan*) are practically disconnected to each other. Even the closest action plans that are administered by the same institutions (e.g., *Tiger University* and *eLearning Strategy of the Estonian E-university 2004-2007* under the *Estonian Information Technology Foundation*) seem not to have shared goals, priorities, etc. (Laanpere, 2006b). The role of the *Ministry of Education and Research*, which should be the central coordinating unit of e-education in Estonia, has become merely the allocation of money from the state budget to the *Tiger Leap Foundation*, to the *Estonian Information Technology Foundation*, and from the ESF funds to *INNOVE*. It has not fulfilled the other crucial tasks as envisioned (e.g., relating the strategies of ICT-education to the other strategic documents in the field of education and creating the legal environment required for achieving the plans' objectives (The *Tiger Leap Plus Strategy*, 2001-2005).

II.2.4 Major public and private projects and programmes in eLearning: their aims, financing and results

II.2.4.1 Projects to develop basic ICT skills

Two major projects in the past have been launched in order to enhance overall digital literacy skills across Estonia: (1) the development of *PIAPs* to promote access to computers and the Internet (a programme already discussed above); and (2) the *Look@World project* to mainly train people for ICT skills development.

The *Look@World Internet training project* was a project for 100 000 people to create training network, to provide free-of-charge basic computer and Internet training (see Text Box 13).

Text Box 13. Two-day courses (8 hours altogether) both in rural and urban areas were provided through the training project. The course included teaching of computer (its different parts and usage, main principles in working with computer, and usage of WS World) and of Internet (especially the use of search engines and of eServices) (Look@World Foundation's Internet Training Project Report, 2004).

Since competence of using Internet in urban areas was already higher than in the rural areas, more training was provided in the latter. During 2002-2004, 102 697 people (i.e., 10% of Estonia's adult population and approximately 15% of adult population in rural areas) was trained in the framework of the project. Hundreds of employees from enterprises took part in the training to learn the use of ICT tools in everyday work (Look@World Foundation's Internet Training Project Report, 2004). Thus, the *Look@World project's* experience was very important also on enterprises (Interview with Tammiste, 2006). The project was implemented on the basis of PPP of the *Look@Word Foundation*, and is one of the biggest training projects financed by the private sector. See also the concrete budget for project in Figure 4 in ANNEX III.

According to the Lifelong Learning Strategy 2005-2008, the follow-up project of Look@World will be conducted in 2007. The original plan suggests that the EU's ESF funds are to be used for offering computer training, setting 15 000 as a realistic number of people who could be trained at the duration of the project (European Commission, 2005a). The role defined for the private sector, and especially the *Look@World Foundation*, is to oversee the training in the field of computer security for all computer home users (Interview with Tammiste, 2006).

II.2.4.2 Projects/programmes at general educational level

At the general education level, the most important activities have been in the framework of *Tiger Leap* development plans. An overview of the project carried out in the earlier phase can be found in ANNEX III.

In 2004, the Tiger Leap Foundation started the technology-teaching project, which was designed to help modernise the subject *Manual and Technology Training* (*Töö- ja Tehnoloogiaõpetus*) in Estonian schools.⁷⁹ Twenty schools from all over Estonia were involved in the pilot project, and got the computer lead CNC profiler and design software (Overview of general education in Estonia in 2001-2005).

General education schools have participated in several projects financed by the *European Commission*. The most important projects are *CALIBRATE*, concentrating on enhancing the usage of electronic learning materials, *eMapps.com* investigating mobile-based eLearning possibilities, as well as *eTwinning project* enhancing the cooperation among European schools.

The project *CALIBRATE* was launched by *European Schoolnet* in Tallinn in 2005 for 30 months.⁸⁰ It is part of a new group of IST projects supported by the *European Commission's 6th Framework Programme*. This project brings together eight Ministries of Education, leading research institutions, validation experts, technology providers and SMEs to carry out multi-level project designed to support the collaborative use and exchange of learning objects/resources in school. In the Estonian context, the plan is to recreate the Estonian news and community portal *Koolielu*, which also contains a repository of digital learning resources, and to connect it to other repositories of the kind and to learning environments widespread in Europe.

In 2005, *eMapps.com* was launched as part of the *European Commission's 6th Framework Programme*. It was also a pilot project about using *mobile phones in learning process in Estonia* (two schools have been selected here – *Tallinn 32nd High School* and *Haapsalu Upper Secondary School*) (The Annual Report of the Tiger Leap Foundation 2005).

eTwinning is a framework for schools to collaborate on the Internet with partner schools in other European countries.⁸¹ It promotes school collaboration in Europe through the use of ICT by providing support, tools and services to make it easy for schools to form short or long term partnerships in any subject area. As a result of their participation in the framework, the Estonian teams have gained positive acknowledgement for its projects (e.g., 'My Week').⁸² A local blog for the project was also developed and carried out several trainings and information days. The programme is very popular among general education schools – by the end of 2006, around 200 schools joined the programme.

In addition to these, the development of digital learning materials for both general education and EU levels is outlined within the framework of the Leonardo da Vinci programme. Higher educational institutions, which would teach the teachers at upper secondary level to design digital learning materials, are involved in the projects (see Eesti Postimees, 31.10.2006).

II.2.4.3 Projects/programmes at higher and vocational education levels

At the higher education level, the *Tiger University* programmes are the most important programmes related to ICT issues. Several new projects are, however, taking over the role especially on eLearning matters.

⁷⁹ See also <http://klient.ok.ee/tiigrihype/?op=body&id=14>.

⁸⁰ See also <http://www.europeanschoolnet.org/> and <http://www.htk.tlu.ee/htk/projektid>.

⁸¹ See also <http://www.etwinning.net/ww/en/pub/etwinning/index2006.htm>, <http://www.htk.tlu.ee/etwinning/news>, <http://sopruskoolid.blogspot.com/>.

⁸² See also <http://projectmyweek.blogspot.com/>.

The **Distance Learning Programme at the Institute of Finance and Accounting** in the University of Tartu⁸³ is composed of 17 web-page courses,⁸⁴ from which each student can compose their own portfolio (see Text Box 14). These 17 courses commence four times every year (and end with an exam three times a year); the total number of courses was 60 (with 605 students) and 65 (with 569 students) in 2005 and in 2006, respectively (Liikane, 2006).

Text Box 14. The Distance Learning Programme was launched by the *Estonian Banking Association (EBA)* in 1995 when the first nine courses were introduced. These courses were worked out within the framework of the PHARE programme in cooperation with *Banking Institutes in Portugal and Catalonia* and *Belgian Bankers Academy*. In 1996, the pilot group consisting of 30 students graduated. In 2002, a contract was signed about the acquisition of the Project by the *Institute of Finance and Accounting* of the University of Tartu. Since 1996 the number of students who have participated in the *Distance Learning Project* has exceeded 7 000.

ICT Cert is a project aiming at the development of joint curricula, courses and accreditation opportunities for telecommunications specialists in Finland and Estonia.⁸⁵ The purpose of the project is to develop a system with which ICT assemblers or those intending to be one may acquire the needed qualifications and certificates. New curriculum will be developed, based on the requirements of qualification in Estonia and Finland, with the needed study materials for the required training (qualification may be achieved also by passing the competence tests without any training). A training cooperation network will be created in which resources (teachers, equipment) may be shared between the participating institutes. Paths for student exchange and on-the-job training in the neighbouring country will also be opened. The project is financed from the ERDF and is implemented in the framework of the program *Southern Finland and Estonia INTERREG IIIA*. This is a project of *Tallinn University*.

iCamp, the *Educational Web for Higher Education in an Enlarged Europe*, is part of a new group of IST projects supported by the *European Commission's 6th Framework Programme*, in which Estonia is represented by the *Tallinn University*.⁸⁶ Its main objective is to create an open virtual learning environment for university students across Europe by connecting different open source learning systems and tools, and to provide interoperability amongst them. This new learning environment is a learner-centred space where students and educators will work collaboratively on assignments across disciplines and across countries with a special focus on the integration of students and universities. *iCamp* will offer students and educators both innovative and easy-to-use tools for collaboration and interaction as well as access to a variety of resources.

In addition, *Tallinn University* has been organising an international Erasmus Intensive Programme **eLearning in Higher Education 2004-2006** in Viljandi and Haapsalu.

Of utmost importance at the vocational education level is the **E-Vocational School's project eKEY (e-VÕTI)**,⁸⁷ which plans to create 640 digital learning objects; to develop courses for 615 weeks; to support the introduction of LMS *IVA* or course management system *Moodle* by consortium members; to train 2310 professors, teachers and tutors; to create a support system based on education technologists (more specifically to employ 33 education technologists in schools of the consortium); to create special portal for web-based courses and digital learning objects; and to conduct studies in the field of eLearning. The project duration is set between 01.07-2005 and 30.06.2008.

However, since the abovementioned projects have only started recently it is difficult to appraise the developments in the framework of the respective projects.

⁸³ See also <http://www.finance.ut.ee>.

⁸⁴ Bank Functions, Balance Sheet Activities in the Financial Institutions, Financial Services, Bank Financial Statement Analysis, Value Based Financial Management, Bank Organisation, Monetary Policy & Euro, Credit Management I-II, Foreign Trade, Real Estate Markets & Business I-II, Marketing of Financial Services I-II, Financial Markets, Life Insurance, Pension Insurance, Insurance of Property Risks, Project Work and Real Estate Law. See also <http://www.finance.ut.ee/index.php?eng/67/11/0/104>.

⁸⁵ See also <http://www.htk.tlu.ee/ictcert>.

⁸⁶ See also http://www.icamp.eu/learnmore/project_objectives/index.html and <http://www.htk.tlu.ee/icamp>.

⁸⁷ See also <http://iva.e-uni.ee/e-voti>.

II.2.4.4 Projects in teacher training

Overall, the emphasis at the general education level on teacher training projects has been much greater (thanks to *Tiger Leap Foundation*) than at higher and vocational education levels. However, several courses have been launched in the latter cases (especially by the *Estonian E-university*, universities and *E-Vocational School*). As a result, greater role has been given to projects carried out at general education level.

On general education, the *Tiger Leap Foundation* has offered courses for basic ICT skills and ICT application training for teachers (e.g., in Biology, Chemistry, Mathematics, Physics, Astronomy, Elementary Studies, History, Estonian, English and German) (The Tiger Leap Plus Strategy, 2001-2005). Altogether, 75% of teachers have been trained twice in ICT skills (Overview of general education in Estonia in 2001-2005; Mägi, 2006).

The **Training Programme on Digital Didactics** was launched in 2003 and ran for two years.⁸⁸ This was a product of the cooperation between *Tiger Leap Foundation* and *Tallinn Pedagogical University*. The programme included courses like *Computers in Digital Didactics of Elementary Education*, *Computers in Math Digital Didactics* and *Computers in Digital Didactics of English*. In 2005, 88 teachers completed the 40-hour training. The final works created in the framework of the course are available from the Estonian educational portal *Koolielu*.⁸⁹

The next project of *Tiger Leap Foundation* is the follow-up project to the *Computer at School*⁹⁰ – **DigiTiger** (*DigiTiiger*).⁹¹ According to this project, the Foundation is making contract to 23 Estonian Schools and will provide free in-service training for general school teachers during the succeeding three years. Until the year 2008, the plan is to train about 6 000 teachers (see Estonian Portal Koolielu, news 06.02.2006).

In 2005, the *Tiger Leap Foundation*, in cooperation with *BSC Koolitus*, also started to work out the special course for school principals – **Digidirector** (*DigiDirektor*).⁹² The aim of the course will be to introduce the possibilities ICT provides for schools and the role of principals on this endeavour.

New courses and projects have been launched in order to support teachers in the field of eLearning (Text Box 15).

Text Box 15.

The Implementation of ICT Skills in Learning Process – Projektipaun (*IKT oskuste rakendamise õppeprotsessis*) (<http://www.htk.tlu.ee/projektipaun>) is a cooperation between *Microsoft* and *International Society for Technology in Education (ISTE)*. The aim of the course is to provide teacher solutions and examples on how to effectively use technology in teaching their subjects and in integrating it to different subjects. In addition to ICT skills, the course gives information about project learning (*projektiõpe*). This is a 20-hour long course.

AnimaTiger (*AnimaTiiger*) (<http://www.htk.tlu.ee/animatiiger>) is an 8-hour course to introduce to the teachers how to make short movies and to use these methods on students to make classes more attractive (e.g., art and literature subjects). The course has also a follow-up advanced course. In addition, the project is supporting the purchase of respective technical means like cameras for schools. The project is a cooperation between the *Tiger Leap Foundation* and non-profit institutions like *Nukufilmi Lastestuudio* and *Movev Bus (Kinobuss)*.

⁸⁸ See also <http://www.tiigrihype.ee>.

⁸⁹ See also <http://www.koolielu.ee>.

⁹⁰ The project was launched in 2001, and was a 40-hour long in-service training programme for teachers, prepared by *Intel Corporation* and adapted in 26 countries (Laanpere, 2003/2004). The course included the following topics: study material and creation of web pages, use of Internet resources as well as educational and standard software, the possibilities about e-mail and ICT use for administration of class work. Furthermore, the course was suitable for Estonian teachers as well as for school managers (European Commission, 2004).

⁹¹ See also <http://www.htk.tlu.ee/digitiger/>. The 40-hour course will include 10 modules and during the course different learning environments like *Plone*, *IVA* for teachers and *VIKO* for students are used. The main aim is to introduce the new innovative learning methodology and means to teachers. The final work is to create own web-based course in LMS *VIKO*.

⁹² See also <http://www.tiigrihype.ee/?op=body&id=18>.

At the higher education level, the *Estonian E-university* and *E-Vocational School* have given great emphasis on training of teachers/trainers and especially of educational technologists. During the courses provided by the *Estonian E-university* teachers are taught the new possibilities in ICT, creating web-based learning materials and specific teaching methodology. The web-based courses provided are divided into three different levels: basic level has courses for 2 CPs, advanced for 6-8 CPs and expert level for 15-35 CPs.⁹³ The courses are mainly available in the web.

Some of the new projects are presented in Text Box 16.

Text Box 16.

OPAH – Teacher’s Professional Development Supported by ePortfolio (<http://www.htk.tlu.ee/opah>) is designed to support a teacher’s professional development through ePortfolio solutions and to develop the competences of lecturers and teachers in educational technology at all the three levels of teacher education. The activities of the whole project are divided into two groups. Group I – *Teacher’s Professional Development group* has three subgroups: *an initial training group*, *occupational year group* and *continuing education group*. All these groups together create the idea and content of the digital portfolio. Group II – *Technical group* creates the implementation, technical and software infrastructure for ePortfolio. The project is financed by EU’s ESF.

B-Learn – Assisting Teachers of Traditional Universities in Designing Blended Learning (<http://www.ut.ee/blearn/>) is planned to offer solutions on how to integrate traditional learning methods with methods offered by new technology. Primary target groups are the users of blended learning (teachers, students, instructional designers, educational technologists) mostly from higher education institutions, and from other types of institutions as well. Innovative usage of technologies and methods by teachers would result in better learning results, more flexibility for all but mainly part-time students, more satisfaction and improvement of orientation towards eLearning.

Notwithstanding the number of projects initiated to address the basic and advanced ICT skills, it has been claimed (also on higher education) that there is still much room for developing teachers’ and professors’ competence in ICT (see also Strategy of the Estonian eLearning Development Centre 2007-2012). Currently, 23.5% of teachers at primary, 24.0% at lower secondary, 29.0% upper secondary and 39.4% vocational education level do not have sufficient computer skills (Empirica and TNS Emor, 2006).

II.2.4.5 Specific programs to specific groups

In general, the *Ministry of Economic Affairs and Communications* and the *Ministry of Social Affairs* are responsible for assuring access to the Internet for disabled people, according to the principles of the WAI. This obligation is also stated in *Estonian Information Society Development Plan for 2013* (Estonian Information Society Development Plan for 2013).

The *Tiger Leap Foundation* supports access of pupils with special needs to general education by making ICT available for that purpose. In particular, the project *ICT in the Education of Pupils with Special Needs*⁹⁴ provides support for centres and counselling for children with special needs, their parents, teachers, officials in education and for all other interested parties. The *Ministry of Social Affairs* provides for some ICT equipment. This is even more essential because many needed equipment are very costly for these targeted pupils. The *Estonian E-university* has created two web-based courses for students with disability, supporting their studies with 15 *Fujitsu Siemens Amilo Pro V2000* laptops and with six screen reader licences (*ekraanilugeja litsentsid*) (Tammeoru, 2006a).⁹⁵

Since 2003, ICT trainings for persons with disability have been carried on within the framework of the project *THINK*,⁹⁶ with financing coming from the *Tallinn University of Technology*. This project offers trainings on the usage of computer, and thereafter assuring graduates a job in the labour market. In 2004, there were 120 people who participated in the programme.

The *Look@World project* has been of utmost importance for people in rural areas.

⁹³ See also <http://www.e-uni.ee/index.php?main=101>.

⁹⁴ See also <http://www.tiigrihype.ee/eng/erivajadused/mis.html>.

⁹⁵ See also <http://www.e-uni.ee/index.php?main=160>.

⁹⁶ See also <http://www.think.ee>.

In sum, the number of projects focusing on the development of ICT skills or on the usage of ICT to support learning designed for the disabled and people living in remote areas are more than limited. Also, the overall assessment on activities in the field has been rather accidental because most of them are based on single project and hence with very specific goals. However, the general view on how eLearning should be promoted overall and on what role it has to play at different education levels and in lifelong learning and hence in teacher training is still missing. This generic view has not been developed in any specific strategies or through any laws.

II.3 The legal framework supporting eLearning

II.3.1 Laws and acts that have been adopted in the area of eLearning

In general, the legal basis in the area of eLearning is mainly restricted to some strategies and has no complete or specific legal basis which would ensure or hinder further development of the field. In fact, the term *eLearning* cannot be found in any legislative document in Estonia (Laanpere, 2006b).

According to the *Regulation of National Curriculum for Basic Schools and Upper Secondary Schools* (*Põhikooli- ja Gümnaasiumiseadus*), *Informatics* or *Computer Studies* is not a compulsory course either in the basic or upper secondary education. The *Ministry of Education and Research* has not also approved the required textbooks. The national curriculum for basic and upper secondary schools of Estonia sees ICT mainly as a horizontal cross-curricular theme – the developing of communicative, technological, math and cultural skills are viewed through ICT.⁹⁷

Every school has to find its own way to integrate ICT in different subjects in different grade levels, and guarantee the mastering of standardised **ICT competencies** by all **students by the end of compulsory 9-year of the basic school**, which have been enacted since 2002 (Laanpere, 2003/2004). See overview of these competencies in ANNEX III. This kind of approach may not be effective in the long run as it does not provide in the national system how to concretely enhance overall ICT skills and in what terms at different education levels.⁹⁸ In addition, according to the new draft of *Regulation of National Curriculum for Basic Schools and Upper Secondary Schools* the system is not changed.⁹⁹ This is illustrated by the fact that after successful deployment of the new national curriculum for basic and secondary schools in 1996, the following two national curriculum releases have failed (in 2002 the failure was partial, in 2006 complete) (Laanpere, 2006b).

At the same time, according to the *Regulation of National Curriculum for Basic Schools and Upper Secondary Schools*, every basic and upper secondary school has the right to provide optional courses in their respective schools. Consequently, most of the schools provide *Informatics* courses for basic school after all, starting in some cases already from the first grade level (1-3 school years). On the other hand, this results in occupying the computer classes and means that other teachers are not able to use computers for their lessons even if they want to (Laanpere, 2003/2004).

The Terms and Order of the Correspondence of Textbooks and Wordbooks to the National Curriculum and Specification for Textbooks and Wordbooks and Other Educational Literature (*Õpikute, töövihikute ja tööraamatute riiklikule õppekavale vastavuse kinnitamise tingimused ja kord ning nõuded õpikutele, töövihikutele, tööraamatutele ja muule õppekirjandusele*) brings out the

⁹⁷ According to the Draft of Regulation of National Curriculum for Basic Schools and Upper Secondary Schools (30 September 2006) the stated horizontal cross-curricular themes are lifelong learning and career planning, environment and sustainability, civil society and entrepreneurship, national culture and cultural diversity, IS, technology and innovation, health and safety, values and morality.

⁹⁸ Today, for example in the curriculum of different science subjects (primary science, biology, chemistry, physics, earth science) the role of ICT is emphasised differently: mainly using interactive learning materials, searching information via Internet and using the possibilities of ICT are considered important. In primary science and biology, project-based learning and simulation-games are suggested (The University of Amsterdam, 2002).

⁹⁹ Draft of Regulation of National Curriculum for Basic Schools and Upper Secondary Schools (2 January 2006).

necessity to have educational references in textbooks for using ICT means (§3). Article 6 states that audio-, audiovisual and electronic materials are used in the learning process as additional learning materials. In sum, as the usage of ICT means is voluntary, much depends on single teachers and on school principals.

The Framework for Teacher Training (*Õpetaja Koolituse Raamnõuded*), the curriculum for teachers of general education offered by higher education institutions, sets out as one of the objectives the development of the skills of teachers in the field of ICT. The competence to use contemporary ICT (general ICT skills) is also one of the qualification requirements for teachers (§ 18). ICT qualification requirements for teachers have also been mandated since 2005 in the **Professional Standard for Teachers** (*Õpetaja Kutsestandard*) – according to which teachers should know how to use ICT hard- and soft-ware, including different learning environments; should have knowledge about teaching methodology using ICT; should be capable to create digital learning materials and web-based courses and critically evaluate the available digital learning materials; and should know the truths about Intellectual Property Rights (IPR) (including citation). However, in general, the legal basis for professional standards in Estonia today remains questionable.

A positive development about teachers' ICT qualification is that the *Tiger Leap Foundation* has been working on a promising framework for eLearning-related competencies for teachers. However, this framework has not been finalised, legitimised, or implemented (Laanpere, 2006b). The other question is at which legal level this framework should be stated.

In some cases, legal acts related to eLearning are adopted due to the **Estonian National Development Plan for the Implementation of the EU Structural Funds 2004-2006**, which gives a concrete legal basis for the distribution of structural funds (see also section II.2.1).

There is a general requirement for the provision of ICT infrastructure in schools and training institutions, as well as in the public points for using computers – **the Specification of Health Care for the Computer Studies and for the Public Use of Computers** (*Tervisekaitsenõuded arvutiõppele ja arvuti avalikule kasutamisele*).

II.3.2 The legal framework for Intellectual Property Rights

Industrial Property matters are supervised by the *Ministry of Economic Affairs and Communications* and implemented by the *Estonian Patent Office*. The authorship rights are regulated by the **Copyright Act** (*Autoriõiguse seadus*) which has been in force since 1992. Copyright and related rights are in the hands of the *Ministry of Culture*. See overview about legal developments and collection of acts (including personal data protection) in the areas of intellectual property and ICT in ANNEX III.

According to *Copyright Act*, works of literature, art and science are protected by authorship rights. From the standpoint of eLearning, authorship rights are also protected in computer programmes, lectures and audiovisual works. However, besides *Copyright Act*, there are no special IPR laws for materials in digital form. The only restrictions are related to databases and computer programmes (Nemvalts, 2004). The rights come into being from the moment of starting the work with the creation.

In general, the author has personal (related mainly with name) and proprietary rights over creation. If the creation is the result of the assignment of work, then on the basis of employment contract the proprietary rights in certain limits are descending to the employer. In the case of web-based courses or materials, this means that the creation is related only to the author's name, but it belongs to the employer (e.g., to the university), who has the right to regulate usage of the creation (Nemvalts, 2004; Copyright Act).¹⁰⁰

¹⁰⁰ See also <http://sise.ttu.ee/?id=1605>.

It is very much possible to consciously or unconsciously violate IPR by using materials or courses available in the web (eLearning Conference, 2006). However, according to some persons actively engaged in the field of ICT-education, these violations, especially in the case of eLearning are not considered very important (Interview with Toots and Laanpere, 2006).

Furthermore, the question about IPR in the case of eLearning in Estonia may be overestimated and be more a theoretical problem. The main issue here is related to the attitudes of school teachers and university staff who do not want to share their digital content with colleagues. At the same time, it is clear that Estonian (higher) E&T market is too small to create a business potential for learning objects written in the Estonian language. This is why the *Tiger Leap Foundation* and *Estonian Information Technology Foundation* have been promoting the use of open licencing of digital learning materials (especially, *Creative Commons Licences*) (Laanpere, 2006b). On the practical side, it has to be taken into account that usually web-based courses do not work by itself – it needs persons behind it to communicate to students (through forums), assess the students' work, etc. (Interviews with Väli and Kusmin, 2006). Maintenance of web-based courses in LMS must also be paid (e.g., in *WebCT*).

II.3.3 Main legal issues and constraints affecting the development of eLearning

According to the *Regulation of National Curriculum for Basic Schools and Upper Secondary Schools Informatics*, ICT is not a compulsory course either at the basic or upper secondary education level (for an in-depth discussion on this issue, see Text Box 17). Although pilot exams are carried out to assess basic ICT skills in the 9th grade (where participation is voluntary) and the results of the exams have been rather good, the question whether that kind of system of no system in the field of ICT skills is enough to introduce eLearning and take it as the base to build up IS. At the same time, without making a paradigmatic change in the curriculum of general education, the realisation of a progressive usage of ICT in the learning process remains elusive. Moreover, on the basis of the study findings about ICT usage for educational purposes in general education, it can be said that the current curriculum, built on classical pedagogy and a strong orientation towards assessed achievement, hinders innovation and multidisciplinary learning (Toots, Plakk and Idnurm, 2004: 18). This is not about using several new methods and tools for assessment, but more about using ICT means and materials as additional support in teaching the subject.

Text Box 17. Concentration on ICT only as a horizontal theme in the development of curriculum is not enough:

- Firstly, the current approach suggests that the different subjects are covered unequally with ICT – i.e., every subject plan should address, among others, the possibility of using ICT tools, as well as the availability of these tools. The other aspect is the inappropriateness of existing curriculum tradition in Estonia which is subject-centred and into which horizontal approach is imported from elsewhere. To date, horizontal themes remain backward in teaching – that is to say, they are not taught at all in large scale. Thus, whether or not students can benefit from different ICT means and digital learning materials depend on the teacher – the teacher's knowledge about availability of these materials and desire to use them in the class. For example, although there are 5 000 materials available in the Internet for general school teachers, there is no consensus how these materials should be used.
- Secondly, some claim that the importance should not be placed on how one achieves ICT skills, but on the result; hence, there is no essential need for *Informatics* to be a compulsory course in general education. However, are the ICT skills acquired through subject learning enough? How much basic skills are required? At what ICT skill level has students achieved after they have finished the various education levels? Although there are very skilled students, this kind of approach may not be beneficial for all students and may actually result in unequal skills. Today, it would be an exaggeration to suppose that everybody already has basic ICT skills.
- Finally, compulsory *Informatics* would solve the problem of resistance on the use of ICT tools in subjects among *Informatics* teachers. Through this, the teachers do not have to search the ways to influence the importance of their own subjects. This is more important because computer classes are usually the main places where ICT tools can be used.

In addition, the use of ICT in teaching subjects is strongly dependent on the school boards, on whose competence development matters of schools depend (Learning Tiger Action Plan 2006-2009; Basic Schools and Upper Secondary Schools Act). The tangible effect of the Foundation's activity in support

of development of eLearning may be limited, especially if its activity is not supported by some kind of legal regulations.

The main issue is how to combine eLearning with national curriculum, and also of which kind should the general working order at schools be. First of all, it means that the technical environment must be in place in order to use ICT more in classes for both vocational and higher education which, in turn, are to be supported with relevant motivation system for teachers. This implies, above all, a good remuneration system for teachers who, on the one hand, spend their time preparing and using ICT in teaching, and, on the other, their compensation depends on the number of classes in a week. The question is even more important when one takes into account that eLearning is a relatively time-demanding task (eLearning Conference in Tallinn, 2006).¹⁰¹ The compensation system and authorship rights issues (resistance of teachers to share their digital content) are quite serious constraints in the area of eLearning.

Further, developments in ICT usage in the learning process are hindered by the lack of a legal basis about ICT qualification requirements for principals as well as for teachers. The *Ministry of Education and Research* should have developed respective standards at both levels by the year 2001. Even though the *Framework for Teacher Training* has required the acquisition of general ICT skills as one of the competencies for graduation, and that ICT qualification standard has been established in the *Professional Standard for Teachers* of 2005 (albeit not legally binding), the real effects of these acts remain in question. This means that reference for ICT skills may not be taken seriously in assessment system for teachers, not to mention that there is no legal requirement for teachers to use ICT in teaching (State Audit Office, 2003). An important step to come out of this situation may be the establishment of a framework for eLearning related competencies for teachers. However, the question as to the improvement of the situation, if any, at vocational and higher education levels is another issue.

Due to the missing ICT qualification standard for principals, the main problem has been the lack of respective in-service training programmes. The standards are also necessary for universities and other training centres to plan the specific courses. Until 2005, school principals took part in in-service training designed for teachers. In 2005, two special courses for principals were conducted. However, the fact may not be relevant when one takes into account that since 1998 all school principals at the general education level have to pass the 160-hour training on school management which has always included an ICT component (Laanpere, 2006b). ICT-related in-service training is very important for principals, upon whom ICT implementation in everyday learning process depends and upon whose competencies development of schools/universities rely to a great deal (The Basic Schools and Upper Secondary Schools Act).

Developments in the area of ICT in education are, however, not supported enough by the central government. In the *Strategy for State Budget 2007-2013*, eLearning is not considered as a priority. As such, no extra financial resources can be expected for this area in the next years.

In sum, it can be said that due to the missing legal basis or even missing vision about using ICT in the learning process, the state has taken no responsibility for the development of the field. This kind of situation is a bit mitigated by the availability of EU's structural funds, which, to this day, has mainly guaranteed financial resources for the field, but only for vocational and higher education. As pointed out above, a legal basis for ICT skills is incomplete – in particular, on the kinds of skills to be acquired concretely at different levels (except the skills for 9th grade students) and on how skills are to be guaranteed. National strategies or other directives hardly indicate the use of ICT tools in the learning process.

¹⁰¹ For example, in the *University Nord*, a special remuneration system for enhancing eLearning has been established since 2005 to motivate professors. According to the system, the design of web-based course has higher coefficient than traditional course. See also http://www.nord.ee/UserFiles/File/e-oppe_akava.pdf. In *Tallinn University of Technology* auditorial work is equal to work done in the framework of eLearning – hence, teachers have the opportunity to choose the teaching form suitable for them and not losing salary as a consequence (Interview with Kusmin, 2006).

II.4 Dedicated specific ICT infrastructures and applications

II.4.1 Description of the existing technical background for providing eLearning services

II. 4.1.1 ICT infrastructure in educational sphere and its usage in the learning process

Comparing data collected in 2000 with that of 2004, the survey *Tiger in Focus* shows that schools are the main place where students can use Internet (79% in 2000, and 88% in 2004). The exception here is in Northeast Estonia, where Internet use at schools is lesser than in other regions (i.e., 55% in 2000 and 73% in 2004).

At the general education level in 2006, there are no school without a single computer: on average, there are one computer per 16 students, one computer per 3 teachers, and one for principal of the school (Mägi, 2006). The best *computer ratio per students* is in Tallinn (over 20); the worst in Lääne County (a bit over 10). And the best *computer ratio per teacher* is in Järva County (4.5); the worst in Tallinn (a bit over 2). See also Table 9 and Figures 5, 6, 7 and 8 in ANNEX III. 96-97% of lower and upper secondary schools have broadband Internet access. The percentage of school Internet access is better in thinly populated (99.7%) than in densely populated areas (94.0%) (Empirica and TNS Emor, 2006). Võru County is in the best situation (with 99% broadband connection), and among those in the worse are Lääne County (84%), Tallinn and Ida-Viru County (87%).

Possibilities have been established in most schools to provide computer studies as voluntary course and develop students' ICT qualification at all levels, and subjects as horizontal theme in curriculum as well. Today, computer sciences are taught as a separate subject in more than 80% of the primary, lower secondary and vocational schools and in 95% of the upper secondary schools, according to the statements made by Estonian head teachers (Empirica and TNS Emor, 2006). As the financing of ICT infrastructure is in the hands of local governments, the real situation in the area of ICT infrastructure in Estonian general education schools varies, although it is clear that the overall situation can be evaluated positively. At the regional level, the situation should be positive, as there have been several projects by counties to better enhance Internet connection (Interview with Mägi, 2006). According to the study of the *European Commission*, in cooperation with *TNS Emor*, the availability of computers in schools for students and teachers is below EU average. There are only seven (7) computers for 100 students, whereas in EU25 the indicator is 11 (in Denmark even 27). Special computer classes are mainly equipped with computers – the share of computers for other classes is only 28%, compared with EU's 61% (Empirica and TNS Emor, 2006).

Table 9. The number of computers in general education used by students and teachers (2001-2006)

	2001/2002	2002/2003	2003/2004	2004/2005	2005/2006
Number of schools	671	651	640	622	615
Number of students	213 774	206 837	199 411	190 879	180 967
Number of computers used by students	6 763	7 585	8 432	9 366	9 365
Number of computers used by teachers	2 404	2 707	3 356	4 406	6 279
Total number of computers in schools	10 596	12 076	14 158	16 581	18 570
Total number of Internet connections	542	574	594	640	...

Note: *Data about the years 2001-2005 is based on national statistics;
Data about 2006 is based on statistics from EEIS

Source: EEIS, 2006

On the use of ICT, the survey *Tiger in Focus* indicated a 15% growth in computer usage outside school over the period of four years (81% in 2000 and 96% in 2004), but the computer usage at school had slightly decreased during the same period (85% and 82%, respectively). This is largely due to an increase in home computers over said period. According to the survey, 74% of pupils used a PC at home. In the case of teachers, the situation had improved more compared with that of students. In 2004, 80% of teachers had a PC at home, while in 2000 the respective indicator was close to 40%.

Also, if in 2000 only 17.5% of teachers had Internet connection at home, in 2004 the number was 54%, of which 34% had permanent connection (Toots, Plakk and Idnurm, 2004: 26-27).

In vocational education on the year 2006, the number of students per one computer is about 11, and in higher education the respective share is 20. See also Table 10 below. Information is not available about basic equipment level for the teacher in classrooms in vocational and higher education. However, at vocational level, 81.6% of teachers agree that their school is well-equipped with computers (Empirica and TNS Emor, 2006).

Table 10. The number of computers in vocational and higher education (2001-2006)

	Number of students	Number of computers used by teachers	Number of computers used by students	Number of computers for common use	Number of computers for school administration	Total number of computers	Number of servers
Vocational education level							
01/02	36 629	575	2 540	280	582	3 915	120
02/03	35 295	666	2 731	266	711	4 543	140
03/04	35 577	794	2 817	312	795	4 682	139
04/05	37 181	959	2 950	355	842	5 204	146
05/06	32 631	1 106	3 065	405	No data	5 291	148
Higher education level							
02/03	56 272	3 046	2 664	No data	No data	7 931	162
03/04	58 265	2 730	2 873	No data	No data	9 023	189
04/05	60 212	3 077	3 278	No data	No data	10 155	198
05/06	64 937	3 771	3 223	810	No data	9 897	347

Source: EEIS, 2006

In general, almost all Estonian schools now use computers for teaching and have internet access. 95% use the internet via broadband connection. There is hardly any variation between school types since it is close to 100%, with the exception of vocational schools which remain at 87%. A high 87% of schools have a website, 70% offer e-mail to teachers but only 18% do so to students. Only 28% of Estonian schools using computers for teaching use them in classrooms, with the highest percentage being achieved in vocational schools (40%). ICT is mostly used as part of teaching in computer labs (91%) which seems to be the typical case in the new member states. Computers in the school library are also more widely used in vocational schools (57% as opposed to approximately one-third in all other school types). The lack of computers in their respective schools is considered by 53% of respondents to be the greatest barrier why teachers do not use computers in class (Empirica and TNS Emor, 2006).

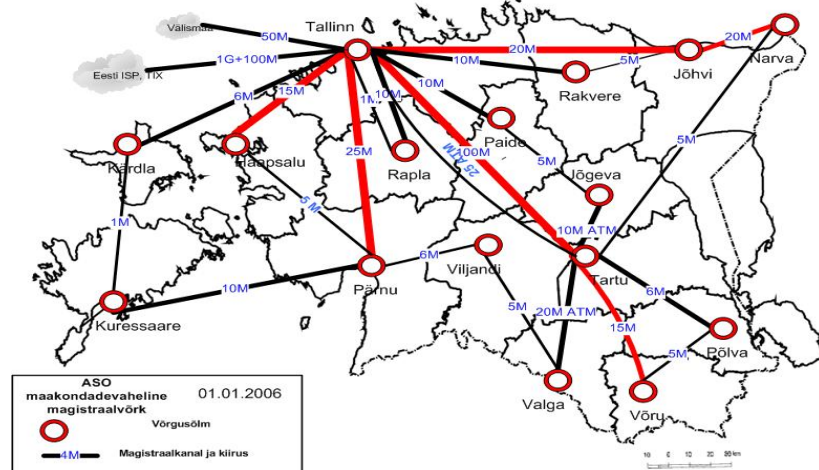
In sum, basic ICT infrastructure should be in place in the education sector. Although the *European Commission* survey presented above suggests some scope for further ICT infrastructure improvements in Estonian schools, the other important issue to be addressed has to do with the quality and even more the possibilities to use ICT in classes.

II.4.1.2 ICT infrastructure in public and private institutions

The development of the public sector ICT infrastructure started very early in Estonia and has been very successful. Most of the civil servants who need computers for their daily activities have them: already in 1995, 34.8% of the administrative staff of central apparatuses were equipped with computer workplaces, 89% of needs for computer workplaces were satisfied in 1998; and as of 2005 the corresponding figure is 97% (Information Technology in Public Administration of Estonia Yearbook, 2005; also, see Table 5 in ANNEX III). The backbone network (see Figure 9) has been built up due to several public projects – *EEBone project* (*Pea Tee*) in 1998, *Village Road* (*Küla Tee*) in 1999 (currently under *Village Road III*), and *eCounty* in 2001 (see ANNEX III). The projects have been administered mainly by the *Estonian Informatics Centre*, and by the *RISO*.

The backbone network **EEBone** connects all Estonian county centers and several nodes in Tallinn. PeaTee has Internet connection based on TPC/IP protocol and 16 Mbps bandwidth. The bandwidth of the backbone network between cities is 4-50 Mbps, connections to Estonian Internet Service Providers (ISPs) are 100 Mbps and 1000 Mbps, and traffic within Tallinn 100 Mbps up to 1000 Mbps (ICA Country Report, 2005).

Figure 9. Backbone network PeaTee (EEBone)



Source: https://www.aso.ee/et/files/ASO_2006_jaanuar_magkanalid_1.jpg

In the private sector, 80% of enterprises had at least one type of computer in 2005 (RISO, 2006). According to the survey of Factum and Ariko, 97% of enterprises have broadband and 3% dial-up Internet connection in 2006 (RISO, 2007). At the same time, broadband connectivity of enterprises is widespread but with a sharp division by size: in 2004, 93% of large enterprises (250+ employees) had broadband access, 78% of medium sized enterprises (50-249), but only 65% of small firms (European Commission, 2005b). As discussed in the *Introduction*, the overall broadband coverage in general is the result of active telecommunications enterprises.

II.4.2 Provision and description of major eLearning applications

Special LMSs such as *WebCT* and *IVA* have been used for creating web-based courses. The LMSs are used often for distributing materials, submitting homework and assessing results of the study. Several educational institutions, especially universities, are using study information systems in order to register students to the courses and for posting information about study results.

Tallinn University, especially by its *Center for Educational Technology*, develops the most common open-source LMSs and CMSs (see Text Box 18).

Text Box 18. *Open Source Software (OSS)* is usually developed on a voluntary basis and, as a rule, freely available according to the licensing principles of *Open Source Initiative (OSI)*. As a major software user, the public sector has a key role in promoting OSS (IT in Public Administration of Estonia, Yearbook, 2004).

In 2004, the *Tiger Leap Foundation* initiated a project for distribution and promotion of freeware in schools aiming to be launched at county level. In the course of the project it was expected to release a *Linux* distribution that is suitable for schools to prepare training materials and to train teachers. Furthermore, since spring 2005 the *Tiger Leap Foundation* only supports projects that will be released under the *General Public License* for the code - and as for the content a *Creative Commons License* will be required. A number of Estonian educational open source software applications have been developed: LMS *IVA*, *VIKO*, CMS *KooliPlone*. Moreover, Estonia being a country with a small market, the government has funded the translation of *OpenOffice's* spell-check programme in Estonian (Vuorikari and Sarnow, 2005).

- 1) **IVA** (*Interactive Virtual Academy*) is a web-based LMS developed in *Tallinn University* in 2002.¹⁰² It is a modification of another open-source *Zope* product called *Fle3*. The structure and functionalities of *IVA* system advocate constructivist approaches to learning and teaching. For constructivists, learning is not merely transmission of objective knowledge - each learner constructs actively his/her own 'picture of the world', associating new meanings with previous experiences and communicating with others. With its one developer (Laanpere, M), *IVA* is mainly a developmental and research project – meaning, this is the software for very innovative professors. In other cases, it may not be as user-friendly as suggested (Interview with Laanpere, 2006). The development of *IVA* LMS in *Tallinn University* was partly supported by the *Ministry of Education and Research* of Estonia, *Tiger University Programme* of the *Estonian Information Technology Foundation*, *Estonian E-university* and *Hansabank*.

Today, *IVA* is an official LMS of *Tallinn University*.¹⁰³ It has Estonian, Russian and English user interfaces and is currently used by more than 2 000 users (Vuorikari and Sarnow, 2005). *IVA* is also one of the three software systems used by *Estonian E-university*. The other two official learning/course management systems of the *Estonian E-university* – *WebCT* and *Moodle* – are the main competitors of *IVA* (Ruul, 2006). *Moodle* and *IVA* are the most preferred learning and course management systems also in vocational schools (Vocational schools reports in the framework of the *eKey* project for I half of 2006).¹⁰⁴

Most of the web-based courses in Estonia have been created in *WebCT*. For example, in 2006 from all 1 000 web-based courses, 795 were created in *WebCT* and the other 205 in *IVA*. In 2006, of the 18 000 students taking part in web-based courses, 14 750 are users of *WebCT* and 3 250 of *IVA*. For instance, in the *University of Tartu* in the academic year 2004/2005, *WebCT* was used by one-third of the University's 6 000 students.¹⁰⁵ Altogether, 825 user licences for *IVA* and *WebCT* have been issued (Ruul, 2006).

- 2) Open source LMS **VIKO**¹⁰⁶ was developed during 2001-2003 taking into account the needs of the general educational schools. Schools do not have to set up their own server, *VIKO* is offered as a free service by *Tallinn University*.

Text Box 19. The *VIKO* environment enables teachers to distribute their learning materials and to make the information and timetable available in the web. In addition, there is a special support system for teachers containing general information about web-based learning and design of electronic educational materials. The environment also includes the forums for communication.

- 3) The *Tiger Leap Foundation* has supported the completion and further development of the environment. There was a plan to develop the next version of *VIKO* in September 2006 that would include the possibility of submitting students' homeworks to teachers through the environment. In 2006, there were over 50 schools using the *VIKO* learning environment, of which about half are active users of the environment (see *Estonian Portal Koolielu*, news for 02.03.2006).
- 4) New learning environment for the first classes **KRIHVEL**¹⁰⁷ is at work in cooperation with *Tallinn University* and *Haapsalu College*.

In the case of all the aforementioned LMSs, the communication elements (e.g., forums) are considered to be important parts of the eLearning approaches in the Estonian educational sector. However, ICT-supported learning in the country typically lacks interaction in the learning process

¹⁰² See also <http://www.tlu.ee/?LangID=1&CatID=1614>; also <http://www.htk.tlu.ee/iva/>.

¹⁰³ *LearnLoop* is also an example of free software that has been used in *Tallinn University* (Interview with Toots, 2006).

¹⁰⁴ See also <http://portaal.e-uni.ee/e-voti/aru/seire/2006I>.

¹⁰⁵ See also http://www.ut.ee/orb.aw/class=file/action=preview/id=153202/e_oppe_strateegia_seletuskiri.pdf.

¹⁰⁶ See also <http://www.htk.tlu.ee/VIKO/>.

¹⁰⁷ See also <http://trac.htk.tlu.ee/krihvel/>.

between participants, and eLearning solutions are mainly different types of learning materials for self-study. The following are prescriptions on the use of LMSs in the Estonian educational system:

- Overall, the LMSs used in Estonia should be more interactive, including simulation games, case studies, assessment systems, etc.
 - In addition to the provision of information, LMSs should also guarantee that students have an overview about their obligations. Currently, this is only the case in higher educational institutions where students, due to the use of LMSs, have information about their obligations for the semester since the first lecture. The same system should be used also in general education.
 - LMSs should have a supporting role in education (e.g., having learning materials and scientific articles in the form of .pdf in the Internet).
 - LMSs should be developed in a way that they can be used also as a guide for students – i.e., what materials should be learned, and in what order in the framework of one subject.
 - LMSs should be used more to carry out seminars (e.g., using forums to discuss certain question raised by teachers and students).
- 5) **KooliPlone**¹⁰⁸ is a Plone-based CMS for school websites also developed in *Tallinn University*. It was released in autumn 2005. The CMS *KooliPlone* is for schools for creating web pages. In addition, *KooliPlone* provides several modules to make the usage of the portal more attractive and useful. These modules are curriculum, timetable, developmental conversations and school's newspaper. By October 2005, there were 10 schools that created their web pages with *KooliPlone*.
- 6) **Edutizer Academy** is being developed by *Mindworks Industries Ltd* to meet the e-training needs of schools and universities. Today, the main clients of the system are from the public sector, and the leaders of financial, telecoms, automotive and real-estate sectors.¹⁰⁹ *Edutizer* was originally the result of *Hansabank's* proposal, but later on the usage rights were also provided to other firms.¹¹⁰ The LMSs based on *Edutizer* are used for distributing materials and using the environment as the testing centre. Big firms using the system have been cooperative in financing further development of the system's functionality. The materials provided in the system and their interactivity depends on each firm, but the design and presentation of learning materials are usually bought in (Interviews with Tammiste, Kuusemets and Väravas, 2006).
- 7) Universities use **study information systems**. However, as there are no commonly agreed data formats and database structures, these systems are not interactive to each other and hence do not support exchange of digital data (e.g., student information).
- 8) The existence of central databases for learning materials is limited.

The *Language Immersion Center*, *Miksike* and *Koolielu* are important repositories at the general education level. The **Language Immersion Center**¹¹¹ can be considered one of the best organised information-providing repositories for second language studies: reading, writing, speaking and listening comprehension. Access to its digital learning resources is also provided for a fee by a **repository of e-worksheets, Miksike Llc**.¹¹² *Miksike* gives more than 25 000 worksheets in HTML eWorksheets and offers a variety of collaborative learning services to facilitate learners in constructing their knowledge. *Miksike* works for regular schools and for lifelong learning communities. In schools, *Miksike* is mostly used by teachers to get new ideas and information, as well as to obtain different worksheets and material for tests (Toots, Plakk and Idnurm, 2004: 48).

¹⁰⁸ See also <http://www.htk.tlu.ee/kooliplone>.

¹⁰⁹ See also <http://www.mindworks.ee/about.html>.

¹¹⁰ These include *Elion*, *EMT*, *Sampo Bank*, *SEB Estonian Union Bank*, *Estonian Energy*.

¹¹¹ See also <http://www.kke.ee/index.php?lang=est>.

¹¹² See also <http://www.miksike.ee>.

The **Estonian news and community portal *Koolielu***¹¹³ is important in providing eLearning materials. But while it offers **digital learning resources** to teachers and information to students, *Koolielu* does not offer possibilities for web-based learning. The Estonian Portal *Koolielu* provides about 5 500 learning subjects.

At the higher education level, there is a central database for web-based courses administered by *Estonian E-university*. The *Estonian eVocationalSchool* is developing a similar database for web-based learning materials and for web-based courses.

- 9) The amount and quality of equipment and number of rooms used for videoconferencing is claimed to be not sufficient. In fact, there is only one room meant for it in large universities (Interview with Kusmin and Toots, 2006).

See other specific applications in Text Box 20.

Text Box 20. The **APSTest** programme was created as a test environment in cooperation of *APSProg Llc* and *Tiger Leap Foundation* and with the support of the *University of Tartu* (<http://www.ce.ut.ee/APSTest/apstesteng.html>). The purpose of the project was to create a system for everyday exercises and tests. The package consists of three programmes: *ApsTeach* (question and test construction), *ApsPupil* (answering) and *ApsAssist* (work with results). The students would only need *Apspupil* (less than 1 Mb). The use of *ApsTest* is free in all Estonian schools and universities.

eFormular (http://www.eformular.com/avaleht_eformular.php3?muudakeel=en) is a tool providing possibility for creating electronic forms (*eFormulars*) and conducting surveys via the Internet. It can be used by teachers to conduct test or quiz in an interesting and novel way or by students to collect data for project questioning different people.

In sum, the main technological means in basic information and technology communications infrastructure and especially of different eLearning environments should be in place; and that not only in the education sector, but also in the private sector.

II.5 Provision of eLearning services

II.5.1 Detailed description of the major services provided within eLearning

The share of online services in the field of education in Estonia is rather limited. The major services developed are closely related and influenced by the progress of eGovernment services with the main purpose to enhance administrative tasks in the sphere of education. These kinds of activities find the strongest support at the Ministerial level.

Table 11. Detailed description of major services provided within eLearning

1. Hosting services	
Institution	Service
EENet under Ministry of Education and Research	EENet provides schools at all educational levels and educational NGOs hosting of services on the basis of <i>IVA</i> , <i>Plone</i> , <i>Kooli-Plone</i> and <i>VIKO</i> . As the costs of this service are covered by the <i>Tiger Leap Foundation</i> , the schools can use it free of charge (Laanpere, 2006b). Permanent Internet connection is provided to numerous research institutions with transmission speed of 100 Mbps. The network extends to most counties in Estonia (EENet, 2006). In addition, development projects are being carried out in cooperation with universities and scientific institutes (IT in Public Administration of Estonia, Yearbook 2003).
In the beginning of 2005, the number of end-users of Estonian academic network was approximately 228 000 people.	

¹¹³ See also <http://www.koolielu.ee>.

2. Educational information systems¹¹⁴	
Ministry of Education and Research	EEIS¹¹⁵ replaces several separate databases of educational information. In October 2005, cross-usage between <i>EEIS</i> and the Population Register became operational. The further purpose is to add to the information system the statistics module for information processing and to link the system to other central educational systems like <i>eSchool</i> and <i>KIS (Schools' Administrative Information System)</i> . Until 2005, the implementation of the project was financed with EUR 243 000 (Overview of general education in Estonia in 2001-2005).
Belongs to Ministry of Education and Research and is administered by National Examination and Qualification Centre	SAIS¹¹⁶ is the service to help to submit admissions applications electronically through the Internet to higher education institutions since 2005. <i>SAIS</i> also helps to organize other procedures, including the exchange of information between the student and the school, the acceptance of a study place or its refusal. In addition, <i>SAIS</i> is connected to databases in other countries. The system was established within the framework of the <i>Tiger University Programme</i> , under the supervision of the <i>Estonian Information Technology Foundation</i> and with the assistance of the EU's Structural Funds with the total amount of about EUR 89 000.
Fifteen (15) Estonian higher education institutions have been using <i>SAIS</i> .	
-	The X-Road was launched three years ago. At the beginning, it was developed as an environment that would facilitate making queries to different public sector databases. By now, a number of standard tools have been developed for the creation of eServices capable of simultaneously using the data of different databases. All Estonian upper secondary schools' graduates can use the <i>Citizen's Portal</i> to view their national exam results. Also, a system has been designed as an operative additional opportunity to enable receiving express confirmation about exam results through e-mail and the short message service (SMS) sent via a cell phone.
In 2005, 31 000 students were tracking their exam results at the <i>Citizen Portal</i> (in which exam results are sent to them via SMS 10 000 times and via e-mail 3 300 times) (ICA Country Report, 2005).	
3. Services for general educational level	
Provided by Koolitööde Ltd and development supported by Look@World Foundation	eSchool¹¹⁷ is an Internet-based communication environment between school and home, a web-based gradebook service. It contains information about studies and allows parents and pupils to view their study-information – e.g., grades, missed classes, home assignments, over the Internet. It also improves parents' communication with teachers via forums. The system is in use since 2004. Today, there are applications to connect the <i>eSchool</i> service to mobile phones.
In 2006, there are 220 schools connected to <i>eSchool</i> service – i.e., usage by a third (120 000) of the general educational students.	
Tiger Leap Foundation	<ul style="list-style-type: none"> • provides financial support for procuring learning software • provides support for developing digital learning materials, simulations, and usage of ePortfolio • financial support for developing LMSs for general education • provides in-service teacher training.
Universities and general educational schools	Develop digital learning materials for general schools. For example, web-based learning projects in the natural sciences, in cooperation of <i>5D Vision Llc</i> and <i>University of Tartu</i> .
Tallinn University	Provider of LMSs and CMSs, etc.
Technology School of Tallinn University of Technology	Provider of courses (including web-based courses) for the students of secondary and vocational schools.

¹¹⁴ *X-Road* targets upper secondary education. *SAIS* focuses on higher education. *EEIS* is important at all levels.

¹¹⁵ In 2004, the *Ministry of Education and Research* also launched similar system for research area – **Estonian Research Information System (ERIS)** (Information Technology in Public Administration of Estonia Yearbook, 2005).

¹¹⁶ See also <http://www.sais.ee>.

¹¹⁷ See also <https://www.ekool.ee/tugi/abi.html>.

During the school year 2006/2007 courses were provided in the field of natural sciences, environment, design and construction and product development. City camps are organized for students in the 7-9 th grade during the holidays.	
Estonian Academy of Arts	This Academy is the provider of virtual children's textbook, Virbits . ¹¹⁸ The learning material is meant to develop reading and writing skills. The main target groups are pupils at preliminary education level.
Audentes	E-Gymnasium provides possibility to go through the whole school programme online at the level of upper secondary school, with the restriction that the most important tests have to be done at the school.
Private sector	<ul style="list-style-type: none"> • develops digital learning materials • provides financial support for developing e-applications.
4. Services for vocational level	
Estonian E-VocationalSchool	<ul style="list-style-type: none"> • develops common infrastructure (<i>Estonian E-VocationalSchool's</i> server where <i>IVA</i> and <i>Moodle</i> are centrally administered; it also provides common virtual portal for courses and for learning objects) • supports development of web-based courses, simulations, and curriculums • supports training (in-service training) of professors, teachers and tutors; great emphasis has been given on the training of educational technologists • supports cooperation at the level of higher professional education institutions and vocational education institutions.
5. Services for higher educational level	
Estonian E-university	<ul style="list-style-type: none"> • pays for joint license on <i>WebCT</i> • supports development of web-based courses and web-based curriculums¹¹⁹ • is working out quality standards for web-based courses • provides in-service training at the three different levels – basic skills providing courses, advanced courses and courses for experts and tutors for professors, teachers and tutors • supports cooperation between universities.
Since 2005, the <i>Estonian E-university</i> and the <i>Estonian E-VocationalSchool</i> have been organizing the activity called e-cafeteria-club (<i>e-kohvik-klubi</i>). In 2006, the new electronic publication, eLearning News Journal (<i>E-õppe Uudiskiri</i>), ¹²⁰ has been released (see ANNEX III).	
Universities	<ul style="list-style-type: none"> • main providers of web-based courses and web-based curriculums • providers of support courses in the sphere of eLearning, but also web-based courses related to the field of pedagogics (especially <i>Tallinn University</i>) • providers of web-conferences • developers of local open source LMSs (especially <i>Tallinn University</i>) • providers of initial teacher training • main R&D institutions (especially <i>Tallinn University</i>).
National Europass Centre	EuroPass ¹²¹ supports internatisation of education. It is a new way of helping to make the skills and qualifications clearly and easily understood in Europe (EU, EFTA/EEA and candidate countries). <i>EuroPass</i> consists of five documents: <i>Europass curriculum vitae (CV)</i> , <i>Europass Language Passport</i> , <i>Europass Certificate Supplement</i> , <i>Europass Diploma Supplement</i> and <i>Europass Mobility</i> .
Private sector	<ul style="list-style-type: none"> • provider of financial support (e.g., cooperation between <i>Jukotec Llc</i> and Estonian vocational institution system since 2000) • provider of educational software (e.g., Microsoft's programme <i>MSDN Academic Alliance</i> for educational institutions)

¹¹⁸ See also <http://lizard.artun.ee/~pir/virbits/>.

¹¹⁹ Awards have been given to web-based courses of high quality since 2004.

¹²⁰ See also <http://portaal.e-uni.ee/uudiskiri>.

¹²¹ See also http://europass.cedefop.europa.eu/europass/home/hornav/Introduction/navigate.action?locale_id=1.

6. Services for lifelong learning	
<i>Universities and Estonian E-university</i>	<ul style="list-style-type: none"> providers of web-based courses.
-	CV databases to provide information about training possibilities, job possibilities and career planning (including the e-school on making a career) ¹²² . The best examples here are information systems Pathfinder, EURES, CV-Online .
Financial support by <i>Open Estonian Foundation</i>	Establishment of the information system of Estonian public libraries . For example, one aim of the county-based data communication project called <i>Village Road (Küla Tee)</i> was to provide data communication services for local governments through Internet connection of the libraries (Public Administration in Estonia, 2004).
By the end of 2003, most public libraries had permanent Internet connection.	
7. Services at workplace	
<i>Private sector</i>	<ul style="list-style-type: none"> provider of LMSs specifically for private companies ICT skills training.

The statistics below provides an overview of the outcome of the activities of the *Estonian E-university* and universities specific to web-based learning at higher education level where most of the activities in the field of eLearning have been focused.

During the period 2002-2006, the *Estonian E-university* has launched 980 web-based courses in a wide range of subjects.¹²³ Altogether, 18 000 people have taken part in web-based courses of *Estonian E-university* (see Table 12). In addition, 30 video lectures have been created, 9 thematic networks established, and the training of 18 educational technologists and 850 professors supported. Today, there are 10 regional eLearning centres (Tammeoru, 2006a). The *Estonian E-university* has also supported the development of three web-based curricula in English. These involve the curriculum of the *University of Tartu – Cognitive Science*, of *Tallinn University – Management of Information Technology*, and of *Estonian Information Technology College – IT Systems Administration* (Interview with Tammeoru, 2006).

Table 12. Increase in the number of web-based courses and students taking part at higher educational level (1999-2006)

Year	Number of web-based courses by the year	Number of students using web-based courses by the year
1999	14	100
2000	50	1 000
2001	100	2 000
2002	238	3 500
2003	350	6 500
2004	430	9 500
2005	750	12 000
2006	1 000	18 000

Source: Ruul, 2006

Several important points must be raised as regards web-based courses, web-based curriculum, and web-conferencing in universities.

(1) *Web-based courses*: The number of web-based courses in the *University of Tartu* was 335 in 2005 (The eLearning Strategy in University of Tartu) and in *Tallinn University of Technology* about 85, of which five were totally web-based (Tallinn University of Technology; Interview with Kusmin, 2006). There were 175 web-based courses provided by *Tallinn University* in 2006 in the IVA server (i.e., on

¹²² See also <http://www.cv.ee/content/?id=480&gr=1>.

¹²³ See also <http://www.e-uni.ee/uus/vaata.php>.

the average, 28 users for every course) (Laanpere, 2006a). As for the private universities, the *Estonian Business School* has implemented web-based courses especially in *Management of Information and Communication Technology*, and the *Estonian Information Technology College* has used web-based courses in all specialisations (10% of subjects altogether). Some other private universities (e.g., *Concordia Audentes International University Estonia* and *University Nord*) have also provided web-based courses since 2004 (there were five web-based courses in the *University of Nord* in 2005).¹²⁴ The *Mainor Business School*, which is not a member of the *Estonian E-university* consortium, has also been using eLearning.

(2) *Web-based curriculums*: To this day, there are very few web-based curriculum. However, there is a trend towards this as shown in the initiatives taken by many larger universities. For example, the *Estonian Information Technology College* has developed a two-year curriculum in the web for IT specialists – the *IT Systems Administration* for distance learning.¹²⁵ In the *University of Tartu*, there is a totally web-based programme, with final exams taking place in classrooms (a programme provided by the *Institute of Finance and Accounting* in the *University of Tartu*).¹²⁶

There is no MSc programme and PhD studies in Estonia focusing on eLearning design, provision, consultancy or technology (Laanpere, 2006b). With regard to an important area of doctoral studies related to eLearning, there are few fresh PhD theses defended by young Estonian researchers in Tartu, Tallinn and Turku Universities, and three more PhD students are studying abroad (with *Kristjan Jaak Scholarships* from the *Archimedes Foundation*) (Laanpere, 2006b). At the vocational level in general, much emphasis has been given to ICT specific curriculum to develop specialist education in the area of IT (Interview with Püüa, 2006).

(3) The practice is very different in the area of the *web-conferences*. One of the best examples is *Tallinn University* and its *Department of Government*, which has one or two *video lectures* in a week. This is because it has colleges outside the City of Tallinn, for example in Haapsalu, and it has cooperation agreement with the *University of Tampere* (Interview with Toots, 2006). In *University of Tartu*, 10 video lectures were created during 2005. *Video lectures* have also been created in *Tallinn University of Technology*.

The activities of the *Estonian E-university* and other Estonian universities, especially in the field of web-based courses, have had implications for lifelong learning. In 2005/2006, there were approximately 60 available web-based courses for lifelong learning at the *Estonian E-university*. In 2005, the *University of Tartu* provided 129 web-based courses with 3 035 participants in the framework of in-service training.¹²⁷ In 2006, there were two in-service training courses in *Tallinn University of Technology* (and, in addition, four courses for general education) (Interview with Kusmin, 2006); and 78 courses, available in the LMS IVA, in *Tallinn University* (Laanpere, 2006a).

II.5.2 Description of nature of eLearning services

In Estonia, the need to develop methodologies for utilising ICT in learning, educational software and learning materials is shown by the fact that eLearning applications are mainly used for administration purposes – for enrolment to a course or a school (40% of those using the Internet) and for communication with school and teachers (36%). At the same time, the participation rate in web-based courses and eTraining is 10.6% (see Table 13; for more concrete information see also Table 16 in ANNEX II).

¹²⁴ See also http://www.nord.ee/UserFiles/File/e-oppe_akava.pdf.

¹²⁵ See also <http://www.itcollege.ee/kolledz/uudis.php?id=908>.

¹²⁶ See also <http://www.finance.ut.ee/index.php?eng/67/11/0/104>.

¹²⁷ See also <http://www.ut.ee/24224>.

Table 13. Usage of Internet on educational purposes, % of those using the Internet (2005-2006)

EDUCATION	2005	2006
Enrolment to a course or a school	20%	40%
Communication with school/teachers	19%	36.1%
Submitting admission papers to university	7%	13.5%
Participating in web-based courses or training	7%	10.6%
Having one's results of finals sent as an SMS or to an e-mail	5%	9.7%
Registering for state examination	-	4.4%

Source: RISO, 2006

The ICT means at general educational level are mainly used in natural sciences – the software in these subjects is in place, the subject itself favours different approach and the teachers in these areas are usually younger (Interview with Toots, 2006). Specifically on basic and lower secondary education, ICT-supported learning is most common in the sciences and geography, and also in Estonian language in the 8th grade. Upper secondary students use computers more often in foreign languages and geography, but very rare in mathematics and Estonian language (Toots, Plakk and Idnurm, 2004: 13). In everyday studies, ICT is used mostly for searching information in the Internet (70%), writing reports (55%) and giving presentations (30%) (Learning Tiger Action Plan 2006-2009).

In 2003, of the 34 available learning software applications (including web-based) only a few were actively used by teachers in their subjects. Today, the number of respective materials has more than doubled.¹²⁸ The most well-known and with the largest usage are the digital learning materials related to natural sciences. Individual teachers usually design the digital learning materials provided at this level.

In vocational schools, steps have been made to design 15 web-based courses in cooperation with, and in the framework of, the *eKey* project. Most schools have the willingness to develop web-based courses and eLearning objects (Vocational schools reports in the framework of the *eKey* project for I half of the 2006).¹²⁹ This is shown in the number of applications in 2006 for design of web-based courses for the *E-VocationalSchool*: 241 applications from 32 vocational schools. The most popular fields are information technology (57 applications to design web-based courses), specific fields depending on specialisation (32), economics (32), general things (20), law (18), technical subjects (16), service (15), languages (13), accounting (11), physics and chemistry (11), rural economy and forestry (11), and art and handicrafts (5).¹³⁰ There were 57 applications altogether for developing the learning objects (The Report on implication of the *eKey* project for *INNOVE* in the first half of 2006).¹³¹

In higher education, there is no evidence that the design of web-based courses is dependent on the area, although the number of courses from 'soft areas' is generally higher than in science and technology subjects (Interview with Tammeoru, 2006).¹³² The division of web-based courses according to respective areas in the Estonian E-university consortium is as follows: 20% of courses in the field of economics; 16% in social sciences and informatics; 11% in educational sciences and philology; 5% in biology, geography and mathematics. There are also courses in the areas like upper secondary school subjects, engineering, physics, chemistry, law, medicine, etc. The share of web-based courses in the *Estonian E-university* consortium among all courses was up to 14% and in the *Estonian e-VocationalSchool* up to 2% in 2006 (Strategy of the Estonian eLearning Development Centre 2007-2012). In total, the share of web-based courses in higher education institutions is believed to be about 30% (Ruul, 2006).¹³³ According to *eUser's Country Report for Estonia*, about 30-40% of

¹²⁸ See also http://www.tiigrihype.ee/projekt/valmis_opi.php.

¹²⁹ See also on <http://portaal.e-uni.ee/e-voti/aru/seire/2006I>.

¹³⁰ See also <http://portaal.e-uni.ee/uudiskiri/stat/voti>.

¹³¹ See also http://portaal.e-uni.ee/e-voti/aru/seire/Seire_2006_I.xls.

¹³² On the contrary, in *Tallinn University of Technology*, for instance, the biggest share of courses having e-support belong to the *Mechanical and Informatics faculties*.

¹³³ At the same time, experts in the field argue that this claim is not justified even for the *University of Tartu*, the biggest university in Estonia (Laanpere, 2006).

courses are believed to have some form of eLearning (Kalvet, 2005). eLearning is mostly used as a support to lectures, which entails use of some ICT equipment and making materials available on the web (Strategy of the Estonian eLearning Development Centre 2007-2012).

In most cases in 2002, web-based courses mainly contained materials in the form of *MS Word*, *MS Excel*, and *PowerPoint* presentations, but also included links to Internet-sources in respective fields. The Kristi-Jette Remi survey results showed around 50% usage of office software for design of web-based courses (Remi, 2002: 37). Today, web-based courses are based on *PowerPoint* and *video lectures*, including the materials, which are educational texts, exercises, different tasks and tests for practicing, forums for communication, and also possibilities for examination (Interview with Kusmin, 2006).

Web-conferences and video lectures seem to have the largest usage in the educational sector as compared to other sectors (e.g., private sector and other public institutions) (Remi, 2002: 69).

In lifelong learning, the share of eLearning is very limited. The same goes in the public sector. This is so even though some steps have already been taken at the Ministerial level (Interview with Laanpere, 2006). Traditional training, instead of self-learning, is preferred in which one has to get a couple of days off to go to training. This depends on the subject – web-based learning, for example, is not considered good for strategic management, or for simulations and learning how to negotiate. But if there is an environment where materials are put up it will be accepted (Interview with Rits, 2006).

In the private sector, eLearning applications for training and education of employees are quite often combined with traditional learning, with the main aim to deliver learning materials. The company intranet provides job aids and important supporting materials to the students such as the employee handbook, regulations, and quality standards (Remi, 2002: 31). eLearning applications are: employed in addition to the distribution of materials, information and guidelines for different activities (also, all kind of instructions) (Pikk, 2006); and used for evaluating employees' qualifications and doing test (Piin, 2004: 45-47; Interviews with Tammiste, Kuusemets and Väravas, 2006). The LMSs are used for in-service training for beginners, and also for continuous complementary training. Since back-office needs more specific training that cannot be provided for in LMSs because face-to-face interaction is considered here to be of utmost importance (Interviews with Kuusemets, Väravas and Tammiste, 2006).

The level of interactivity of learning materials is very different in the private sector. Perhaps, the best example is the telecom company *Elion*, which has given a lot of emphasis to make information interesting and easier to read (e.g., many pictures, schemes, very small textual part, system that is easy to navigate, etc.). It has been claimed that 5%-25% of overall in-service training has some form of web-based learning in private sector where the most preferred form is blended learning (Kahn, 2006; Pöldsam, 2006).

In general, the use of ICT-based learning materials greatly depends on the schools' ICT infrastructure, internal organisation of work, the willingness and skills of teachers and employers to use new teaching forms and the support from school's directorate or TOP-level in enterprises for eLearning (Overview of general education in Estonia in 2001-2005). To date, the availability of different digital learning materials has been the most problematic issue. It can be said that the development of eLearning services in Estonia has been poor, especially when we consider SCORM, IEEE LOM, IMS CP/LIP/QTI compliant content, interoperable content authoring, storing and brokering services, ePortfolio services, web-based courses search and enrollment databases (Laanpere, 2006b).

II.5.2.1 The role of assessment and accreditation techniques in eLearning services

The *ECDL* system is the *de facto* standard for user training, as well as in general, vocational and in-service training. Although *Informatics* is not a compulsory course in general education, its inclusion as an elective course is under the *ECDL* system.

ECDL programme was initiated in Estonia by PHARE ISE. Later, the field has been organised by *AO Keskus*,¹³⁴ which works under the *Estonian Information Technology Society*. The *ECDL* programme started in Estonia in 1998. The tests may be taken in *ECDL* test centres over Estonia, there are altogether about 30 of those. Today, about 6 500 people have taken the *ECDL* test in Estonia.

It is said that *ECDL* has had the biggest share in enhancing ICT skills (Interview with Laanpere, 2006). The most widespread field of application of *ECDL* has been the occupational standards (*kutsestandardid*). The number of those is over 500. In these standards the bases for computer usage competences have been defined through modules of *ECDL* (Oruaas, 2006).

ECDL standards have been the base for *Informatics* courses in Tallinn and Tartu universities. Trainers have followed *ECDL* standards also in in-service training in the field of ICT (including respective teacher training (for example in the framework of *Tiger Leap Foundation*) and also in the case of courses provided by *Estonian E-university*.¹³⁵ In addition, the *Ministry of Education and Research* can take into account the ICT skills requirements for teachers as stated in the *Framework for Teacher Training* and in *Professional Standard for Teachers* while registration the curriculum of teacher training (State Audit Office, 2003).

Currently, the *Estonian E-university* is developing eLearning quality standards for higher education. These standards include: general instructions; how the web-based course should be built up and what sorts of information are to be included (e.g., information sheet for the course, manual for using *WebCT*, the objectives of the course and the syllabus, learning materials, references to the additional learning materials, communication means, tasks and the rule for assessment); and how the course should be carried out.¹³⁶

II.5.2.2 The differences in terms of the services provided for the target groups

eLearning services in terms of digital learning materials and of eLearning applications provided in general education are more harmonized, as these are directed by the state with more or less concrete vision in the field, based on the strategies discussed above. The services for adult training depend more on private sector and autonomous universities, and hence these are quite diverse. In addition, services to children and young people have had much more attention in recent years and thus have also had policy support. This has led to greater variety of services for younger age groups.

The digital learning materials that have been developed for general education have been mainly seen as support materials for teachers (especially exercises), and for students as well to make learning easier. However, the current materials are very theme- and subject-oriented. The digital learning materials are mainly oriented on presenting the text in easier way, with further link possibilities and with pictures and practices. The materials are available for public and are free of charge.

At the higher education level, the main aim has been to enhance the information flow between students and teachers: that is, to enhance communication between these groups and to help teachers with ICT-supported material delivery. The web-based courses are mainly using *PowerPoint* and *video*. These solutions are available for students participating in specific courses and are often single university-centred. Students do not have to pay additional fee for web-based courses. Too, many web-based courses are provided for in vocational schools. Here, the cooperation between different schools is greater. However, the courses and certain learning objects for explaining concrete theme are mainly oriented on students. It can be said that the eLearning environments (especially study information systems, LMSs and course management systems) are used more actively at these two levels. On higher education, the movements toward web-based curriculum are the biggest ones.

¹³⁴ See also <http://www.ao.ee/keskus.htm>.

¹³⁵ See also <http://www.e-uni.ee/e-oppija/2004/taiend.html>.

¹³⁶ See more <http://www.e-uni.ee/index.php?main=108>.

The courses provided in the framework of lifelong learning are mainly available in the web page of the *Estonian E-university* and are not available without a charge. But there are also some courses available for informal learning and are free of charge. The difference of these courses lies especially on the topic of the courses, which are oriented on general daily issues (e.g., gardening, cooking, etc.). However, the content provided for these target groups has been very limited to this day.

II.5.2.3 The differences in terms of the services provided by public and private actors

The services provided by the public sector are considerably more harmonised than in the private sector. The *Tiger Leap Foundation* and consortiums at higher and vocational education levels provide some kind of supervision in the public sector in terms of training, counselling, and financing etc. On the other hand, private companies often develop in-house competences where attitude towards eLearning is very variable. Interactivity is generally lower in among the private sector than in the education sector.

The main difference between the education sector and the private sector is that the latter does not share the understanding that there should be forums and communication behind web-based courses besides just delivering materials (Interview with Laanpere, 2006).

II.5.2.4 The division of responsibilities in the provision of content between public and private actors

There are no clear divisions as far as content development is concerned. Here both autonomous universities and private sector actors have been left with more or less unregulated territory to develop eLearning content according to their specific needs. As discussed above, at other educational levels and in vocational education, there are no common guidelines or prescriptions as far as content is concerned. Neither is there a strategic or other policy document that divides such responsibilities. However, the *Estonian E-university* has initiated steps to standardise web-based courses.

Currently, the publishing of books and textbooks (especially for general education) has been in the hands of the private sector. A major reservation, however, on the part of the private sector to develop digital learning materials is the probable loss of profits for them (Interviews with Mägi and Anton, 2006a).

II.5.2.5 Language issues: availability of services in other languages

In developing digital learning materials, web-based courses and curriculums, the main attention is given to the Estonian language. In the case of higher education, and especially of the *Estonian E-university*, some courses are also provided in English (see the web page of Estonian E-university).¹³⁷ In higher education, the Russian web-based courses have not been developed.

Since Russian is the most common minority language in Estonia there is an intention to develop a Russian version of the local open source LMS *VIKO* for general schools (see Estonian portal Koolielu, news, 02.03.2006). Most of the resources are in Estonian and Russian in the e-worksheets repository *Miksike*. These trends are due to the fact that the Russian language is permitted as a medium of instruction in teaching general education.

Unlike many other European teachers, Estonian teachers do not seem to have problems in finding adequate web-based material. This is only criticised by 6% of Estonian teachers – as opposed to the EU25 average of 20%. Lack of content in national language is even less of an issue: less than 2% claim it to be an issue, as compared with the overall European level which is five times higher (Empirica and TNS Emor, 2006).

¹³⁷ See also <http://www.e-uni.ee/uus/vaata.php>.

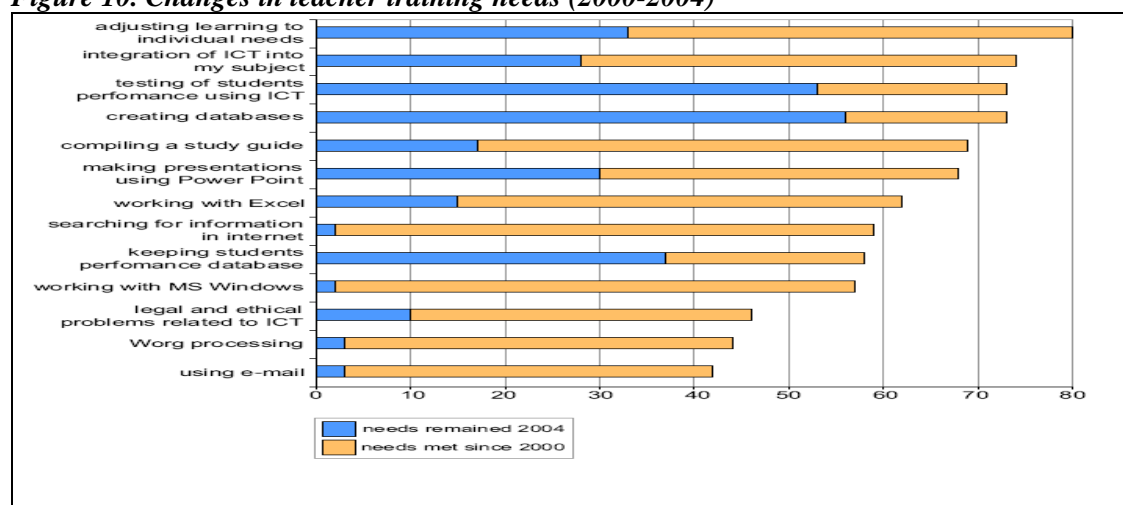
II.5.2.6 Training of the trainers and teachers: capacity of teachers in providing the necessary digital literacy teaching services

According to the *Tiger Leap Plus Strategy* 2001-2005, a teacher: should require ICT competences and methodological skills in initial training; should acquire systematic and good in-service training; should use respective competences in everyday work and have access to the information of sample exercises and different themes, and also have access to e-mails (Tiger Leap Plus Strategy 2001-2005).

The ICT national strategy *Tiger Leap* stated that all respective programmes for initial teacher education programmes should include courses on the use of ICT in education and educational technology. The expected total volume of such courses should be at least four (4) *ECTS* (Laanpere, 2003/2004).¹³⁸ See more about teacher training curriculum from the standpoint of ICT in ANNEX III. Even though the objectives of the teacher training are further developed in the *Learning Tiger* strategy (Learning Tiger Action Plan 2006-2009), the real situation has been negative due to the *Bologna-related reform* of university curriculum. Today, the introductory *Informatics* course is compulsory only for students who did not pass the ICT competency test, and eLearning topics form only one part of a general didactics course (4 CP in total, about 1 CP for eLearning environments) (Laanpere, 2006b).

On the other hand, teachers' in-service training needs (e.g., in general education) have become more sophisticated and specific because most teachers could master basic operations in *MS Windows*, find additional information for their subjects in the Internet and use e-mail (see Figure 10). However, the aspects of implementation of ICT for student performance assessment and data management have remained areas in acute need of in-service training (Toots, Plakk and Idnurm, 2004: 16).¹³⁹ Today, in-service training is mainly oriented towards ICT-supported learning methodology (including the use of different eLearning environments, especially those of LMSs and course management systems).

Figure 10. Changes in teacher training needs (2000-2004)



Note: % of teachers who said they cannot accomplish the listed task and would like training Source: Toots, Plakk and Idnurm, 2004: 17

The most important restrictions in enhancing ICT skills of teachers in vocational education have been the lack of time and low interest in eLearning (Vocational schools reports in the framework of the

¹³⁸ For example, due to the *Tiger Leap Programme* the teacher training curriculum at Tartu University and Tallinn University included a basic course in *Informatics*. Moreover, a number of specialities provided courses in subject didactics dealing with computer applications and/or courses on the basics of educational technologies. Specifically, teacher education curriculum in the universities of Tallinn and Tartu comprise the following ICT-related courses: a) *Introductory informatics* (2 CP course), b) *ICT in school* (2 CP course), c) PLUS some optional courses related to *subject didactics*, e.g., *Computers in school mathematics* (3 CP).

¹³⁹ The survey also found significant differences in the schooling patterns of urban and rural schools. Rural schools, which have fewer financial and human resources, rely mainly on the informal exchange of optimum practices among colleagues, and do not make great demands on professional teacher development.

eKey project for I half of the 2006). However, it is at this level of vocational education where the support of educational technologists has been strongest. Promotional work at this level has also been impressive – for instance, there had been nine information days all over Estonia during the year 2006 (The Report about implication the eKey project about the first half of the 2006 for INNOVE).

One of the objectives in higher education is to give more emphasis on in-service training (Tiger University Plus Programme 2005-2008). According to the survey *Needs analysis of Estonian E-university* in 2004,¹⁴⁰ 43% of teachers had not passed any ICT-related complementary training during the last three years at high education level; 22% of teachers had respective trainings for less than 10 hours; 17% for 21-40 hours and 15% for more than 40 hours (Laanpere, Läheb and Plakk, 2004: 15). Similar pattern has been observed with regard to pedagogical complementary training during the last three years: 48% of teachers had not undergone pedagogical complementary training at all; 19% had it less than 10 hours; 13% had it 21-40 hours and 17% had it more than 40 hours. Although more than half of teachers were satisfied both with the announcement and the arrangement of complementary training in their institution, only a few were satisfied with the content of training and with possibilities to implement gained new knowledge in practice. Least satisfying was the assortment of available complementary training. As regards support systems in the institution, more respondents were satisfied with IT support than with support to eLearning or pedagogy (Laanpere, Läheb and Plakk, 2004: 15).

In conclusion, much emphasis has been given on improving digital literacy skills of teachers (especially in general education) through in-service training. Nevertheless, there have been necessary changes in initial training (but as to whether these changes have been positive is another question). More attention must be drawn at in-service training at high education level. Furthermore, as the survey *Needs analysis of Estonian E-university* shows, ICT-supported learning is often used by teachers who have likewise studied through this method.

II.5.2.7 Price levels and affordability of eLearning solutions for the target groups

Most of the digital learning materials, which development is supported by *Tiger Leap Foundation*, are available in the Internet for free, and some are used in schools in the form of CDs (Overview of general education in Estonia in 2001-2005). The procurement of learning software is also supported by the Foundation. The schools are paying relatively small monthly fee for using *eSchool*. The commercial monthly fee for each school would be around EUR 200-250. Since hosting and initial costs were largely covered by companies and NGOs, schools are paying the monthly fee of EUR 50 (Look@World Foundation). The available LMSs and CMSs for general education are essentially open source.

At vocational and higher education levels, there are available local open source LMSs. The *Estonian E-university* pays for the *WebCT* licence. Financial restrictions seem to be the major barrier in acquiring special ICT equipment like those for videoconferencing.

Most courses provided inside universities are free. Courses (especially teacher in-service training) provided inside the *Estonian E-university* and *E-VocationalSchool* consortiums are often 50% cheaper than the usual. Basic skills courses are totally free for teachers the consortiums (see also Tammeoru, 2004). For vocational schools, which take part in the *eKey* project, the courses are 75% cheaper.

The prices of courses for in-service training are generally a bit lower than traditional courses (for

¹⁴⁰ There were four sections in the survey: 1) background information (including indicators of everyday use of computers, self-evaluation for IT skills); 2) readiness and willingness to use eLearning: experiences, competences (both pedagogical and technical), attitudes, pedagogical concepts of learning and teaching; 3) evaluation of existing eLearning support system and training possibilities; 4) eLearning policy (judging current situation, problems, needs). There were 195 respondents altogether from 6 partner institutions. Results in Estonian are available at the *Estonian E-university*'s home page at <http://www.e-uni.ee>.

many cases the cost of the CP is about EUR 38, and the amount of course varies from 1 to 4 CPs).¹⁴¹ Some courses, however, have quite the same price level – e.g., some teacher training courses (also, see the web page of the *Estonian E-university*).¹⁴² The more specific theme the course handles, the higher the price is; and here, the differences with web-based courses are considerably big (as much as it is possible to do that kind of comparison at all since web-based courses mainly handle quite simple and general themes).

In sum, the expenditures on eLearning have been limited both in the education sector and the private sector. The overall attitude in developing web-based courses at different educational levels has been their resource-demanding nature in terms of time and finance.

II.6 Specific issues and problems related to eLearning

This section presents the general problems in education system in Estonia with particular reference on financial issues that have significant impact on the development of eLearning in the country.

To date, state support is concentrated on concerns related to the overall goals in education other than questions like eLearning. In a situation in which financial concerns are the biggest problems, venturing into an additional financial responsibility in new risky areas such as eLearning does not seem to be promising.

- The financial priorities for general education are mainly investments in schools and teachers' wage.
- The main problems in higher education are about quality and resources. Since the support from the state budget is minor and universities are rather autonomous in Estonia, the competition for resources has been based mainly on quantity of students. This also means the lack of cooperation tradition between universities to focus more on reasonable use of finances and on quality. In addition, there is a serious lack of professors, especially in technical areas, because the wage is too low. However, this is also a question of having not enough new generation of teachers. The lack of teachers results in overburden of the existing ones.
- On the students' aspect, the state has no financial resources to give scholarships as competitive, or comparable, as working in the private sector. This reality, in turn, favours working in the private sector more than prioritising completion of education. A solution to mitigate the problem would be to have flexible universities actively using web-based learning. Further, in order to tackle the problem, there should be higher financial support from the state for students (i.e., bigger stipends, financial aid) in order to keep them in the education system while studying.

However, eLearning as such is not considered the solution here because the state is not yet willing to considerably change the current education system and it is not willing to invest more in education (especially in activities that are very much resource demanding such as eLearning which requires availability of much better ICT infrastructure/equipment and content). That eLearning is part of knowledge society, the objective so broadly declared in several national strategies, is not recognised yet. This means that there are not enough resources to integrate eLearning into overall education, to legal and institutional spheres. It must be mentioned that the current difficulties is mitigated by the availability of the EU structural funds. Moreover, the lack of attention given to eLearning issues is a question about state capability, and the lack of respective competence at the Ministerial level at this time. But what is important here is that the lack of financial resources is not only a question of the small state budget, but rather of unstable political environment. The goals today are very much dependent on prevailing political ideas. What is a real pity is that the educational system is over

¹⁴¹ EUR 30-45 per 1 CP is the usual price for training and at the undergraduate level in universities. See also, for example, *Tallinn University of Technology* (<http://www.ttu.ee/?id=2153>) and *Tallinn University* (<http://www.tlu.ee/files/arts/2306/UusAP489c3bf37339d7c5c912fa76f1bc43d0.pdf>).

¹⁴² See also <http://www.e-uni.ee/taiend/TLU.htm#TLU1>.

politicised at all levels – especially at the local level where the selected principal must be neutral and does not belong to any political party.

II.7 Acceptance and usage of eLearning services

II.7.1 Users of eLearning: usage, perceptions and attitude

The usage of the ICT-supported learning can be considered to be in a quite early stage and used mainly if the teacher (but also educational institution) is full of enthusiasm enough to take advantage of ICT means.¹⁴³ The overall figure of computer-based learning participation in Estonia is 10.3 in 2005 (Eurostat, 2006; see here also Table 13 in ANNEX I).

At the basic and secondary educational level, both students' and teachers' ICT competence has increased significantly during 2000-2004 and therefore has increased computer usage in teaching subjects among students from 8% to 73% and among teachers from 32% to 61% (Toots, Plakk and Idnurm, 2004: 73). The students' competence was measured in the framework of the survey *Tiger in Focus*.¹⁴⁴ The results showed that the proportion of students with the lowest scores has dropped sharply and although boys' knowledge and skills are still higher, girls have made more notable progress.¹⁴⁵ Furthermore, 80% of students would like to use ICT in learning. On the other hand, the time that students spend learning with ICT has not increased (Toots, Plakk and Idnurm, 2004: 11-18).

The same survey (*Tiger in Focus*) asked teachers to estimate their competence.¹⁴⁶ The use of ICT in teaching had tripled between 2000 and 2004 (Toots, Plakk and Idnurm, 2004: 10). The share of teachers using a computer on a daily basis increased from 32% in 2000 to 46% in 2004. Only 2% of teachers did not use a computer (Toots, Plakk and Idnurm, 2004). Today, according to estimations, about 10-11% of trained teachers are using ICT means in their subjects even if learning activities had not been altered or developed (Interview with Mägi, 2006). Hence it cannot be said that there have been many instances of how resistance of teachers limits the prospects for development. One of the best examples is the web-based gradebook, *eSchool* service, in which the resistance was mainly based on the issue of fairness of electronic means which, in turn, resulted in double work for teachers (i.e., registering grades not only on paper but in the electronic system as well). In sum, only a few of the possibilities, which ICT can provide for learning and teaching, are currently used in schools. Rather, teachers see ICT-supported learning as a useful tool in enhancing student discipline and motivation (Toots, Plakk and Idnurm, 2004: 18, 11).

ICT is increasingly used in school management and administration. According to the principals' survey, ICT is extensively used for keeping student registers and storing subject syllabuses. Less common is the application of computers in activities, which demand closer cooperation between teachers and advanced skills in data processing and analysis (Toots, Plakk and Idnurm, 2004: 16).

At the higher education level, computers are mostly used by professors as a tool for text editing, tool for information retrieval from the Internet or as a tool for e-mail exchange. Usage frequency of web-based LMSs (*LearnLoop*, *WebCT*), data analysis (*SPSS*) and content management (*Postipoiss*) significantly differs from overall computer usage – 60% of teachers (117 people) are not using web-

¹⁴³ For example, it has been claimed that Tallinn is in the worse situation in the area of eLearning than other schools due to the lack of enough enthusiasm and wish to experiment. However, one of the reasons maybe the large size of schools.

¹⁴⁴ This was done in two ways. First, a test with multiple-choice answers was composed to measure actual knowledge and skills. And, second, a set of statements was included in the survey to measure self-perceived skills. Actual knowledge and skills were calculated by the total sum index and by three sub-domain indices.

¹⁴⁵ Overall, nation-wide academic placement tests in 2002 with participation of 45 schools and 740 students – and in 2005, 129 schools and 6 623 students – show that students' skills and knowledge is good, and over **90%** of students have required presumable ICT competence (Learning Tiger Action Plan 2006-2009).

¹⁴⁶ The statements were divided into two categories. The first category measured general skills in using ICT; and the second category measured the professional application of ICT in teaching the subject.

based LMS (Laanpere, Läheb and Plakk, 2004: 6). In regard to the skill in creating web page, 31% (the biggest group of respondents) indicated their skills as ‘cannot at all’; 8 respondents indicated themselves as experts; and 34 people rated themselves as proficient. The result is that 24% of teachers do not use eLearning tools at all; 49% are using some web-based tools; and 25% are using several eLearning tools. Very few have indicated that they do all their teaching in web-based form (Laanpere, Läheb and Plakk, 2004: 10; see also Text Box 21).

Text Box 21. Personal experiences in different learning management areas can be summarized by usage frequency as follows:

- Feedback to students by e-mail (47% regularly and 34% seldom)
- Uploading learning materials (39% and 17%)
- Creating a course web-page (17% and 13%)
- Using a web-based LMS (WebCT, LearnLoop etc.) (11% and 7%)
- Participating in a web-based course as a student (3%; and do not have any experience 69%)
- Combining face-to-face courses with eLearning (11%; and do not have any experience 71%)
- Conduct an entirely web-based course (3% and 3%; do not have any experience – 90%)

Overall, the share of teachers in Estonia who used computers in their classes last year at all educational levels (except in special computer classes) was 60%, compared with EU’s 74%. The respective figure is lower for example in Latvia (35%), but is considerably higher in Finland (85%) and in Denmark (95%). A very high 87% of teachers use prefabricated pedagogical material from existing online sources, and 65% use materials available in the schools’ network and databases. Offline learning materials such as CD-ROMs are used by 72% (Empirica and TNS Emor, 2006).

The demand for the use of eLearning tools is growing – and is the biggest – among students.¹⁴⁷ Today, from a total of 42 000 students in all member universities of *Estonian E-university* consortium, over 40% of students (18 000) are taking part in web-based courses.¹⁴⁸ Among Internet users, 5.9% of individuals are using it for formalised educational activities (see also Table 14). The highest is the usage of computer-based learning participation in the age group between 25 and 34 years – the figure is 15 (Eurostat, 2005). However, the demand is mainly for usage of LMSs in order to have better access to information related to learning and concrete subjects. Furthermore, because of the developing ICT society and other eServices, the demand in this sector is believed to grow very fast in the coming years (eLearning Conference in Tallinn, 2006). This can also be observed from the increasing number of students at the higher education level.

Table 14. Percentage of individuals having used the Internet in relation to training and educational purposes (2005)

Percentage of individuals	Estonia	EU25
Percentage of individuals who used Internet in the last 3 months for formalised educational activities (school, university, etc.)	5.9	8.5
Percentage of individuals who used Internet in the last 3 months for other educational courses related specifically to employment opportunities	3.1	6.8
Percentage of individuals who used Internet in the last 3 months for post educational courses	2.3	5.4

Source: Eurostat, 2006

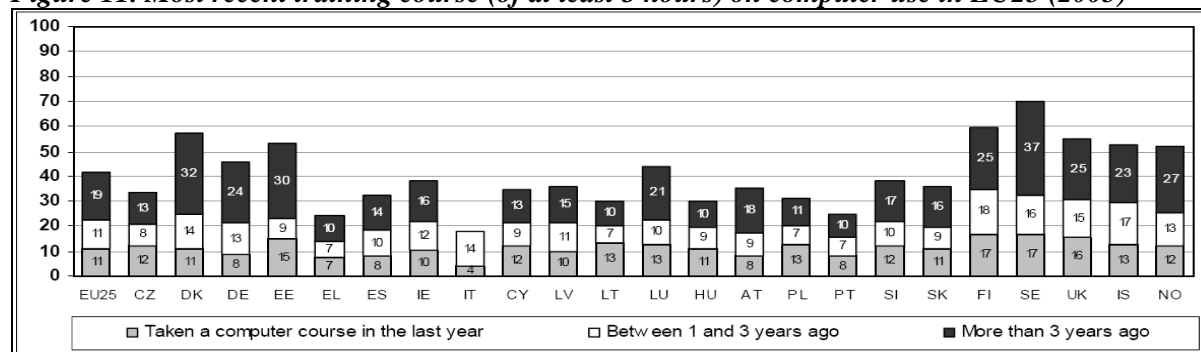
Although a legislative framework and measures were introduced to promote learning both in the workplace and outside (especially *Lifelong Learning Strategy*), it may be said that more effort is required from different parties to create a proper learning society and learning organisations. First of all, there is need for time for the idea of lifelong learning to take root. The demand for ICT-supported learning is smallest in lifelong learning. According to *Eurostat*, 5.9% of people aged 25-64 participated in E&T. In 2005, only 2.3% of individuals used the Internet for educational purpose; and

¹⁴⁷ In 2001-2003, 88% of students were ready for web-based learning, but as the figures show, the web-based learning itself was then in the starting phase (Sule, 2003).

¹⁴⁸ It should be taken into account that one student can enrol in several web-based courses, and hence the statistical figures may be higher than the real case (Interview with Laanpere, 2006).

2.4% of the inactive population, 5.8% of the unemployed, and 13% of the employed were into computer-based learning (Eurostat, 2005). However, as there is no demand, there is also no supply – the web-based courses provided for adult training are very limited both in scope of content and in numbers. The intensity of ICT skills' training at present is considerably low, although the respective figure is still high compared with other EU25 (see Figure 11).

Figure 11. Most recent training course (of at least 3 hours) on computer use in EU25 (2005)



Note: As a percentage of the total number of individuals aged 16 to 74

Source: Statistics in Focus, Eurostat, 17/2006

It is difficult to measure how much people learn from 'googling'. According to a *TNS Metrix* survey, the most frequently visited websites are the search engine *Neti* and the news portal *Delfi*. Also popular are online newspapers – *Postimees*, *Sloleht* (*Sõnumileht*), *EPL* (*Eesti Päevaleht*), as well as portals for different operations in the field of real estate (*City24*, *KV*) and cars (TNS Emor, 2006; also, see Table 1 and Table 2 in ANNEX III).

In the private sector, eLearning applications are used extensively by large enterprises for training and supporting learning of their staff.¹⁴⁹ Banks and telecom companies use web-based learning for training their staff (Massy, 2004). In addition, the highest percentage for using eLearning applications exists in the areas of electricity, gas and water supply (37%) and of real estate, renting and business activities (36%) (Eurostat, 2006; there were no statistics about the financial sector). In 2006, 33.5% of enterprises used Internet for training purpose (SOE, 2007); and 30% of enterprises used eLearning applications for training and education of employees (Eurostat, 2007). The same indicators for EU25 and EU15 are 20% and 19%, respectively. In 2005, the percentage for Estonia was 24 - the difference with EU average was not so remarkable (Eurostat, 2007). Assessing enterprises on the basis of size, 56% of large enterprises, as compared with 30% of SMEs, used eLearning applications for training employees in 2006. In other words, bigger companies have recognised and adopted eLearning faster than SMEs (see Table 17 in ANNEX II; Tables 17 and 18 in ANNEX I).

While larger employers can develop their own personnel, SMEs often lack the resources and it is more difficult for them to find a substitute for employees participating in training (Kiviselg et al., 2006). However, eLearning solutions are considered useful where the number of employees is great enough, which is mainly the case in large companies (Interview with Väravas, 2006). SMEs prefer traditional training in order to facilitate organisational culture and communication with each other. On the other hand, the feedback for eLearning in large companies are neutral, rather than euphoric, since it has become a natural part of everyday work (Interview with Tammiste, 2006).

Overall, users think 'access' as one of the main benefits of eLearning. Most of the employers think e-access reduces the time spent away from the job; and secondly, they are convinced that self-paced learning enables learners to take the most of the training programme and content (Remi, 2002: 31). Large companies regard cost efficiency as a benefit from eServices (Interview with Väravas, 2006). In general, the benefits of eServices are believed to be saving of time (86%) and of money (46%), and the availability of more qualified information (35%) in faster way (74%) (see Oviir in *Eesti Postimees*,

¹⁴⁹ For example *Hansabank*, *SEB Estonian Union Bank*, *Elion*, *EMT*, *Eesti Energia* (see *Eprojekt*, at <http://www.eprojekt.ee/>).

19.10.2006). The main reasons raised for not using web-based training include the possibilities not to use the computer, the lack of knowledge about the opportunities of eLearning, the lack of trainings in certain speciality and the satisfaction in traditional training (Piin, 2004: 42).

There are different ways to measure satisfaction in web-based learning. The main form used is the employee feedback, but corporations and government offices also pay attention to the bottom line results. The simple tracking number of learners is very often used (Piin, 2004: 49). This means that there is no special evaluation for the quality of courses offered by universities that use eLearning approaches. The training management units and the board, which plays a very important role in the education sector, mainly make decisions (Piin, 2004: 51).

II.8 Impacts of eLearning developments

To date, eLearning has been developed in the framework of different projects – in particular, *Tiger Leap* programmes on general education, *Tiger University* and *Estonian E-university* on higher education, and *E-VocationalSchool* on vocational education. Arguably, the deepest impact eLearning has had can be found at the general education level, where the next strategy for developing eLearning (*Learning Tiger*) also considers putting in place the necessary legal bases for new trends in education. The developments in the eLearning area on general education are mainly based on networks of teachers – one of the greatest net benefits from eLearning. The other main net benefit in the area in Estonia comes from the unified consortium of universities, the *Estonian E-university* on higher education. The same is the case for *E-VocationalSchool*. Although public universities in Estonia are autonomous, the role of the *Estonian E-university* has been very important – i.e., a supportive role to enable universities to reach their respective strategic goals. Here, the *University of Tartu* and the *Tallinn University of Technology* have elaborated their own strategic plans in which especially web-based learning plays a crucial role. However, it may not be plausible to argue that eLearning has greatly, if at all, ushered in reforms in the higher education sector. The same can be said about vocational education and adult training.

This is likewise the case in general education. Important is here the finding of the survey *Tiger in Focus* which shows that although 80% of students would like to use ICT in learning, the time that students spend learning with ICT has not increased (Toots, Plakk and Idnurm, 2004: 11-18). At the same time, one of the main motives in purchasing a computer is educational reason (23%); and people with high education are the ones most willing to buy a computer (35.1%), as well as families with two or three children (42.7%) (Vare, 2005; Content Village, 2005).

On all these educational levels, a positive development has been the effects of eLearning on the availability of information and on making communication easier between students and educational institutions.

eLearning has effected the overall spread of ICT. eLearning programmes, especially at the general education level, have been of utmost importance from the standpoint of developing ICT infrastructure.

Tiger University programmes have supported the provision of ICT infrastructure in higher education. For the larger society (especially for rural areas), the Look@World project was certainly important in spreading ICT infrastructure. What is important is that these programs have not only created physical infrastructure for eLearning, they have also generated public interest in eLearning. Noteworthy is the leading role played by the private sector in many of the initiatives, especially in the provision of finance. However, eLearning has not affected much the ICT industry and training industry. Many leaps forward have been made in teacher training; but, the management of ICT tools in teaching activities, especially the training of didactical skills, needs further improvement.

Furthermore, the use of ICT-supported learning and of eLearning applications has certainly deepened the country's IS. However, it is clear that various public (e-tax office) and private services (online banking) have had much greater impact. In addition, it can be argued that Estonia has not been able to

capitalise from eLearning developments in lowering digital divide. In fact, even though there are no in-depth studies, it can be argued similarly to the case of e-elections that favour young, relatively well-to-do urban age groups; not to mention that advances in eLearning in Estonia mainly help the young people in the larger cities of Tallinn and Tartu.

Moreover, eLearning has had only limited effect on growth and competitiveness, as well as on achieving the *Lisbon* targets. On the one hand, Estonia's growth and competitiveness have been clearly driven by other factors (outsourcing, foreign direct investments, etc.). On the other hand, lack of general eLearning strategy has led to different outcomes in different sectors: while formal education projects have been successful, there is clear lack of eLearning measures for older and poorer age groups.

Summary of Chapter II

To date, eLearning activities have been strongly affected by developments in the area of eServices in Estonia. As a result, several projects have been taken up in cooperation between the public and private sectors to support educational institutions mainly with the provision of ICT infrastructure. In addition, several steps have been made to develop eLearning content due to the initiatives of public sector's foundations. Yet a concrete system for eLearning in the public strategies, as well as a clear legal base, is missing – this seems to be the main barrier to the further development of the area.

Contemporary eLearning policy has been mainly successful in creating infrastructure at the general school level, including some 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*. At vocational and higher education levels, these policies have supported the development of web-based courses, materials and curriculums, as well as the creation and use of LMSs (such as IVA, WebCT and Moodle). However, these mechanisms have not affected the usage of ICT as expected. Neither has the time students spend learning with ICT increased, nor has the usage of ICT means by teachers in learning process been comparable to those in EU25. At the higher education level, ICT in education is mainly used for administrative purposes, e.g., for enrolment to a course or a school and for communication with school and teachers. Teachers in higher education mainly use ICT as a tool for text editing, information retrieval from the Internet, or e-mail exchange. In addition, the current policy has failed to address the issues about high digital divide and e-exclusion. In other words, there has been lack of attention on older, lower-educated, poorer and Russian-speaking population groups. This means that students and employees are the ones who have mainly gained from the benefits ICT has to offer for educational purposes.

In the private sector, only 30% of Estonian enterprises have benefited from ICT means in cutting expenses, increasing turnover and introducing new products and services. And only larger enterprises (especially banks and telecom companies) have thus far gained from eLearning.

III: ASSESSMENT OF THE STATE AND DEVELOPMENT OF E-LEARNING

This chapter aims to integrate the various data collected and analysed in the previous chapters. It identifies the major factors, both drivers and barriers that influence the development of eLearning services in Estonia. It does so in three inter-related steps: (1) an account of the current state and trend in the development of eLearning, (2) a presentation of the major factors affecting the evolution of eLearning, and (3) an analysis of barriers to, and drivers of, the development of eLearning.

III.1 Current main achievements and shortcomings

Based on certain indicators established through an analysis of the data and information presented in the previous chapters, this chapter gives a summary of the current state and trend of eLearning developments in the country.

General characteristics of eLearning in Estonia:

Achievement:

- In cooperation with some of the leading actors in the private sector (ICT companies, banks, telecoms), the Estonian public sector has been very successful in implementing projects that have greatly improved the ICT infrastructure at schools and in regionally remote areas as well. In particular, these developments include: (1) the realisation of different *Tiger programmes* to provide schools and universities with computers and Internet connections; and (2) the implementation of projects such as *Look@World* to contribute to the development of people's basic ICT skills.

Shortcomings:

- However, a single policy document that combines all the aspects of eLearning has been missing from the very beginning. Both in policy formulation and organisation (i.e., in the design and implementation of policies), Estonia has relied upon non-profit organisations, schools and universities, and local initiatives, rather than upon a central policy coordination and formulation from the government. This, in turn, has led to the creation of various foundations and consortiums that implement policies independently, yet technically under government supervision. In effect, the government has not played a central role in developing eLearning.
- In Estonia, the idea of eLearning is very much related and closely associated to web-based courses and also to digital learning materials delivery at different levels of education (although lesser degree at the level of general education), in lifelong learning and in the private sector. Such misconception regards eLearning in Estonia as a self-study and not as a collaborative learning process with other learners.
- eLearning is seen as a goal by itself rather than a mean to build up the knowledge-based society.

eLearning in general, vocational and higher education

Achievements:

- Various NGOs have emerged with the common orientation to support the development of eLearning in Estonia, namely: [a] *Tiger Leap Foundation* (focusing on general education); [b] the *Estonian E-university* consortium (focusing on higher education), which was established through the initiative of universities; and [c] *E-VocationalSchool* (focusing on vocational schools).

- Several development plans to promote ICT infrastructure, as well as the role of ICT in everyday learning process, have been made for both the general and higher levels of education. The different *Tiger* programmes for general and higher education have been a key to the developments from the very beginning. Some universities have likewise set their own goals in the field of eLearning.
- Contemporary eLearning policy has been most successful in creating infrastructure at the general school level (especially as regards the ratio of computers per students, teachers or principals, and the availability of broadband connection in all schools). The main services provided within eLearning at general educational level include web-based grade-book *eSchool* service, web-based learning materials and different educational portals. In addition, there are some programmes created making it possible to acquire upper secondary education through the Internet. At the levels of vocational and higher education, the most important support services within eLearning are the ones provided by the special consortiums. Main attention is given to web-based courses and materials on these levels. Availability of materials in the web supporting on-campus courses has been improving.
- Due to the initiatives of universities, especially by *Tallinn University*, locally open source LMS like *IVA*, *VIKO*, and *CMS KooliPlone* have been developed. All of these LMSs are widely used in Estonia; yet *WebCT*, also supported by the *Estonian E-university*, is the most popular.
- Interest towards eLearning has been high since 2000 for both the general and higher education levels. Today, over 90% of students at the general education level have necessary ICT competence. The highest interest towards eLearning is at the higher education level, where almost a third of university students belonging to the *Estonian E-university* consortium claim to have participated in web-based courses. However, it must be noted that the statistics refers to participation in available web-based courses (based on logfile), not in the share of web-based courses compared to on-campus courses.

Shortcomings:

- At the general education level, a legal framework to incorporate ICT in the learning process is incomplete. Moreover, the curriculum remains classical and traditional – not enough emphasis is given on the use of ICT in the learning process (e.g., ICT is dealt with in the national curriculum as a horizontal theme), let alone web-based learning materials. ICT qualification standards for students and teachers need to be further developed and should have stronger legal base. The respective standards for principals are to be worked out. In addition, ICT-related in-service training for teachers has been voluntary at the moment. In sum, although the strongest emphasis has been given precisely to general education level, much of the stated goals are not yet achieved. In fact, although 90% of students require ICT competence from schools, the time students spend learning with ICT has not increased.
- At the higher education level the stress has so far been on-campus education, and not on distance learning, in the provision of web-based courses and curricula. This is also shown also in the low number of web-based curriculum. In addition, there are not enough curriculums in higher education that contain courses for ICT skills, and especially for respective didactical skill necessary for using ICT-based teaching. Moreover, there is no curriculum concentrating on teaching eLearning specialists: there is no MSc programme focusing on eLearning design, provision, consultancy, and technology – not to mention PhD studies.
- The development of eLearning is not supported by a special remuneration system or by other favourable conditions for teachers who use ICT in their teaching. However, it has been claimed that, for instance, much of the digital learning materials today are not created because of financial reasons, but more so because of the overload of teachers and hence the lack of time.
- The design of web-based courses is hindered by threats related to authorship rights, although IPR in Estonia is considered to be up-to-date. The use of open licencing of digital learning materials (especially *Creative Commons Licences*) has been promoted by the *Tiger Leap*

Foundation and the *Estonian Information Technology Foundation*. However, it has not yet found the support needed at the Ministerial level. Cooperation between teachers has been stronger here at general education level than at other levels.

- Today, since the role of ICT in education is not specified in the programmes of the public sector there are also no concrete schemes supporting the development of eLearning in general. Interestingly, the *Tiger Leap Foundation* has managed to include secure private financing because of its formal status of being an autonomous entity from the *Ministry of Education and Research* – otherwise, the private sector would not have been interested in financing as it would have meant a direct support for the public sector.
- In fact, the main initiatives of the *Ministry of Education and Research* – the central government unit that is supposed to be responsible for the development of eLearning activities and services – have only been related to the establishment of several information systems in education, like *EEIS* and *SAIS*, which can be considered more particularly as by-products of eGovernment services than as educational ones. One of the results is that ICT in the area of education is mainly used for administrative purposes – i.e., for enrolment to a course or a school and for communication with school and teachers.
- At the same time, there is a lack of interoperability between content authoring, storing and brokering services. ePortfolio services, web-based courses, search and enrollment databases are likewise lacking. The study information systems of universities are not interoperable with each other. Connection to existing databases or other information systems via *X-road* has also been only hypothesised. In addition, the lack of compliant content illustrates the poor development of eLearning services – not to mention that companies and institutions (e.g., Estonian TV, radio, publishers), which are main content owners, are not involved in eLearning development projects (Laanpere, 2006b). However, there is a serious lack of digital learning materials in general.
- A critical shortcoming is that at different levels of education eLearning is not incorporated in the overall education reform or strategic plans. Hence, it is not seen as a mean to provide solutions to current problems; but as a goal by itself. More specifically, even though teachers see ICT-supported learning as a useful tool in enhancing student discipline and motivation, it is not mentioned in existing strategies that the use of ICT could improve the current situation in which many students are dropping out of school or are repeating a school year. Further, the use of ICT in vocational education is a plausible option that could improve its current negative reputation.
- Further, the latest survey suggests that, although computer and Internet penetration in Estonia is comparable to the EU average, the existing ICT infrastructure in classes other than special computer classes is considerably lower than the EU average. A contradiction here is the fact that 70% of financial resources in general education level should have been directed to maintaining and improving the schools' ICT infrastructure. On higher education, the greatest problems are related to the lack of special technical equipment (e.g., for videoconferencing).

eLearning in the private sector

Achievements:

- The will to modernise the training system has been recognised earlier in the private sector than in the educational system (the first LMS *Edutizer* was initiated by one of the largest banks in Estonia – *Hansabank*).
- In general, about 30% of Estonian enterprises take advantage of eLearning applications for training and education purposes.
- There are also some training and software enterprises in the market whose activities include the provision of eLearning services (i.e., providing general ICT skills training, creating of virtual learning objects and digital learning materials, supporting purchase of new modern technologies for schools and further development of eLearning environments [especially those

in Estonian, and those of local open source LMSs], and creating web-based test environment for controlling ICT skills of the teachers and students).

Shortcomings:

- Private sector efforts in eLearning (other than via publicly led Foundations mentioned above) are clearly concentrated among larger companies, especially in the banking and telecoms sectors.
- Due to small local market (in terms of physical number of companies, geographical distance and real wage), it is doubtful that Estonia will see a dramatic rise in the development of the eLearning content in local private sector in the near future. It seems simply cheaper to have traditional training at the company level, and as there are not many similar companies, it is not feasible to develop Estonian-language eLearning programmes and content.
- Private sector cooperation with the public sector remains limited in developing eLearning content or special environments for different levels of education. One of the reasons behind this is that there has been a tendency to develop LMSs, CMSs, etc. locally as open source – in which a main exception is the financial support provided to *eSchool* service on general education.
- Furthermore, as publishing of textbooks is under the monopoly of private firms, the latter would rather fight for traditional than digital learning materials to guarantee for themselves at least some kind of profit. Hence, further developments in the area of eLearning depend much on actions related to a broader project of changing the system.
- To this day, the cooperation between public and private sector has been limited in the field of R&D. Meaning that, the claims of knowledge-based society is not backed up with universities and enterprises neglected competition. The private sector's role has been limited in financing certain projects.

eLearning in lifelong learning and eLearning services for the unemployed

Achievements:

- The main achievements of eLearning in the areas of lifelong learning and services for the unemployed on these levels are: a number of general ICT skills training, some web-based courses available from the *Estonian E-university* portal free of charge, opportunities to use the Internet at public libraries, and the availability of several online job-search systems.

Shortcomings:

- While the demand for self-study courses is very low, the services provided in the framework of lifelong learning and for the unemployed are modest. Web-based training for the unemployed is not in use. And although the *Lifelong Learning Strategy* recommends that participation in lifelong learning must be considerably increased in Estonia, advances provided by web-based learning are not yet seen in this field.
- To date, the emphasis in the case of unemployed people is on teaching the basic ICT skills in a traditional way.
- The idea of regional learning colleges is yet to be implemented.
- In addition, there are no legal mechanisms in place to legitimise knowledge and skills (e.g., accreditation of prior learning experience, including professional skills), both of which are acquired outside formal education.
- In the case of 'googling' or searching in the Internet, search engines and online databases are most often used to search for information related to real estate and cars, and rarely for educational purposes.
- There are not enough policy initiatives in the areas of eLearning that could prove most vital for Estonia's sustainable growth and competitiveness except for one-time projects that, for

example, address digital divide and training of older, poorer and Russian-speaking population groups. Such a policy of no policy is potentially deepening digital divide and e-exclusion.

- The possibilities of web-based learning in these unemployed target groups are also hindered by variations in ICT infrastructure, as well as the availability and affordability of the Internet in rural areas.

III.2 Factors behind the existing developments

The major factors affecting the evolution of eLearning are summarised in the following structure:

- Economic factors: macroeconomic and microeconomic environment

The Estonian economy is characterised by a continuous growth in GDP, which has been one of the highest in the EU in the last years. Rapid economic growth, with its direct impact (e.g., increases in tax revenues to cover public ICT-investments) and indirect impact (e.g., increases in living standards and thus more widespread home ICT-infrastructure) have had certainly positive implications for the development of the Estonian IS and for the emergence and acceptance of eServices. However, Estonia has been falling behind in terms of productivity and has not been able to take full advantage of ICT. For example, only bigger companies have maximised their activity through the use of ICT in-service training activities; but for SMEs it has been limited.

Nevertheless, both the private and public sectors have been developing a variety of eServices (e.g., banks' extensive promotion of Internet banking services, and the Citizenship and Migration Board's issuance and promotion of the use of electronic IDs). Successful developments of eServices in other areas have been the main stimuli to the provision of eLearning services.

Provision of eLearning services has also been supported by the Estonian ICT market, which is dominated by telecommunications network services. Estonia has highly developed telephone communications and networks, and is known for its provision of alternative data communications options (e.g., wireless Internet). In fact, Estonia has one of the highest broadband penetration rates not only among the NMSs, but also both in the EU15 and the world. The geographical proximity of highly developed ICT countries (Finland, Sweden, etc.) to Estonia, as well as the good neighbourly relations among these countries, further contributes to the country's development.

Yet, compared to the public and private sectors the share of computers and Internet access in the households is considerably smaller. Access to the Internet in the rural areas needs to be developed. Although the state has made several steps to provide ICT infrastructure in all counties and is seen to continue its activity, the biggest problem about everyday usage of the Internet is still not solved. This is partly due to the contrasts in availability of different services provided online. Considering the fact that average incomes in rural areas is below state's overall average, the current situation is even worse. Since the state has declared that it will not subsidise Internet connection, it should therefore give more emphasis on designing free digital services (e.g., through *Citizen Portal*) that are attractive to every citizen in Estonia. The need for sufficient ICT equipment and quality of Internet connection is not only a problem in rural schools, but also of schools in the city of Tallinn.

Nonetheless, costs of broadband connection in Estonia are generally one of the lowest in the EU.

- Policy factor: policies at national, regional and local levels

Attempts to build up an IS as well as a knowledge-based economy in Estonia have been present since the late 1990s. ICT has always been regarded as one key priority to ensure Estonia's economic growth and to build a strong society – an idea which is also adopted in the *Lisbon Strategy*.

Although Estonia has been the frontrunner in eServices, it is claimed that the current ICT policy is not sufficient to assure sustainable results. This is mainly because of the lack of vision about how the Estonian economy could benefit from ICT and which role Estonia may generally play in the area of ICT at the international scale. These ideas are related to the implementation of the strategy *Knowledge-based Estonia*, in which ICT is regarded as one of the key areas. However, concrete programmes and measures to fulfil this goal have still not seen the light. In addition, there is a lack of vision on how ICT can create added value in non-economic sectors like education, and hence support the building of sufficient bases for future innovations. The main reason behind the shortages is the fact that the state is not a leader in enhancing ICT as it should be. This is also the reason quite many initiatives in ICT have arisen in the private sector (e.g., the last initiative about computer safety).¹⁵⁰ At the same time, the state has played a great role in enhancing ICT in Estonia in the early 2000s, when there were *Informatics Council* and *Informatics Fund* – i.e., focused financial resources.

There exists no coherent strategy for eLearning. At present, eLearning is promoted through the different individual strategies in the E&T systems. The main ICT priorities (including eLearning) are set by *RISO* (allegedly in cooperation with the *Ministry of Education and Research*). As long as *RISO* belongs to a particular Ministry – i.e., the *Ministry of Economic Affairs and Communications* – it cannot enact actions for other Ministries, meaning that the implementation of the overall priorities of ICT-education as stated by *RISO* cannot be assured. Furthermore, the different NGOs (*Tiger Leap Foundation* and *Estonian Information Technology Foundation*), rather than the *Ministry of Education and Research* itself, play the greatest role in the implementation of eLearning initiatives.

Firstly, this kind of rather fragmented public sector's provision of eLearning reflects the absence of consensus, and hence priorities, about the role of eLearning in the Estonian educational system, and about how the available ICT applications, environments and content should be incorporated into the study process. One of the results is misconception of the term 'eLearning', resulting in some negative stereotyping about it – for instance, some support traditional learning because it maintains the so-called 'human touch'.

Secondly, it may be asked: does this kind of a decentralised system guarantee developments in the area?¹⁵¹ Do these foundations have enough power to go further in their actions?¹⁵² Apparently, the activities of the Foundations remain limited, especially if there is no support from the *Ministry of Education and Research*, and hence no connection created between new ICT-supported and current traditional learning processes. This then evokes two other significant questions. First, how strongly are the activities of these Foundations connected to each other?¹⁵³ And, second, how are the activities of these Foundations and their consortiums take into account the opinions of educational institutions, the level that needs the support in the development of eLearning. This kind of fragmented system has resulted in lack of cooperation between different institutions dealing with eLearning development

¹⁵⁰ The main solution is seen in the ID-card, which over a million people already have. Another solution is seen in mobile phone SIM-cards. The theme will become more public during the first semester of the next year. The problem is triggered by the fact that the current authentication systems are created in 1993/1994 and now is the time for updating.

¹⁵¹ These Foundations can be considered as centralised only from the point of view of their respective orientations to specific educational level, namely, *Tiger Leap Foundation* on general education and *Estonian Information Technology Foundation* on vocational and higher education.

¹⁵² For example, educational literature for general educational school is absolutely in the hands of the private sector and hence market-based. This, in turn, means that *Tiger Leap Foundation* initiatives can only be project-based.

¹⁵³ Positive examples here include the cooperation between the *Tiger Leap Foundation* and the *Ministry of Education and Research* to put in order ICT skills qualification for teachers and students; and the *eLearning Development Center* in order to provide connection between *Estonian E-university* and *E-VocationalSchool*.

(*Tiger Leap Foundation* and *Estonian Information Technology Foundation*, companies and universities, secondary and vocational schools) (Laanpere, 2006b).

The development of eLearning in educational institutions is strongly dependent on the TOP-level (principals, rectors, directors of departments etc.). Yet, some claim that the ICT knowledge and skills of said level is not sufficient to plan the actions to be taken in the area of eLearning. The result is uneven possibilities for students in different schools and at different educational levels. In addition, current policies to build the IS have failed to address the specific concerns about the older, poorer and Russian-speaking population groups. As indicated in the previous sections describing the positive state of the ICT sector and eServices in Estonia, ICT-related progress in the area of eLearning in the country has been rather demand-driven – i.e., dictated by the actors active in the field and by the private sector – than policy-led.

In general, although the main activities in the field of eLearning have been directed to the provision of ICT infrastructure, more attention are increasingly given to the design and distribution of web-based learning materials. This is particularly so in the universities; and the main reason behind this is demographic: in the coming years there will be less high school graduates entering universities and thus the latter see eLearning as an opportunity to reach international as well as additional local students.

A special positive factor to enhance eLearning has been the joint steps and cooperation projects of the government and private companies in creating mechanisms for the use of the ICT infrastructure. An impressive example is the *Look@World Internet Training Project*, a PPP initiative to increase the number of Internet users and popularise eServices. However, whether the motives behind the project were to train the future clients of services (especially in the banking sector), or to solely contribute to the development of ICT in Estonia, remains a question. The cooperation between public and private sector in other areas has remained limited.

- Legal factor: regulation at national and EU levels, the relevant regulatory elements

From the perspective of the overall ICT sector, it is undoubtedly important that a functional regulatory institution was in place especially at the time when the Estonian telecommunications market has become completely open to competition and that the service has been offered by a variety of companies since 1 January 2001. While enactment of legislations that could promote the overall development of ICT is certainly positive for Estonia, there is currently no specific eLearning law or any other necessary regulations in Estonia. The *eEurope 2005 Action Plan* has been influential to the overall development of IS and several eServices in Estonia. However, the degree of international pressure for Estonia in the area of eLearning needs further elaboration.

The lack of a legal basis behind the initiatives can be considered a relevant issue. Due to this, several basic questions and significant issues are not mandated by the state and hence remain voluntary – questions and issues such as standards, qualifications, training, infrastructure, and content.

One crucial aspect hindering eLearning development is the inadequacy of existing ICT qualification standards for students, teachers and principals. *ECDL* has been the *de facto* main standard for user training, as well as for general, vocational, higher and in-service training. However, the requirement for ICT skills competence has no concrete legal basis until now so that it could be integrated into the national curriculum for basic and upper secondary schools (except that it is a skill requirement for the 9th grade). ICT is currently a horizontal theme – not a compulsory subject – in the general education curriculum. The problem about ICT skills competence is especially important at the general education level, where students are prepared for the higher levels and where subsequent developments and progress of students strongly depend.

In addition, the learning process has remained much more oriented on general learning than on students and their personality. The national subject programmes are too much oriented on classical

pedagogy, which makes it difficult to use constructive methodology like group-work and different projects for solving specific tasks. The large number of students in classes and the strict timetable are favouring this trend. Also, many teachers are afraid of using ICT in their subjects because they think they do not have enough time to go through the entire subject programme which academic placement tests and national examinations demand and control. This is supported by the lack of available ICT infrastructure to be used in classes, requiring extra time for organising to have some of them in class. Indeed, the use of ICT needs further estimation as to what and in what ways it is (to be) taught in class.

At the higher education level, the content of curriculum is not under the jurisdiction of the *Ministry of Education and Research*. Universities enjoy a rather big autonomy. Thus, much depend on their respective strategies for the future. And as a result, this makes central state regulation in the field difficult. However, through strategic plans, regulations have been and can be done. For example, the state has tried to support through the *Tiger Development Plans* the provision of ICT infrastructure for universities, as well as training of teaching staff in the field of ICT and development ICT-related curriculum. Special educational institutions have also been established like the *IT-College* to providing ICT education. But from the perspective of eLearning, these developments are not enough particularly because the training of special eLearning experts is not emphasised at the higher education level.

Other important issues are the modernisation of teacher training and the system of remuneration. Currently, the wages of teachers are computed on the basis of the number of classes and courses they teach. This means that, for example, if digital learning materials are created at home and not in the framework of the project, it is not appreciated. The result is that the use of ICT-based learning greatly depends on the willingness of teachers to use new forms of teaching. Apparently, teachers have no particular motivation and time to use ICT in the learning process – not to mention, to prepare web-based learning materials on their own – for a variety of reasons, among others: [a] the usage of ICT in the learning process is not mandated by the state; [b] the usage of ICT tools demand extra time for teachers who are known to have very stringent time framework in line with the national programme; and [c] the amount of digital learning materials available is small. It is all the more difficult because today's teacher learning programmes do not foresee special didactical skills to prepare the web-based learning materials on their own, although in some universities the goal has been taken. This is supported by a survey result among Estonian higher educational institutions indicating that ICT-supported learning methodology is used in learning by the teachers who have had themselves used eLearning in their own studies. ICT is also increasingly used school management and administration. To date, the *Tiger Leap Foundation* has mainly carried on the ICT in-service training of teachers at the general education level. But still, due to a self-financing character and to limited financial and human resources, professional teacher development is not of importance in rural schools where, some claim, that teacher training chiefly relies on informal exchange of optimum practices among colleagues.

The *Estonian E-university* has mainly provided in-service training of teachers at vocational and higher education levels. Importantly, it is at these levels where teacher training is even more dependent on individual school, resulting in a wide variation of teachers' ICT qualifications at both levels. In addition, according to a survey on higher education, lecturers use computers mostly as tools for text editing, information retrieval from the Internet, or e-mail exchange.

The missing legal basis for eLearning means that, above all, there is no clear legal basis for financing eLearning initiatives. The main shortcoming of this is the orientation towards one-time projects. Too, the central government's *Strategy for State Budget 2007-2010* does not give enough support to ICT in education. However, the EU has been important in the initiative to provide financial resources for eLearning activities. It has supported the participation of Estonian schools in several programmes it has financed. Yet, it may be the case as well that the availability of EU's structural funds has to a certain extent hampered the country's drive to build its own eLearning local system and support, and contributed to Estonia's focus on a project-based approach to eLearning.

- Ethical factor

The main issue about ethics is related to authorship rights. It is not so much about fear of others abusing digital learning materials and web-based courses, but about the attitudes of school teachers and university staff who do not want to share their digital content with colleagues, and hence not letting colleagues to comment on and develop their materials. Currently, there is an overall lack of knowledge about the possibilities to protect authorship rights.

- Technological factors

Compared to other former Soviet Republics, Estonia was in a rather advantageous position for a number of reasons: [a] there were some ICT-manufacturing industries existing in Estonia, [b] almost every former state-owned organisation had its computing centre in Estonia, and [c] a good level of ICT-education provided by the *Tallinn University of Technology* and the *University of Tartu*. Also important is the existence of well-educated human resource in the field of ICT capable of working out local learning (content) management systems. However, there is a lack of ICT specialist in the market at this time, especially those who have appropriate university education. In fact, the relative share of graduates in the spheres of science, mathematics and computing, as well as in the engineering, manufacturing and construction sectors in Estonia falls short if compared with the countries which are successful in the ICT field (especially Finland and Ireland). The number of doctoral graduates is very low. Nonetheless, a recent positive initiative, which shows state support in ICT education, is the opening of a web page that introduces the possibilities to acquire ICT education and to work in this field as well. Yet, there are no specific educational programmes concentrating on eLearning issues – more specifically on eLearning design, provision, consultancy and technology.

Another technological factor contributing positively to the developments is the advanced fixed (including broadband) and mobile telecommunications infrastructure created by Finnish-Swedish owned *Eesti Telekom Ltd*. Although several programmes have aimed to provide ICT infrastructure for schools, there is no overview about the real situation in every single school, especially as the availability of ICT tools and infrastructure depends much on the school. For example, a usual case is that bigger universities are in a better situation than smaller higher educational institutions, resulting in inequality from school to school in terms of the provision of different eLearning applications.

Furthermore, poorer ICT infrastructure in rural areas has hindered lifelong learning possibilities in the area of eLearning – the latter being especially the case of having computer and Internet access at home. A development in this endeavour however is the establishment of *PIAPs*, *WIFI* areas and the ‘internetisation’ of public libraries.

The existence and availability of environments conducive to eLearning is a very important factor in the development of eLearning as well. While several eLearning environments, LMSs, CMSs, study information systems, content repositories are available and being developed locally in Estonia, the problem is that the LMSs in Estonian educational and training institutions are not interoperable with study information systems or with content repositories and *EEIS*. This seems to be the overall problem in Estonia because there are not enough horizontal solutions developed between government agencies, central and local authorities, or either beyond the public and private sectors.

The other question is how well current ICT activities are responding to the actual needs of the private or public sectors. It has been claimed that to the state has not understood to this day that it should be the provider of (convenient) services. This is also the question on the non-use of the current available bases for developing eServices – i.e., *X-Road* and *Citizen Portal* – as much as they provide possibilities. Rather, the trend has been developing IT applications on their own. The trend has carried over to eLearning applications, coming from the practice that public and private activity are not integrated enough, as the public sector is afraid of commercial and the private sector of the too regulated market. Moreover, the private sector is holding itself back because of EU’s overregulation. The result is either the IT sector sells what is asked (read: improving the product than the system

behind), or the private sector develops systems which are not working in reality.

The essential factor in enhancing the development of eLearning is the need to develop software and content in the Estonian language. An important recent initiative in the area of software is the digitalisation of the Estonian cultural heritage, which is also being related to LMSs. But as indicated above, not all the means to support the provision of richer online content has been utilised. The use of already existing traditional educational content is especially underutilised despite its significance under conditions in which the scale and scope of eLearning content currently available is really limited and in which there are not enough capabilities (theoretical, practical, financial, etc.) for content design.

Although Estonians are not generally afraid of problems related to safety and security of using eServices, these problems are in the private sector agenda. The private sector is still working out solutions on these problems, as well as exploring ways to use internal LMSs outside the workplace.

- Socio-cultural factors (including skills and adaptability, knowledge of the employees)

The general image of ICT usage is very positive in the Estonian society and the share of Internet users is rapidly increasing over the years. Positive attitude towards IS has been generated in the media. In fact, Estonia has lower levels of concerns about data security and privacy/confidentiality, and this includes perception among non-users of the Internet.

The high level of formal education among the adult population of Estonia compared to the EU member states is certainly an important factor influencing the demand for eLearning. According to *SIBIS*, low levels of formal education appear to be the most significant reason why people cannot participate in the IS. The share of Estonian population with tertiary education is also one of the highest among EU member states. This is essential because the practice in Estonia shows that those involved in overall educational system are those who use eLearning applications. This is likewise reflected in the big digital divide between educated and low educated persons, as well as in the digital divide between young and old people. A plausible reason for the digital divide between the young and the old people is the fact that there is not enough information in the web for older people and craftsmen. This, therefore, contributes to the older people's dissociation from the Internet. The English language is also one of the problems in using computers or the Internet.

In relation to the use of ICT-supported learning and of eLearning applications in different levels of education, a most important consideration is the attitude of school principals and university heads upon which the culture of schools and universities begin. The same is the case in facilitating teachers' participation in ICT E&T by organisational measures (e.g., how to solve the absence of teacher during in-service training, how to motivate teachers to educate themselves, how to motivate teachers to use ICT). This, in turn, means that acknowledgement of ICT is very important at this level. However, this TOP-level is currently considered to be one of the main bottlenecks for the future. The reason is not mainly about ICT skills, but more so about the lack of knowledge on how to change – that is to say, it is not only about the decisions whether to use ICT tools in schools, but about change in the overall vision of work in schools.

Another very important factor is the attitude of teachers and professors towards using ICT tools in class especially in the framework of formal education. There have been many instances of how resistance from teachers limit the prospects for development. One of the best examples is the web-based gradebook, *eSchool* service. In addition to the absence of a legal background for eLearning and ICT skills, the resistance comes more from teachers of the older generation. Apparently, the overall attitude towards eLearning tends to be related to teacher's age.

The attitude of students seems to be the most positive among the three user groups. However, distinctions must be made. At the general education level, the main problem to be addressed is the lack of content, and even more the lack of information about existing content. At the higher education level, the main problem seems to be the wrong conception about eLearning – i.e., students are afraid

of decreasing quality of education due to eLearning (overestimation of eLearning as a distance learning form), and hence see eLearning mainly playing a supportive role.

In spite of Estonia's high level of formal education, participation in lifelong learning and in company-provided training has been below EU average. In addition, Estonia has one of the highest shares of older workers in the labour market in the EU. One of the main reasons here may be the fact that to date lifelong learning is not appreciated in Estonia both by the population and the state. The state, as a matter of fact, gives modest financial support for lifelong learning.

In the case of private sector, eLearning is much dependent on organisational culture and the size of the organisation. For instance, it is believed that the use of self-study courses is effective if the number of employees is more than 1 000 because with this number the efficiency in terms of time, instant feedback, and lower costs could be guaranteed.

It must be noted however that eLearning in the private sector seems to be currently characterised by their limited efforts to take full advantage of ICT. An exception here is the importance put on eLearning by bigger companies, especially in the fields of finance and telecommunications, which have become successful in doing ICT-related business. Yet, having ICT skills is not seen as a crucial qualification for work in Estonia, and also a high number of people with higher education do not have ICT skills. As a result, the need for ICT skills training is still in the agenda.

In general, the main reasons for not using web-based training include the possibilities not to use the computer, the lack of knowledge about the opportunities of eLearning, the lack of trainings in certain speciality, and the satisfaction of current traditional training.

- Regional specificities and regional factors

A negative characteristic of the regional development in Estonia is its unbalanced and uneven character. In particular, development is highly concentrated in larger cities (especially in the capital city of Tallinn, and in Tartu and Pärnu as well). This has, in recent years, resulted in internal migration in which people from the smaller towns move to the bigger towns, which are the main centres providing tertiary education and where educational level of labour force is highest. In addition, while eLearning and the general development of IS are concentrated in cities, there are no specific eLearning programmes that are seriously needed targeting rural, poorer and Russian-speaking populations.

Since the development of ICT infrastructure is under the responsibility of uneven local governments, the differences may be quite big. Although, differences at the regional level are relatively low, they exist. This means that the eLearning development strategies required may vary from region to region.

- Demography

Much of the pressure to provide and use web-based learning has been generated from the problem of decreasing population. This particular problem has forced universities and vocational schools to use eLearning facilities in order to bring in more students locally as well as internationally.

Specific to the lifelong learning aspect, it is important to note the high percent of elderly people in the total population – that is to say, the changing situation in the labour market in favour of older people and the need to modernise their skills in the framework of the ICT 'techno-economic paradigm' (for the concept of 'techno-economic paradigm', see Perez, 2002). And specific to the demographical aspect, it is important to note the Russian-speaking minority, who are the main and rather large minority in Estonia. There are no specific eLearning policies targeting the Russian-speaking minority, not even in the sense of further integration or adult training. In this endeavour, utilising the *Language Immersion Center* – the information providing repository for second language studies, which can be considered one of the best repositories – would be of beneficial contribution.

III.3 Drivers and barriers for future eLearning in Estonia

Based on the major factors determined above, this study gives a Drivers/Barriers analysis of eLearning developments.

The following are drivers of eLearning development in Estonia:

- Continuous economic growth is important for creating the needed basis for public ICT-investments. Its consequence leading to higher living standard supports more widespread home ICT-infrastructure.
- There is strong political will to build an IS as well as knowledge-based economy. This is supported by legislations promoting overall ICT development.
- Due to a highly developed ICT infrastructure (refers to high computer and Internet penetration rates) together with the successful development of eServices (e.g., Internet banking, submission of tax declarations through the Internet, e-voting, etc.) there is a general wish to take advantage of ICT in as many fields as possible, including in E&T. This is supported by state strategies in order to build a knowledge society. In addition, this is also supported by the high level of formal education among the adult population, which means that the target group in the field of educational would not be the small ones.
- There is a generally very positive image of eServices among the Estonian population (e.g., massive use of e-tax office and electronic banking) and thus willingness to try 'something new'.
- Broadband costs are relatively low in Estonia compared to other EU member states.
- In addition, there has been active cooperation between public and private sectors in the development of ICT infrastructure and general ICT skills as well. This kind of positive experience provides favourable basis for possible future initiatives, especially if these, at least in the beginning, might seem to be too ambitious or costly to be taken up only by one side, - e.g., only by private or public sector.
- Special Foundations and Consortiums under the Government have been the main drivers especially in the field of eLearning. The specific task of these has been the promotion and provision of support in the field of eLearning. Today, the initiatives and programmes taken up by these organisations provide the main basis for future developments in the area, especially taking into account that there are no signs for the increase of the Ministerial role in the area.
- In practical life, developments in eLearning are born out of the need to develop software and content in the Estonian language, as well as the need to create different eLearning applications.
- In universities and vocational education institutions, the main driver is 'competitive pressure': there are less and less potential students due to demographic trends and thus higher and vocational education institutions try to capture as much students as possible. This has also led to increased efforts in eLearning (especially in the field of web-based learning where there are several courses being worked out and the developing trend towards web-based curriculum) as well as to internationalisation (i.e., attracting foreign students and professors). Internationalisation through web-based learning is supported by trends to develop English web-based curriculum.
- There is also a need to increase participation in lifelong learning and in company-provided training. In the first case this means the fulfilment of EU regulations, and overall it means more efforts to be done to take advantage of ICT tools in everyday life.
- There is need to pursue balanced regional development in ways that are not too concentrated in larger cities so as not to promote peoples migration away from rural areas. ICT has an important role to play in this objective and it also brings services (especially online services) closer to citizens.

- There is need to cope with digital divide and promote training of older, poorer and Russian-speaking population groups through e-inclusion. This is all the more important because there is not much eServices today that target these groups.
- A very important financial driver in the field of eLearning has been and still is the availability of EU structural funds and programmes upon which the developments specifically at the vocational and higher education levels largely rely. Although the *Ministry of Education and Research* has been behind the priorities for EU's ESF Measure 1.1, it is actually *INNOVE* that has had greater influence in supporting eLearning developments because it is this entity that selects the appropriate projects.

The following are barriers to the development of eLearning in Estonia:

- Lack of efforts to take advantage of ICT in the Estonian economy. This is related to the problem that eLearning is not seen as a means to take advantage in building a knowledge-based society. Knowledge, however, is one of the most important factors in terms of innovations and economic development.
- Lack of access to ICT infrastructure and availability of different services provided online. This is mainly the problem about regional differences in computer and the Internet penetration in households and in educational institutions as well. In the case of educational institutions there is a general lack of technical environment such as programmes and additional IT equipment (e.g., cameras, etc.) which are necessary for giving daily classes, recording lectures, providing WIFI in classrooms, making computers available in classrooms, etc.
- Lack of policy and administrative coordination both in design and evaluation of policies in the field of eLearning: there is no clear national strategy/development plan/policy document (single or significant part in others) for eLearning as a tool in building the knowledge-based society. The problem is that eLearning issues today have been supported by several single development plans (each for different educational levels), which have not been interconnected to each other. This mainly refers to the limited role of the *Ministry of Education and Research* and other related ministries (e.g., the *Ministry of Communication and Research*). Thus, in devising new strategic goals and plans, the public sector follows either the initiative shown by respective partners (e.g., universities, private companies), or policies at the EU level. Moreover, the implementation of these goals has not been assessed in the framework of the earlier strategies, and it is highly probable that such assessment will not be done in the near future. And even if such assessment is done under current organisational structure, it would not have any real impact. As long as *RISO* belongs to a particular Ministry – i.e., the *Ministry of Economic Affairs and Communications* – it cannot enact actions for other Ministries.
- Political consensus about the use of ICT in subjects has been missing. That kind of policy of no policy, however, may become the main obstacle in the field of eLearning in the future – the development in the area of education cannot depend only on the new means available, but should consider deeply how to, and which means actually, support the quality of education. The result is that the main emphasis has been given on the first instance to ICT infrastructure and then to eLearning as a web-based learning. There is also the lack of comprehensive approach to the development of ICT in education – in particular, lack of consensus for the role of ICT at different educational levels.
- These problems are also related to the lack of political will to use ICT to solve general problems in the educational system and also lack of political will to modernise curriculum (e.g., existing orientation towards classical pedagogy).
- Lack of clear legal bases for eLearning and ICT for all educational levels (especially at general education level). In the case of *Informatics* as a horizontal theme in general education curriculum, it may be argued whether or not this kind of approach is providing sufficient and equal bases for further developments in the next levels. The legal gaps are also described by the lack of ICT qualification standards for predefined skills for students, teachers and principals. In addition, eLearning developments are not backed up with financial and technical support for teacher training. To date, ICT-related in-service training for teachers has been

based on the principle of voluntary participation. At the same time, future changes in teachers' competences must address the pressing need for more teachers in schools and in universities. However, the insufficiency of teacher competences may result in unequal study conditions for students in different schools and at different educational levels. Also, there is lack of MSc (not to mention, PhD) programmes in Estonia that focus on eLearning.

- The lack of a legal basis means that there is no clear financial basis and financial plan to develop eLearning. Whatever has been achieved thus far is due to several one-time projects vis-à-vis long-term programmes. It can therefore be said that eLearning has been based on enthusiasm and money, rather than on students' needs. In addition, current developments in the field of eLearning have relied too much on the EU structural funds. However, the financial system under the EU structural funds has been rather bureaucratic, not to mention its prioritisation of less, if at all, risky projects. At the same time, the availability of EU structural funds has, to a certain extent, hampered the country's drive to build its own eLearning local system and support and contributed to Estonia's focus on a project-based approach rather than on services in the area. This kind of approach may not be sufficient in the long run if Estonia wishes to go along with the developments in the fields of ICT and education. On the other hand, the *Tiger Leap Foundation* has been relying too much on state support, in addition to its funding priorities for project-based activities.
- Lack of cooperation between different institutions dealing with eLearning development (both at national and local levels). The highest problems here are at the level of universities. There is also low cooperation between teachers and educational technologists.
- Lack of horizontal ICT solutions developed between government agencies, central and local authorities, and between public and private sector. Every agency uses its own ICT solutions that are not interoperable to others. This is also a serious problem in educational institutions where different LMSs, study information systems, content repositories, and *EEIS* are currently not interoperable to each other.
- Furthermore, there is lack of common requirements within individual organisations on how to take advantage of currently available eLearning applications. The usage of available eLearning applications (e.g., usage of LMSs in educational institutions) has been accidental and varies very much in the framework of one institution.
- Solutions are yet to be found with regard to safety and security challenges of LMSs, especially those used by private sector.
- eLearning developments are not supported by specific contents needed in respective levels of education. In addition, there is lack of efforts done to digitalise and re-use existing content, as well as lack of cooperation among concerned actors. However, the limited scale and scope of digital content is not providing enough basis for further developments in the field of eLearning, especially in the case of self-study.
- At the same time, the small size of local market, to a large extent, discourages larger eLearning software and content developments in the private sector.
- There is also lack of policy initiatives targeted towards lowering digital divide, especially among the elderly, rural poor, and Russian-speaking minority.
- R&D has been and still is undersupported in the field of eLearning. Cooperation in R&D is non-existent, although the private sector has provided financial support for some public initiatives.

IV: ANALYSIS OF THE POSSIBLE POLICY OPTIONS

The purpose of this chapter is to find out the most important policy issues and options available for Estonia to foster the development of eLearning services. This chapter outlines the most important policy issues that need to be addressed. It then tries to establish a more proactive framework through which major breakthroughs in the areas of eLearning may occur pending the implementation of the proposed policy measures. These policy alternatives will allow the determination of a possible effect of proactive, forward-looking government policies on the evolution of eLearning applications in Estonia.

The findings and issues of this chapter are based on the results of the first part of the country study comprising the first three chapters as well as on the findings of the interviews carried out with the major stakeholders in the field.

IV.1 The most important policy objectives in Estonia

Although Estonia is known, at least in the EU, as a well-developed '*e-country*' in terms of available ICT infrastructure and e-services, current developments have not had enough spill-over effect to the other closely related areas, especially in the educational sector. What is important here is the acknowledgment that in building up IS, the new skills – technical, intellectual and social – are as essential for living, working and participating actively in the society (The eLearning Action Plan, 2001).

Within the framework of a knowledge-based economy, in which great emphasis (at least political) has been given by Estonia since the beginning of the 21st century, the education sector has to play an important role – i.e., that the **education sector must reorient itself and take advantage of technological developments and it must provide inputs for future innovations and technological breakthroughs**. This is supported by the innovation theory of Carlota Perez (2002): that research and educational policies must be oriented towards the logic of the techno-economic paradigm so as to enjoy the benefits of its unfolding potentials (also, see Kattel and Kalvet, 2006). Broadly speaking, the idea is positively related to evolutionary (Schumpeterian) economic theory, emphasizing the role of the state in the creation of (new) knowledge as the basis for economic development (see Reinert, 1999). Hence, **there is a great need for the inclusion of eLearning in E&T system not as a goal for itself, but both as a goal aiming at improving the quality and variety of learning methodologies applied in the institutions and as a mean for building and supporting the knowledge society**.

One way schools – and indeed the society as a whole – can take advantage of ICT and, at the same time, support the creation of new knowledge is through ICT-supported learning (see also Hakkarainen et al., 2006). This suggests the broader need for change from traditional educational methods to one that is oriented towards the current E&T system.

General, vocational and higher education

One of the important factors upon which the development of eLearning is claimed to be strongly dependent (especially by the representatives of the special Foundations and Consortiums in the eLearning area) is the need for consensus on the kind of skills and knowledge required for students. Should the stress be on those which can be easily measured by exams and by state exams as it is currently done? Or, should the orientation be on those skills which are essential in everyday life – such as skills for searching information, cooperation, analysing, assessing, generating ideas, time planning, ability to finish things, etc. The latter would be especially essential in the society, which evaluates the ability to learn more than pure knowledge of facts. The other question is whether the changing of existing educational methodology is a policy option today, taking into account the situation where

Estonian society, educators and parliament have not reached consensus on the goals, structure and content of the new national curriculum for primary and secondary schools during the last five years. In the next 10 years, **policy makers, teachers, students and parents** have to be informed more about ICT means and ICT-supported learning methodology. One of the main aims must be the **elimination of prejudices toward eLearning and hence the rediscovery of its real definition: that eLearning is not only about self-study or distance learning**. This is even more important especially at this time when pedagogical and mind restrictions are claimed to be higher in the area of eLearning than in technological ones. Here, the *eLearning Conferences* must be considered a top priority. Importantly, **policy makers** are the first ones who should be informed more profoundly about the possibilities ICT can provide, including educational matters. Participants' attitude towards eLearning in practice is very important. This is because the participants themselves are the direct concerns of eLearning, namely, local level – **TOP-level** in educational institutions, **teachers** and **students**. Hence, more information activities should be also focused at the TOP-level in educational institutions (school principals, heads of faculties, directors of institutes, etc.), the level which makes decisions and distributes financial resources.

The measures for students depend on different educational levels. At the general education level, the role of teachers in giving information and guiding students on the use of different available ICT tools is very important both in the learning process and in the reorientation of current learning approaches. At the higher education level, since many students are afraid of eLearning due to misinterpretation of the term, more information drives for and among students should be carried out about the eLearning theme. This would include the distribution of informative materials, something, which universities can do independently given proper motivation and interest. To date at the national level, the respective orientation has however been mainly towards teachers (e.g., annual *eLearning conferences*).

Workplace training

The main factor in enhancing the development of eLearning is the **organisational agreement** that eLearning is to be considered as important as, or complementary to, traditional learning and that it is a priority. Other decisions are dependent on this agreement, considering the emphasis of web-based learning materials, LMSs, CMSs, course management systems, and so on. The practical value is that employees can use working time for learning because it is already the case in traditional learning. Here, the attitude towards eLearning at the TOP-level is also of utmost importance.

Life-long learning and informal learning

From the policy options above, it can be concluded that **life-long learning and informal learning is strongly dependent on academic education** and the orientation taken on learning process at this level – that is to say, both depend much on whether the academic learning is oriented on acquisition of facts or on ability to learn on its own. Moreover, the promotion of the idea of lifelong learning needs further and more focused attention, and should not be oriented only on potential learners. This means that the public sector should work out a concrete system for providing services in the framework of lifelong learning. As such it is about increasing the role of the state in active measures for unemployed persons (like training) rather than in passive ones (like aid).

In addition, it is very important to **promote knowledge about ICT society** (e.g., its meaning, reflections in media, public debates, etc.). And it is even more important to **enhance the knowledge about different eServices**. In the latter case, the paper-based information materials (brochures) would be an effective channel to exploit since Internet users are already most likely familiar with eServices. The promotion work should be carried out as close to citizens as possible.

IV.2 Suggested policy measures

In general, what should be done in the area of eLearning concerns the consensus about its role in the education system and the society as a whole. In practice, this is about explicitly stating the goals in certain policy strategy or as part of other strategies on building up the knowledge society. A favourable environment conducive to the realisation of the set goals should be in place. This would then include questions about financial resources, ICT infrastructure, quality insurance system for digital learning materials, involvement of current actors in the field of education and culture in digitizing content, establishing centralised brokerage systems with digital right management support as well as measures against piracy, and supporting further the training system of teachers. In broader terms, emphasis on promoting the idea of lifelong learning and eServices is needed.

IV.2.1 Policy measures on legal and regulatory issues

General, vocational and higher education

- There is a need for the development of an **overall eLearning strategy or a comprehensive learning strategy in which eLearning would be part of it**. Or, there is need for the inclusion of eLearning in state development plan and other significant strategy/policy documents. This kind of strategy should give an overall view of the current situation upon which concrete goals and vision for the whole education sector could be possibly set up. In doing so, ICT development at different educational levels would be interconnected. This strategy would be important to ensure some kind of stability in the area and to make possible that educational institutions plan more their activities. However, what is very important about the strategy is that eLearning should be brought out not **only as a goal by itself, but as a mean for implementing education reforms and building up the knowledge society**.
 - In general, the need for eLearning strategy or as a part of other strategies is essential to get enough **political, financial and legal support** for the area, especially when taking into account the current situation where eLearning 'has not been the mainstream', and especially not among politicians.
 - Extra strength should be given to coordination between different educational institutions and between different organisations involved in the areas of education and ICT. Accordingly, the **need for a special autonomous entity for coordinating ICT concerns in all areas** (general education, vocational and higher education, lifelong learning and private sector) must be seriously considered. It is important that this entity enjoys substantial political power.
 - The other possibility, and may even be more realistic and easier to implement, would be to synchronise the policies of different fields related to ICT at the **round table** for representatives in the fields of education (the *Ministry of Education and Research* and those organisations deeply engaged in eLearning issues like *Tiger Leap Foundation* and *Estonian Information Technology Foundation*, and *eLearning Development Center* and the *Estonian Information Technology Society*), of ICT development (*RISO*), as well as entities responsible for innovation and R&D (*TAN*) and respective representatives from the private sector (*ITL*) and *Look@World Foundation*.
 - The higher education institutions and vocational schools should **have their own eLearning strategies**. This is even more important in the case of higher education because the universities are rather autonomous and are not very eager to cooperate with each other. The support here by *Estonian E-university* and *E-VocationalSchool* is of utmost importance.
- In addition, the *Ministry of Education and Research* should **work out the overall framework for ICT qualifications and digital competencies, in addition to professional qualifications,**

that should be included in basic, secondary and post-secondary curricula. The main mistake done at present is that ICT education is divided into several small pieces and it is believed that if each fulfils its piece, it is what is expected. Also, the role of teachers and students in creating necessary connections between different educational levels are overestimated. This suggests that necessary ICT skills should be stated for different educational levels (general, vocational, and higher education and its different levels). Likewise, the progress in acquiring ICT skills should be stated so that this would not overlap at different educational levels.

- A particular important question is **the role of ICT in basic educational curriculum.** Should it be only the horizontal theme as it is now (and stated very generally), or should its clarification be deeper? The happy medium would be the position that *Informatics* is a compulsory subject at least for one year at general education level to guarantee equal skills for students, especially taking into account the preparation for higher education. This is also important for guaranteeing that all students in bigger and smaller schools have equal opportunities. The argument that computer teaching for everyone in traditional way is too expensive should not be acceptable at the state level. Furthermore, there should be regulations in place to guarantee that all students in the country have equal opportunities to take advantage of these new means.
- Since the development of schools is greatly dependent on the TOP-level and in order to make the most of the ICT means, the main policy measure for TOP-level should not only be ICT, but also the change management in-service training. This is important in order to guarantee that the TOP-level is able to connect successfully current and new learning tools and processes. Cooperation between school principals and teachers is also very essential.
- Teachers' competence to use innovative measures in their classes has been the biggest bottleneck in promoting the use of ICT in the learning process. Therefore, much more attention should be paid to developing curriculum to enhance teachers' competence and also to in-service training. This is supported by the fact that if teachers have not used eLearning in their learning, they do not know about that and will not use it in their own classes. To achieve the overall development in the field it is essential that there are established ICT qualification requirements for teachers, which are agreed in more binding ways than it is to date.
 - Teachers' educational curriculum should be looked at and be up-dated in accordance with the evolving ICT world. This is even more important taking into account the decrease of ICT-related courses in teacher's curricula due to the Bologna-process.
 - ICT competences for teachers should be established in a more legally binding way than it is done currently – for example, a decree of the Ministry of Education for teacher's evaluation (*de jure* approach). The difference on current regulatory bases for ICT competences (i.e., *The Framework for Teacher Training, Professional Standard for Teachers*) would be in the actual bases to control and demand the acquisition of ICT competences.
 - The other important aspect is teachers' in-service training where much emphasis has already been given. According to the developments, **ICT-related in-service training should, in some proportion, be at least compulsory** (*de jure* approach).
 - The regulation of teachers' ICT competences through in-service training should be developed in accordance to the consensus on the standard for ICT competence for teachers (*de facto* approach). In a structure where there is absence of a legal regulation for teachers' ICT competences, the latter can be promoted through shared standardised in-service training.
 - Also, the *Ministry of Education and Research* should issue an order to universities to practise in-service training for teachers, especially based on subjects not only on ICT.

Here, the market basis mechanism is not working. The teachers' in-service training is especially important for elderly teachers to guarantee that they are able cope with the challenges of the changing learning process and environment.

- **English language skills** of teachers should be given much more emphasis.
- In the case of teachers, it is also important to create a **motivation system** for them in order to enhance the usage of ICT and other up-to-date learning approaches in their work. This means, above all, flexibility in the educational system – teachers can choose which kind of learning methodology they would approve and their choice is not punished by the remuneration system. To date, it is too much to suppose that teachers improve their classes and use ICT means just for their own will to become better.
 - Firstly, the state should guarantee a **decent average wage** for teachers/professors comparable with the average wage in the private sector.
 - Schools and universities can pay **additional salaries or bonuses for dealing with eLearning matters**. More specifically, the change in the frameworks of remuneration system would mean that the salaries of professors should not be calculated only on the basis of work done in class, but also on the work done in other ways (e.g., the time spent using ICT means, creating new materials). And it is even more important to take into account course novelty and innovativeness, while compensating for its development. The emphasis here should be in improving the education, and the rewards system should target quality improvements in it with, possibly, ICT-supported approaches. eLearning should not be promoted only for eLearning.
 - However, while it is claimed that wage is a motivator to certain aspect, the motivation system should not be based only on wage. Other favourable conditions should be supported. For example, teachers should have the **position in society, which is appreciated** and should gain **recognition in the institution** for developing **new and high quality approaches for teaching** (meaning, that there are technical, up-to-date tools available in schools).
- At the moment, the quality of digital learning materials is variable and so the problem is related to large amounts of these materials and to the question of how to evaluate them. The same is true with web-based courses, and more with web-based curriculum in the future. Hence, **quality standards** should be worked out at the Estonian level and at the EU level in order **to guarantee the quality of digital learning materials and of web-based courses and curriculum**.
 - For example, all digital learning materials used by educational institutions should have the **quality mark**. There can also be other sources for respective materials, but here the user would take the risk on its own. The current framework, for instance, of the learning object repositories like *Miksike* and *Koolielu* is made post-ante or ex-ante **quality control, respectively**, for materials being put up.
 - Further, much emphasis should be given to quality standards at the higher education level. A positive development here is that the *Estonian E-university* is already working out specific standards. Also, in the development of courses more attention should be given to the details that are important for the people with disabilities (e.g., study videos with subtitles).
 - **The EU should develop common quality standards** that take into account the high possibility of web-based courses and curriculum to become international.
- The other question which arises from standards, especially from those worked out by EU like

the *EuroPass* standards (facilitating internationalisation in the areas of learning and working), is how much of these standards are taken into account in developing particular standards internally or how much of these are integrated into the local system.

- In addition, more emphasis should be given on teaching the new generation of teachers. And at the local level in educational institutions, the solution here is not to be found in engaging entrepreneurs in teaching (especially in higher education) because they lack pedagogical background and are very much private sector-oriented.

Lifelong learning and informal learning

- A **political agreement** is needed between public and private (but also non-governmental) sectors **about the distribution of responsibilities on lifelong learning**. This means that there should be a real organisation and legal basis in place in order to achieve the goals set out in several strategies related to lifelong learning. A solution for this challenge could be the establishment of a **special department for lifelong learning or an NGO in/under the regulations of the Ministry of Education and Research**.
- Also, there is a need for the implementation of a delivery system – **regional learning colleges** (developed on the basis of vocational schools and higher educational institutions), which have been one of the top priorities in strategies and ESF measures related to lifelong learning. These centres (equipped with up-to-date technical means, including possibilities to carry out video lectures, and likewise providing consultancy services) are especially important for those who live away from towns, but would like to acquire higher education, improve one's professional skills or would like to learn something new.
- The other important aspect in lifelong learning is to work out **standards for accreditation of prior learning experience** – i.e., standards for information that cannot be documented, but can be presented by doing the special activity for which qualification is needed (for example, video record of cooking). There should also be a consensus on the bases for working out these standards. The idea is more realistic because the systems and standards for this kind of new learner information packages have already worked out (see, for example, *IMS Lip Editor*, worked out by *IMS Global Learning Consortium, Inc.*).¹⁵⁴ Ministerial action is urgently needed for legitimising this kind of opportunities.

IV.2.2 Policy measures on fiscal and financial issues

General, vocational and higher education

This report has frequently stated the need for a legal basis for eLearning activities. The main reason for this is the need for a **legal basis for financing**. Today, the role of ICT in education is not specified, and neither is it supported financially.

- To date, the *Tiger Leap Foundation* has relied too much on state support and hence measures should be taken in order to enhance the endeavours of the Foundation to also use resources other than those coming from the state (i.e., for the Foundation **to also take advantage of the opportunities offered by the EU's structural funds**).
- On the other hand, eLearning developments in higher and vocational education have been relying too much on EU's structural funds. There is a need for concrete financial funds and programmes developed by the *Ministry of Education and Research*. The availability of **EU's structural funds should be taken as additional financial resources**, not as the only means to depend on.

¹⁵⁴ See more, at <http://www.imsglobal.org/>.

- In the educational sector, one problem is related to financing of the development of the Estonian LMSs. Since the *Ministry* is only interested in IT application which will make easier their work in monitoring the area under their responsibility, it has not contributed to local LMSs or other e-applications, which can be used by schools in their everyday life. This also means that less attention is given to the needs of students in the development of particular systems.
- It should be considered whether it is justified to support the use of just one LMS more actively at the state level. On the one hand, the usage of the LMS, which is accepted in the whole country, would make it easier to connect this LMS with other state's initiatives in the field and would guarantee some kind of unity in the educational system, especially when we are speaking about vocational and higher education. On the other hand, this kind of approach may result in lock-in effect in which the system is not developed further as it should be and would create the conditions hindering the possibilities to change the selected way in the future. There are three possible ways to be chosen: (1) the state financial support for having the country licensed for **WebCT** (must be a newer version of **WebCT** than it is today); (2) support further the developmental work of local open source LMS **IVA**, in respect to the changes with **WebCT** due to **Blackboard** arising as the new market leader; and (3) the orientation taken on freeware (in addition to **IVA** and **Moodle**). The use of **Moodle** is also supported by its flexibility – the changes can be done in the system specific to what is needed in particular cases. In all cases, the most important factor is that if one particular way is selected, the state should support changes to use the same system in all vocational and higher education schools in Estonia in order to support interconnectivity of educational system and guarantee unity.
- The state should also finance developmental work in order to guarantee **interoperability** between LMSs and study information systems. The next opportunity would also be to engage digital library in the system.
- The role of **INNOVE** comes in the agenda in relation to the distribution of financial resources under ESF measure 1.1.
 - Very important is the **financial support for activities based on programmes rather than single projects**. This mainly means that the state buys what is offered, and not what is necessary. The programme-based approach suggests that the development is more organisation-centred, or better service for users, and hence can support the current role of the Foundations in the area. Moreover, programme-based financing enables the setting up of more long-term goals for the area. Some steps toward changing the current system have already emerged.
- There is a need to develop **financial schemes based not only on public, but also private financial resources**.
 - This kind of approach should especially support higher, workplace and lifelong learning. In the case of higher education, this would mean private funds and expertise knowledge as well to be available to participate in the R&D programmes of universities. In the workplace and lifelong learning, this would mean the provision of training programmes by universities, which, in turn, is financed by the private sector.
 - In order to support interconnections in R&D between public and private sector one possibility could be the development of **common eLearning environments** (e.g., LMSs). In this case, both counterparts would be interested in further developing these environments and would be providing finances for the purpose. The result would be better learning environments for both sectors and for Estonia as a whole. The availability of LMS, partly supported by the state, would enhance the usage of LMS also in other

enterprises than in finance and telecommunications sector, especially in SMEs, for whom the usage of that kind of systems is not affordable, but also attractive enough, at the moment.

Lifelong learning

- Financing in the framework of **lifelong learning** should be flexible. Today, the orientation has been on the working society. There is a serious need to investigate the biggest problems on which to concentrate. In the framework of lifelong learning, several solutions are proposed:
 - To make lifelong learning system rather **based on contracts**, every employer should provide additional resources. This kind of system has two aspects. First, the state is not willing to pay off the in-service training of employees from private sector. And second, in-service training financed by employers often serves a certain purpose.
 - **A schooling fund for lifelong learning**, including state finances for developing flexible solutions and different web-based courses, should be established. This requires a legal basis for lifelong learning. In order to implement this fund, a **survey** should be conducted to have a basis of the courses which the state must finance as top priority.
 - **A special fund** in order to enhance the ICT-supported learning should be developed for special groups – like for the people with no basic and secondary education, the older generation, the socially excluded, etc.

Informal learning

- Financing in the framework of **informal learning** cannot be a direct one. Here, the role of the state should be more oriented on providing enough eLearning applications and content on the web (content here is understood as educational materials developed for courses).

IV.2.3 Policy measures on infrastructure and technology

ICT infrastructural matters are not the main issues to be addressed today, although there are some regional differences the problems also occur in the new living, residential areas near Tallinn. At the same time, the **reserve for usage of ICT means** is a valid one – that is, all the technological possibilities are not yet explored. Furthermore, there is no consensus about the best way to use them. This is not mainly a question of ideas, but of costs and resources as well.

General, vocational and higher education

- It has been supposed several times that the quality of teachers' environments should be developed (e.g., the idea that **every teacher should have her own laptop, and every student's schoolbag should contain a laptop instead of books**). This policy measure has been brought out also in the *Programme of the Coalition for 2007-2011* in which the Coalition will give each teacher a laptop computer and launch a programme aimed at granting each student the basic school technical access to computers and the Internet at home and at school. In general, the support from the state is still needed to build up a **sufficient basis for ICT infrastructure**, with more concentration on **special technical equipment**. For example, taking into account the possibilities of ICT in general education, a stronger need for smart boards will soon arise. In higher education, the equipments for videoconferencing are to be supported.
- Also, there are too much '**handicrafts**' in the area of technological equipment at schools today, being put up and down before and after every lecture. This is usually the case because there are not enough ICT means available so that all classrooms would be continuously equipped and the set-up of this equipment in classrooms seems to be a concern for safety. The system of the equipment should thus be made more automatic.

- In order to enhance developments in eLearning at the general education level in the regions, all general schools should have **equal starting point in the perspective of using LMSs and e-applications in education**. For example, all schools should be included in the network of *eSchool* service. Too, the use of different learning and CMSs (at least those developed in Estonia like *VIKO* and *KooliPlone*) should be actively promoted in schools.
- In higher as well as in vocational education levels, a **common LMSs** should be used in order to guarantee interoperability with other systems (e.g., to study information systems) and between different educational institutions as well. And if it is not possible to guarantee interoperability at the national level, at least **interoperability of LMSs and study information systems should be in place in individual schools**.
- It is very important at the local level that the usage of LMS inside one institution should be made **compulsory**. For example, information about all the courses provided by the institution would be available in the LMS.
- There is a need to **initiate a special state-financed interdisciplinary research programme dedicated to R&D on the next generation eLearning and knowledge management solutions** and involving innovative companies and researchers from different fields such as computer science, information science, educational science, cognitive science, media studies, psychology, (computer) linguistics, etc.
- At the local level, every school can promote its development in the area of ICT by hiring **IT specialist** responsible for hardware. There may also be a person who has general knowledge about learning and CMSs, eLearning services, ePortfolio, eLearning repositories, etc.
- The efforts of universities to provide **access to special databases** (e.g., EBSCO) for students are particularly important at the higher education level.

Workplace training

- To date, **digital learning materials in the private sector** are not interactive enough and mainly consist of guidance documents. However, interactivity is a very important aspect for enterprises themselves in the case of digital learning materials. Increasing emphasis on interactivity must therefore be given. At the same time, there are only a couple of advertising companies that are capable of design from Word document interactive web-based learning material. Companies have not also succeeded in hiring the needed special consultants for eLearning by themselves. The problem seems to be related to the overall limited emphasis on design in companies. This is why the *Enterprise of Estonia* should provide state supported programme focusing on design in Estonian enterprises.

Lifelong learning, informal learning

- In order to support lifelong learning, the **state-financed programme to equip adult learning centres with ICT** should be developed and implemented.
- The idea of **regional centres** should be finally implemented. The **technical basis of general educational schools (especially in rural areas) could be exploited** by using the rooms for adult training in the evening.
- In the framework of lifelong learning and informal learning, the **internalisation of libraries and establishing PIAPs** are important. State support for creating ICT infrastructure, including **WIFI areas**, in the countryside is here likewise important.

IV.2.4 Policy measures on content

General, vocational and higher education

The lack of good learning materials, not to mention their expensiveness, is an essential reason ICT usage in education is limited. The quantity of web-based learning materials is said to be greatly dependent on the number of users – the more users the more useful it is to work out ICT-based solution. However, what needs further attention in the promotion of ICT-based learning approaches is the notion that the only important content is not the existing reading/listening materials, but the web discussions and collaborations and the knowledge created with peer learners. Good eLearning can be implemented without much existing written materials.

- State programme should be in place **to translate and adjust eLearning content** developed, for instance, in the EU **to Estonian and to Estonian conditions**. The real work could be done even at the local level by teachers, whose efforts would be covered financially. This requires that a **quality assurance system** is in place in Estonia. However, the emphasis on translation only is not wise from a long-term perspective. This is mainly due to financial reasons (it is very expensive), and to fast-changing character of content today.
- The state should financially **support the digitalisation of cultural heritage**, including TV and radio broadcasts.
- In addition, a state-supported **open digital content programme** must be initiated, one which is oriented to the re-use of most of the content that have been written or recorded in the Estonian language and that would guarantee free access to them in the longer perspective. Here, common digitalisation and distribution is of the essence.
- The other question is a more general one – the state should be able to **guarantee authorship rights for digital content** and software to schools, universities, companies, and private persons. This means that the commercial publishers should have a secure market for selling their digital content to schools, universities, companies, and private persons (e.g., centralised brokerage systems with DRM support, measures against piracy).
- Further emphasis should be drawn on the tools enhancing collaboration between teachers and students or between students in the promotion of the use of LMSs. This kind of informative work could most probably be done effectively by the *Tiger Leap Foundation* and *eLearning Development Center*.

General education

- For the general education, a **framework on the use of ICT means and eLearning content in different subjects** should be in place. The framework should set the basis for themes and subjects that eLearning content needs to supplement. A positive trend here can be seen in the existing programmes from the *Tiger Leap Foundation*. Yet, the crucial **involvement of the representatives of the Ministry of Education and Research** is missing.
- Another important aspect is that **competition** should be created on the needed digital learning materials. Some steps toward this have already been made. To date, too much attention is given to the producer and not to the user: the state has financed the development of digital learning materials for which project applications have been made and not for those that are actually needed.

Vocational education

- For vocational education, more emphasis should be made on **practical skills** in teaching ICT. This means training IT specialists who could orient in real life and are able to solve software problems in accordance with real, and not only to IT, world. Here, **involvement of schools in private sector projects** would be of utmost importance. The private sector would not only provide

stipends, but provide relevant expert knowledge as well.

- In developing digital learning materials, **cooperation between vocational schools** should be supported by **the state**. This is specifically important because it is too expensive to develop eLearning content with high quality separately in every vocational school. This kind of approach has already been taken in the framework of the *Estonian E-VocationalSchool*.
- The development of eLearning content should also **include the private sector and its interest**, especially to provide relevant web-based courses and content for professional and workplace training.

Higher education

- It has been claimed that since eLearning is very much resource demanding it will, with high probability, remain in the area of the real enthusiasts or in one or two universities (especially if one talks about eLearning in distance education). Thus, a possibility is to support only **a couple of universities in Estonia that are making their name based on web-based learning**.
- However, a more realistic programme is that *Estonian E-university* should **further facilitate the cooperation between Estonian universities**. But the question is how much it has done so far, especially in the case in which future decisions are rather made internally in *E-university* than born out of negotiations between member universities. Therefore, there should be concrete **state-financed programme to facilitate cooperation between Estonian universities in developing web-based courses/curriculum and joint-degree programmes**. Unfortunately, the existing organisational system has not supported this idea, and the reliance of projects on EU's structural funds has mainly resulted in single web-based courses. In addition, the project-based approach does not support long-term planning.
 - In order to assure the quality of higher education, the cooperation between universities should be facilitated through working out the **web-based joint-degree programmes**, especially in areas like business administration and public administration, **which are very popular among students** and which are offered in many different public and private universities.
 - Further, **English web-based courses and curriculum should be developed**. Since Estonian courses are not very commercial it is possible to make money with English courses (while allowing international participants). English web-based courses/curriculum could also be used for creating first impression of Estonian higher education and for enhancing income from foreign students to the country. The target market here should not only be the old European countries, but even more the East and Central European countries as well. The cooperation between different local universities would certainly give better results.
- Further internetisation should be supported in order to **do cooperation with foreign universities** and to be involved in different projects (e.g., in Erasmus-Mundus projects creating cooperation in web-based joint-degree programmes).
- Broader cooperation should also be facilitated **within different universities**.
 - **Web-based learning** should be first developed **in the framework of some general courses compulsory to very large number of students**. This means the assurance of quality and efficiency. There is also no need to pay for the same course for different professors in different faculties in the same university. However, it should be noted that web-based courses contain a lot of online tutoring and the teachers' workload in the framework of the course does not disappear completely.
 - eLearning should provide **wider opportunities for students** – i.e., if a student misses a lecture, s/he has the opportunity to follow the lecture using other means (e.g., audio or visual

recording of the lectures).

- In higher education, there should be **support for web-based learning** not only in formal education as in the current case, but more so in **distance training**. Furthermore, in the latter case the trend should be towards developing web-based curriculum to enhance learning besides working and in rural areas.
- There should be some kind of **organisation in place to organise the provision of web-based courses**, especially given an international target group. This mainly means that someone would organise a decent group of students for every web-based course and assure the availability of a professor for the course to give feedback to students.

Workplace training

- Since eLearning applications in enterprises are currently seen mainly as a mean to deliver learning materials, with little recognition on the **importance of collaboration and interaction through the web**, extra attention must be drawn on this aspect. As a starting point, the design of LMSs can be undertaken, in which the importance of forums should not be underestimated.

Lifelong learning and informal learning

- In order to enhance developments in lifelong learning and informal learning, the eLearning content and services must be attractive enough and at reasonable costs.
- There is need for provision of **free digital services** (e.g., through *Citizen Portal*) to every person in Estonia. For example,
 - ePortfolio hosting service with *EuroPass*, blog and competency management tool; and
 - online competency testing and accreditation services (starting from *ECDL* and digital literacy, Estonian language, foreign languages, etc.).
- In the framework of lifelong learning, the emphasis should be given on **single courses**. There should also be a **common repository for available web-based courses and materials** provided by the public and private sectors in Estonia as well in the EU. However, neither is there demand nor supply at this time, and hence the scope of the courses is limited. In the case of content, **cooperation between educational institutions** (especially universities and vocational educational institutions) and **private sector** should be facilitated.
- In addition, there is a need **for training in ICT skills** particularly because ICT skills are below average. For example, one aim is to find out solutions how to continue the ***Look@World project in adult training*** to provide basic ICT skills. The ICT skills training are very important also for **trainers active in adult education**.
- Computer usage experience is generally in positive relation to eLearning usage. Since computer usage skills mainly come from using computers at home, rather than in schools, it is questionable whether the existing system could enhance eLearning among risk target groups with their worse than the average financial situation.
 - **eLearning may save students at general educational level from dropping-out or repeating the class** – unstable and secure students prefer computer to build personal learning conditions and interest towards learning. This means, firstly, that computers should be accessible to students after classes. And secondly, since concrete eLearning solutions for problematic students are too expensive to develop at the school level, it is at this area and level where the *Tiger Leap Foundation* should take the responsibility and contribute to the creation of these special learning materials.
 - In the case of **unemployed people**, the main problems are deeper – i.e., psychological and

motivational. It is also questionable whether they have opportunities to use computers and Internet. If the problem comes from changing the job, then it is more difficult to provide courses to retrain people only online because it needs very specific content and it is currently believed that not all themes and subjects can be taught through the Internet (e.g., accounting) (see Chapter II.5.2).

- At present, educational opportunities for persons with disability to enter higher education are limited. Hence, policy makers must create mechanisms to mitigate this problem, if not solve it entirely through ICT-based learning.

IV.2.5 Policy measures on learning methodology

General, vocational and higher education

In the case of teachers, it is said that the bigger problem is related more to the lack of methodology than to the ability to use ICT.

- First, the Foundation responsible for eLearning along with the *Ministry of Education and Research* should put more strength on promoting different learning methodologies, which are available among teachers and then bring out systematically what eLearning is about. This is important not only in using ICT in general in more active ways, but also in the exploration of new teaching approaches needed.
- At the same time, the *Ministry of Education and Research* should put more strength on working out and continuously updating learning methodologies in line with current economic development, especially ICT developments.
- In addition to training as discussed above, a very important aspect is the development of **support system for teachers**, which would give direct guidelines on how to incorporate ICT into the subject and on how to concretely design web-based learning. The support for teachers should remain and be developed further. After all, teacher education cannot cover all the specific knowledge in ICT. A teacher is still the specialist in her own area. In particular, this means the need for assistants who are competent in technical as well as pedagogical matters and who are expected to give insights on how to implement the ideas of teachers through ICT tools.
- Emphasis should also be given on the **educational specific knowledge**.
- There is need for **training education technologists** at the level of formal education.
 - And there is also a need for **special MSc and PhD programmes**, which would concentrate specifically on **eLearning matters** – design, provision, consultancy or technology.

Workplace training

- Designing web-based learning approach (including creation of digital learning materials) is also a problem in the private sector. Currently, there are no trainings provided in the area (as has been shown above), and the *Estonian E-university* is claimed to be much centred on higher and vocational education levels. There is a real need for **practical advice for the private sector** in the area of eLearning.
 - Therefore, mechanisms have to be developed on how private sector could benefit from *Estonian E-university* and *Estonian E-VocationalSchool services*.
 - Private sector consultants should be trained in cooperation with the public sector (e.g., Foundations) in, for instance, special in-service training courses.
 - The role of the state here could be to facilitate a programme that focuses on how to benefit from ICT means. In doing so, the state supports the cooperation between enterprises and hence their initiatives to search the solutions together.

- Further, ICT education and specialists' education should be promoted. This means increasing the number of places financed by the state as well as the quality of education in order to promote education in different target areas and groups. The practice should be organised in ways that take into account the system in private sector (e.g., their need for IT specialists or practitioners during summer).

Lifelong learning and informal learning

- Teaching technologies and concrete methodology for adult education should be worked out.

Summary of Chapter IV

eLearning must not be considered merely as a self-study and distance learning, or as goal by itself; but as a mean to exploit the windows of opportunities the ICT paradigm offers. This means that the state should support the education sector to take full advantage of ICT tools, and thereby supporting innovation in education and the building up of the knowledge-based society and the IS. However, in the area of eLearning, serious threats should also be taken into account. For example, if life is too much ICT-centred the trends in some areas (such as E&T) may rather be the opposite.

In general, all these proposed policy options above require the existence of an overall political consensus on the role of eLearning in education.

A very important aspect in working out the framework for eLearning development in Estonia is that there is not one solution available for different problems (i.e., in developing policy options distinctions must be done between different educational levels, including lifelong learning and workplace training). In addition, it should be taken into account that eLearning without any face-to-face meetings is, and will be, a small niche service, a poor substitute to on-campus courses (Laanpere, 2006b).

V: MAJOR R&D CHALLENGES FOR E-LEARNING

The purpose of this final chapter is to identify the most important technical and non-technical R&D challenges in the future specific to eLearning so as to address the local and global needs identified in Chapter III. In doing so, the chapter also assesses particular areas for policy action, institutional change, human skills reforms, education development, and finance that could immensely contribute to the resolution of the challenges facing the development of eLearning in Estonia at this time and in the future. These factors will be used to prepare the Synthesis Report to find out the major common trends characteristic of the NMSs.

V.1 Studies needed in support of eLearning development

First, on the basis of the ‘Policy Paper’ of the *European ODL Liaison Committee* in the 2004 *Distance Learning and eLearning in European Policy and Practice: The Vision and the Reality*, the question arises: how much and in what way eLearning developments have been driven by different policies and strategies? According to the paper, national developments in most EU countries in the area of eLearning were not very substantial up to the year 2000 and that nevertheless strong policy initiatives. More than four years later the situation appeared very differently – although eLearning was down in policy discourse, it was up in practice – the eLearning market was showing a growth rate of 30% per year (European ODL Liaison Committee, 2004).

The situation in Estonia seems to follow the same path as described above, yet with the distinction that the development of eLearning in the country has only reached the stagnation phase characterised by disappointment in policies and hence with low growth. This is especially expressed in the adoption of the *E-memorandum* in Estonia in September 2006, which is directed to the students and teachers (not to policy makers). According to the developments in other EU countries, the question that arises is: **why policy initiatives have not supported enough the developments in the area of eLearning; and on the contrary, what have been those measures which have supported the area in a positive way?**

These questions are also important for Estonia, especially when the current fragmented organisational as well as fragmented strategies developed in support of eLearning are taken into account. However, **it is yet to be proved that this kind of organisational set-up and strategies actually prohibit the success of the area.** Further, as in the Estonian case the strategies in the field have been too much influenced by the changing political ideas, and hence not conducive for setting long-term goals and do not guarantee a stable financial system. A related question then is: **‘How much does the availability of financial resources matter in the area’?**

However, ICT-supported learning should not be an objective in itself, but should be recognized as **indispensable in bringing about socio-economic changes.** This, in turn, sets out the question: **how and in what ways can the ICT be best exploited** in economic and non-economic spheres? Further, which **institution should take the responsibility of developing eLearning in Estonia** that would guarantee an integrated vision for developing digital competences in the education sector as well as in the society at large?

The other aspect here is how much and in what ways **EU strategies, policies and programmes have influenced eLearning developments in member states.** In Estonia, analyses of these respective areas of enquiry are still missing. This issue is both crucial and essential for Estonia because developments, especially on higher and vocational education levels, have largely been dependent on the availability of EU’s structural funds.

V.2 R&D challenges set by ICT and by the knowledge society

1. Educational challenges and changes in learning approaches

ICT-supported educational change sets further future challenges for policy makers, educators, researchers, technology developers and teachers on how to prepare learners to engage in innovation and knowledge creation, activities which are becoming commonplace and most important sources of new material and intellectual wealth. Firstly, **the challenge is to explore and support the usage of new learning approaches, which are in line with current ICT developments**, and consider deeply the mechanisms that actually support the quality of education. In terms of the educational practices, a challenge for the knowledge society is that students, teachers, professionals, designers, and researchers take part not only in knowledge acquisition or social participation processes, but also in **knowledge creation focusing on shared objects of activity – the so-called ‘social constructivist eLearning’** (Hakkarainen et al., 2006). More importantly, these are questions about the most effective and mostly used teaching technologies and methodology. If solutions to these questions had been tried and tested, they might usher in best practice principles that can be useful at the EU level, and to the development of respective knowledge-based societies and innovation systems.

At the local and global levels, the challenge for eLearning in terms of **social software (community based learning – blogs, Wikis, etc.)**, rather than merely developing LMSs and repositories, must be addressed in order to engage learners in innovation and knowledge creation. However, since this is more likely a challenge for teachers on how to use the available tools, this requires further incentives for future teacher training programmes. This question is especially important for Estonia because the emphasis given on web-based interaction and collaboration has always been limited. The greatest challenge here is working out ways to address this shortcoming in the private sector, where this issue is a critical concern.

Another important challenge is to legalise the **accreditation of prior learning experience**. The idea is even more realistic since some systems and standards for this kind of new learner information packages have already been implemented (see, for example, *IMS Lip Editor* which was carried on by *IMS Global Learning Consortium, Inc.*). This question, together with the overall ICT competence issue, is especially important for Estonia to seriously consider the form and the formal level standards that could actually support new learning approaches and developments in lifelong learning the most.

Other important questions that need to be considered in employing new learning approaches are as follows:

- Firstly, in order to take most of the ICT-supported education it requires **surveys to be available to assess ICT skills** of students and teachers at all educational levels, including trainers and people not involved in formal education – lifelong learning, workplace learning, etc. In the latter case, another question then arises: how much can lifelong learning and informal learning benefit from the new approaches given the dependency on the values appreciated at the formal education level (meaning, also the capability to adopt the value of lifelong learning itself)?
- Secondly, it requires assessment of the **availability of ICT infrastructure** to enable re-orientation of education. In addition, before working out and supporting the usage of new learning approaches, a research needs to be implemented to assess whether the **possibilities to use eLearning are the same in terms of different subjects**, and if not, how they differ.
- Whether the new approach for learning **will change the role of school** (i.e., towards treating educational institutions more as the providers of services) is a related question, which may arise. In addition, the question as to ‘what would be the effect of transforming schools into service providers and marketing organisations on education as a whole’ needs further investigation. Interestingly, the negative effects of this trend of transforming schools into marketing organisations, a trend, which is already strongly present in Estonian schools, have been clearly demonstrated in some educational research in Estonia (Laanpere, 2006b).

2. Technological developments and challenges posed by their application

- One of the challenges in the area of eLearning is the **need to create interoperability** of eLearning systems and tools. Today, LMSs in Estonian educational and training institutions are not interoperable with study information systems or with content repositories and EEIS. As the selection of those eLearning systems, which are used by different educational institutions of the same level, especially in higher education, varies greatly, the challenge for interoperability is even greater.
- In general, one of the challenges is the need to develop horizontal applications (i.e., the need for measures supporting cooperation, especially at the ministerial level). To date, there is lack of a united view in providing services for citizens; and every entity tries to solve the problems in a self-indulgent way – i.e., IT solutions are entity centred and are oriented toward solving very specific problems. **The challenge here should be on more user-friendly and citizen-oriented services.** The other problem is that to date the new solutions developed have been based on solving complaints. This means that at the state level there is a great challenge to develop **a system to guarantee the systematic development and provision of IT-based services.**
- In order to overcome the technological challenges, cooperation between public and private sector in the field of R&D is very important. However, the role of the private sector has so far been limited to financing certain projects. **A scheme that would support synergy between these two sectors needs to be worked out.** This can be considered as a wider challenge and hence prevailing at the global level.

3. Financing issues and challenges (business models) concerning the funding of eLearning

- What business models should be used for producing eLearning content? Firstly, the solutions best for commercialising **the produce of digital learning materials** need to be explored. Secondly, both the public and private sectors must work together in implementing eLearning applications, notwithstanding which sector initiated a particular application, so that they could do business and enlarge their market in a way that is acceptable to users. For example, a practical question would be a financial system for sending SMS for exam results. This problem is manifested in the current situation where the private sector resists to finance open source LMSs, CMSs, etc.
- One of the greatest challenges related to digital learning materials is the resistance among **book and textbook publishers** due to the threat of losing their current market despite the *Ministry of Education and Research's* strong support to them. A solution to this problem would not only rely on changing the current orientation of publishers from traditional learning materials towards more innovative ones – not to mention, that such a change in orientation may not guarantee profitability for publishers. The challenge is **to study how this could be made profitable in Estonia.** Secondly, the emphasis should be on **how to re-use existing learning materials and what should be the necessary schemes and mechanisms to support it.**
- In addition, there is a need to establish a system, which would enhance the developments related to e-books. More broadly, this is a question of **how to support the web-based business** in the area so vulnerable in the terms of making profits (parallels can be drawn here with the audio area). In other words, this is a question of how to protect the content provided against piracy and at the same time guarantee the management of authorships rights.
- How can **exchange of web-based courses between different schools and participation in web-based courses provided by other schools at general and upper secondary education levels** – taking into account that the financial scheme for these levels is based on **capitation fee** – be supported? Broadly speaking, this is a question about how to legitimise and finance the eLearning networks.

- eLearning should support mobility of students **to take courses nationally from other universities and in foreign universities**. However, the required financial scheme for this needs to be figured out.

4. IPR issues in the area of eLearning

- In the case of eLearning, much more emphasis must be given to the issue of authorship rights related to digital learning materials including flexibility of these rights in order to allow other persons to use the materials and at the same time to recognise and complement them (e.g., *Creative Common Licence*). Firstly, this means that when the state buys a digital learning material it should be made public – i.e., available to everyone freely and open for making ads. However, this approach is not yet adopted by the Estonian society. Secondly, the state must guarantee the usage of *Creative Common Licence*, even in the context in which a private company produces a particular digital learning material.
- The other challenge for the state, but also for the larger EU level, is the technical support required to guarantee **authorship rights for digital content and software** – meaning, measures to be worked out and be in effect to fight piracy (digital rights management).

5. Security aspects of eLearning applications

- Security problems seem to be the biggest challenge in the private sector. Although they have developed their own LMSs, there is still very much paper-based training. This is mainly a result of the restriction of **access to LMS and to the databases from home**. What is mainly feared is technical safety (i.e., viruses); yet, this is above all a question about data security of the companies – fear of the volatility of inner databases, data about clients, etc.

Summary of Chapter V

Two main R&D challenges for eLearning in Estonia can be identified. Firstly, there is a need to implement mechanisms that will positively support its development. These are measures and institutions that concern organisational set-up, policies and strategies, and financial support for the area. And secondly, the question on how to support the usage of new learning approaches in line with current ICT developments in formal education and in lifelong learning needs to be addressed. These issues include technological developments and the challenges posed by their application, financing schemes required in the use of eLearning, and solutions for current IPR and security problems.

BIBLIOGRAPHY

Documents of Government, ministries and other institutions

- Action plan for growth and jobs 2005-2007. For implementation of the Lisbon Strategy.* Republic of Estonia, Tallinn, 2005, available at: http://www.riigikantselei.ee/failid/1.October_2005_Estonian_Action_Plan_for_Growth_and_Jobs.pdf.
- Anton, J. "Response to the e-mail inquiry on 30 March 2006". *Ministry of Education and Research*, 2006.
- Anton, J. "Reponse to the e-mail inquiry on 3 May 2006". *Ministry of Education and Research*, 2006b.
- "Comments on Estonia's preliminary balance of payments for 2005". *Bank of Estonia*, 27 March 2006, available at: http://www.bankofestonia.info/pub/en/dokumendid/publikatsioonid/seeriad/mb_lyhi/_2006/_1_06.pdf?objId=850316.
- "EContent in Estonia". *Content Village*, November 2005, available at: http://www.content-village.org/incaccontent/upload/CP_Estonia.pdf.
- Education, Labour Market and Career Guidance in Estonia.* Foundation Lifelong Learning Development INNOVE, National Resource Centre for Guidance, 2004, available at http://www.INNOVE.ee/ee/files/Handbook_2004.pdf.
- "Eestis on selle aasta lõpuks tuhat avalikku WIFI punkti" (There are almost one hundred WIFI areas in Estonia by the end of this year). *Eesti Postimees, Online*, 28.10.2006.
- "Eestlased hakkavad Euroopale e-õppematerjale tegema" (The Estonian are going to develop digital learning materials for Europe). *Eesti Postimees, Online*, 31.10.2006.
- The Development of Education. National Report of Estonia.* Ministry of Education and Research, August 2004, <http://www.ibe.unesco.org/International/ICE47/english/Natreps/reports/estonia.pdf>.
- Democracy in Information Society*, Conference organised by the eGovernance Academy and by the State Chancellery on 9th of June 2006, see more at <http://www.ega.ee/?id=26940>.
- eLearning Conference in Tallinn, 6-8th of April, 2006*, available at <http://conference2006.e-uni.ee/index.php?n=et&do=17>
- "Estonia Today, E-Estonia". Fact Sheet. *The Ministry of Foreign Affairs*, October 2005a, available at http://web-static.vm.ee/static/failid/286/E-Estonia_uus.pdf.
- "Estonia Today, Estonian Educational Landscape". Fact Sheet. *The Ministry of Foreign Affairs*, June 2005b, available at <http://web-static.vm.ee/static/failid/107/Education.pdf>.
- "IKT sektori 2004. aasta andmete analüüs" (The Analysis of Estonian ICT Sector in 2004). *Estonian Association of Information Technology and Telecommunications*, 2006, available at http://www.itl.ee/engine/document_view.asp?folder_id=144&document_id=319.
- Information Technology in Public Administration of Estonia. Yearbook 2005.* Ministry of Economic Affairs and Communication, Department of State Information Systems, Tallinn, 2006, available at http://www.riso.ee/en/pub/yearbook_2005.pdf.
- IT in Public Administration of Estonia. Yearbook 2002*, Estonian Informatics Center, 2003, available at <http://www.riso.ee/en/pub/2002it/>.
- IT in Public Administration of Estonia. Yearbook 2003*, Estonian Informatics Center, 2004, available at <http://www.riso.ee/en/pub/2003it/p15.htm>, <http://www.riso.ee/en/pub/2003it/p37.htm>.

- Jääger, T. "Flexible learning in Estonia". *DialogWeb*, 2005, available at <http://www.nordvux.net/page/192/flexiblelearninginestonia.htm>.
- Kahn, K. "Response to the e-mail inquiry on 15 May 2006". *Elion*, 2006
- Kalkun, M. and Kalvet, T, eds., *Digital Divide in Estonia and How To Bridge It*, Tallinn: PRAXIS Center for Policy Studies, 2002, available at <http://www.praxis.ee/innopubl/>.
- Kalvet, T. *eLearning country report for Estonia*. Country background report, *Document 591*. eUSER: Public Online Services and User Orientation, 2005, available at <http://www.euser.eu.org/ShowCase.asp?CaseTitleID=591&CaseID=1228&MenuID=109>.
- Kalvet, T. *The Estonian ICT Manufacturing and Software Industry. Current State and Future Outlook*. European Commission, Joint Research Centre (DG JRC), Institute for Prospective Technological Studies, April 2004, available at http://www.praxis.ee/data/WP_15_2004ICT_Industry1.pdf.
- Kattel, R., Kalvet, T. *Knowledge-based Economy and ICT-related Education in Estonia: Overview of the Current Situation and Challenges for the Educational System*. Tallinn: PRAXIS Center for Policy Studies, 2006, available at <http://www.praxis.ee/data/PRAXIS ICTrelated Education in Estonia.pdf>.
- Kikkas, K. „E-koolitus mõõdukate kulutustega: vaba tarkvara e-õppes”. *A&A*, No. 6, 2002, available at <http://deepthought.ttu.ee/aa/>.
- Kikkas, K. „Puuetega inimestest, e-õppest ja mõnest asjast veel”. *A&A*, No.2, 2004, available at <http://deepthought.ttu.ee/aa/>.
- Kiviselg, I., All, K., Silla, E., Orav, A. *Detailed Thematic Analysis: Continuing Education and Training for Adults in Estonia*, Estonian National Observatory, First Edition, February 2006, available at http://www.INNOVE.ee/refernet/files/Theme5_final2.pdf.
- Krull, A. *ICT Infrastructure and E-readiness Assessment Report: ESTONIA*. Praxis Working Paper No. 5, PRAXIS Center for Policy Studies, April, 2003, available at http://www.praxis.ee/data/Krull_era_FINAL1.pdf.
- Laanpere, M. *ICT in Teacher Education in Estonia*. Tallinn Pedagogical University, 2003/2004, available at http://www.palinz.ac.at/international/Alert/TNTEE/TNTEE_publication/modicm/estonia.pdf.
- Laanpere, M., Kikkas, K. "Pedagogical foundations of IVA Learning Management System". *eLearning in Higher Education*, 2005, available at <http://www.htk.tlu.ee/iva/kirjutised-en/>.
- Laanpere, M., Läheb, R., Plakk, M. *Needs analysis of Estonian E-University*, May 2004, available at http://www.e-uni.ee/doc/uuring/Needs_analysis_final_.pdf.
- Laanpere, M., Kippar, J., Põldoja, H. "Kodumaine õpiahaldussüsteem IVA: pedagoogiline ja tehniline kontseptsioon". *A&A*, 2003, available at http://www.htk.tlu.ee/oldiva/files/papers/iva_artikkel_a&a.pdf.
- Laanpere, M. "Response to the e-mail inquiry on 6 December 2006". *Center for Educational Technology, Tallinn University*, 2006a.
- Laanpere, M. *Peer-review comments*. In the framework of the project "Next Steps in Developing Information Society Services in the New Member States: the Case of eLearning", 27.10.2006b.
- The Learning Software Appliances in Estonian General Education Schools*. University of Tartu, 2003, available at <http://www.tiigrihype.ee/publikatsioonid/uuringud.pdf>.
- Liikane, M. "Response to the e-mail inquiry on 26 November 2006". *University of Tartu*, 2006.
- Look@World Foundation. *Best practices in Estonian public sector: E-school*. State Chancellery of the Republic of Estonia, available at <http://www.riigikantselei.ee/3qc/content11.html>.
- Look@World Foundation's Internet Training Project Report*. Look@World Foundation, 2004.

- “Memorandum: e-õpe parandab hariduse kvaliteeti (*According by Memorandum: eLearning will improve the quality of education*)”. *Eesti Postimees Online*, 05.09.2006.
- Mägi, E. “E-õpe üldhariduskoolides (eLearning in general education)”. *Presentation on the eLearning conference in Tallinn*, in 2006, available at <http://conference2006.e-uni.ee/index.php?n=et&do=17>.
- Mägi, E. “Response to the e-mail inquiry on 30 March 2006”. *Tiger Leap Foundation*, 2006b.
- Mölder, M. “Response to the e-mail inquiry on 12 June 2006”. *EEIS, Ministry of Education and Research*, 2006.
- “National standardized test to assess the 9-graders’ ICT competencies (IKT pädevuste tasemetöö 9. klassile)”. *National Examination and Qualification Center*, available at <http://www.ekk.edu.ee/oppekavad/yldoppekava/IKTtase2602.html>.
- Nemvalts, K. „Autoriõigusega ja autoriõigusega kaasnevate õigustega seotud küsimusi infoühiskonna tingimustes (about authorship rights in Information Society), *presentation in Estonian E-university*, 2004, available at <http://www.e-uni.ee/konverents/2004/slaidid/KartNemvalts.pdf>.
- Ülevaade üldharidusest 2001-2005 (Overview of general education in Estonia in 2001-2005). Ministry of Education and Research, Tartu, 2005, available at <http://www.hm.ee>.
- Oviir, M. (the State Chancellor). “Tiigri turjal peab kasu e-riigist jõudma igauheni” (The Benefits of the Tiger Leap should Reach to Everybody). *Eesti Postimees*, 19.10.2006.
- Pihl, T. *Analysis of Estonian IT Sector Innovation System: Estonian ICT cluster: Present State and Future Outlooks*, Estonian eVikings. Archimedes Foundation, 2001, available at <http://www.esis.ee/eVikings/evaluation/eVikings ICT cluster.pdf>.
- Piin, S. *Veebipõhise õppe kasutamine organisatsioonisiseses koolituses Eesti suurettevõtete näitel* (the Web-Based Training in Workplace Training in Estonian Large Enterprises). Tallinn Pedagogical University, sotsiaalteaduskond, infoteaduste osakond, 2004.
- Pikk, A. “Response to the e-mail inquiry on 19 May 2006”. *Tobaccoland Eesti AS*, 2006.
- Pilt, L. (the educational technologist of University of Tartu) in Hansmann, B. „eLearning – here and now”. *A&A*, 20 May 2003, available at <http://www.tlu.ee/?LangID=1&CatID=1615>.
- Pilv, M. (the head of the Miksike) in Hansmann, B. „eLearning – here and now”. *A&A*, 20 May 2003, available at <http://www.tlu.ee/?LangID=1&CatID=1615>.
- Public Administration in Estonia*. State Chancellery of the Republic of Estonia, 2004, available at http://www.riigikantselei.ee/failid/Public_administration_in_Estonia.pdf.
- Puusep, R., Ehandi, A. *Case Study on Successful Practices Telecommunication for Rural and Remote Area, Estonia*. International Telecommunication Union, available at http://www.itu.int/ITU-D/fg7/case_library/case_study_2/Europe_and_CIS/Estonia.pdf.
- Pärtel, H. *E-õpe Eestis, õpikeskkond WebCT ja selle rakendamine aines „Füüsikaline maailmapilt”* (eLearning in Estonia, the Learning Management System WebCT and its Application in the Course “Physical Concept of the World”). Master’s Thesis: University of Tartu, 2005.
- Põldsam, A. “Response to the e-mail inquiry on 19 May 2006”. *Hansabank*, 2006.
- Remi, K-J. *ELearning a New Trend in Training*. Bachelor’s Thesis, Estonian Business School, Tallinn, 2002.
- Remi, K-J. „Kaugtöötajale kaugkoolitus?” *Äripäev*, 07.05.2003, available at <http://www.edukas.ee/index.php?go=3&t=5&i=14>.
- The Report about implication the e-Key project about the first half of the 2006 for INNOVE*, available at http://portaal.e-uni.ee/e-voti/arv/seire/Seire_2006_1.xls.

- Rits, K. "Response to the e-mail inquiry on 23 April 2006". *Department of State Information Systems*, 2006.
- Ruul, K. „E-õppe hetkeseis ja tulevikusuunad Eestis e-ülikooli ühise e-õppe keskkonna valiku taustal”. *A&A*, No. 2, 2004, available at <http://deepthought.ttu.ee/aa/>.
- Ruul, K. "Statistika rubriik" (The column for statistics). *e-Õppe Uudiskiri*, No. 1, 2006, available at <http://portaal.e-uni.ee/uudiskiri>.
- Siil, I. "Year 2000 in the Estonian Informatics Centre". *Estonian Informatics Centre*, 2000, available at <http://www.riso.ee/en/pub/2000it/p22.htm>.
- Statistical Yearbook of Estonia* (CD-ROM). Statistical Office of Estonia, 2006.
- Sule, K. *Veebipõhine õpe ja selle hetkeseis Eesti kõrgkoolides* (Internet-based learning and the current state in the Estonian High Education Institutions). Bachelor's Thesis, Tallinn Pedagogical University, sotsiaalteaduskond, infoteaduste osakond, 2003.
- Särel, V. *Veebipõhised õpikeskkonnad Eesti ülikoolides* (The web-based learning environments in Estonian universities). Bachelor's Thesis, Tallinna Ülikool, sotsiaalteaduskond, infoteaduste osakond, 2005.
- Tammeoru, E. "Eesti e-ülikool" (Estonian E-university). *A&A*, No. 2, 2004, available at <http://deepthought.ttu.ee/aa/>.
- Tammeoru, E. "E-õpe kõrgkoolides – kuidas see algas ja kuhu me liigume" (eLearning in high education – how did it start and where are we moving). *Presentation on the eLearning conference in Tallinn*, in 2006, see more available at <http://conference2006.e-uni.ee/index.php?n=et&do=17>.
- Tammeoru, E. "Response to e-mail inquiry on 8 May 2006". *Estonian E-university*, 2006b.
- Silla, E., Ausmees, K., Kõiv, K., Kiviselg, I., et al. *Thematic Overview: Description of Estonian VET system*. Estonian National Observatory, First Edition, February 2006, available at <http://www.INNOVE.ee/refernet/files/Thematic%20Overview%202006.pdf>.
- "Tiigrihüppe" programm Eesti üldhariduskoolis" (The Tiger Leap Program in Estonian Schools of General Education). *State Audit Office*, 2003, available at <http://www.riigikontroll.ee/audit.php?audit=312>.
- Tiigrihüppe Sihtasutuse Aasaraamat 2004* (The Annual Report of the Tiger Leap Foundation 2004). Tiger Leap Foundation, 2005, available at http://www.tiigrihype.ee/publikatsioonid/aastaraamat_2004.pdf.
- Tiigrihüppe Sihtasutuse Aasaraamat 2005* (The Annual Report of the Tiger Leap Foundation 2005). Tiger Leap Foundation, 2006, available at <http://kliient.ok.ee/tiigrihype/?op=body&id=96>.
- Tiits, M., Kattel, R., Kalvet, T. *Made in Estonia*. Balti Uuringute Instituut, Tartu, 2005, available at http://www.ibs.ee/component/option,com_docman/task,doc_download/gid,13/Itemid,39/ -
- Toots, A., Plakk, M., Idnurm, T. *Tiger in Focus*. Executive Summary. Estonian Tiger Leap Foundation, Tallinn Pedagogical University, 2004, available at <http://www.tiigrihype.ee/eng/publikatsioonid/summary.pdf>.
- "Use of the Internet among individuals and enterprises". *Statistics in Focus*, Eurostat, 12/2006.
- Uusen, K., "Eesti kõrgharitud ei oska arvutit kasutada". *Eesti Postimees*, 27.06.2006, available at <http://euro.postimees.ee/270606/esileht/majandus/207163.php?r>.
- Vare, T. "Arvuti on kallid" (Computers are expensive). *Arvutimaailm*, 2005, available at <http://vana.am.ee/>.
- "Uuring: Eesti koolides on liiga vähe arvuteid" (*The survey: there are too few computers in Estonian schools*). *Eesti Postimees, Online*, 11.10.2006.

Vocational schools reports in the framework of the e-Key project for I half of the 2006, available at <http://portaal.e-uni.ee/e-voti/aru/seire/2006I>.

Documents of the European Commission and other international organisations

“Baltic States Internet Population”. *ClickZ Network*, 2005, available at <http://www.clickz.com/stats/sectors/geographics/article.php/3561451>.

Capgemini. *Online Availability of Public Services: How is Europe Progressing? Web Based Survey on Electronic Public Services Report of the Fifth Measurement*. Prepared for: European Commission Directorate General for Information Society and Media, 2004, available at http://europa.eu.int/information_society/eeurope/2005/doc/all_about/online_availability_public_services_5th_measurement_fv4.PDF.

“Complete National Overview”. *European Agency for Development in Special Needs Education*, 2005, available at http://www.european-agency.org/nat_ovs/estonia/9.html.

“Country Brief: Estonia”. *eUSER: Public Online Services and User Orientation*, 2005, available at http://www.euser-eu.org/euser_countrybrief.asp?CaseID=1658&CaseTitleID=750&MenuID=83.

“Country Brief 2005: Estonia”. *World Bank*, 2006, available at <http://web.worldbank.org/WBSITE/EXTERNAL/COUNTRIES/ECAEXT/ESTONIAEXTN/0,,menuPK:301083~pagePK:141132~piPK:141107~theSitePK:301074,00.html>.

“Country Profile: Estonia (Report 2)”. *BEACON consortium*, 2005, available at <http://www.ovum.co.uk/beacon/pdf/estonia.pdf>.

“The digital divide in Europe”. *Eurostat News Release*, 143/2005 - 10 November 2005, available at http://epp.eurostat.cec.eu.int/pls/portal/docs/PAGE/PGP_PRD_CAT_PREREL/PGE_CAT_PREREL_YEAR_2005/PGE_CAT_PREREL_YEAR_2005_MONTH_11/4-10112005-EN-AP.PDF.

Education in the News: Europe, Issue 38, Eurodice, October, 2005, available at <http://www.nfer.ac.uk/Eurydice/pdfs/Issue36.pdf>.

eEurope+ Final Progress Report, February 2004, available at http://www.emcis2004.hu/dokk/binary/30/17/3/eEurope_Final_Progress_Report.pdf.

Empirica and TNS Emor. *Benchmarking Access and Use of ICT in European Schools 2006*. Final Report from Head Teacher and Classroom Teacher Surveys in 27 European Countries, study published by the European Commission, August 2006, available at http://ec.europa.eu/information_society/eeurope/i2010/docs/studies/final_report_3.pdf.

The Employment Policy Guidelines 2003-2005. Council Decision of 22 July 2003 on Guidelines for the Employment Policies of the Member States (2003/578/EC).

“The 2005 e-readiness rankings. A white paper from the Economist Intelligence Unit”. *The Economist Intelligence Unit*, 2005, available at http://graphics.eiu.com/files/ad_pdfs/2005Ereadiness_Ranking_WP.pdf.

European Commission. *Commission analyses Estonian National Reform Programme for Growth and Jobs*. Memo /06/31, Brussels, 25 January 2006a, available at <http://europa.eu.int/rapid/pressReleasesAction.do?reference=MEMO/06/31>.

European Commission. *Detailed Analysis of Progress Towards the Lisbon Objectives in Education and Training, 2006 Report. ANNEX*. European Commission, 2006b, available at <http://ec.europa.eu/education/policies/2010/doc/progressreport06annexes.pdf>.

European Commission. *Implementation of “Education & Training 2010” Work Programme*, Working Group C “ICT in education and training”, Report on Mapping of recommendations. Synthetic presentation of contributions. European Commission, Directorate- General for Education and Culture, 2004, available at <http://europa.eu.int/comm/education/policies/2010/doc/infonational2004.pdf>.

- European Commission. *Implementation of "Education & Training 2010" Work Programme, 2005 Progress Report. Estonia*. European Commission, Education and Culture, Lifelong Learning: Education and Training policies, Coordination of Lifelong Learning Policies, 2005a, available at http://europa.eu.int/comm/education/policies/2010/natreport/et_en.pdf.
- European Commission. *Information Society Benchmarking Report 2005*. European Commission, 2005b, available at http://ec.europa.eu/information_society/eeurope/i2010/docs/benchmarking/051222%20Final%20Benchmarking%20Report.pdf.
- European Commission. *Progress towards the Lisbon objectives in education and training*, Report based on indicators and benchmarks, Commission Staff Working Document, SEC(2006) 639. European Commission, 2006c, available at <http://ec.europa.eu/education/policies/2010/doc/progressreport06.pdf>.
- European Electronic Communications Regulation and Markets 2005* (11th report). Communication from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions, [SEC (2006)193].
- European Innovation Scoreboard 2005. Comparative analysis of innovation performance*. European Trend Chart on Innovation, 2005, available at <http://trendchart.cordis.lu/scoreboards/scoreboard2005/pdf/EIS%202005.pdf>.
- "Distance Learning and eLearning in European Policy and Practice: The Vision and the Reality. Policy Paper from 2004". *European ODL Liaison Committee*, 2004, available at http://www.odl-liaison.org/pages.php?PN=policy-paper_2004.
- "Estonia - Telecoms Market Overview & Statistics". BuddeComm, 2006, available at <http://www.budde.com.au/Reports%5CContents/Estonia-Telecoms-Market-Overview-Statistics-716.HTML>
- "Europe's digital divide is slowly narrowing". *EurActive.com*, 2006, available at <http://www.euractiv.com/Article?tcmuri=tcm:29-148102-16&type=News>.
- Gaspar, P., Jaksa, R.A. *Broadband Developments in the New Member States: Experiences and Problems, Working Paper No 28*, International Center for Economic Growth, European Center December 2005, available at http://www.icegec.hu/hun/docs/KESZ_20060131/WP_Broadband_NMS.pdf.
- Hakkarainen, K., Ilomäki, S., Muukkonen, H., Toiviainen, H., Markkanen, H., Richter, C. *Design Principles and Practices for the Knowledge-Practices Laboratory (KP-Lab) Project*. KP-Lab Research and Development Community, 2006, available at http://www.helsinki.fi/science/networkedlearning/texts/KPLab_in_ECTEL_2006.pdf.
- "How skilled are Europeans in using computers and the Internet?" *Statistics in Focus*, Eurostat, 17/2006, available at http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-NP-06-017/EN/KS-NP-06-017-EN.PDF.
- ICA Country Report, Estonia, 2005*. International Council for Information Technology in Government Administration, available at http://www.ica-it.org/conf39/docs/Conf39_country_report_Estonia.pdf.
- ICT@Europe.edu. Estonia, available at http://www.eurydice.org/ressources/eurydice/pdf/019DN/019_EE_EN.pdf.
- "ICT in science education in Estonia". *University of Amsterdam*, 2002, available at <http://www.science.uva.nl/amstel/dl/en/Stede/ses1/ICT-Estonia.htm>.
- Massy, J. *The eLearning industry and market in Europe*. Lot 1, Appendix to Synthesis Report. Danish Technological Institute, 2004, available at http://ec.europa.eu/education/programmes/elearning/doc/studies/market_annex1a_en.pdf.

“Measuring the Information Society in the EU, the EU Accession Countries, Switzerland and the US”. *SIBIS Pocket Book 2002/2003*, SIBIS, 2003, available at <http://www.sicenter.si/pub/Sibispcktbook.pdf>.

“17 million tertiary students in the European Union: Enrolments 2002/03- graduates 2003 in tertiary education”.

Statistics in Focus, 19/2005, Eurostat, 2005, available at http://epp.eurostat.ec.europa.eu/cache/ITY_OFFPUB/KS-NK-05-019/EN/KS-NK-05-019-EN.PDF.

“National Report: Estonia”. *Eurochambres*, 2006, available at http://www.eurochambres.be/PDF/pdf_ees2006/country%20reports/Estonia.pdf.

Nissinen, M. *The Baltics as a Business Location for Information Technology and Electronics Industries*. VTT Technology Studies, 2002, available at <http://www.esis.ee/ist2004/text/images/baltics.pdf>.

Overview of the National Contexts – NAS 10 Countries (Estonia), SIBIS ANNEX to WP4-D4.3.1. SIBIS, 2003, available at http://www.sibis-eu.org/files/WP4_D4-3-1_eEurope_NAS-ANNEX.pdf.

Perez, C. *Technological Revolutions and Financial Capital. The Dynamics of Bubbles and Golden Ages*, Cheltenham – Northampton, MA, Edward Elgar Publishers, 2002.

Reinert, E.S. “The Role of the State in Economic Growth”. *Journal of Economic Studies*, Vol. 26, 4/5, 1999, pp. 268-326.

SIBIS Country Report: Estonia, No. 3, SIBIS WP5. European Commission, 2003, available at http://www.sibis-eu.org/files/WP5.3_CountryReport_EE.pdf.

UN Global E-Government Readiness Report Readiness Report 2005. From E-Government to E-Inclusion. Department of Economic and Social Affairs Division for Public Administration and Development Management, United Nations, New York, 2005, available at <http://unpan1.un.org/intradoc/groups/public/documents/un/unpan021888.pdf>.

Vuorikari, R. and Sarnow, K., *Innovation Brief: Open Content and Source: European Schoolnet Riding the Wave*. European Schoolnet, 2005, available at http://www.eun.org/insight-pdf/Full_Paper_vuorikari_sarnow_OSS_Europe_final.pdf.

World Health Organisation, Regional Office for Europe, 2005, available at http://www.euro.who.int/eprise/main/WHO/Progs/chhest/ANNEX/20041126_1.

List of legal acts and strategies (most available in electronical official database for legal acts – *Riigi Teataja* (RT))

Action plan of the principles of the Estonian Information Policy for 2006, available at http://www.riso.ee/et/files/TG06_05.pdf.

Law of Adult Education, RT I 1993, 74,1054.

Basic Schools and Upper Secondary Schools Act, RT I 1993, 63, 892.

Copyright Act, RT 1992, 49, 615.

Development Strategy of Archimedes Foundation for 2002-2006, available at <http://www.archimedes.ee/strateegia.pdf>.

Education Act, RT 1992, 12, 192.

Educational Strategy Learn Estonia (in Estonian *Haridusstrateegia Õpi-Eesti*), available at <http://www.hm.ee>, 15.04.2006.

Estonian Broadband Strategy 2005-2007, available at <http://www.riso.ee/et/files/upload/Lairibastrateegia.pdf>.

Estonian Information Society Development Plan for 2013, available at <http://www.riso.ee/et/?q=infopoliitika/arengukava>.

The eLearning Strategy of the Estonian E-university 2004-2007, available at http://www.e-uni.ee/documents/e-Uni_Strategy.pdf.

E-memorandum, available at <http://portaal.e-uni.ee/uudiskiri/e-uni/memorandum>.

Estonian National Development Plan for the implementation of the EU structural funds SPD 2004 - 2006), available at http://www.struktuurifondid.ee/failid/ESTONIAN_SPD-c_FINAL.pdf.

Foundation Articles of the Estonian Information Technology College, available at <http://www.itcollege.ee/kolledz/pohikiri.php>.

Foundation Articles of National Examination and Qualification Center, the Decree no 58 of the Minister of Education and Research, 29 October 2004.

Framework for Teacher Training, the Regulation no 381 of the Government of the Republic, 22 November 2000, RT I 2004, 72, 509.

Learning Tiger – the development plan of eLearning in general education in 2006-2009, available at http://www.tiigrihype.ee/arhiiv_1.php?uID=268.

National strategy for using EU structural funds in 2007-2013, (Riiklik struktuurivahendite kasutamise strateegia 2007-2013), available at http://www.struktuurifondid.ee/failid/Strateegia_rskd_110107.pdf.

National Support Programme for the ICT in Higher Education Tiger University (2002-2004), available at <http://www.eitsa.ee/tiigriylikool/index.asp>.

National Support Programme for the ICT in Higher Education Tiger University Plus (2005-2008), available at http://www.eitsa.ee/tiigriylikool/tiigriylikool_pluss_programm.asp#3.

Principles of the Estonian Information Policy for 2004-2006, available at <http://www.riso.ee/en/files/Policy.pdf>.

Professional Standard for Teachers, available at <http://www.hm.ee>.

Programme of the Coalition of the Estonian Reform Party, Union of Pro Patria and Res Publica and Estonian Social Democratic Party for 2007-2011, available at <http://www.valitsus.ee/index0358.html?id=1468>.

Regulation of National Curriculum for Basic Schools and Upper Secondary Schools, RT I 2002, 20, 116.

School Network Development Plan for 2005-2008, available at <http://www.hm.ee>.

Specification of Health Care for the Computer Studies and for the Public Use of Computers, The Decree no 57 of Social Minister, 7 June 2001.

Standard for Higher Education, the Regulation of the Government of the Republic on the 13 August 2002, No. 258, RT I 2002, 70, 426.

Standard for Vocational Education, the Regulation of the Government of the Republic on the 6 April 2006, No. 90, RTI 2006, 16, 131.

Standing Orders of Estonian Educational and Research Network, RTL 2004, 63, 1046.

Strategy for State Budget 2007-2013, available at <http://www.fin.ee/doc.php?13502>.

Strategy of the Estonian eLearning Development Centre 2007-2012, available at http://www.e-uni.ee/documents/strat_final_en_web.pdf.

The Terms and Order of the Correspondence of Textbooks and Wordbooks to the National Curriculum and Specification for Textbooks and Wordbooks and Other Educational Literature, the Decree no 36 of the Minister of Education and Research, 4 October 2005.

Tiger Leap Plus – the development plan for eLearning in general education in 2001-2005, available at http://www.tiigrihype.ee/tiiger_pluss/strateegia.html.

University of Tartu, E-õppe strateegia, seletuskiri, (The eLearning strategy in University of Tartu, Explanatory Memorandum, available at http://www.ut.ee/orb.aw/class=file/action=preview/id=131055/e_oppe_strateegia_seletuskiri.pdf.

Web-pages

Eurobase, *Eurodice*, available at <http://www.eurydice.org/Eurybase/Application/frameset.asp?country=EE&language=EN>.

Estonian E-university, <http://www.e-uni.ee/index.php?main=120>.

Estonian E-Vocational School, <http://www.e-vet.ee/>.

“Estonian Information Society in Facts and Figures”. *ESIS*, 2004, available at <http://www.esis.ee/ist2004/text/116.html>.

Estonian Information Technology Foundation, <http://www.eitsa.ee>.

Foundation for Lifelong Learning Development (INNOVE), <http://www.INNOVE.ee/>.

“Information Society Indicators of Estonia”, *RISO*, 2006, <http://www.riso.ee/en/coordination/statistics>.

Ministry of Education and Research, <http://www.hm.ee>.

Social Sector in figures, 2005. Ministry of Social Affairs of Estonia, available on <http://www.sm.ee>.

“Statistics”, *Estonian Labour Market Board*, 2004, available at http://www.tta.ee/failid/statistics_2004_en.pdf.

Statistical Office of Estonia, <http://www.stat.ee>.

Statistical Office of the European Commission, Eurostat, epp.eurostat.ec.europa.eu.

Structures of education, vocational training and adult education systems in Europe. Eurodice, available at http://www.eurydice.org/Documents/Fiches_nationales/en/frameset_EN.html.

Tiger Leap Foundation, <http://www.tiigrihype.ee/eng/index.php>, <http://klient.ok.ee/tiigrihype/>.

List of interviewees

Interview with Anton, J. Adviser of Information Technology, *Ministry of Education and Research*, on the 19th of September 2006.

Interview with Aru, H. Adviser of Education and Labour Market, *Ministry of Education and Research*, on the 18th of September 2006.

Interview with Kusmin, M. Educational Technologist, *Tallinn University of Technology*, on the 15th of September 2006.

Interview with Kuusemets, V. Head of Training, *Hansabank*, on the 25th of September 2006.

Interview with Laanpere, M. Head of the Center for Educational Technology, *Tallinn University*, on the 19th of September 2006

Interview with Mägi, E. Head of the *Tiger Leap Foundation*, on the 5th of September 2006.

Interview with Rits, K. Head of Information Society Division, *State Information Systems Department (RISO)*, on the 15th of September 2006.

Interview with Palm, J. Member of the Board, Education and Social Affairs, *Student Council of the Tallinn University of Technology*, on the 9th of October 2006.

Interview with Püüa, M. Head of the *State Information Systems Department (RISO)*, on the 15th of September, 2006.

Interview with Tammeoru, E. Head of the *Estonian E-university*, on the 8th of September 2006.

Interview with Tammiste, T. Director of IT, *EMT AS*, on the 19th September 2006.

Interview with Targama, K. Head of the European Structural Funds Unit, *INNOVE*, on the 21st of September 2006.

Interview with Toots, A. Associate Professor in the Department of Government, *Tallinn University*, on the 18th of September 2006.

Interview with Tüür, M. Member of the *Federation of Estonian Student Unions*, on the 30th October 2006.

Interview with Väli, I. Educational Technologist, *IT College*, on the 7th of September 2006.

Interview with Väravas, M. Developer of IT systems, *Hansabank*, on the 25th of September 2006.

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Abstract

In 2005, IPTS launched a project which aimed to assess the developments in eGovernment, eHealth and eLearning in the 10 New Member States at national, and at cross-country level. At that time, the 10 New Member States were Cyprus, the Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Slovenia and Slovakia. A report for each country was produced, describing its educational system and the role played by eLearning within both the formal education system and other aspects of lifelong learning. Each report then analyzes, on the basis of desk research and expert interviews, the major achievements, shortcomings, drivers and barriers in the development of eLearning in one of the countries in question. This analysis provides the basis for the identification and discussion of national policy options to address the major challenges and to suggest R&D issues relevant to the needs of each country – in this case, Estonia.

In addition to national monographs, the project has delivered a synthesis report, which offers an integrated view of the developments of eLearning in the New Member States. Furthermore, a prospective report looking across and beyond the development of the eGovernment, eHealth and eLearning areas has been developed to summarize policy challenges and options for the development of eServices and the Information Society towards the goals of Lisbon and i2010.

The mission of the JRC is to provide customer-driven scientific and technical support for the conception, development, implementation and monitoring of EU policies. As a service of the European Commission, the JRC functions as a reference centre of science and technology for the Union. Close to the policy-making process, it serves the common interest of the Member States, while being independent of special interests, whether private or national.

