



The Development of eServices in an Enlarged EU: eLearning in the Czech Republic

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PREFACE

Policy context

At the European Council held in Lisbon in March 2000, EU-15 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 the Lifelong Learning Programme⁵ have set objectives for education and support the development of learning in the knowledge society. One of the 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 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.

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

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 the Czech Republic

This report was produced by EEIP, A.S., the consortium member from the Czech Republic, and it presents the results of the research on eLearning in the Czech Republic.

First, the report describes the Czech Republic'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 Czech Republic, 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
AICC	Aviation Industry Computer-Based Training Committee
AtGentive	Attentive Agents for Collaborative Learners
ATKM	Association of Management Trainers and Consultants
BELCOM	Building Effective Learning Communities
BINGS	Business Integration Systems
ccTLD	Country Code Top Level Domain
CDMA	Code Division Multiple Access
CELN	Czech Efficient Learning Node
CIP	Competitiveness and Innovation framework Programme
CITED	Computer Interactive Test and Educational Device
CNB	Czech National Bank
CMS	Content Management System
CO ₂	Carbon dioxide
COQS	Communicating with others Obtaining (or downloading) and installing software on a computer Questioning the source of information on the Internet Searching for the required information using search engines
CSO	Czech Statistical Office
CZK	Czech Crown (currency)
DILLEO	Digital Library of Learning Objects
DIVAI	Dištančné vzdelávanie - Aplikovaná informatika (Distance Education – Applied Informatics)
DSL	Digital Subscriber Line
DWDM	Dense Wavelength Division Multiplexing
ECB	European Central Bank
ECDL	European Computer Driving Licence
eDilema	eResources and Distance Learning Management
ELefANTS	e-Learning for Acquiring New Types of Skills
EMU	European Monetary Union
EU	European Union
EU-25	European Union with 25 member states
EUNIS	European University Information Systems
EUR	Euro (currency)
ESF	European Social Fund
EVENE	Erasmus Virtual Economics & Management Studies Exchange

Gbps	Gigabit per second
GCSE	General Certificate for Secondary Education
GDP	Gross Domestic Product
GPRS	General Packet Radio Service
HSCSD	High Speed Circuit Switched Data
ICT	Information and Communication Technology
ICTE	Information and Communication Technology in Education
IDA	Interchange of Data between Administrations
IEA	International Energy Agency
ISCED	International Standard Classification of Education
ISDN	Integrated Services Digital Network
IT	Information Technology
LAN	Local Area Network
LCMS	Learning Content Management System
LMS	Learning Management System
Mbone	Multicast Backbone
Mbps	Megabit per second
Moodle	Modular Object-Oriented Dynamic Learning Environment
NATO	North Atlantic Treaty Organisation
Netacad	Networking Academy
NPCL	National Programme for Computer Literacy
NREN	National Research and Education Network
NUTS	Nomenclature Unit of Territorial Statistic
OECD	Organisation for Economic Co-operation and Development
p.p.	Percentage Point
PC	Personal Computer
PHARE	Poland and Hungary Assistance for Restructuring of Economies
POS	Packet Over SONET
PPP	Public-Private Partnership
R&D	Research and Development
SANET	Slovak Academic Network
SIBIS	Statistical Indicators Benchmarking the Information Society
SCO	Sharable Content Objects
SCORM	Sharable Content Object Reference Model
SMTP	Simple Mail Transfer Protocol
USD	American Dollar (currency)
VAT	Value Added Tax

VIRTUNIV	Virtual University
WAN	Wide-Area Network
WebCT	Web Course Tools
WiFi	Wireless Fidelity
WTO	World Trade Organisation
XML	Extensible Markup Language

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EXECUTIVE SUMMARY

The Czech Republic is a landlocked country of 78 866 km² in Central Europe. It is composed of the whole of the historic regions of Bohemia and Moravia, and parts of Silesia. Czechoslovakia was a Communist state from 1948 until the 1989 Velvet Revolution. On 1 January 1993, the country peacefully split into the Czech and Slovak republics. The capital and largest city is Prague. The population is slightly more than 10 million and, according to the International Monetary Fund, the GDP per capita in 2005 reached USD 23 100, ranking the Czech Republic in 33rd place.

In 2006, more than one third of Czech households were equipped with a personal computer and approximately every third household had an Internet connection (*Eurostat, 2006*). The number of households with a computer increased by 100% between the years 2001 and 2006, however this indicator is still far from reaching the EU15 level (*Eurostat, 2006*). Similarly, while only 17% of households have broadband connection in the Czech Republic, one third of households within the EU15 countries have it (*Eurostat, 2006*). The exclusive role of wireless technology is a particular feature of the structure of broadband connection in the Czech Republic. WiFi is used far more extensively than in other EU states (*OECD, 2005*). When compared to the household situation, the level of ICT equipment of enterprises is surprising. 97% of enterprises with more than 10 employees are equipped with a computer, which is exactly the EU15 average (*Eurostat, 2006*). The percentage of enterprises connected to the Internet and with their own web pages is also comparable to the EU15 average (*Eurostat; Czech Statistical Office, 2005*).

According to the comparable measure of digital literacy, the average Czech citizen is slightly less digitally literate than the average citizen of the EU15 (*SIBIS Pocket Book, 2002/2003*). Basic computer literacy of the Czech population older than 15, as measured by the research of the Ministry of Informatics, reached 27% at the beginning of 2005. People younger than 35 years old, people with higher education and people living in big cities had the best computer knowledge.

When compared to other European countries, the level of usage of eLearning in the Czech Republic is visibly below average. Both the Economist eLearning Index and the take-up rates of eLearning as assessed by SIBIS indicate that the Czech Republic still has quite a way to go to fully exploit the potential of eLearning, at least when compared to the EU15 countries and the New Member States from the Baltic region. Schools and higher education institutions are the main providers of eLearning courses and related services. They provide eLearning not only as an element of traditional courses for regular students or one of the means of implementing them, but also in further education for adults and employees in small and medium enterprises. Private institutions offering their own eLearning courses are the other main suppliers (*eUser, 2005*).

At primary and secondary schools, multimedia tools are being used in a wide range of curricula activities. However, the usage of ICT in the educational process is rather low. In 2002, the usage of ICT directly in classes (including in informatics classes) was at a level of 26% and only 6% in non-informatics classes; in more developed countries this indicator is estimated to be 10-15% (*Ministry of Education, 2003*).

Secondary schools are significantly better equipped with ICT facilities than primary schools, and regional factors apply in the level of ICT equipment in both types of schools. Also, there is a relatively low average number of computers per 100 pupils, which inhibits the development of computer usage as an integral part of education. However, the trend is obviously positive and this indicator has improved significantly in recent years. At the end of 2005, the average number of computers per 100 pupils at primary schools was 11.5. At lower secondary education institutions, there were 12.3 computers per 100 pupils and for upper secondary and postsecondary non-tertiary education 12.8 computers (*Institute for Information in Education, 2006*). When compared to other New Member States, Czech schools in 2003 were relatively well-equipped (*Czech Statistical Office, 2003*). There has also been a similar improvement in Internet penetration in recent years. In 2005, 98.1% of primary and 98.9% of secondary schools were equipped with PCs with Internet access (*Ministry of Informatics, 2006*).

eLearning solutions are most advanced at the level of the universities, many of which have started to use Learning Management Systems (LMS) and provide online libraries and a number of other online learning solutions. However, there is a low level of cooperation between individual universities in the eLearning field. Universities are isolated, do not support each other in the implementation of eLearning solutions and do not exchange their educational contents (*Kopecký, 2006*). An increasing number of students and the limited space and personnel capacities of the universities have been important motivation factors in the development of ICT-supported education. The universities are very well equipped with ICT. All of them are connected to the Internet and more than 90% of their computers have broadband connection (*Ministry of Education, 2006*).

The Czech Republic traditionally has high levels of educational attainment. In the area of adult continuous education, the country is better positioned than the majority of New Member States and, indeed, many of the old ones (*eUser, 2005*). Recently, primarily larger companies have started to use eLearning courses in employee training. These companies usually use either eLearning courses with a general focus, such as language courses, ICT courses and courses on work security, or tailor-made courses to inform employees about the new products and services of the company, etc. Based on expert estimates, eLearning courses are used by 70-80% of large enterprises and 10-20% of small enterprises. In comparison to workplace training, there is a lack of tradition in lifelong education in the non-work related fields. Overall participation in learning by the adult working population is considerably below the EU15 average (*eUser, 2005*).

The first comprehensive government policy relating to information society was the “State Information Policy – a Way towards an Information Society” in 1999. The issue of information literacy was later covered by a policy document entitled “Concept of the National Strategy for ICT in Education” approved by the government in April 2000, under the authority of the Ministry of Education, Youth and Sports. Later “The State Information and Communication Policy – e-Czech 2006” was adopted by the government in March 2004. As an EU member state, the Czech Republic joined the European eEurope 2005 Action Plan. The State Information and Communication Policy therefore focuses primarily on elaborating the goals and requirements of the Plan. The priorities of the eEurope 2005 Action Plan were reviewed in relation to the current situation in the Czech Republic. In addition, the Broadband Strategy of the Czech Republic was approved by the government in January 2005.

The implementation of the National Strategy for ICT in Education can be regarded as successful; although the indicators of ICT equipment at schools have remained below the EU average, there has been a clear positive trend in the development of both ICT equipment and Internet penetration. It is an achievement that the level of ICT equipment at schools and the ratio of trained teaching staff have improved significantly. Moreover, usage of LMSs of different types (open source, commercial, self-developed) by the universities is more common and the majority of universities offer a combined form of studies comprising eLearning elements.

eLearning take-up has been supported, above all, by sound macroeconomic growth which has influenced the purchasing power of both households and enterprises and has changed the structure of the economy towards the service sector. ICT skills have started to be considered as an obvious part of basic skills and, due to the growing need for employees with ICT knowledge and skills in the services sector, the demand for eLearning services has been increasing. On the other hand, eLearning development might have been negatively influenced by an attitude towards ICT of some groups in the population characterised by anxiety about the first, elementary steps in ICT usage. This might be reinforced by lack of knowledge of the English language. Furthermore, there are substantial differences between the bigger towns and the smaller municipalities.

Another problem posed by the general relatively low motivation of teachers in pursuing further education could be solved by the implementation of a promotion ladder in the education system. If teachers had a perspective of promotion, accompanied by both higher wages and higher social status, their motivation to participate in educational courses would significantly increase. The State should also support cooperation between the public sector and private enterprises in the form of public private partnerships, which has already been successfully accomplished in the National Programme for Computer Literacy. Within this programme, a large network of training centres was built to provide

courses for absolute computer beginners. Also, a framework covering the cooperation of secondary schools with private enterprises would help to accelerate the development of eLearning content. Since schools have the knowledge necessary for content preparation and commercial enterprises have the experience and appropriate technology for course design, their cooperation would be mutually beneficial.

One of the major challenges for the future eLearning development is to harmonise the development of technology with the development of appropriate content, since both these two elements are necessary in the formation of quality eLearning products. Moreover, the market seems to be almost saturated with software such as learning management systems, and it will be a challenge for the suppliers of technology to launch new products on the market. Innovation will be necessary. There will also be greater opportunities for the development of open source software. Another challenge for the State is presented by relatively high wages in the ICT commercial sector because they make it more difficult for the State to offer competitive wages to qualified experts.

An additional challenge relates to products and services provided for handicapped people. There has been a growing emphasis on the importance of social inclusion and eLearning provides a new range of opportunities for handicapped people. Therefore, in the near future, the companies developing new technologies may focus more on developing enabling ICT technologies for handicapped users.

INTRODUCTION

Figure 1: Location of the Czech Republic in Europe



Table 1: General data on the Czech Republic

	2005	2004
General data		
Population (2005, million)	10.2	10.2
Area (km²)	78 864	78 864
Currency unit (Czech Koruna)	CZK/EUR=29.78	CZK/EUR=31.90
Per capita GDP (EUR)	9 616	8 499
Economic situation		
GDP growth	6.00%	4.70%
Unemployment	7.90%	8.30%
Inflation	1.90%	2.80%
Government deficit (% GDP)	2.60%	3.00%
Government debt (% GDP)	30.50%	36.50%
GDP distribution		
Agriculture	3.00%	3.30%
Industry and Construction	37.80%	37.90%
Services	59.20%	58.80%
Households connected to Internet	19% (I.Q)	19% (IV.Q)
Basic computer literacy	27%	
Membership in international organizations	EU, NATO, OECD, WTO, IEA, ...	

Source: Ministry of Finance of the Czech Republic (Macroeconomic Forecast – Czech Republic, January 2006), Czech Statistical Office (<http://www.czso.cz>)

General data¹³

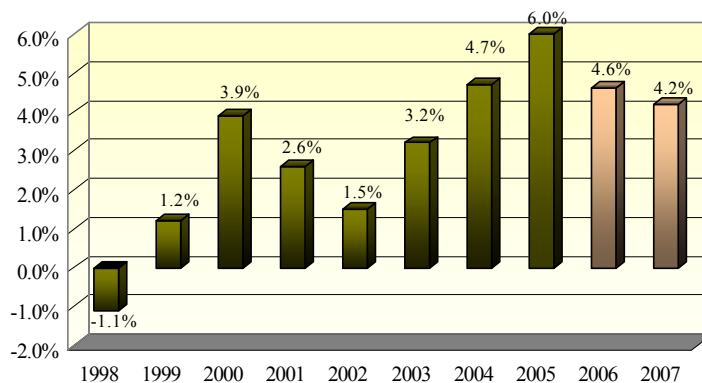
GDP and its growth

A gradual acceleration of year-on-year growth of the potential GDP (gross domestic product) is a positive phenomenon caused by the acceleration of the growth trend of the total factor productivity. It results from lifting the remaining barriers on the movement of goods after EU (European Union) accession, the inflow of foreign direct investment, the stability of the financial system and lowering rates in corporate taxation.

The Czech economy follows a growth path presently estimated at above 4%, slightly above its potential output. From the future growth perspectives, a structure of growth is very favourable, pulled mainly by net exports. In 2005, the year-on-year increase of real GDP reached 6.0% (*Czech Statistical Office*, <http://www.czso.cz>; *Eurostat*), and, according to recent data, in the first quarter of 2006, it reached 7.4% (*Czech Statistical Office*, <http://www.czso.cz>).

In 2004, for the first time in five years, there was a positive contribution of foreign trade to GDP growth amounting to 1.4 p.p. (percentage points). The trend is expected to continue in future years. The contribution of the foreign trade balance to GDP growth in 2005 is estimated at 3.9 p.p. and at 1.3 p.p. in 2006.

Figure 2: GDP growth (%)¹⁴



Source: Ministry of Finance of the Czech Republic (Macroeconomic Forecast – Czech Republic, January 2006)

The inequality of income distribution, which is one of the indicators of social cohesion, is quite low. In 2003,¹⁵ the ratio of total income received by the 20% of the population with the highest income to that of the 20% of the population with the lowest income was equal to 3.4, while the EU-25 (European Union with 25 member states) average was 4.6 (*Eurostat*).

International comparison

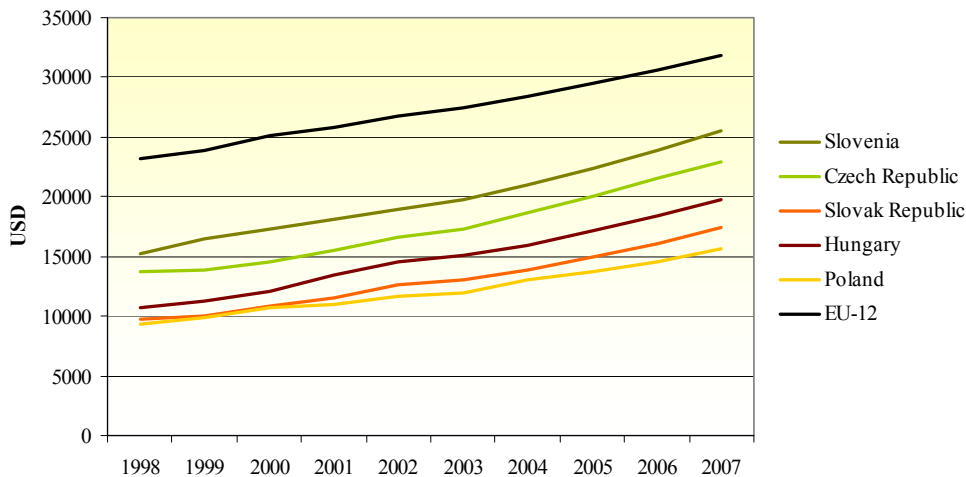
Comparisons of the economic performance of different countries are usually made by means of purchasing power parity, which is a relation between currencies expressing ability to buy the same set of goods in different countries. In 2006, the Czech GDP per capita is expected to reach 75% of the EU-25 average.

¹³ As a main source for this subchapter the report of the Ministry of Finance of the Czech Republic „Macroeconomic Forecast – Czech Republic” was used.

¹⁴ In the bar charts the forecast values of particular variables are depicted as rose-coloured.

¹⁵ Data for 2004 and 2005 were not available at the time of writing.

Figure 3: GDP per capita (using current purchasing power parities)



Source: Ministry of Finance of the Czech Republic (Macroeconomic Forecast – Czech Republic, January 2006)

Fiscal policy

Although the total balance of the general government performance in 2005 was the lowest since 2002, deficit tendencies still persist. Revenues performed relatively well, however the spending side showed considerable growth. The overall estimate of the general government deficit including net lending fell by CZK 64.9 billion (EUR 2.2 billion; 2005 exchange rate) to CZK 14.7 billion (EUR 0.5 billion, 2005 exchange rate), amounting to 0.5% of the GDP.

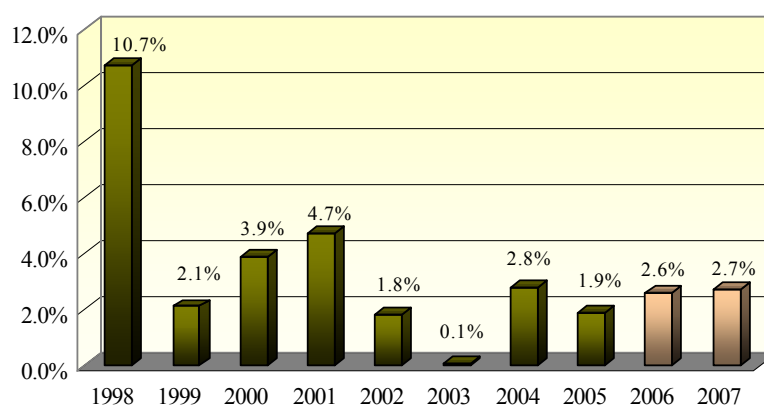
In 2005, the ratio of the total expenditures of the general government to the GDP increased to 45.2%. The highest share of general government expenditures was transferred to households and non-profit institutions, consisting of mandatory expenditures of more than 70% and mainly implemented by the state budget. The most important spending burden imposed upon mandatory expenditures stems from pension benefits, constituting 50% of total transfers to the population. Social expenses, such as sickness benefits, systems of state social support and social care benefits paid out through municipalities, are another important group of mandatory expenditures. Social transfers represent a substantial part of the state budget's total spending and contribute to its total imbalance.

With regard to the above-mentioned negative developments, a general government reform is under way. In order to reduce fiscal deficits permanently, the government has set a 2006 fiscal target of 3.7% ratio of the general government deficit to the GDP, excluding net lending and subsidies to transformation institutions.

Monetary policy

The monetary policy of the CNB (Czech National Bank) is based on an inflation-targeting regime. The average rate of inflation in 2005 reached 1.9%. This slowdown was affected mainly by the strengthening exchange rate (on average by 7.1% against the EUR and 7.3% against the USD in year-on-year terms), as well as the slowdown in price movement on world and domestic commodity markets of raw materials and products, excluding oil. The prices of oil hit record levels in 2005, with the average price of Brent oil growing 42% in dollar terms between 2004 and 2005. Thanks to the appreciation of the CZK/USD exchange rate, the average "koruna" price of oil increased only by one third.

Figure 4: Average inflation (%)



Source: Ministry of Finance of the Czech Republic
(Macroeconomic Forecast – Czech Republic, January 2006)

Labour market

In past years, the unemployment level in the Czech Republic has been above 7%. The situation is marked by considerable regional differences. Prague has the lowest level of unemployment (around 3%), whereas in some regions in the northern part of the republic unemployment overreaches 20%¹⁶. This is mainly a consequence of recent the transformation of the economy, which resulted in the termination of many heavy industry enterprises in the north leading to structural unemployment.

Furthermore, the development of the unemployment rate has been highly influenced by policy measures that have increased social benefits, weakening motivation of people to seek and keep work. Changes in the social benefit system are seen as possible solution of this problem. The adoption of the above-mentioned laws taking effect on 1 July 2006 should bring an intervention in the structure and construction of social benefits aimed at increasing the difference between earned incomes and social benefits. Also, there should be a deepening of the difference in welfare benefit receipts between active job seekers and those who do not seek work.¹⁷

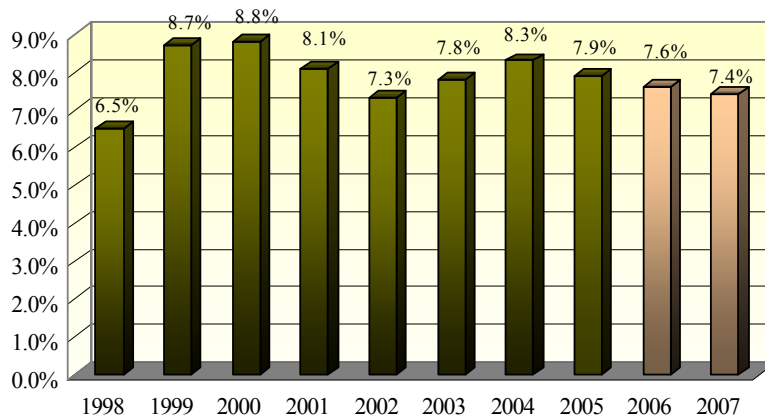
Tax cuts in the beginning of 2006 should also have a positive impact. The two lowest marginal rates of the personal income tax were cut from 15% to 12% and from 20% to 19%. These measures are aimed at increasing disposable earned income, especially regarding low-income groups, and increasing vertical tax fairness.

The ongoing reduction of unemployment in 2005 (seasonally adjusted) is mostly of a cyclical nature and do not show significant improvements in structural problems. The indicator of long-term unemployment as defined by Eurostat (12 months or more) was equal to 4.2 in 2004, which is similar to the EU-25 level (*Eurostat, 2005*). Labour productivity per employee reached 68.3% of the EU-25 average; however, there has been a visible positive trend in this respect as the productivity has been increasing from 56% in 1997 (*Eurostat, 2005*).

¹⁶ Ministry of Labour and Social Affairs of the Czech Republic, <http://www.mpsv.cz>

¹⁷ Commentary on Macroeconomic Forecast - Czech Republic; Ministry of Finance; January 2006

Figure 5: Average unemployment level



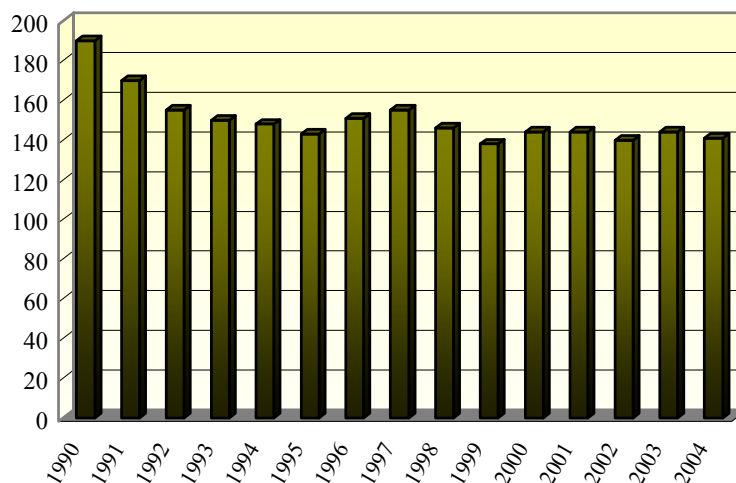
Source: Ministry of Finance of the Czech Republic (Macroeconomic Forecast – Czech Republic, January 2006)

Environment

In 2003, the total investment in the environment reached CZK 19 383 million (EUR 608 million), almost one half of what was used for water protection, and more than 20% on air and climate protection.¹⁸

Since the 1990's, there has been a positive development in the energy intensity of the economy as a consequence of the transformation process connected to an increase in efficiency. With the changing structure of the economy, the increasing share of the services sector and higher energy prices, energy consumption has been decreasing continuously. This led to a drop in CO₂ (carbon dioxide) emissions at the beginning of the 1990's. Since 1995, emissions have remained more or less at the same value. However, the indicator is far below the level defined by international agreements. (*Ministry of Environment of the Czech Republic*; <http://www.env.cz>)

Figure 6: CO₂ emissions (millions of tons equivalent)



Source: Ministry of Environment of the Czech Republic (<http://www.env.cz>)

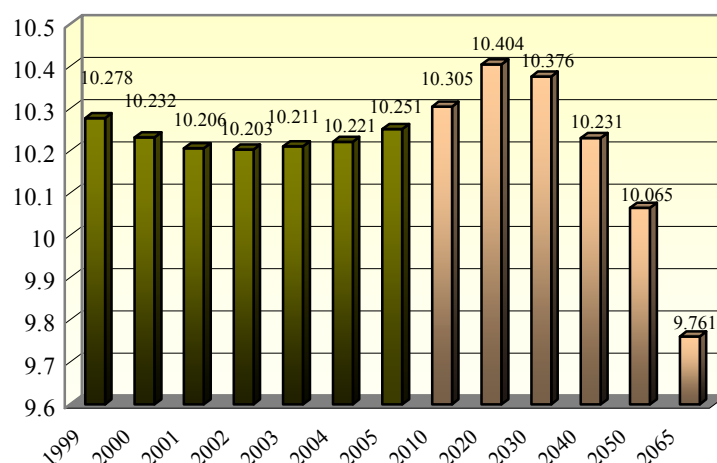
¹⁸ Czech Statistical Office; Information on the Environment in the Czech Republic (1999-2004)

Population developments¹⁹

The population of the Czech Republic is relatively homogenous without important big minorities. According to the population census carried out in 2001, more than 90% of people were of Czech nationality and 3.7% of Moravian nationality. There were 1.9% of Slovaks in 2001, all other nationalities were below 0.5%. (*Czech Statistical Office, 2001 Population Census*)

During the 1990's, there was a continuous decline in the number of inhabitants of the Czech Republic. While in 1990 there were 10.36 million inhabitants of the Czech Republic, in 2004, the population amounted to 10.2 million. In 2004, fertility slightly increased, mortality decreased and the population started to grow.

Figure 7: Population (in millions)



Source: Ministry of Finance of the Czech Republic (Macroeconomic Forecast – Czech Republic, January 2006), Czech Statistical Office (<http://www.czso.cz>)

The number of the population belonging to the 20-59 age group has already started to fall. In terms of workforce resources, the most favourable demographic structure was probably reached in 2003 (as revealed through historical demographic data).

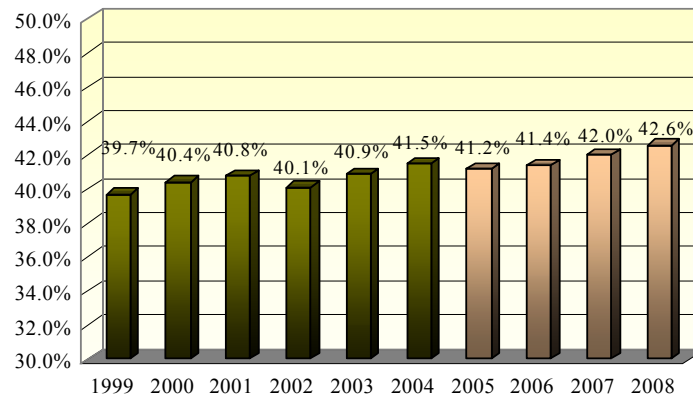
Consequently, we are witnessing the beginning of the population-ageing process. The share of the population within younger age groups will continue to reduce, due to the low fertility rate. While total fertility grew to 1.23 in 2004, against the minimum of 1.13 in 1999, this value is still quite far from the reference value of 2.04 needed to ensure long-term population stability. The downward shift in the birth rate is not only influenced by lifestyle changes, but also by the low availability of housing for young families. In contrast, the number and share of seniors in the population will grow, due to the nature of the demographic structure and the extension of the average life expectancy. This unfavourable outlook can be only partially mediated by immigration.

As a result, the Czech population is growing, but primarily among elderly people above 60 years of age. The proportion of young people to total population is projected to fall from 30% in 1985 to below 20% in 2008, while the proportion of seniors is projected to rise from 17.4% to 21.7%.

Policy measures have been taken to mediate the unfavourable effects of population ageing, such as legislation that gradually extends the minimum retirement age until the year 2016. There have been further changes made under public finance reform, e.g. the limited indexation of pensions.

¹⁹ The report of the Ministry of Finance of the Czech Republic „Macroeconomic Forecast – Czech Republic“ was used as a main source for this subchapter.

Figure 8: Effective old-age dependency ratio (%)



Source: Ministry of Finance of the Czech Republic (Macroeconomic Forecast – Czech Republic, January 2006)

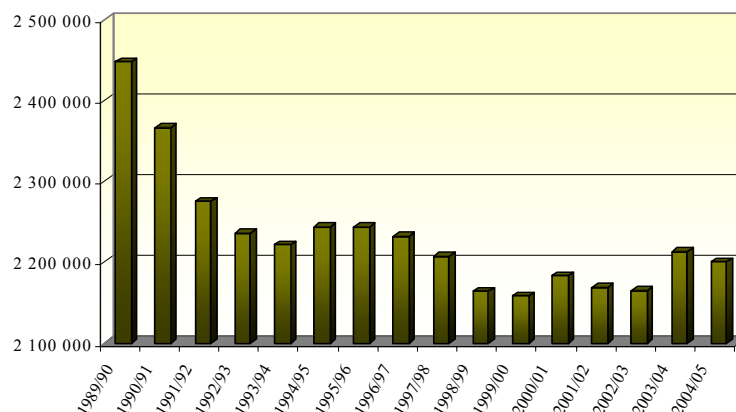
Major education indicators

Education indicators

A substantial part of the debate on the organisation and administration of education in the recent years has centred on the need to address the marked fall in the population, the projected slow growth of population in the future and the need to reduce the number of schools. Compulsory education is provided by municipalities, which are numerous and small. The fall in the population may render the maintenance of schools too expensive. So far, problems have been solved either by merging schools or, to a lesser extent, by closing them.²⁰

The total number of schools on the primary, secondary, higher vocational and tertiary levels has fallen from 6 333 during the 1994/1995 school year to 6 023 in 1999/2000 and even further to 5 692 in 2004/2005. The number of pupils attending school at all levels has decreased between 1994/1995 and 2004/2005 by 43 000.²¹

Figure 9: Total number of students



Source: Institute for Information in Education (Development Year-Books of Education System: 1989/1990-2002/2003, 2003/2004 and 2004/2005)

²⁰ Eurydice Education Unit; The Education System in the Czech Republic; 2003

²¹ Institute for Information in Education; Development Year-Books of Education System: 1989/1990-2002/2003 and 2004/2005

According to the 2001 population census of people 15 years and above, the share of the population with a primary level education was 23%, 66.4% had attained a secondary level, of which 43% passed the state final exam, and 8.9% of population had completed their tertiary level education. There had been visible improvement in general level of education compared to the results of the population census conducted 10 years earlier. In 1991, the share of the population with a primary education was 33.1%, with a secondary education 58.3% and with a tertiary education 7.2%. (*Czech Statistical Office, 2001 Population Census*)

In 2005, the percentage of the adult Czech population (aged 25-64 years) that had completed upper secondary education reached 89.9% whereas in the EU-15 this indicator was equal to 66% and in the EU-25 to 68.9% (*Eurostat, 2005*).

Slightly less than 1.5% of primary schools and 22% of secondary schools are privately owned. 58% of colleges or universities are privately owned; however, public universities are much larger and are attended by more than 90% of students.²²

First and foremost, education is funded by public budgets, drawing from both the central state budget and the budget of the territorial administrative units, consisting of regions and municipalities. The schools' economic activities as well as their participation in international programmes provide additional funding. The funding mechanism changed fundamentally in 1992 from the provision of resources by funding institutions to that working on a "per capita" basis, in which the amount of non-capital expenditure per pupil/student is determined by the Ministry of Education.²³

Total education expenditures per capita as expressed in current prices increased significantly from EUR 240 in 2000 to EUR 378 in 2004 (which is equivalent to EUR 344 measured in 2000-prices)²⁴.

The share of public educational expenditures in the GDP decreased from 5.2% in 1995, which is equivalent to 13.4% of the state budget, to 4.1% in 2000, which is equivalent to 11.7% of the state budget. Since then, it has been slightly increasing and in 2004 reached 4.5% of GDP, which is equivalent to 14.3% of the state budget. Private funding forms approximately 10% of total education expenditures (8.8% in 1995, 10.1% in 2000, and 9.4% in 2001).²⁵

Education and Training 2010 indicators

The number of graduates in mathematics, science and technology has been increasing continuously, reaching 7 500 in 1998 and 12 100 in 2004. The share of graduates in this specialization to graduates in all fields has been fluctuating around 23-24% in the long-term. This indicator is comparable to EU-25 and significantly higher than in the new member states (16%). Gender imbalance has been improving; however, it is still worse than in the EU-25 and the new member states. While in the Czech Republic, share of women graduates increased from 29.3% in 1998 to 41.8% in 2004, in EU-25 it increased from 40.2% to 44.5% and in the new member states from 43.3% to 48.6%.

Percentage of early school leavers (Percentage of the population aged 18-24 with at most lower secondary education and not in further education or training) has been fluctuating between 5.5% and 6.5% (5.5% in 2006), therefore fulfilling the EU 2010 target (10% maximum). The indicator has been significantly lower than both in the EU-25 (15.1% in 2006) and the new member states (7.5% in 2006).

Similarly the Czech Republic has fulfilled the 2010 target of upper secondary education completion (85% of 22 year old). For the period when the data are available (1998-2005) the indicator was above 90% (91.2% in 2005). For comparison, in 2005 the indicator for EU-25 reached 77.5% and for the New member states 89.3%.

²² Czech Statistical Office; Schools and Educational Institutions in the Academic Year 2004-2005

²³ Eurydice Education Unit; The Education System in the Czech Republic; 2003

²⁴ Institute for Information in Education; Year-Book Economic Indicators – Chapter A; 2004

²⁵ Institute for Information in Education; Development Year-Book of Education in the Czech Republic 1989/1990 – 2002/2003

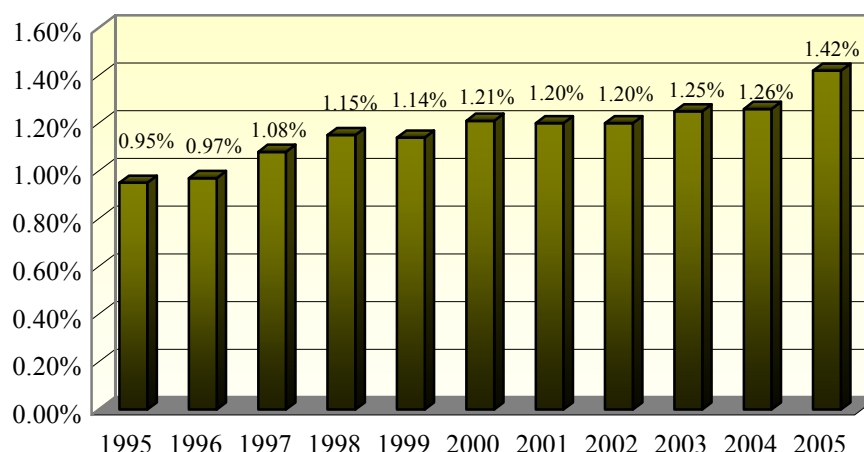
On the other hand, the situation is worse in lifelong learning. In 2010 at least 12.5% of adult working population should participate in lifelong learning. So far, in the Czech Republic the participation level has been rather low. Only 5.6% of workers participated in lifelong learning in 2005, while in the EU-25 it was 10.2%. Furthermore, there has not been any strong positive trend in this respect – in the period 2002-2005 there was no change. In the New member states the indicator (5.3%) reached similar value as in the Czech Republic.

Regarding reading literacy, the Czech Republic reached similar values as the OECD average in 2000 (OECD; *Education at a Glance 2004*). Unfortunately, no updated data were available at the time of writing this report.

Innovation and research

Total expenditures are usually used as an indicator of research and development. In 2005, total domestic expenditure on research and development as expressed in current prices reached CZK 42 198 million (EUR 1 400 million; 2005 exchange rate). The share of total R&D (research and development) expenditure in the GDP was 1.42%. This share has been increasing continuously in the long-term run. The most important financial source supporting research and development activities was the business enterprise sector, which contributed to the total R&D expenditures by 54.1%. The second most important provider of financial sources was the government (40.9%).²⁶

Figure 10: R&D expenditures (% of GDP)



Source: Czech Statistical Office; Expenditures on R&D in the Czech Republic in 1995-2005

General ICT usage indicators

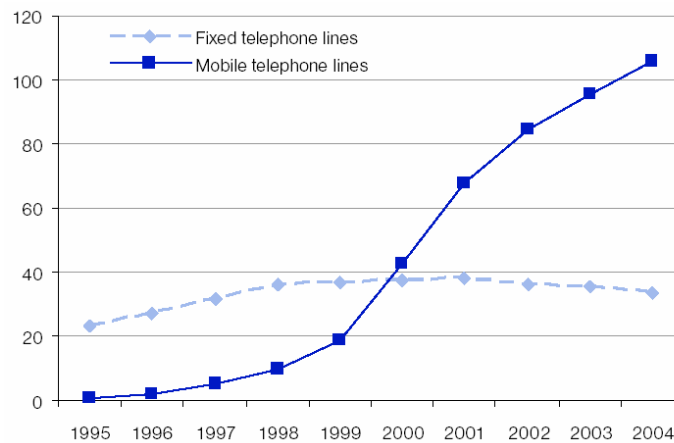
Telephones

Access to fixed telephone lines has been decreasing due to the replacement of this service by mobile phones. In 2005, 61% of households had access to a fixed telephone line, compared to 63% in 2003. The mobile phone is a very intensively used communication technology. 76% of the population aged 15+ has a mobile phone for private use. This technology is used especially by the 25-34 (94%) and 15-24 (92%) age groups.²⁷

²⁶ Czech Statistical Office, Expenditures on R&D in the Czech Republic in 1995-2005

²⁷ Czech Statistical Office; Results of ICT Usage Survey in Czech Households and among Individuals 2005

Figure 11: Number of telephone subscribers (per 100 inhabitants)



Source: Czech Telecommunication Office (<http://www.ctu.cz>)

Personal computers and Internet: Households and individuals

In 2006, more than one third of Czech households were equipped with a personal computer (PC) and approximately every third household had an Internet connection. The number of households with a computer increased by 100% between the years 2001 and 2006. Yet, the indicator is still far from reaching the EU-15 level, which equals to 64%. (*Eurostat, 2006*)

The degree of computer technology equipment differs significantly according to the type of household. In 2005, the ratio of equipped households was higher in the case of households with children than households without children. Out of those households equipped with the computer, 64% were connected to the Internet. Of the households with an Internet connection, 63 % had a connection through a telephone line (a dial-up connection), 27 % had a broadband connection, 8 % used ISDN line (Integrated Services Digital Network) and 4 % used mobile phone (GPRS – General Packet Radio Service, HSCSD - High Speed Circuit Switched Data). There was a clear decreasing trend in telephone line connections. On the other hand, the usage of broadband connections has been increasing. From those households with a broadband connection, 37% were connected through cable TV, 19% through ADSL or other DSL technologies and 44% had another type of connection (satellite, wireless).²⁸

A particular feature of the structure of broadband connection in the Czech Republic is the exclusive role of wireless technology (*OECD, OECD Broadband Statistics; 2005*). WiFi is used far more extensively than in other EU states. More than 50% of all WiFi connections in the EU can be found in the Czech Republic (*Ministry of Informatics of the Czech Republic, <http://www.micr.cz>; 2006*). Because this type of connection was included into the OECD statistics on broadband penetration, the statistics showed a penetration level in the Czech Republic of 6.4 per 100 citizens, compared to the EU-15 average of 14.2 (*OECD; OECD Broadband Statistics; 2005*).

ADSL and WiFi connections cover with few exceptions the whole area of the Czech Republic, in other types of connection there are regional differences.²⁹ The level of competition between broadband providers also depends on the type of connection. There is a very high level of competition in WiFi connection with several hundreds of providers. For ADSL connection, there is one major provider with two competitors, who are present only in few bigger cities. However, competitive environment is not created only within one type of connection but also between various types.

The reasons why the households equipped with computer were not connected to the Internet were high connection charges and access to the Internet elsewhere, such as the workplace, school, etc.³⁰. The Czech Republic is lagging behind the EU-15, where 54% of households are connected to the Internet

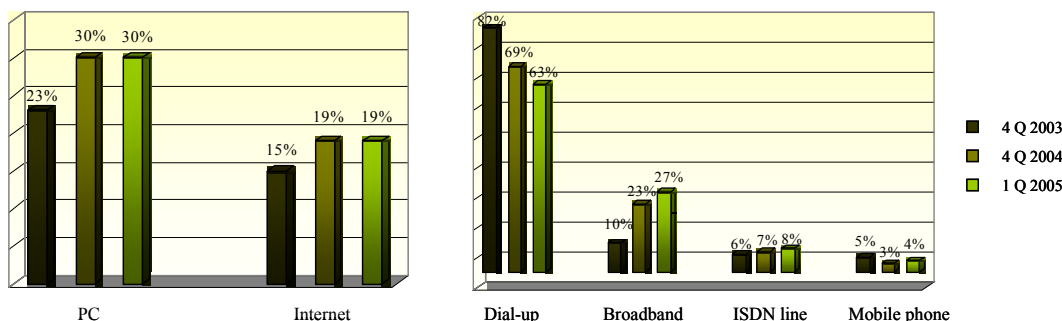
²⁸ Czech Statistical Office; Results of ICT Usage Survey in Czech Households and among Individuals 2005

²⁹ Ministry of Informatics of the Czech Republic; maps of broadband coverage; <http://www.micr.cz>

³⁰ Czech Statistical Office; Results of ICT Usage Survey in Czech Households and among Individuals 2005

(Eurostat, 2006). Similarly, while only 17% of households have broadband connection in the Czech Republic, one third of households within the EU-15 countries have it (Eurostat, 2006).

Figure 12: Household access to PCs and Internet and type of Internet connection used by Households



Source: Czech Statistical Office (Results of ICT Usage Survey in Czech Households and among Individuals 2005)

32% of the population aged 15+ used a personal computer in the first 3 months of 2005. There were quite big differences in PC usage according to both age and education. The usage of personal computers is especially common among persons with a university degree (79% used PC in the 3 months) and among persons in the 15-24 age group (77% used computer in the 3 months). On the other hand, only 3% of PC users are in the age group 65+. 72% of PC users reported using a PC in the last 3 months at home, 49% at work, 21% at school, 10% at friend's house and 4% elsewhere. The majority of users used a computer almost every day (53%), approximately one third of them between one and four days a week and 14% less frequently.³¹

34% of the population aged 15+ has undertaken a course or training on computer operation. The majority of people with training are students (87% of all students of the age 15+) and in the 15-24 age group (75%).³²

The Internet users have a similar structure to that of personal computer users. 32% of the population aged 15+ used the Internet in the first 3 months of 2005. The Internet is used especially by individuals with a university degree (73% used the internet in 3 months) and by the 15-24 age group (64% used the internet in the last 3 months). Conversely, only 2% of Internet users are among individuals aged 65+. 62% of Internet users used the Internet at home, 44% at work and 21% at school.³³

Personal computers and the Internet: Enterprises

97% of enterprises with more than 10 employees are equipped with a computer, which is exactly the EU-15 average (Eurostat, 2006). There are approximately 40 computers per 100 employees in Czech enterprises. 95% of enterprises are connected to the Internet and two thirds of enterprises have their own web pages, comparable to EU-15 average.³⁴ This is surprising especially when compared to the household situation.

In 2004, 21% of enterprises used a dial-up connection to the Internet, 32% used an ISDN connection, 19% used an ADSL connection with a maximum speed lower than 2Mbps, 3% used a TV cable connection with a maximum speed lower than 2Mbps, 27% used a leased line with a maximum speed lower than 2Mbps and 29% used a wireless connection. Regarding the speed of the connection, 9% of

³¹ Czech Statistical Office; Results of ICT Usage Survey in Czech Households and among Individuals 2005

³² Czech Statistical Office; Information Society in Figures 2005 – Czech Republic and World

³³ Czech Statistical Office; Results of ICT Usage Survey in Czech Households and among Individuals 2005

³⁴ Eurostat, 2006 and Czech Statistical Office; Information Society in Figures 2005 – Czech Republic and World

enterprises use a connection with a maximum speed slower than 56 kbps, 17% with a speed between 57 - 128 kbps, 53% with a speed between 129 – 2 000 kbps and 13% with a speed faster than 2 Mbps.³⁵

Within the enterprises one third of employees work with a computer (38.3%) and 28.5% work with a computer connected to the Internet. 37.8% of enterprises used a computer-mediated network for e-purchases and 16.6% for e-sales. More than two thirds of enterprises have LAN (Local Area Network), 12% have wireless LAN. Furthermore, 23% of enterprises have intranet and 6% have extranet.³⁶

³⁵ Czech Statistical Office; Results of ICT Usage Survey in Czech Business Sector 2004

³⁶ Czech Statistical Office; Results of ICT Usage Survey in Czech Business Sector 2004

I. CURRENT EDUCATIONAL SYSTEM AS THE PLACE OF E-LEARNING

I.1. Description of the education and training system³⁷

The Czech education system (see Figure 13) consists of nursery schools (*mateřská škola*), primary schools (*základní škola*), secondary schools (*střední škola*), special schools (*speciální škola*), tertiary professional schools (*vyšší odborná škola*) and universities (*vysoká škola*), all of which offer different levels of education. The education system also includes primary art schools (*základní umělecká škola*) that provide a basic education in art.

Nursery schools have a long-standing and unique national tradition influenced by the ideas of Jan Amos Komenský (Comenius) in the 17th century, among others. While attendance is not compulsory, 88.2% of children aged 3 to 6 year olds attend nursery school (data for the year 2004/05).

Before the year 1990/91 the duration of compulsory school attendance was 10 years – 8 years of uniform education at primary school, and at least two years at one of upper secondary schools. In 1990, the length of primary school attendance was prolonged to 9 years while compulsory school attendance was shortened to 9 years. People have the right to primary education free of charge.

Upper secondary education is a considerably differentiated system guaranteeing education and vocational training for almost the entire population of young people following completion of compulsory school attendance and before taking up employment or continuing in higher education. Pupils attending upper secondary schools are generally aged from 15 to 19 years. Participation of the 15–18 age group in education is not compulsory; nevertheless it was 90.5% in 2002/03. Most of the population attend secondary education completed by passing a final examination and attaining an apprenticeship certificate or passing a final examination (*maturitní zkouška*).

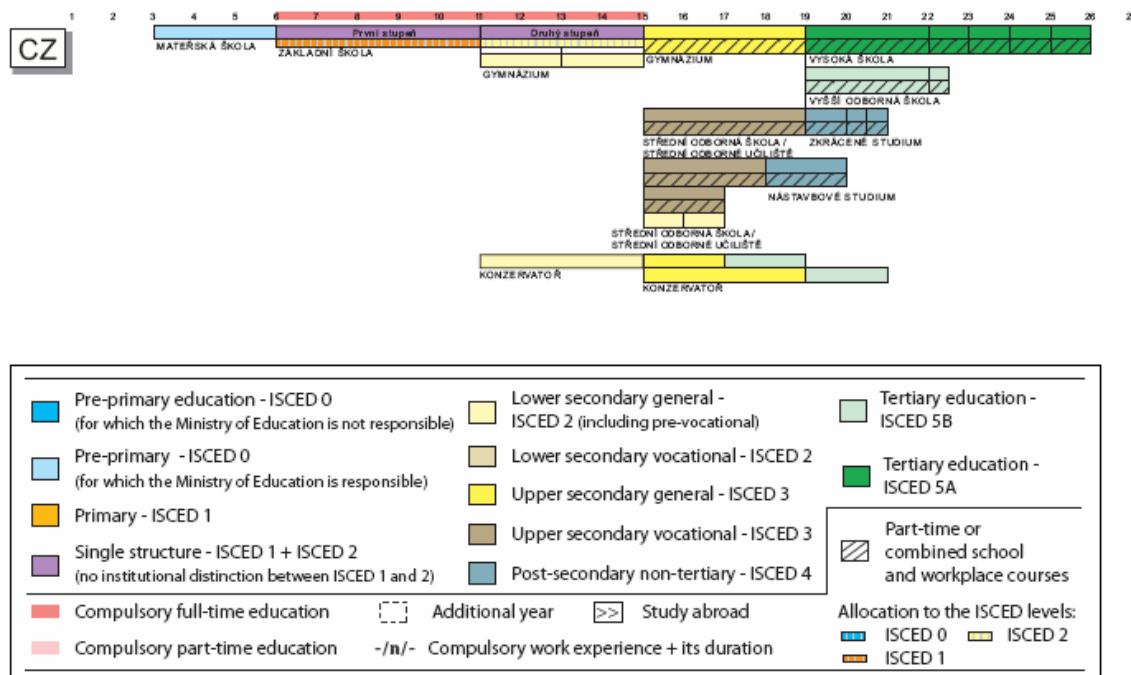
In 2004/05 school year 57% of pupils who had completed secondary education with final examination in the previous year were admitted to tertiary education (that is 34% of all 19-year olds), 81% of whom entered higher education institutions, 16% entered tertiary professional schools and 16% enrolled in both the types of tertiary education. At universities Bachelor's study programmes are focused on professional training and provide a basis for studies in Master's study programmes. The study lasts 3–4 years. Master's study programmes are aimed at providing theoretical knowledge based on latest scientific findings, research and development, at mastering their applications and on developing creative skills. Their standard length is 1–3 years. A Doctoral study programme can follow after the completion of a Master's programme. It is aimed at scientific work, independent creative activity in the area of research and development or at independent theoretical and creative skills in art. It is offered solely in the university type of study. It usually lasts 3–4 years.

One of the drawbacks of the system, which might hinder its further development, is non-existence of a promotion ladder and consequent low motivation of the teachers for above standard activities and their further education (*interviews carried out as a part of the study*).

The state administration of education is carried out by the Ministry of Education, Youth and Sport, or in stipulated cases by other central government bodies, by the Czech School Inspectorate, regional authorities, municipal authorities of municipalities with extended competences and heads of schools, pre-school institutions and educational establishments. Public administration in education is highly decentralised; different levels of administration and the schools have a high degree of autonomy. Responsibility for the establishment of schools lies primarily with municipalities and regions. The decentralisation was implemented over only two years, between 2001 and 2003.

³⁷ As the main sources of this subchapter the analyses of the Eurydice Education Unit “The Education System in the Czech Republic” (2003) and “Structures of Education, Vocational Training and Adult Education Systems in Europe: Czech Republic” (2005/2006) were used.

Figure 13: Organisation of the education system



Source: Eurydice; Structures of Education, Vocational Training and Adult Education Systems in Europe: Czech Republic 2005/2006

The Ministry of Education, Youth and Sports is responsible for the conceptualisation, condition and development of the education system. This means that it is authorised to define state educational policy and the strategy for the development of education and the education system. Its responsibilities also include lifelong learning, policy for science, research and development including international co-operation in this area, and issues concerning scientific degrees, children and young people (primarily leisure time activities and social issues) as well as physical education and sport. The Ministry cooperates with the Ministry of Labour and Social Affairs in areas relating to the labour market and guidance, and in some questions with other central authorities of the state administration (Ministry of Interior, Ministry of Defence and Ministry of Health). Retraining is intended chiefly for the unemployed and is controlled by the Ministry of Labour and Social Affairs through Labour Offices.

The information and statistics on the Czech education indicators are annually collected and provided by the Czech Statistical Office and the Institute for Information in Education. The Eurydice Education Unit provides summarizing studies on the Czech education system.

I.2. Place of eLearning in educational system

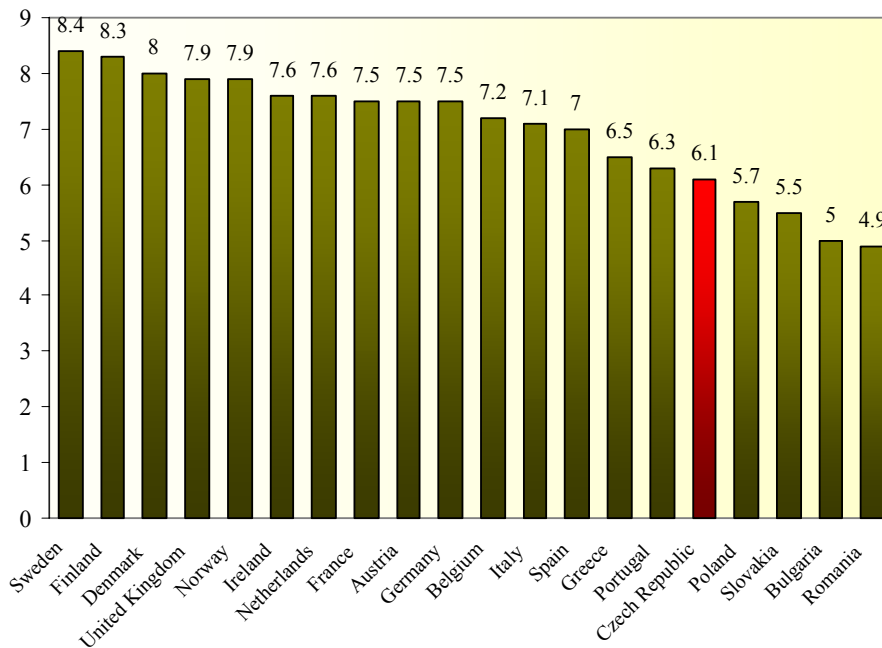
I.2.1. International comparison

When compared to other European countries, the level of usage of eLearning in the Czech Republic is visibly below average. Both the Economist eLearning Index (see Figure 14) and the take-up rates of eLearning as assessed by SIBIS (Statistical Indicators Benchmarking the Information Society; see Figure 15) indicate that the Czech Republic still has quite a way to go in fully exploiting the potential of eLearning, at least when compared to the EU-15 countries and the New member states from the Baltic region (*eUser, 2005*).

State schools, including high and higher education institutions, are the main providers of eLearning courses and related services. These institutions not only provide eLearning courses as a part of presence study or combined form of education for regular students, but also for adults and small and medium enterprises (in so-called further education). Private institutions offering their own eLearning courses are the other main supplier. Current estimates indicate that about 720 private institutions operate on the educational market using eLearning as distribution channel (partly or totally) with a

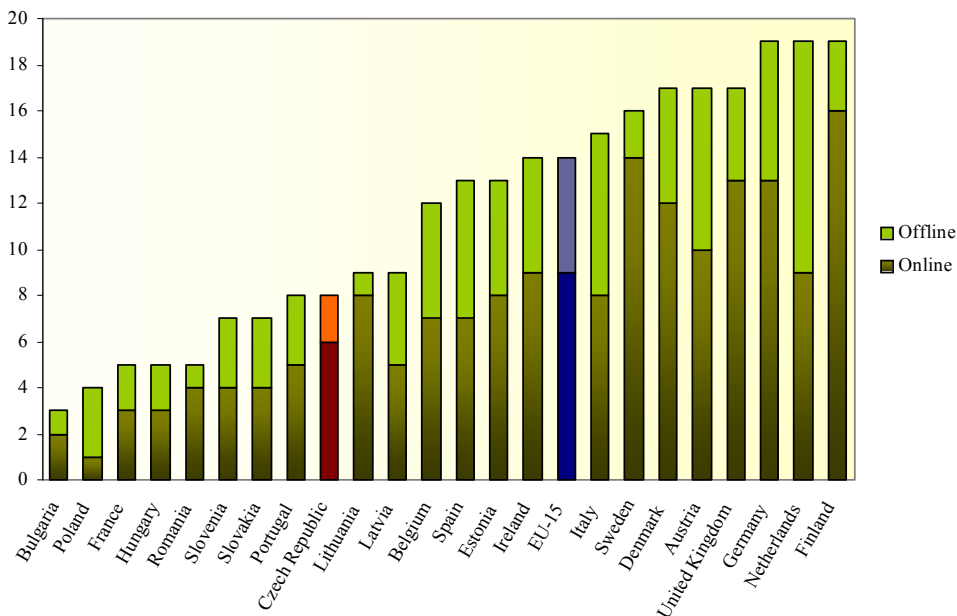
total enrolment of more than 12 000. There is hardly any information available as to the extent to which enterprises use eLearning for staff training. The National Centre of Distant Education has asserted that eLearning is being used, by large multi-national enterprises in particular. (*eUser*, 2005)

Figure 14: The Economist eLearning index



Source: Economist Intelligence Unit, 2003; In *eUser*, 2005

Figure 15: Usage of work-related eLearning



Unit: share of employed population who used electronic learning material for work-related learning.
Source: SIBIS Pocket Book 2002/2003

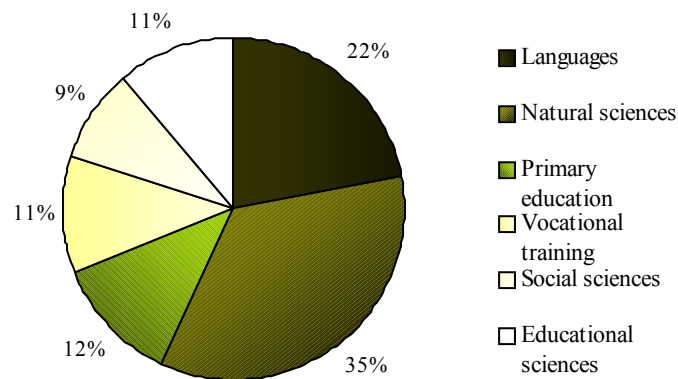
1.2.2. Schools³⁸

Primary and secondary schools have gradually started to use eLearning tools. While the usage of LMS systems³⁹ is very exceptional, schools distribute educational content on their web pages (eReading) and use online tools for practicing and testing the knowledge of the pupils (Kopecký, 2006). However, due to the ongoing reform of the educational system and, consequently, to the uncertainty regarding the future curricula, the teachers are less motivated to prepare detailed electronic materials or eLearning content (*interviews with experts carried out as a part of this study*).

In primary education, PC usage is taught at least once at the first stage and once at the second stage (2 hours in total). In secondary education there are two hours compulsory in the first year at four-year “gymnázium”, in later years number of lessons is decided by the school head. At eight-year “gymnázium” there are two hours compulsory in the third year and one hour in the fourth year. In vocational education it highly depends on the field of specialization. (Eurydice, 2006)

At primary and secondary schools multimedia tools are being used in a wide range of curricula. The teaching software is used predominantly in natural sciences (35%) and language classes (22%).⁴⁰ However, the usage of ICT in the educational process is rather low. According to the report of the Czech School Inspectorate from January 2003, the usage of ICT directly in classes was at 26% level (including in informatics classes) and only 6% in non-informatics classes; in developed countries this indicator is estimated to be 10-15%.⁴¹

Figure 16: Structure of teaching software in schools (without universities, 2003)



Source: Czech Statistical Office; Information Society in the Czech Republic: eEducation; 2005

Secondary schools are significantly better equipped with ICT facilities than primary schools, and regional factors apply in the level of ICT equipment in both types of schools.⁴² Also, there is a

³⁸ Information and statistics on eLearning in the Czech Republic have been provided by the Czech Statistical Office, the data being collected by the Institute for Information in Education and the Czech Statistical Office. The statistics is divided into two sections: ICT infrastructure in schools and usage of ICT in education. In 2006 K. Kopecký published the book „e-Learning (nejen) pro pedagogy (e-Learning (not only) for Pedagogues)”. To the knowledge of the authors of this study no other comprehensive study dealing with eLearning in the Czech Republic has been elaborated.

³⁹ Learning Management System (or LMS) is a software package that enables the management and delivery of online content to learners. Most LMSs are web-based to facilitate "anytime, any place, any pace" access to learning content and administration. Typically an LMS allows for learner registration, delivery of learning activities, and learner assessment in an online environment. (www.wikipedia.org)

⁴⁰ Czech Statistical Office; Information Society in the Czech Republic: eEducation; 2005

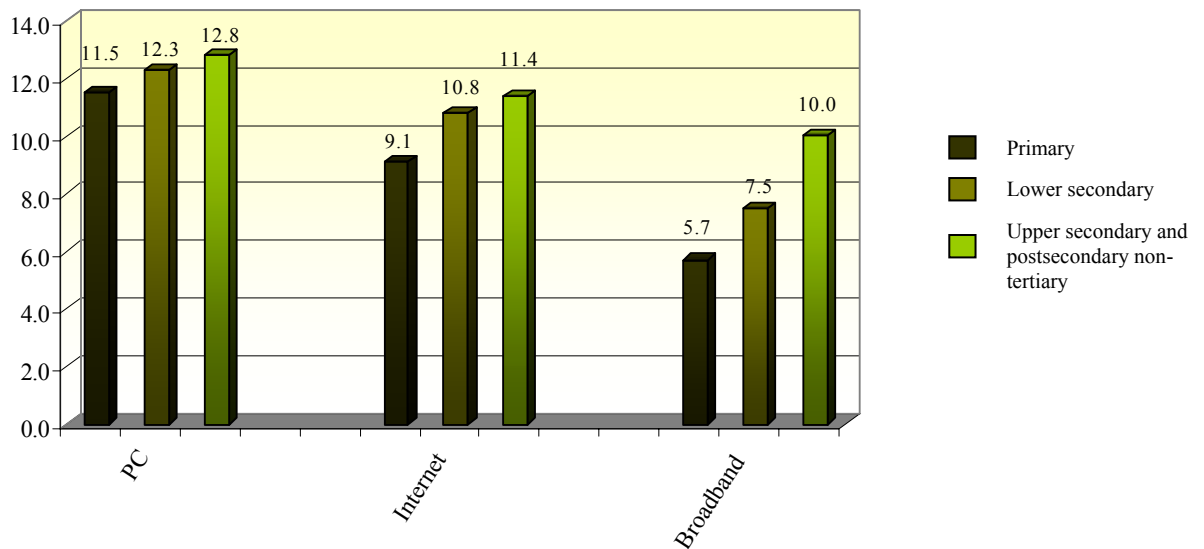
⁴¹ Ministry of Education, Youth and Sport; Report on Fulfilment of Plan of National Strategy for ICT in Education Implementation until 31 December 2003

⁴² Ministry of Education, Youth and Sports; 2004 Report on Fulfilment of Plan of National Strategy for ICT in Education Implementation

relatively low average number of computers per 100 pupils, which inhibits the development of computer usage as an integral part of education.

However, the trend is obviously positive and this indicator has been improving significantly in recent years. At the end of the year 2005, average number of computers per 100 pupils at primary schools was 11.5. In lower secondary education, there were 12.3 computers per 100 pupils and for, upper secondary and postsecondary non-tertiary education, 12.8 computers. Out of these computers on average 9.1 (5.7) were connected to the Internet (broadband) at primary schools, 10.8 (7.5) at lower secondary schools and 11.4 (10.0) at upper secondary and postsecondary non-tertiary schools.⁴³

Figure 17: PCs and PCs connected to Internet per 100 pupils (2005)



Source: Czech Statistical Office (Information Society in the Czech Republic – eEducation; 2006)

Vocational schools are slightly better equipped with ICT than general secondary schools. Almost all the schools are equipped with PC and the Internet, however the difference is visible in broadband coverage – around 81% of secondary schools and almost 85% of vocational schools have broadband connection. There is almost no difference in usage of computers at secondary and vocational schools (*Czech Statistical Office; Usage of ICT in Education; 2006*).

In the year 2000, the average number of pupils per computer in schools attended by pupils aged 15 was 19.6 in the Czech Republic, while in the EU-25 it was 27.8, which was, however, caused by extremely high numbers for Greece (57.9) and Portugal (67.4).⁴⁴

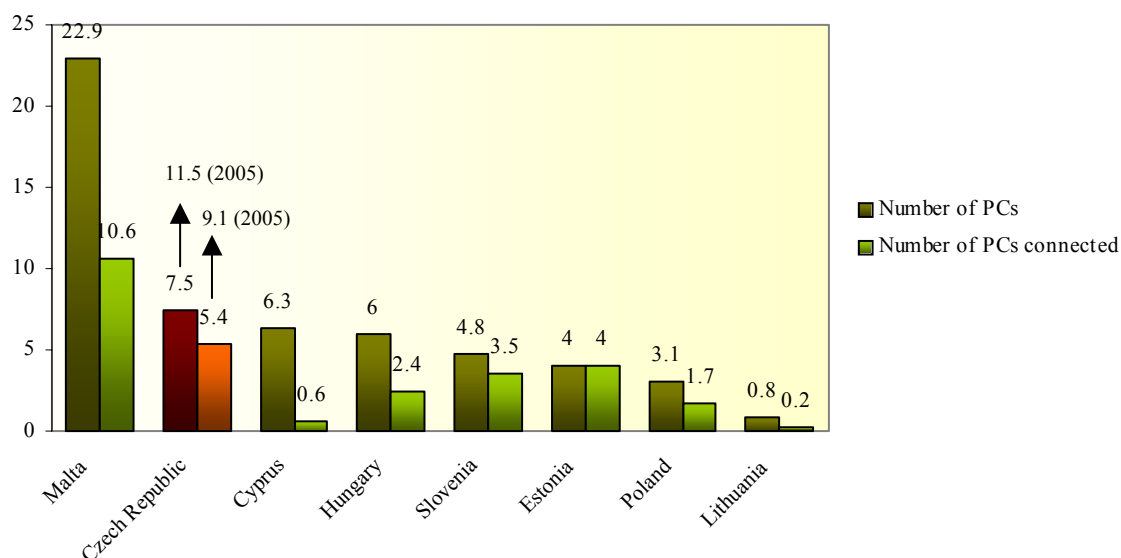
When compared to other new member states, Czech schools in 2003 were relatively well-equipped⁴⁵. Furthermore, it is important to take into account the above-mentioned positive trend and the significant improvement of PC and Internet access indicators in 2005.

⁴³ Institute for Information in Education, In: Report on Fulfilment of the Implementation Plan of the National Strategy for ICT in Education in 2005 and Financing Proposal after 2006

⁴⁴ Eurydice, Key Data on Information and Communication Technology in Schools in Europe; 2004 Edition

⁴⁵ Czech Statistical Office; Information Society in the Czech Republic: eEducation; 2005 and eEurope+ Benchmarking Survey, 2003

Figure 18: Number of PCs (PCs connected to the Internet) per 100 pupils of primary schools (2003)



Source: Czech Statistical Office; Information Society in the Czech Republic: eEducation; 2005 and eEurope+ Benchmarking Survey, 2003

There has been a visible improvement in the Internet penetration in recent years. In 1999, one third of secondary and three quarters of primary schools were not connected to the Internet and the existing connections were of insufficient quality.⁴⁶ In 2005, 98.1% of primary and 98.9% of secondary schools were equipped with PCs with Internet access (*Ministry of Informatics; Press release from 22 June 2006*).

As of the end of 2003, 62.5% of teaching staff were trained at least at basic level within the National Strategy for ICT in Education, including 50 000 of trained teaching staff in kindergartens. If the kindergartens are excluded from the calculation, 74% of teaching staff were trained at least at a basic ICT level at the end of 2003. More than 30% of teachers started to attend advanced level training during 2003. In 54% of schools, teaching staff used a computer connected to the Internet for their work. One third of teachers used Internet connection intensively.⁴⁷

1.2.3. Universities

eLearning solutions are most advanced at the level of the universities, many of which have started to use the LMS system and provide online libraries as well as a number of other online learning solutions. However, there is a low level of cooperation between individual universities in the field of eLearning. The universities are isolated, do not support each other in the implementation of eLearning solutions and do not exchange their educational contents (*Kopecký, 2006*). As a first step towards more intense cooperation the project “Cooperation of universities at development of standardised multimedia educational tools” was launched in 2004. Furthermore, there are differences in the usage of eLearning solutions between particular universities caused by different management approaches and financial possibilities, influenced by the high cost of the primary investment into eLearning.

The most active Czech universities in the field of eLearning are the University of Hradec Kralové, the University of Ostrava, the Czech Technical University in Prague, Palacký University in Olomouc and others. The universities use different LMS systems (Czech, foreign, open source) and have developed a number of eLearning courses. The content of the courses is primarily focused on the natural sciences (*Kopecký, 2006*).

⁴⁶ Ministry of Education, Youth and Sports; Concept of National Strategy for ICT in Education

⁴⁷ Ministry of Education, Youth and Sports; National Strategy for ICT in Education in 2003 in Data – Infrastructure

However, only the University of Economics in Prague offers a distant master's studies, and has done so since 2002 when it obtained accreditation. In addition, a distant bachelor's studies of Applied Informatics are provided by the University in Ostrava. In most cases universities provide a combined form of studies in which the education process is divided into presence study "face-to-face" and self-study (*eUser*, 2005). The National Centre of Distant Education coordinates the so-called "national net of distant education", grants accreditation to distance courses via ICT, and provides access to databases of experts and courses.

The increasing number of students and the limited space and personal capacities of the universities have been an important motivation in the development of combined education. While in the academic year 2001/2002 there were 219 514 university students, by the year 2004/2005 the number had already increased to 274 962; similarly, the number of university students of combined or distance studies increased from 38 157 in 2001/2002 to 52 739 in 2004/2005.^{48 49}

The universities are very well equipped with ICT. All of them are connected to the Internet and more than 90% of their computers have broadband connection.⁵⁰ Network technologies were developed based on their initiative. Before 1989 a group of specialists was formed in the IT (Information Technology) centre of the Czech Technical University and other universities. With a financial subsidy from the Ministry of Education, Youth and Sport, the network infrastructure was built and the availability of Internet services was increased. The network CESNET, which was launched in 1993, was later transformed into the network TEN-155 CZ interconnecting all universities, academic and other, and, above all, research workplaces in the Czech Republic.

For the future developments an indicator of graduates in math, science and technology graduates might be important. The percentage of students enrolled in these fields is slightly above the EU-15 average (30.3% compared to 26.9%), however, the number of graduates per 1 000 members of the population between the ages of 20 to 29 is significantly lower (7.4 compared to 13.6). (*Eurostat*)

1.2.4. Workplace

The Czech Republic traditionally has a high level of educational attainment. In the area of adult continuous education, the country is at a better position than most other New member states and, indeed, many of the old ones: Participation in company-provided training (42%) and the share of employers offering training (61%) are both above EU-15 averages (40%, resp. 54%). (*eUser*, 2005)

Intra-company education is systematically financed from the internal sources of the company. The increase of interest in this type of education can be primarily found among organizations and companies with stable economic positions, often in relation to the standards and habits of foreign companies.

Recently, above all larger companies have started to use eLearning courses in employee training. These companies usually use either eLearning courses with a general focus, such as language courses, ICT courses and courses on work security, or tailor-made courses through which the employees are informed about the new products and services of the company, etc. Companies participating in these types of training programs include Český Telecom (Czech Telecom), České dráhy (Czech Railways), Česká pošta (Czech Post), Česká komora daňových poradců (Czech Chamber of Tax Advisors) and McDonald's. In addition, eLearning solutions provide international companies with the opportunity to use the same educational system for employees in more than one country.

Based on the estimates of experts, eLearning courses are used by 70-80% of large enterprises and 10-20% of small enterprises. Many companies use the European Social Fund as a financial source for purchases of eLearning products and courses. (*Interviews with experts carried out as a part of this study*)

⁴⁸ Czech Statistical Office; Schools and Educational Institutions in the Academic Year 2004-2005 and Schools and Educational Institutions in the Academic Year 2001-2002

⁴⁹ Number of students at tertiary education level according to Eurostat: 260 044 in 2001; 318 858 in 2004.

⁵⁰ Ministry of Education, Youth and Sports; Report on Fulfilment of the Implementation Plan of the National Strategy for ICT in Education in 2005 and Financing Proposal after 2006

Regarding the ICT education of employees, the situation has been improving visibly. In 2004, on average 5.7% of employees attended an ICT training course, in comparison to 2.9% three years earlier. Among the sectors with the highest ratio of employees attending the courses are the financial intermediation sector (25.9%), the electricity, gas and water supply sector (13.6%) and the business services sector (10.4%).⁵¹

Table 2: Share of employees attending ICT related training courses (%)

	2001	2002	2003	2004
Small (10-49 employees)	1.8	2.5	3.4	2.3
Medium (50-249 employees)	2.2	2.6	4.7	4.6
Large (250+ employees)	3.8	3.9	7.8	8.3
Total	2.9	3.2	5.8	5.7

Source: Czech Statistical Office; Information Society in Figures 2005 – Czech Republic and World

Re-qualification courses are provided for the unemployed. Some of them are subsidized by the Ministry of Labour and Social Affairs. At each labour office there is an information centre where the list of re-qualification courses paid by the unemployed themselves and the list of re-qualification courses paid by the labour office are accessible. In 2005, approximately 32% of job applicants who had undertaken a re-qualification course took part in a course focusing on ICT usage.⁵²

I.2.5. Lifelong learning

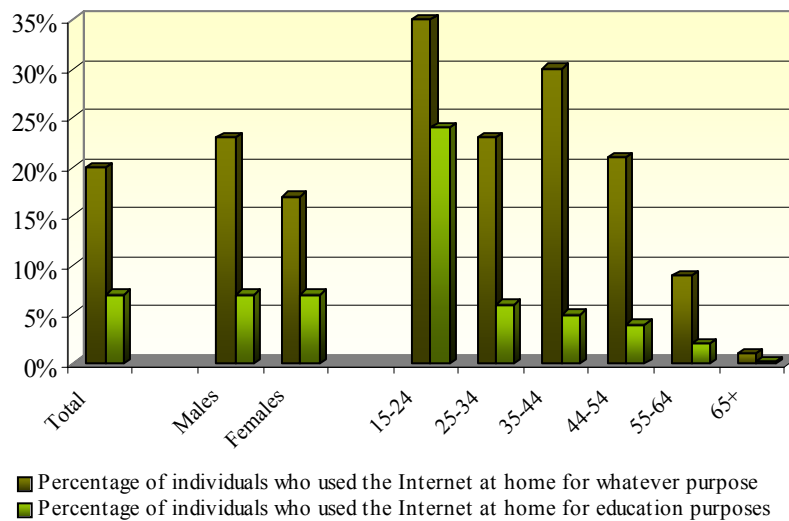
In comparison to workplace training, there is not much of a tradition of lifelong learning on topics that are not work-related. Overall participation in learning among adult working population currently stands at 6.3%, which is considerably below the EU-15 average (10.6%). One of the factors that hinders progress in the development of lifelong learning is the geographical inaccessibility of the courses to major parts of the population; courses are offered mainly in the bigger cities, which means the rural population has limited access to them. This situation is worsened by the fact that courses in urban locations cannot easily be attended by adult students from villages because public transport systems are not sufficiently developed. There is also a lack of mechanisms for quality assurance, accreditation, certification and other related aspects of adult education. (*eUser, 2005*)

As ICT skills are becoming an important aspect of basic knowledge and skills, eLearning is being used for educational purposes more often. Especially the usage of computers and Internet has started to become one of the important tools in lifelong education, as indicated e.g. by the Internet usage for purposes related to education in the Figure 19. There is a wide range of eLearning courses focused on different topics, ICT courses, Internet encyclopaedia, etc., provided to the broad public.

⁵¹ Czech Statistical Office; Information Society in Figures 2005 – Czech Republic and World

⁵² Ministry of Education, Youth and Sports; Report on Fulfilment of the Implementation Plan of the National Strategy for ICT in Education in 2005 and Financing Proposal after 2006

Figure 19: Internet usage for purposes related to education (% , 2004)



Source: Czech Statistical Office; Information Society in the Czech Republic: eEducation

While in 2003 9.8% of the population aged 15 and above attended an ICT training course, two years later the number was 12.2%. The courses were attended mostly by young people between the ages of 15 and 24.⁵³

As the importance of out-of-school lifelong learning increases, the role of other institutions, especially libraries, in the provision of access to information and knowledge grows as well. While in 2003, 28.1% of libraries provided public access to the Internet, in 2005 this indicator reached 48.4%. Similarly, in 2003, 76% of the population lived in a place where a library offered public Internet access, yet in 2005 it had already risen to 87%.⁵⁴

I.3. ICT skills and attitudes towards ICT usage

I.3.1. General attitude – main barriers

According to the policy document “The State Information and Communication Policy – e-Czech 2006”, the government perceives the following as the main barriers to the computers and the Internet usage in households:

- Insufficient incentives and low awareness of the potential of ICT
- Anxiety about the first, elementary steps and about alleged complexity and intricacy
- Low affordability of ICT products and services due to their relatively high price in comparison to the purchasing power of the population
- Limited opportunities to acquire and maintain information literacy

According to the research of the Ministry of Informatics carried out in 2005, the majority of people who do not have computer at home (70%) do not see any reason to use a computer. Furthermore, they usually consider the purchase of computers to be costly. More than one half of those people without an Internet connection at home (56%) attribute their lack of PC or Internet connection to high costs.⁵⁵

⁵³ Czech Statistical Office; Information Society in Figures 2005 – Czech Republic and World

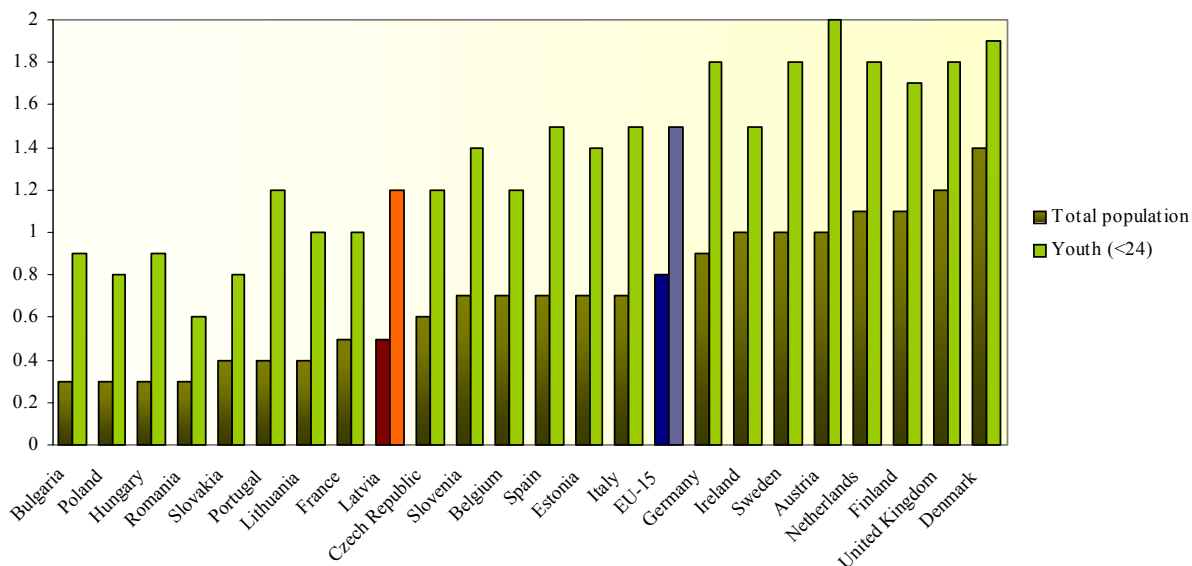
⁵⁴ Ministry of Education, Youth and Sports; Report on Fulfilment of the Implementation Plan of the National Strategy for ICT in Education in 2005 and Financing Proposal after 2006

⁵⁵ Ministry of Informatics, STEM/MARK; Research on Digital Literacy – presentation of main research results; 2005

I.3.2. Computer literacy

According to the comparable measure of digital literacy provided within the SIBIS project (Statistical Indicators Benchmarking the Information Society), the average Czech citizen is slightly less digitally literate than the average citizen of the EU-15. While the COQS index⁵⁶ for the Czech Republic equals 0.6, it reaches 0.8 in EU-15 countries (*SIBIS Pocket Book, 2002/2003*). Similarly, the index value for youth is slightly below the EU-15 average (see Figure 20).

Figure 20: Digital literacy COQS index value in the total population

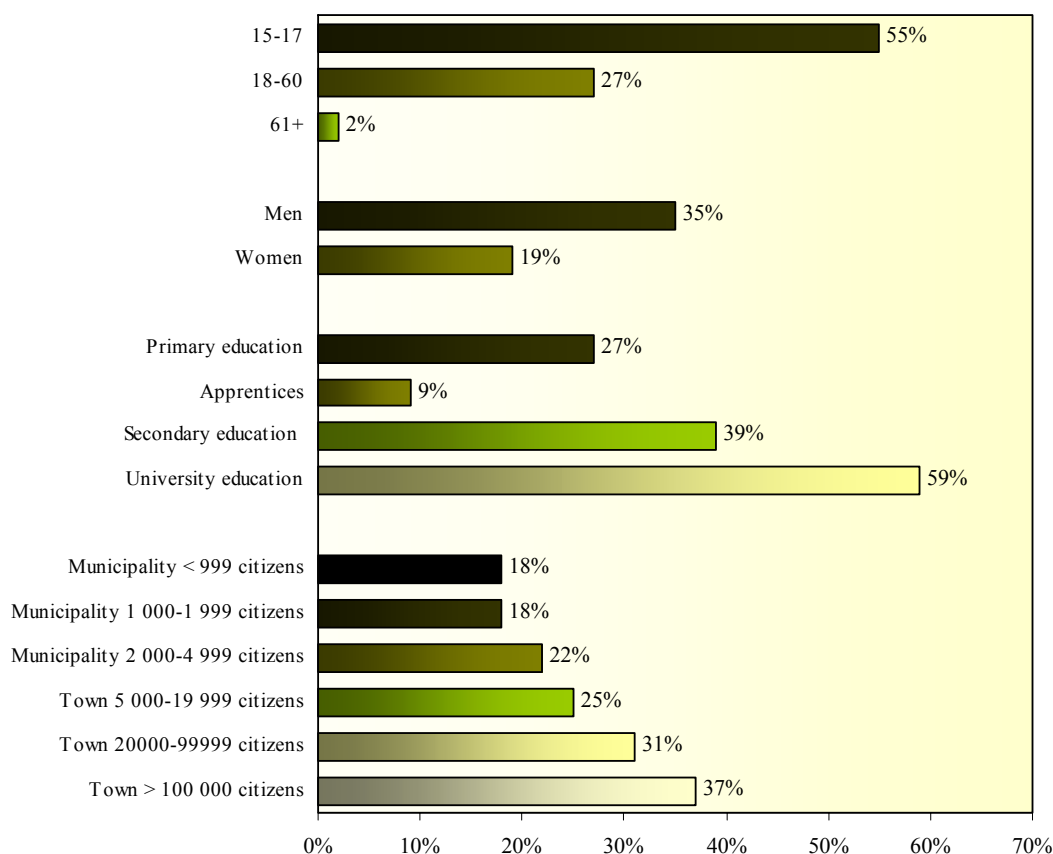


Source: SIBIS Pocket Book 2002/2003

Basic computer literacy in the Czech population older than 15 as measured by the research of the Ministry of Informatics reached 27% at the beginning of 2005. The People younger than 35 years old, people with higher education and people living in big cities had the best computer knowledge. Although 66% of the population declared that they were capable of using a computer, the research determined that only 27% could be regarded as computer literate. Basic computer literacy was defined as being not only the general skills necessary for computer usage, but also basic knowledge of text editors, spreadsheet editors, graphics and the Internet.

⁵⁶ The COQS index is a measure that combines four types of skills in using the Internet into an overall “digital literacy” score. The skills included are communicating with others, obtaining and installing software on a computer, questioning the source of information on the Internet and searching for the required information using search engines (*SIBIS Pocket Book, 2002/2003*).

Figure 21: Computer literacy of Czech population



Source: Ministry of Informatics, STEM/MARK; Research on Digital Literacy – presentation of main research results; 2005

Furthermore, there are significant differences in the level of computer literacy among professions. The lowest level of computer literacy – only 4% -- was identified within the group of unqualified workers. On the contrary, specialized professions such as lawyers (67%), university teachers (57%), policemen, firemen and soldiers (52%), or civil servants (45%) were far above the average percentage mark.

People use computers for information searching (76%), self-education (63%), music and movies (61%) and in work (53%). 31% of respondents make purchases through the Internet and 26% use e-banking services.

II. OVERVIEW OF E-LEARNING IN THE CZECH REPUBLIC

II.1. Institutional structures and resources for eLearning

II.1.1. Actors in eLearning - public institutions

Ministry of Education, Youth and Sports and schools of all levels

The ministry is one of the most important institutions with respect to eLearning in the public sphere since it is responsible for ICT education at **schools of all levels**. One of the responsibilities of the ministry is the implementation of the **National Strategy for ICT in Education** in schools of all levels. A specialized department of the Ministry of Education, Youth and Sports, “The National Strategy for ICT in Education,” was also established.

Ministry of Informatics

An institution with a high level of responsibility for the implementation of eLearning was the Ministry of Informatics. Based on an amendment to the Authorities Act, the Ministry of Informatics was established as of 1 January 2003 in order to take over former duties of the Office of Public Information Systems relating to telecommunications and information society, as well as the former duties of the Personal Data Protection Office relating to the electronic signature. Both institutions were dissolved after establishment of the Ministry of Informatics. The Ministry of Informatics was responsible for the coordination of information society development in the Czech Republic on the supranational and international levels. One of its responsibilities was to elaborate the State Information and Communications Policy, a government strategic document regarding information society. The approach of the ministry complied with the priorities of the European Union while reflecting the specific situation in the Czech Republic. However, after the change of the government in summer 2006, the ministry started to prepare itself to dissolution and its competencies reassigned to the Ministry of Interior.

The Broadband Forum was established within the National Broadband Access Policy as an advisory body to the Ministry of Informatics. Its members include representatives of service providers, end-users, experts from public administration and academia and independent individuals.

Ministry of Culture and libraries

The Ministry of Culture is the institution responsible for the development of ICT in **public libraries**. Libraries and other repositories should provide equal access to traditional and electronic information resources for education, research and development. ICT courses are provided for librarians within the “Public Information Services of Libraries” programme organized by the ministry. The information centres, which were built in the libraries, will also be used for the ICT education of selected groups of citizens, such as seniors, housewives, social minorities etc.

Ministry of Labour and Social Affairs and labour offices

Regarding the increase of employment, the long-term targets including ICT usage are worked out in the National Action Plan of Employment for 2004-2006, which was approved in July 2004 by the government. The programme of the ministry related to education is financed by the Active Employment Policy. As a part of the re-qualification courses, the Ministry is responsible also for preparation of ICT courses designed for those who are unemployed, which are facilitated by the **labour offices**.

Towns

Some towns have launched their own initiatives in the field of eLearning. Specific examples are Information Strategy of the City of Prague or the project Internet for the Elderly in Hradec Králové.

National Centre of Distance Education

The National Centre of Distance Education is a specialized department of the Centre for Higher Education Studies. The main activities of the National Centre of Distance Education are coordination

of the national network of distance education, support for the creation of distance and combined education programmes and courses, training of workers in the field of distance education and establishment and administration of information databases, especially the database of distance and combined studies at Czech universities. In 1999, the Centre published a guidebook of distance education entitled "Distance Studies in Questions". The guidebook provides an explanation of differences between distance education and other forms of education, information on multimedia tools, study methods, course organizations and basic terms used in the field of eLearning. Furthermore, the Centre organized National Conferences on Distance Education in the Czech Republic.

CESNET

CESNET is an association of legal entities set up in 1996 by all Czech universities and the Czech Academy of Sciences and is responsible for operation and development of the Czech NREN (National Research and Education Network).

II.1.2. Actors in eLearning - private institutions

Private companies providing eLearning products

There is a number of private companies that provide eLearning courses of different content. The biggest market share belongs to the companies Kontis and Trask Solutions.

Private companies operate projects like the database of eLearning courses (Czech Society for Human Resources Development) or Internet encyclopaedia (Optimus, s.r.o.). Furthermore, materials and exit and entrance exams are provided for pupils and students (SCIO).

Private companies cooperating on NPCL and re-qualification courses

Based on the PPP form of cooperation, in the private sphere there are many private companies cooperating with the Ministry of Informatics on the NPCL (National Programme for Computer Literacy), e.g. Unilevel, Proprio, Lyrax centrum, ISZOS International, ASI informační technologie, Computer Help, ČD-Telematika, etc. Other private companies cooperate with the Ministry of Labour and Social Affairs on the re-qualification courses related to ICT, e.g. the Re-qualification and Information Centre (Rekvalifikační a informační centrum), the Centre for Lifetime Education (Centrum celoživotního vzdělávání) and others.

Private companies cooperating on National Strategy for ICT in Education

Several private institutions, predominantly private schools, provide ICT courses within the framework of the National Strategy for ICT in Education, such as Euroschool Prague (Euroškola Praha), University of New York in Prague, the Business Academy (Podnikatelská akademie), the School of International and Public Relations in Prague (Škola mezinárodních a veřejných vztahů Praha), the Private Secondary School of Information Technology (Soukromá střední škola výpočetní techniky) and others.

Private companies active in eLearning employee training

Companies participating in these types of training programs include Český Telecom (Czech Telecom), České dráhy (Czech Railways), Česká pošta (Czech Post), Česká komora daňových poradců (Czech Chamber of Tax Advisors) or McDonald's.

CELN

CELN (Czech Efficient Learning Node) is a civic association established in September 2002 with the aim of supporting and developing eLearning education. The association was originally founded under the name Czech eLearning Network, which was then changed to CELN at the beginning of 2006. CELN activities are focused on the promotion of the effective use of information technologies, multimedia support and online content in frontal teaching both on the elementary and secondary school levels and the promotion of eLearning in the field of adult education and in the commercial sphere. In addition, CELN is a major applicant and partner in a number of the EU projects with the aim to involve its members and non-member educational institutions in the projects. There are approximately 171 schools of all levels included in the CELN projects.

School Informatics Staff Association

The School Informatics Staff Association is a civic association of pedagogues and other school ICT staff. The Association participates in preparation and organization of educational ICT courses that form a part of the National Strategy for ICT in Education.

Microsoft

As a part of the Microsoft programme Partners in Learning, a Memorandum of Understanding between Microsoft and the Ministry of Education, Youth and Sports was signed in 2004. Under the PPP scheme, Microsoft and the ministry would extend cooperation in the field of development of ICT infrastructure in Czech educational institutions.

Table 3: Actors in eLearning - summary

	Institution	Scope	Task areas	Level
Public	Ministry of Education, Youth and Sports	National	Policies	All levels
	<i>Schools</i>	<i>Local</i>	<i>Providing digital literacy and ICT supported education</i>	<i>All school levels</i>
	<i>Schools cooperating on NPCL</i>	<i>Local</i>	<i>Providing digital literacy education</i>	<i>Lifelong learning</i>
	Ministry of Informatics	National	Policies	Lifelong learning
	Ministry of Culture	National	Policies	Lifelong learning
	<i>Libraries</i>	<i>Regional</i>	<i>Access to electronic resources; providing digital literacy education for selected groups of citizens</i>	<i>Lifelong learning</i>
	Ministry of Labour and Social Affairs	National	Policies	Lifelong learning (unemployed)
	<i>Labour offices</i>	<i>Regional</i>	<i>Re-qualification courses (ICT)</i>	<i>Lifelong learning (unemployed)</i>
	Towns	Local	<i>Diverse (policy, providing digital literacy)</i>	<i>Lifelong learning,...</i>
	National Center of Distance Education	National	Coordination of the national network of distance education	Higher education
	CESNET	National	Operation of NREN	Higher education
Private	eL products providers	Local/regional	Providing eL products	All levels
	Companies cooperating on NPCL	Local/regional	Providing digital literacy education	Lifelong learning
	Companies cooperating on re-qualification courses	Local/regional	Providing digital literacy education	Lifelong learning (unemployed)
	Companies cooperating on National Strategy for Education	Local/regional	Providing digital literacy and ICT supported education to teachers	Primary and secondary schools teachers
	Companies active in eLearning employee training	Local/regional	Providing digital literacy and ICT supported education to employees	Workplace
	CELN	National	Support and development of eL education	Primary and secondary schools; lifelong learning

II.1.3. Resources and funding

Specific data related to the financing of eLearning services and ICT equipment is not available. In general, the private sector is perceived as a key source of funding for the development of information and communication technologies for educational purposes. The role of the government is to stimulate these investments and to create a stable environment for investors. Private sector investment naturally heads to industries where e.g. profits and growth of market and market share. are to be expected. Therefore, the state intends to create favourable legislative and non-legislative conditions to stimulate private investment in new technologies, especially in regions facing structural problems, regions with high unemployment, inexpedient population structure or transport difficulties.⁵⁷

⁵⁷ Government of the Czech Republic; State Communication and Information Policy, e-Czech 2006

Nevertheless, the **government** is responsible for financing the ICT equipment at schools of all levels and in public libraries. This financing constitutes a significant portion of the amount of resources going to information technologies. Teaching staff and managing and expert staff from public administration are trained in ICT courses. The government also supports ICT education through the National Programme for Computer Literacy. The programme is run through the cooperation between the public and private sector in the form of **public-private partnership (PPP)**. The government attaches great importance to the PPP financing scheme and has promised to actively seek and promote such programmes in the future.⁵⁸ Financing of public ICT infrastructure also depends on **the support of the private sector**, even though the extent of such support is not large. For example, Microsoft supports the deployment of IT in Czech educational institutions through its Partners in Learning programme. In 2002, the project “Educational Centre for the Further Education of Librarians in the Czech Republic” was financially supported by the Soros Open Society Foundation in the amount of CZK 2.8 million (EUR 91 000) dedicated to the equipment of centres.

Another significant source of financing comes from the **EU funds** within various ICT-programmes. To finance public projects (and public components of PPP), the state takes advantage of the Czech Republic’s membership in various EU programmes. In this respect there has been a certain gap so far and the government regards it as necessary to help also private entities to draw on those funds⁵⁹. In 2006, the Czech Republic was a member of the following EU programmes: the Sixth Framework Programme for Science and Research – IST (Information Society Technologies), eTEN, IDA (Interchange of Data between Administrations) and eContent. From 2007, eTEN and eContent will be integrated into the Competitiveness and Innovation Framework Programme (CIP), of which sub-programme ICT Policy Support Programme will be important in the development of eLearning. CIP will run in the period 2007-2013.

The **EU Structural Funds** are another means of financial support that will apparently play an increasing role in financing high-speed (broadband) Internet access in remote regions.⁶⁰ The European Commission has identified information society as a priority area for Structural Funds co-financing, with a strong emphasis on the demand for services and applications, including support of private sector demand and awareness of the benefits of ICT use and support of computer literacy.

In addition, a number of projects focused on the education of citizens in the field of information society issues are financed by the **ESF** (European Social Fund). The Operational Programme – Development of Human Resources for the period 2004-2006 - provides a basis for implementation of funding. The goal of the Programme is to reach a high and stable level of employment and one of the ways, how it intends to achieve this goal, is through the promotion of information society. The Ministry of Labour and Social Affairs is the body responsible for implementation of the Programme. Support of EUR 422.43 million was provided to applicants of the Programme, one quarter was financed from the state budget. (*European Social Fund in the Czech Republic*; <http://www.esfcr.cz>)

For the period 2007-2013, the Czech Republic prepares 24 operational programmes, which will be co-financed from the EU Structural Funds. The Programmes “Education” and “Human Resources and Employment”, both ESF-financed, will be the most relevant for the development of eLearning. The programme Human Resources and Employment will focus on re-qualifications and the Education on the Complex System of Lifelong Learning programme. Their financial sources have not yet been determined.⁶¹

⁵⁸ Government of the Czech Republic; State Communication and Information Policy, e-Czech 2006

⁵⁹ Government of the Czech Republic; State Communication and Information Policy, e-Czech 2006

⁶⁰ Government of the Czech Republic; State Communication and Information Policy, e-Czech 2006

⁶¹ Ministry for Regional Development of the Czech Republic; Draft of National Development Plan of the Czech Republic: 2007-2013; January 2006

II.2. Strategies, policies, action plans and projects

II.2.1. Public policies

The first comprehensive government policy relating to information society was the “State Information Policy – a Way towards an Information Society” approved in 1999. The issue of information literacy was later covered by a policy document entitled “Concept of the **National Strategy for ICT in Education**” approved by the government in April 2000, being under the authority of the Ministry of Education, Youth and Sports.

Later “**The State Information and Communication Policy – e-Czech 2006**” was adopted by the government in March 2004. This strategic document defines the objectives of the state in the field of information society and the area of telecommunications and formulates a new strategy for the period ending in 2006. Unlike in the previous approach, which adopted separate policies for both areas (in the documents “State Information Policy – a Way Towards Information Society” and “National Telecommunications Policy”), the Government decided to respect a general trend toward the convergence of both areas and to develop one common strategy and policy document. As an EU member state, the Czech Republic joined the European eEurope 2005 Action Plan. The State Information and Communication Policy therefore focuses primarily on elaborating goals and requirements of the Plan. The priorities of the eEurope 2005 Action Plan were reviewed in relation to the current situation in the Czech Republic.⁶²

In addition, the **Broadband Strategy of the Czech Republic** was approved by the government in January 2005. The Strategy describes in both domestic and international terms the significance of broadband Internet access and sets out phases for its future development in the Czech Republic as well as specific measures for its support. The “**Information Strategy of the City of Prague until 2010 – Way to e-Prague**”, which was approved by the City of Prague in 2005, is important regarding regional policies.

Table 4: Public policies - summary

Policy	Actors	Target group	Action	Timing
National Strategy for ICT in Education	Ministry of Education, Youth and Sports; Schools; Private companies	Teachers, students	ICT skills, ICT supported education, infrastructure	2001-2006 (continued?)
State Information and Communication Policy - e-Czech 2006	Government; Schools	Whole population	ICT skills, infrastructure	2004-2006
Broadband Strategy of the Czech Republic	Ministry of Informatics; Broadband Forum	Whole population, schools	Infrastructure (broadband for schools and libraries); Support of electronic services.	2005-2010
Information Strategy of the City of Prague up to 2010 – Way to e-Prague	Public administration; Schools	Prague citizens	Development of informatics in the city (rather eGovernment)	2005-2010

⁶² Government of the Czech Republic; State Communication and Information Policy, e-Czech 2006

II.2.1.1 National Strategy for ICT in Education (National Strategy for ICT in Education)⁶³

After the approval of the policy two Plans of Implementation of National Strategy for ICT in Education were subsequently issued in 2000 and 2001. The Concept is focused on integration of ICT into education on all levels and in all forms. Emphasis is put not only on students but on other aspects of lifelong learning as well. Improvement in digital literacy should be accessible not only to teaching staff and librarians but also to public administration staff, handicapped citizens (in terms of health, age, social status), citizens from lagging regions with a high level of unemployment and poor transport infrastructure and citizens from both productive and post-productive age groups.

Aims of the policy

The major aim of the policy is the extension of education of teaching staff and librarians, education of public administration and health care workers and citizens in general, equipment of all primary and secondary schools and libraries with ICT and Internet connection, etc. In the long-term, the Czech Republic should reach the same ratio of computers per teacher and computers per pupil and the same level of digital literacy as in the rest of the EU. This supports the general aim of creating an environment, which will prepare all citizens for effective ICT usage in all the areas of their activity.

Partial programmes

The above-mentioned key aims have been realized via four partial programmes:

- Information Literacy
- Educational Software and Information Resources
- IT Infrastructure
- Coordination Centre

Within the programme “Information Literacy,” the following ICT courses of different levels have been provided for the teaching staff: basic user skills, informed user training, specific skills training, the training of school computer network administrators and the education of school ICT coordinators and methodologists. Schools receive a subsidy for financing the ICT education of their teachers. The first two types or courses are provided through a network of almost 800 special training centres, which have also been proactively involved in the ICT education of the general public. The remaining three types of higher level courses have been provided by universities and commercial organizations.

Within the framework of the programme “Educational Software and Information Resources,” in 2001 the Ministry of Education purchased a multilicense for a number of educational programmes for every school, which were sent to the schools on demand. Since 2003, schools received an annual financial subsidy for the purchase of other educational software. Besides, the policy includes the development of educational applications, courses or smaller educational, methodological and information software. In 2003, an evaluation web was created in order to ensure the quality of such software. To register a piece of software on a list on this web, it must be first evaluated by reviewers and by the schools themselves.

Within the programme “IT infrastructure,” schools were equipped with ICT infrastructure and connection to the Internet. Since the middle of 2005, there has been a new model of providing ICT services in schools based on the responsibility of individual schools. Financial resources are distributed in the form of focussed subsidies per pupil at a level determined by the school type.

The “Coordination Centre” represented by about twenty independent ICT specialists is the conceptual, consultative and methodological body, which closely cooperates with the Ministry of Education.

⁶³ As the sources for this sub-chapter the following documents were used: Concept of National Strategy for ICT in Education, Plan of the First Stage of Implementation of National Strategy for ICT in Education, Plan of the Second Stage of Implementation of National Strategy for ICT in Education, National Strategy for ICT in Education in 2003 in Data – Infrastructure, Report on Fulfilment of Plan of National Strategy for ICT in Education Implementation until 31 December 2003, 2004 Report on Fulfilment of Plan of National Strategy for ICT in Education Implementation, Concept of Financing of Information and Communication Services in Schools after the year 2005 and Report on Fulfilment of the Implementation Plan of the National Strategy for ICT in Education in 2005 and Financing Proposal after 2006.

Budget

In 2005, the volume of the budget of the National Strategy for ICT in Education reached CZK 1.21 billion (EUR 40.6 million, 2005 average exchange rate). The total budget of the policy in 2001-2006 should reach CZK 7.31 billion (EUR 230 million, 2003 average exchange rate).

Table 5: Budget of the National Strategy for ICT in Education (EUR million, 2003 average exchange rate)

2001	2002	2003	2004	2005	2006	2001-2006
10.3	57.3	52.2	39.8	37.9	32.1	229.7

Source: Ministry of Education, Youth and Sports; Report on Fulfilment of the Implementation Plan of the National Strategy for ICT in Education in 2005 and Financing Proposal after 2006

For the years 2007-2010, the Ministry of Education, Youth and Sports proposed the annual budget of CZK 2 billion (EUR 67 million, 2005 exchange rate) for the financing of ICT services at schools. In June 2006, the material was submitted to the government; however, it was not discussed due to the elections.

Results achieved

The indicators of ICT equipment at schools of all levels significantly have improved.

Table 6: Average number of computers at particular school levels in 2002-2005

	Computers/100 pupils				Computers with connection/100 pupils				Computers with broadband/100 pupils			
	ISCED 1	ISCED 2	ISCED 3+4	ISCED 5B	ISCED 1	ISCED 2	ISCED 3+4	ISCED 5B	ISCED 1	ISCED 2	ISCED 3+4	ISCED 5B
2002	7.6	10.1	9.5	n.a.	5	7.8	7.6	n.a.	2.8	5.3	6.7	n.a.
2003	7.5	9.7	9.3	22.2	5.4	7.9	7.6	20.7	2.3	4.4	6	18
2004	9.6	10.7	11	23	7.1	8.9	9.6	20.9	3.2	4.7	7.8	18.3
2005	11.5	12.3	12.8	30	9.1	10.8	11.4	27.4	5.7	7.5	10	25.6

Source: Ministry of Education, Youth and Sports; Report on Fulfilment of the Implementation Plan of the National Strategy for ICT in Education in 2005 and Financing Proposal after 2006

ISCED 1 (International Standard Classification of Education) – primary education, ISCED 2 – lower secondary education, ISCED 3+4 – higher secondary and postsecondary non-tertiary education, ISCED 5B – tertiary education.

The planned number of teachers educated within the ICT courses was overreached for all five types of courses. At the end of 2005, there were 141 942 graduates of the “basic user skills” course, 101 080 of the “informed user training” course (89 778 graduates of optional modules) and 39 750 graduates of the remaining three types of higher level courses. In the academic year 2004/2005 the total number of trained pedagogues was approximately 200 000.

At the end of 2005 there were 486 educational software products registered on the evaluation web.

The aim, which was not fulfilled, was creation of the School Educational and Information Portal. The concept for its educational portion was not prepared.

On the other hand, an evaluation web was established where schools can choose eLearning products subsidised by the state. Each product is assessed by two independent reviewers. Basic information on each type of educational software and an expert view is provided. In September 2006, there were almost 2 500 items on the web, both freeware and commercial ones.

The resulting effects of the implementation of the **National Strategy for ICT in Education** are continuously monitored and assessed in annual reports issued by the Ministry of Education, Youth and Sport; the final assessment was completed by the end of 2005. The assessment is based on comparable indicators, such as the number of computers per 100 pupils, the number of connected computers, and others. The indicators are compared in time (to their historical level) and in space (for particular regions). Furthermore, the reports describe and assess the progress achieved in particular phases of the project. Finally, the overview of the usage of financial resources is provided in the report as well as the more detailed financial structure of each sub-project.

II.2.1.2 State Information and Communication Policy – e-Czech 2006⁶⁴

The State Information and Communication Policy elaborates the content and priorities of eEurope 2005 in the following four priority areas, fully covering the eEurope 2005 priority areas while taking into account the specific position of the Czech Republic. The following four priority areas of the State Information and Communications Policy are ranked by importance attached to them by the government:

- Affordable and secure communications services: issues pertaining to electronic communications market regulation and the enhancement of market competition, including the transposition of the new European electronic communications regulatory framework; in addition, the completion of the remaining tasks of the eEurope+ programme concerning the affordability of basic (so-called narrowband) as well as high-speed Internet services.
- Information literacy: primarily issues pertaining to the introduction of ICT to schools and of information literacy, eLearning and overcoming the digital divide.
- Modern online public services: online public services, above all eGovernment, eProcurement and eHealth services.
- Dynamic eBusiness environment: government measures primarily in the area of legislation.

The absence or lack of information literacy generates such a strong handicap for some citizen groups that it may result in population stratification, called the digital divide. The government defined the plan to actively prevent this from occurring by removing obstacles and supporting the opportunities of lifelong education relating to information literacy for broader population. In the field of information literacy, the government established the goal of extension of elementary computer literacy to at least a half of the population by the end of 2006. The basic instrument for the achievement of that goal is, apart from the systemic support of information literacy at schools of all levels, the extension of the information literacy to the adult part of the population through public courses.

In June 2006 the report on the fulfilment of the policy was released, where the relevant indicators were provided. Regarding information literacy, indicators of ICT equipment, Internet and broadband penetration at schools and improvement in the information literacy of pedagogical staff were made public. The aim of introduction of tax allowances on PCs and Internet connection for households was not achieved because of other priorities of the government.⁶⁵

II.2.1.3 Broadband Strategy⁶⁶

The Broadband Strategy, which was approved in 2005, is based on the current state of broadband and the current and future technological possibilities available. The proposal for broadband development takes into account requirements for countrywide access for all groups of the population, including support for rural and remote areas. It also includes basic principles for identifying cases that require financial support from EU structural funds or from other sources.

In May 2005, the Ministry of Informatics set up a Broadband Forum of experts as its advisory body. Its members include representatives from service providers, end-users, experts from public administration and academic circles and independent individuals. The Forum's main task is to further develop the strategy, to regularly draft up-dating proposals and to publish further recommendations for broadband development. It evaluates the content side of projects applying for co-financing under the Broadband Development Subsidy Title.

⁶⁴ As the main source for this sub-chapter the document of the government of the Czech Republic „State Communication and Information Policy, e-Czech 2006” was used.

⁶⁵ Ministry of Informatics; Report on the Fulfilment of the State Information and Communication Policy

⁶⁶ As the main source for this sub-chapter the document of the Ministry of Informatics „National Broadband Access Policy – Broadband strategy of the Czech Republic” was used.

Aims and measures of the policy

The government intends to aim its direct state support towards education, culture, healthcare and public administration electronic services. After a transitional period it then intends to support separate infrastructure projects, or metropolitan networks.

The government planned to connect all schools and public libraries with broadband access by the end of 2006. In support of the provision of access to documents on the national cultural heritage it will continue the digitalisation and subsequent opening of remote access to archives and collections of the National Library, the Museum of Czech Literature, the National Museum, National Gallery, etc. The government also intends to actively stimulate the demand for broadband access and services by using information literacy education and by supporting training activities aimed at increasing the information literacy and computer skills of all sections of the general public.

Financing

In accordance with the State Information and Communication Policy, the strategy regards direct financial support as being an extraordinary and transitional instrument. The majority of the costs for constructing new and modernising existing networks capable of providing broadband access shall come from private sector investment. At the same time, the relevant end-equipment will mostly be provided by the end-users themselves from their own resources. On the other hand, the government will support the development of broadband content and services by co-participating financially in projects at the level of public administration or non-profit organisations.

The Government is considering two possible sources of public budget financing for the direct support for projects of city and town networks or local distribution networks and projects supporting content and services:

- Structural Funds and other EU Instruments
- Broadband Development Subsidy Title - Government deposited 1% of the proceeds from the privatisation of the state share in Český Telecom a.s. for the Subsidy Title (approximately EUR 27 million).

II.2.1.4 Information Strategy of the City of Prague up to 2010 – Way to e-Prague⁶⁷

The strategy intends to develop informatics in the capital city up to the year 2010. Its aims include the creation of a productive and economical information and communication environment, the effective usage of city information, an increase in the number and quality of information services provided on-line, the maximum security of all information processed, simplification of the contact between citizens and city offices through the Internet, and others. In general, the strategy is focused more on eGovernment than on eLearning issues. It defined no specific indicators to be fulfilled.

An action plan was prepared as an inherent part of the strategy. The basic financing strategy of the Action plan intends to draw financial means from four major sources:

- The budget of the capital city of Prague, from which the whole-Prague programmes and projects and strategic management of the city informatics should be financed;
- The budgets of particular Prague districts, from which the projects related to particular offices should be financed;
- Public-private partnership projects;
- EU funds.

The Action plan defines two specific projects focused on increasing digital literacy. The project involving officer and expert worker training will run during the whole period of 2005-2010 and the costs of the project are expected to reach EUR 2.2 million. The second project is focused on

⁶⁷ As the main source for this sub-chapter the document of the City of Prague „Information Strategy of the City of Prague until 2010 – Way to e-Prague” was used.

information technology, digital literacy and Prague educational institutions and will run until the year 2008 and should cost EUR 1.5 million.

II.2.2. Public projects

The **state programmes focused on the support of digital literacy** of the general public include the National Programme for Computer Literacy and free ICT courses on the portal of public administration. There are a number of **university eLearning** projects. This report describes the project “Cooperation of universities at development of standardised multimedia educational tools” since the information on it is the most available. Furthermore, there are various **conferences and workshops** organized that contribute to the promotion of eLearning and the sharing of information related to the topic. As an example of the eLearning initiatives organized at the **regional level**, this study presents the Hradec Králové program promoting Internet for the elderly.

Table 7: Public projects - summary

Project	Actors	Target group	Action	Timing
National Programme for Computer Literacy	Ministry of Informatics; Schools; Private companies	Population without experience with ICT	ICT skills	2003-
eLearning courses on the portal of public administration	Ministry of Informatics; Private companies	Whole population	ICT skills	2005-
Projects of universities	Universities	University staff and students	ICT supported education, digital libraries	2001-2003 (eDilema) 2004-2006 (multimedia tools)
eLearning conferences and workshops	Universities; Private companies; National Center for Distance Education	eLearning experts	Information sharing	
Internet for the Elderly in Hradec Králové	Town of Hradec Králové; Schools	Seniors	ICT skills	2004-

II.2.2.1 State programmes supporting digital literacy

*National Programme for Computer Literacy*⁶⁸

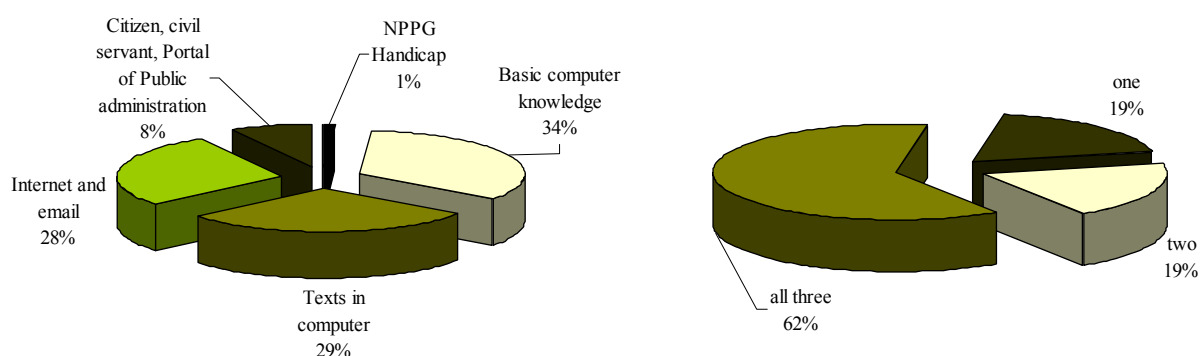
The National Programme for Computer Literacy was launched in 2003 for the population without any experience with ICT. In cooperation between the state, represented by the Ministry of Informatics, and the private sector, a large network of training centres was built -- above all in schools -- to hold courses for absolute computer beginners. Each year in autumn the subjects to operate the training centres are chosen in a tender. In the process of preparation and realization of the courses, there is an emphasis placed on high-quality content, regional availability of training centres, emphasizing the coverage of the whole Czech Republic, and time availability in afternoon and evening hours throughout the whole year.

The programme is designed for the broadest public and its aim is to equip trainees with basic computer and Internet knowledge and to help citizens overcome the fear of new technologies. Besides the basic courses (Basic PC knowledge, Texts in computer, Internet and email), there are two special courses – NPCL Handicap, designed for handicapped citizens, and the NPCL Portal of Public administration, which were both added into the programme in 2005. The course-books for all three basic courses are provided free of charge on the web page of the Ministry of Informatics in Adobe Acrobat format.

⁶⁸ The main sources for this sub-chapter were the web pages of the Ministry of Informatics on the National Programme for Computer Literacy <http://www.micr.cz/nppg.html> .

The programme is based on two-hour courses costing approximately EUR 3. The Ministry of Informatics provides a subsidy of CZK 417 (EUR 14) for each trainee. The subsidy covers a complete sequence of at least three two-hour lessons (minimum 4 people, maximum 12 people in the class). In 2006, the subsidy was given to 18 training centres providing NPCL courses at more than 200 places in the Czech Republic. In 2005, there were 7 subjects operating training centres at more than 200 places with the participation of 81 573 trainees. Since 2003, when the programme was launched, until June 2006 more than 190 000 people were trained within the programme programme.⁶⁹ 1 500 people were trained in NPCL Handicap. The age of the majority of the graduates of NPCL courses is above 40 years and the largest proportion of the trainees is in the age category 51 to 60 years. 62% of the participants were women. The most attended courses were “Basic computer knowledge” (34%), “Texts in computer” (29%) and “Internet and email” (28%).

Figure 22: Structure of NPCL courses in 2005 and number of completed courses in 2004



Source: Ministry of Informatics of the Czech Republic; <http://www.micr.cz/nppg.html>

eLearning courses on the portal of public administration

The Ministry of Informatics has prepared a set of eLearning courses accessible on the Portal of public administration <http://portal.gov.cz> free of charge. Registered users have access to seven ECDL (European Computer Driving Licence) courses, one course on the eDoceo system (module Student), a course on the Portal of public administration and a course on the electronic signature. The ECDL courses were prepared by the company Gopas and the eDoceo course by the company Trask solutions, which also participated in the development of the courses on the Portal of public administration and on the electronic signature. The content of the course was prepared by the Ministry of Informatics.

II.2.2.2 Universities' projects

eDilema project

The eDilema project (eResources and Distance Learning Management) ran between 2001 and 2003 and cost approximately EUR 130 000. It was funded by the EU Minerva Programme and its aim was to promote access to efficient methods and high quality educational resources as well as to promote access to the best practices in the field of eLearning. One of the tasks of eDilema was to develop DILLEO (Digital Library of Learning Objects), a repository for learning resources and related materials. The coordinator of the project was the University of Hradec Králové. Other participants were the Institute of Public Administration (Ireland), Leeds Metropolitan University (United Kingdom), the Bohemian-Moravian Society for Automation (Czech Republic), the EMWACGroup (Czech Republic) and the University of Economics (Slovak Republic).

Within the project, the study “On-Line Distance Learning Technology and E-Resources” established guidelines for teachers on how to prepare high quality and effective materials with minimum effort and time and prepared WebCT (Web Course Tools) training materials in Czech.

⁶⁹ Ministry of Informatics; Report on the Fulfilment of the State Information and Communication Policy

The motivation for building the digital library was the lack of digital learning materials available in Czech. Teachers and students lacked a repository where they could submit their materials, find related material, create new content, and collectively improve both the quantity and quality of digital teaching resources. Now, teachers can use learning objects accessible at DILLEO when preparing courses, seminars, presentations and tests. Students have the opportunity for the self-study of library learning materials. Before their addition to the library, all learning materials are reviewed. The DILLEO library was launched in 2003 at the University of Hradec Králové.

The cooperation of universities on the development of standardised multimedia educational tools

The project “Cooperation of universities at development of standardised multimedia educational tools” ran from April 2004 to December 2006. The project was implemented within the framework of the development and transformation programmes of the Ministry of Education, Youth and Sport. A long-term aim of the project was a significant cost reduction, higher quality of the creation of multimedia education tools and higher efficiency of the usage of these tools. The universities proposed their own development projects, but the priority objectives were common to all of them. The achievement of the aims of the project would make it possible to use the previously completed education resources again and to implement them in the education resources, both researches oriented and administrative, of other universities. Thus, both financial and human resources would be used more effectively.

Since the beginning of the project, its members were University of Ostrava, Silesian University in Opava and University of Hradec Králové. In 2005, the Czech Technical University in Prague, Charles University in Prague and West-Bohemian University in Plzeň joined the project. In addition, other universities have started to cooperate on the project as subcontractors.

The aims of the project were following:

- The further development and filling of distributed digital library of education institutions
- The further development and filling of a portal that provides summarized information on eLearning education
- The practical validation of multimedia education tools in education courses operated within LMS/LCMS (Learning Management System/Learning Content Management System)
- The systematization of quality control in the process of standardization of multimedia educational tools and the evaluation and accreditation of courses

In 2005, new goals directed towards stronger cooperation with foreign universities and using best practices were added. The establishment of specialized digital university libraries and their accessibility via the Internet was defined as the major aim of 2006.

So far, within the project the further technical development of the DILLEO library was undertaken and the data and functional analyses of the library were extended. The further development of the library was solved in accordance with the SCORM (Sharable Content Object Reference Model) standard.

Furthermore, a specialised eLearning workplace was established at the Silesian University in Opava. The department is responsible for eLearning operation in the faculties and for the provision of technical and organizational support to all participants of on-line education. In 2004, the Silesian University in Opava launched a combined form of studies that uses eLearning methods. In the first year there were 16 interactive courses available for students (e.g. Informatics, Microeconomics, Quantitative methods, English for professionals, etc.). Furthermore, the Silesian University in Opava established CMS (Content Management System) Moodle (Modular Object-Oriented Dynamic Learning Environment) portal, which is accessible via the Internet.

In 2005, the DILLEO library was installed at the University of Ostrava. In July 2005, in cooperation with the University of Ostrava, DILLEO was also installed at the Silesian University in Opava. At the Czech Technical University in Prague, DILLEO was installed to fit the needs of the Department of

Building Technology and thus provided a basis for a future library in the field of civil engineering. Furthermore, all three resorts of DILLEO library were interconnected.⁷⁰

In addition, the eLearning portal (<http://vsportal.osu.cz>) was established by the University of Ostrava. Furthermore, the participants of the project took part in a number of eLearning related events.⁷¹

All the universities participating in the project publish annually a final report summarizing the results achieved. The controllable results are provided together with the structure of financial resources used. In 2004, the budget within the project of the Silesian University in Opava was CZK 1.5 million (EUR 47 000), the budget of the University of Hradec Králové CZK was 1.4 million (EUR 44 000) and the budget of the University of Ostrava CZK was 2 million (EUR 63 000).

II.2.2.3 eLearning conferences and workshops

There are several eLearning conferences and workshops organized annually in the Czech Republic in which universities and commercial enterprises meet to share the information and their experience. The Czech Technical University in Prague organizes the conference **BELCOM** – Building Effective Learning Communities. In February 2006, the 6th conference took place with the main topic of “Cooperation of Universities on the Effective Creation and Usage of Educational Resources”. In 2005, the conference was focused on “Trends in eLearning” and the topic in 2004 was “eLearning in the Czech and Slovak Republic”.

Since 2000, the private company SEMIS, spol. s r.o. – Agency for education and enterprise advisory (SEMIS Ltd.), the Association of Management Trainers and Consultants (ATKM) and VOX agency (provider of courses, workshops and re-qualification) have cooperated on the organization of the annual conference **E-learning Forum**. The 2005 and 2006 conferences were organized by SEMIS and VOX only.

Furthermore, the University of Hradec Králové organizes an annual **eLearning competition**. In November 2005, the fifth competition took place. It was organized in cooperation with the association EUNIS-CZ (European University Information Systems), the National Centre of Distance Education, the Czech Technical University in Prague and the Ministry of Education, Youth and Sport. The aim of the competition was to introduce the best educational products based on information technology produced in the last two years. At the same time, the above-mentioned institutions organized the 6th **eLearning workshop** focused on the issues of eLearning efficiency and multimedia study support.

The National Centre of Distance Education organized three **National Conferences on Distance Education in the Czech Republic** in the years 1999, 2002 and 2004. In June 2006, the fourth conference took place.

II.2.2.4 Internet for the elderly in Hradec Králové

The town of Hradec Králové organizes the project Internet for the elderly. A similar project took place in 2002 in the town of Jihlava. During the 14-hour classes, the pensioners can acquire Internet knowledge from the primary school students. For each pensioner there is one “teacher” (i.e. student) and in the classroom there is also a professional teacher of informatics. The first courses in Hradec Králové took place in June 2004 and since then almost 500 pensioners participated. In the academic year 2004/2005, five primary schools took part in the project, and in 2005/2006 the number of schools increased to eight. (*Web pages of the town of Hradec Králové; <http://www.hradeckralove.org/>*)

⁷⁰ DILLEO is accessible at the Silesian University in Opava (<http://edu.opf.slu.cz/dilleo/>), the University of Ostrava (<http://dilleo.osu.cz/dilleo2/>) and the University of Hradec Králové (<https://e-dilema.uhk.cz/dilleo2/>).

⁷¹ In 2005, participants of the project presented a number of contributions at specialised workshops and conferences (University of Ostrava – 18, Silesian University in Opava –10, etc.). They participated for example in the following conferences: BELCOM 2005 (Building Effective Learning Communities), organized by the Czech Technical University in Prague, SCO 2005 (Sharable Content Object), DIVAI 2005 (Dištančné vzdelávanie - Aplikovaná informatika, Distance Education – Applied Informatics), eLearning for schools, ICTE 2005 (Information and Communication Technology in Education, organized by the University of Ostrava), VIRTUNIV (Virtual University), etc.

II.2.3. Private projects

There is a wide range of private companies dealing with the development of eLearning products and a number of companies use these products in the educational process of their employees. Out of them the project **Kontis for Schools** and the **case study of Český Telecom** were chosen for this study. **CELN** (Czech Efficient Learning Node) is a civic association established with the aim of support and development of eLearning form of education. It participates on several international eLearning projects.

Table 8: Private projects - summary

Project	Actors	Target group	Action
Kontis for schools	Private company Kontis	Schools	Infrastructure (software, LMS)
Virtual university of Český Telecom	Private company Český Telecom	Employees	ICT skills
CELN projects	CELN; Schools; Public administration	Network specialist, schools	ICT skills, ICT supported education

II.2.3.1 Kontis for Schools

The private company Kontis is a developer of tailor-made software and eLearning products and services. The company has prepared a program for schools named “Kontis for Schools”, which helps to improve the programme equipment in school environment. There are two components of the program “Kontis for Schools”:

- Licenses of LMS iTutor (most widely used eLearning platform in the Czech Republic), development tools Assistant or Instructor and finished courses provided at significantly reduced prices
- Cooperation on course development and eLearning projects

Financial contribution of “Kontis for Schools” programme to individual schools is as follows:

- Purchase of iTutor licenses with 60% discount
- Purchase of the development tool ToolBook II Instructor and Assistant licenses with a 30% discount and special multi-license price for the whole school
- Purchase of licenses for selected courses with a 60% discount
- Possible purchase of licenses for operating systems, database servers, web servers etc. under convenient conditions made possible through cooperation with Microsoft
- Free installation and introductory training for schools that have signed a contract within the Select program and purchased Kontis’ management or development products (iTutor, Instructor or Assistant)

II.2.3.2 Virtual University of Český Telecom

In 2000, the company Český Telecom decided to implement eLearning for the education of its employees. Based on criteria evaluation and pilot operation of the system, LMS Ingenium was chosen. The system language localization was undertaken and the system was integrated into the corporate intranet. In total the implementation phase took six months. A newly installed system was named Virtual University.

The courses of Managerial Academy (in total six online courses) were the first education courses implemented. Within the Virtual University, a wide range of courses is provided, e.g. courses for

drivers, courses on environment protection, adaptation courses, courses on new products and services of Český Telecom, etc. 35 000 man-days of learning were consumed by students of the Virtual University in 2003. Compared with an identical portion of lessons conducted in traditional classrooms a cost reduction worth approximately 40% was achieved.

Furthermore, Český Telecom offers its customers EDUportal with a set of customised on-line lessons or, alternatively, the opportunity to create one's own lessons. EDUportal uses the iTutor learning system. The EDUportal Content makes it possible for the customer to use eLearning contents and for the customer's employee to study its contents over the Internet. Regular reports on the customer's study progress are an integral part of the service. The customer buys yearly access to the desired courses. EDUportal Management offers the opportunity of maintaining and coordinating the learning process by the company.

II.2.3.3 CELN projects

Netacad – Cisco Networking Academy Program is based on a partnership between the private and public sphere, i.e. on the cooperation of the Cisco Systems company, educational institutions, public administration institutions and commercial subjects. The aim of the programme is to contribute to the professional preparation of network specialists. eLearning oriented education forms a part of the project. The Netacad programme was launched in 1997. In the Czech Republic it was introduced in 1999 at the meeting of CESNET association and the Czech Technical University in Prague, where the creation of the first regional academy was discussed. In 2001, the Cisco Systems company signed a memorandum on the cooperation and support of Netacad with the Ministry of Labour and Social Affairs. Subsequently, the programme was incorporated into the re-qualification system. However, currently, it is not used intensively (only in Most and Karviná region) since it is based on a two-year course, which is too long from the point of view of the labour offices. In 2002, Cisco Systems initiated the establishment of the CELN association. The association has started to support Netacad development and involve other partners and initiatives, which has led to the popularization of distance education. One part of Netacad is a system supporting what is called blended learning. The system combines online studies with face-to-face sessions. The educational Netacad process is divided into several phases. In each phase there is a set of courses oriented towards a specific topic.

The CELN association is also an exclusive distributor of **CITED** (Computer Interactive Test and Educational Device) in the Czech Republic. The CITED is an IT application designed for usage at elementary and secondary schools. It is a software for the preparation of customised tests, questionnaires and questions. For the teachers it provides measurable methods of revision and verification of pupils' knowledge and easier interaction with students. Furthermore, it saves time spent in preparation and evaluation of tests. For the students it provides an interactive form of learning.

CELN together with the company BINGS (Business Integration Systems) cooperates in the **O-learning project** (online learning). The aim of the project is to create an infrastructure prototype for the interactive study of foreign languages (and in the future other subjects as well) via voice-, picture- and data-transmission using a broadband connection. Students communicate with a native speaker via an interactive classroom, and thus do not need to meet at the same place. The motivation for the project is to provide an opportunity of language courses with a native speaker in the regions where it would otherwise be problematic to employ and accommodate such a teacher. Other important motivation factors are savings in time and finances in comparison to the currently accessible communication tools.

Together with Intel Czech Tradings, Inc. CELN is a partner of the project **“Effective Use of IT in Education – Education for Future”**. In ten modules (40 hours) the teachers learn how to incorporate ICT into education and how to use the Internet and design web pages and creative software to encourage students' creativity.

II.2.4. EU Projects

There is a number of eLearning projects implemented under the EU's initiative. For example, a relatively high proportion of Czech schools use the opportunity to cooperate with other European

schools within the **eTwinning** project, which is one of four action lines of the eLearning Programme - a programme for the effective integration of ICT in education and training systems in Europe (2004 – 2006). As an example of another action line “Virtual Campuses”, the project **EVENE** is presented in this study. Furthermore **other EU projects** have been implemented, for example, in cooperation with **CELN** or the **National Centre of Distance Education**.

Table 9: EU projects - summary

Project	Actors	Target group	Action
eTwinning	Schools	Teachers, students	ICT supported education, information sharing
EVENE	Universities	University students	Virtual student mobility
Integration of Handicapped Children into Frontal Education	CELN; Cross Czech, a.s.	Handicapped students	ICT supported education
Other: AtGentive, Blended Learning Academy, ELefANTS, eMapps, Phare projects			

II.2.4.1 eTwinning

eTwinning is the main action of the European Union's eLearning programme. It promotes the use of ICT at schools in Europe. Teachers and students use the Internet to work together across borders. They cooperate, exchange information and share learning materials. In the Czech Republic there were 798 schools registered in the programme in June 2006, which corresponds to 78.08 registered schools per million citizens. This indicator was higher only for Malta (293.02), Lithuania (148.02), Iceland (136.24), Cyprus (117.46) and Slovakia (79.85) (*Statistics of eTwinning Programme in the Czech Republic; 2006*). The National Support Service representing and promoting the eTwinning programme in the Czech Republic is the Centre for Higher Education Studies – the National Agency for EU Programmes. The centre organizes meetings and workshops on eTwinning. In August 2005, the national conference on eTwinning took place. More detailed information for teachers and schools interested is provided at www.etwinning.cz.

II.2.4.2 EVENE

EVENE (Erasmus Virtual Economics & Management Studies Exchange) is one of the projects of the eLearning initiative of the European Commission, which was awarded in 2005 in the category of Virtual Campuses. The coordinating administrator of the project is the Czech University of Tomáš Baťa in Zlín. The University of Hradec Králové and West-Bohemian University in Plzeň also participate. The project has been operating since March 2006, with the projected duration of two years and a budget of EUR 627 000.

The aim of EVENE is to create a core network of traditional European higher education institutions operating in the specialised field of Economics and Management studies able to effectively contribute to better quality of pan-European educational initiatives through virtual student mobility realised via distance study using an eLearning approach.

II.2.4.3 Cooperation with CELN

Furthermore, the CELN association is a partner dealing with ICT issues in a number of EU Projects. These are for example the Integration of Handicapped Children into Frontal Education, ATGentive (Attentive Agents for Collaborative Learners), the Blended Learning Academy for Network Specialists, ELefANTS (E-Learning for Acquiring New Types of Skills) and eMapps (<http://www.celn.cz>).

In August 2005, the project **Integration of Handicapped Children into Frontal Education** was approved by the Ministry of Education, Youth and Sport. The project is financed from the Human Resources Development Operational Programme and is run in cooperation with CELN and Cross

Czech a.s. The problem of interactive cooperation of the handicapped students is intended to be solved by a Multimice system. It is a completely new system that improves the quality of frontal education using the computer, projector and a set of mice. The handicapped students can operate the teacher's computer directly from their seat and interact with other students.

The major aim of the **AtGentive** project is to investigate possibilities of the use of artificial agents in monitoring attention of young and adult students in the context of individual or cooperative educational online environments. The project runs within the 6th Framework Programme for 2002-2006.

In cooperation with CELN, the secondary industrial school and vocational school in Třebíč obtained a subsidy from European Structural Funds and have started to implement the project „**Blended Learning Academy for Network Specialists**“. The commercial price of the Academy is CZK 15 000 (EUR 500) excluding VAT (Value Added Tax) for one semester. As established in the project, it will be provided free of charge for all applicants from public administration and educational institutions. Participants from commercial sphere are obliged to pay part of the costs. The Academy is based on the programme „Cisco Networking Academy“ and is authorised to distribute international certificates. The studies are divided into four semesters and take place from April 2006 till the end of 2007. The theoretical part of the studies is based on electronic forms of materials accessible via the Internet. The materials are created by the company Cisco Systems and are in English. The practical part of the studies will be held in Czech approximately twice a month. The whole project is designed for the target groups in the Vysočina region.

ELefANTS is a project that takes place within the framework of the Leonardo da Vinci programme. The project is operated by the Electro-technical faculty of the Czech Technical University and CELN is one of its partners. The major aim of ELefANTS is to help people from specific social groups to find new job possibilities via eLearning courses (Fundamentals of teleworking for disadvantaged persons and Teleinformatics in industrial automation) and to introduce developing communication technologies to them.

eMapps is a project of “Motivating Active Participation of Primary Schoolchildren in Digital Online Technologies for Creative Opportunities through Multimedia” and is operated within the 6th Framework Programme. The aim of the project is to build communities of creative, networking children in the new member states, generating their own cultural content and communicating with peer groups in other countries and to develop adaptable interactive tools (primarily games played on a mobile platform), which deliver learning objectives and which help to integrate the use of ICT into education (<http://www.emapps.com>). The project is focused on groups of creative children of the age between 9 and 12. In the Czech Republic, CrossCzech, a.s. is a project coordinator and CELN is a partner in the project.

II.2.4.4 Cooperation with National Centre of Distance Education

In the period 1996-1999, the Czech Republic took part in a Phare programme “**Multi-country Cooperation in Distance Education**”. Within this programme a basis for national network of distance education centres was created. At the beginning of 2000, there were four distance education centres in the cities of Prague, Brno, Olomouc and Liberec. All these centres were fully technically and personally equipped including information technology, a classroom with the Internet connection and a library with theoretical publications focused on distance education technology. The four centres and the National Centre of Distance Education, acting as the coordinator of the development of the network, are interconnected. The whole project was finished by the end of September 1999.

In 2002, the National Centre of Distance Education joined the implementation phase of **PHARE** (Poland and Hungary Assistance for Restructuring of Economies) **NUTS II projects**. These projects were financed from the Fund of Human Resources Development and from the state budget of the Czech Republic. The aim of the project “Kraj” (Region) was to establish a regional centre of lifelong learning in the Moravia-Silesia region. The project was run by the National Institute of Technical and Vocational Education. The National Centre of Distance Education cooperated on the implementation of education tutorials designed for project participants who afterwards worked out 24 distance

education programmes and courses. Since 2002, the National Centre of Distance Education has cooperated on another NUTS II project “Regional centre of technical lifelong learning at Technical University in Ostrava”. Again it participated in the implementation of educational courses for workers at a newly established centre and in training for future authors of 12 distance courses. Both projects finished in 2003.

II.3. The legal framework supporting eLearning

There is no specific legal framework in the field of eLearning in the Czech Republic. However, there are several acts dealing with education, electronic communication and information society issues in general, which are relevant also for eLearning.

Act n. 127/2005 Coll., on electronic communication came into force in May 2005 and replaced the Telecommunication Act from 2000. The new act transposed a new regulatory framework of the European Union into the Czech legislation. It changed the regulation rules for the market of standard telecommunication services and covered new electronic communication services. **Act n. 480/2004 Coll., on certain information society services and on the amendment of other acts** (Certain Information Society Services Act) came into force in September 2004. The act governs, in accordance with the law of the European Communities, the liability and rights and obligations of persons providing information society services and dissemination of commercial communications. According to the act, the provider is not responsible for the content of web pages and is not obliged to monitor the pages. However, he is obliged to withdraw the pages in case he is informed about illegality of the content.

For developers of new eLearning solutions the copyright issue is also important. **Act n. 121/2000 Coll., on copyright** came into force in April 2000. The act governs the rights of an author to his products. According to the act, there is a copyright also to a computer programme, which is original in a sense that it is the intellectual product of the author.

In 2000 the **Act n. 101/2000 Coll., on personal data protection** came into force. Consequences of the act include publishing of personal data, e.g. exam results, etc.

Education in general is covered by the acts on education, universities and libraries. **Act n. 561/2004 Coll., on education** governs preschool, primary, secondary, higher vocational and some other types of education at schools. In the act there are five forms of education defined. One of them is distance education defined as self-study carried out mainly or entirely through information technologies, eventually supplemented by individual consultations. Qualification requirements for teachers of all educational levels, except for higher education qualifications, are regulated by the **Act on Educational Staff**, which became effective as of January 2005. **Universities** are covered by the act n. 111/1998 Coll., with the last amendments in December 2005.

The basic legislative framework for teacher training is provided by the Higher Education Act of 1998, which handed over the responsibilities for the content and organisation of studies entirely to the individual universities. Each study programme has to be accredited. The Ministry of Education decides on the accreditation on the basis of a recommendation by the Accreditation Commission. The accreditation is granted for a limited period of time and a higher education institution has to apply for its renewal when it expires. The teaching qualifications of academic staff are not prescribed in the Higher Education Act, although universities usually organise courses in higher education pedagogy for new academic staff. (*Eurydice, 2006*)

Responsibility for the preparatory education of teachers for the **first stage of primary school** rests with faculties of education. The content and length of study is determined by the faculties of education themselves. It is at Master's level and lasts 4 or 5 years. Graduates are qualified to teach all subjects. The typical total length of training of future teachers is 9 years of primary school, 4 years of secondary school ending with a leaving examination, and 4 to 5 years of university education at a faculty of education, leading to a qualification at ISCED 5A level. Teachers of specific subjects at the **second stage of the primary school, at secondary schools and at conservatoires** are trained at faculties of education in five-year Master's studies, which are mostly concurrent. These teachers can also gain

their qualification at other faculties, e.g. of philosophy, of natural sciences, mathematics and physics, or at faculties of physical education and sports. The studies at these faculties can be both concurrent and consecutive, and are usually 5 years in duration. The content and length of study is determined by the faculties of education themselves. The typical total length of training of future teachers in concurrent studies is 9 years of primary school, 4 years of secondary school ending with a leaving examination, and from 4 to 5 years of Master's studies at a faculty of education. Pedagogical training of graduates from non-pedagogical fields of studies usually represents a further 3 years of Bachelor's studies or 2 years of studies on a life-long learning study programme. At the end of their studies, the teacher has a qualification at ISCED 5A level. Teachers are normally qualified in for two subjects. **Teachers of vocational subjects** study for Master's degrees at various types of universities (technical, economic, and agricultural, as well as medical and theological faculties). A further prerequisite is a teaching qualification, which may be either a Bachelor's degree in pedagogical sciences, or may be gained through studies of pedagogy within the framework of life long learning (in institutions for in-service training of educational staff). Their methodological studies are organised concurrently or more often consecutively. The typical total length of training of future vocational subject teachers includes 9 years of primary school, 4 years of secondary school ending with a leaving examination, and a 4 to 5 year Master's degree from an institution of higher education, or subsequent pedagogical training. (*Eurydice, 2006*)

The adoption of the Act on Educational Staff had the most crucial influence on the development of both working and salary conditions of teachers. The most heated **discussions** concern the application of the regulation about direct **educational activity over and above the required level** (known as above-load work); regulations about paid leave of absence for teachers' self-study; and finally, the **regulation on in-service training and career progression for teachers**. The latter in particular was the topic of discussions because the legislative provisions for in-service training and career progression of teachers were issued only in August 2005, and discussions concerning the way in which these changes would be implemented were under way. (*Eurydice, 2006*)

Act n. 257/2001 Coll., on libraries, governs a system of libraries providing public library and information services and conditions of their operation. The act defines public library and information services, among others, as well as access to external information sources, which are accessible for the library for free, using the telecommunication equipment. **Regulation n. 288/2002 Coll., on rules of subsidies for support of libraries** governs rules of subsidies on new technologies launched for ensuring public library and information services, subsidies on interconnection of the libraries within the network, subsidies on transformation of information sources into electronic form (i.e. development of digital library), etc.

Additionally, on 1 July 2006, a new **Act n. 411/2005 Coll., on traffic operations** came into force. According to the act the applicants for driving licenses take the exams exclusively in an electronic form. Until the end of May 2006, the Ministry of Transport ensured training of all affected civil servants and all 500 state examining commissioners. Furthermore, there are several compulsory trainings of employees regulated by the **Labour code**, e.g. work safety, first aid, training of drivers, etc. Recently, companies have started to use the opportunity of training their employees in these fields also in an electronic form.

A **system of accreditation and certification** not only for schools but also for commercial products would be beneficial. Mechanisms for quality assurance, accreditation, certification and other related aspects of adult education need to be put into place (*eUser, 2005*).

A **Programme of statistical research** for the consecutive year is published annually. According to the programme, the CSO (Czech Statistical Office) is obliged to gather data on ICT equipment in business sector. Gathering the data is based on questionnaires.

Furthermore there were some additional suggestions to the Concept of National Strategy for ICT in Education proposed to be incorporated into legislation that were not incorporated, for example, tax allowances on investments into ICT and activities related to the use of ICT for education or tax allowances for educational staff (teachers, pedagogues, lecturers, librarians) for ICT purchases and investments into self-learning in the field of ICT.

II.4. Dedicated ICT infrastructures and applications

Firstly, ICT infrastructure in schools is briefly described. Among specific ICT infrastructure, the **Czech NREN** (National Research and Education Network) should be mentioned. Furthermore, this study presents two examples of LMS used relatively intensively in the Czech Republic. The first one, **eDoceo**, is a **commercial** system developed by a Czech company and the second, **Moodle**, is probably the most used **open source** LMS in the Czech Republic.

II.4.1. Classroom infrastructure

Indicators of ICT equipment at schools were already provided in the sub-chapter I.2.2.

In the Czech schools, computers are usually used in the computer lab rather than directly in the classroom. While 90.7% of Czech schools use computer in a lab, in the EU-25 it is only 80.5%. The average for new member states is 94.6%. On the other hand only 47.6% of Czech schools use computers in a classroom, which is below the EU-25 average (61.4%) but significantly above the average of the New member states (29.5%). For more detailed information on infrastructure at different education level see the table below. (*Empirica; Benchmarking Access and Use of ICT in European Schools 2006*)

Table 10: Usage of PC in computer lab and in classroom (2006; % of schools)

	Primary schools	Lower secondary	Upper secondary	Vocational schools	Czech Republic	EU-25	NMS
PC in computer lab	86.5	96.7	99.4	100.0	90.7	80.5	94.6
PC in classroom	48.0	44.7	46.3	42.3	47.6	61.4	29.5

Source: Empirica; Benchmarking Access and Use of ICT in European Schools 2006

II.4.2. NREN network

CESNET, an association of legal entities, was established in 1996 by all universities in the Czech Republic and the Czech Academy of Sciences. One of its responsibilities is the operation and development of the Czech NREN.

CESNET2 is a national broadband computer network designed for science, research, development and education. Its backbone interconnects the largest Czech university towns. The network users are mainly universities, the Academy of Sciences of the Czech Republic, some secondary schools, hospitals and libraries.

The first DWDM line (Dense Wavelength Division Multiplexing) providing more than 10 Gbps channels was deployed in December 2004. One year later it has been enhanced to a DWDM backbone ring connecting Prague, Brno, Olomouc and Hradec Králové. Remaining core lines of the CESNET2 network are based on the mixture of Packet Over SONET (POS) and Gigabit Ethernet. It ensures a very high channel capacity, meaning that the bandwidth of all core lines operates in the scale of gigabits per second.

The network has the following independent international connections:

- 2.5 Gbps to GÉANT, used for academic traffic
- 800 Mbps to Telia, used for commodity traffic
- 10 Gbps to NetherLight for experimental traffic
- 1 Gbps to SANET (Slovak Academic Network)
- 1 Gbps to PIONIER, Polish optical academic network

The network provides multicasting capability and is a part of the MBone (Multicast Backbone) network. Videoconferencing services based on the MBone technology are offered to network users. IP version 6 is provided as a standard service. (<http://www.cesnet.cz>)

Figure 23: NREN topology valid since February 2006



Source: CESNET (<http://www.cesnet.cz>; 2006)

II.4.3. eDoceo LMS

LMS eDoceo is designed for the administration of electronic educational programmes and the administration of classical courses with e-learning support, otherwise known as blended learning. The first version of the system, called “e-výuka” (e-education), on which experts from IBM Czech Republic participated, changed the name to eDoceo. At present, the third version of the system already exists. It can be operated within a corporate network (Intranet) or through the Internet, including testing, scoring, monitoring of study results and certification of graduates. The system was developed in a Czech environment and works also in English and Slovak version. It is based on eLearning standards for the development of courses (SCORM - Sharable Content Object Reference Model and AICC - Aviation Industry Computer-Based Training Committee).

The company Trask solutions provide the three basic pillars of this system: LMS eDoceo system, Off-line Student application and a tool for the creation of the courses, Autor (“Author”). The system can be operated in the local network of corporate intranet, as a complement of a personal system and in the Internet network. LMS eDoceo is formed by five basic modules: Student, Manager, Administrator, Tutor and Pedagogue. (<http://www.edoceo.cz>)

At the beginning of 2006, the Ministry of Informatics chose LMS eDoceo and products of GOPAS company for the provision of eLearning courses to the general public at the portal of public administration.

The customers who have implemented eDoceo system come from almost all economic sectors:

- Banks, insurance companies and financial institutions: HVB Bank Czech Republic (2004, LMS eDoceo is used within the human resources projects, above all for the education of employees in the field of work security and internal compliance processes), GE Capital Bank (2003), Kooperativa (2002), etc.
- Public and state administration: the Research Institute of Work Security (2002), the Ministry of Health (2004, LMS eDoceo used for two eLearning courses, which were developed within Phare project “Strengthening the Capacity of the Public Health Administration”, also used as a tool for ECDL courses), Czech Social Security Administration (2001), etc.

- Industrial enterprises: Česká rafinérská (2003, petrochemical industry, education of employees in the field of own regulations and directives, work security, digital literacy and managerial skills), Škoda Auto (2004, the largest passenger car producer in Central Europe, eDoceo is used for the internal education of employees, at training colleges and universities), PLEAS (2004-2005, textile company), etc.
- Universities and secondary schools: the University of Economics in Prague (2001, LMS eDoceo is used as a platform for distance education, as a complement for all the students and also for students of the third age university. Currently there are approximately 3 000 users of the system), University of Pardubice (2004, system used as an education platform for 5 000 students), J.A. Purkyně University in Ústí nad Labem (2002), etc.

II.4.4. Moodle

Moodle is a software package for producing internet-based courses and web sites and is provided for free as the open-source software. The word Moodle was originally an acronym for Modular Object-Oriented Dynamic Learning Environment. (<http://moodle.org>)

In the Czech Republic, a number of secondary schools, grammar schools and universities use Moodle as a basis for their offer of eLearning courses. It seems that Moodle has become the most frequently used open source LMS; for example, it is used by the philosophical and pedagogical faculties of the Masaryk University in Brno, by the Faculty of Mathematics and Physics of the Charles University in Prague, by the Silesian University in Opava, and others (Kopecký, 2006).

II.5. eLearning services

II.5.1. Public eLearning services

Public eLearning services, which were already mentioned above, can be depicted in the following structure, based on their target group:

- Pupils: services at schools
- Students: services at universities
- Teaching staff and librarians
- Unemployed: re-qualification courses
- General public: digital literacy courses

ICT courses from basic to advanced levels are run at **primary and secondary schools**. Various types of multimedia instruments are used in the classes of different subjects. The teaching software is used predominantly in natural sciences and language classes. A few primary schools and a number of secondary and grammar schools use the Moodle system to organize their own online courses, courses developed within the National Strategy for ICT in Education, or as an environment for passing information on students.⁷² Furthermore, on the Internet, students can find many materials and online tools focused on preparation for school exit exams and university entrance exams.

In the field of education, eLearning services are the most developed at **universities**. A number of universities provide a combined form of studies based partially on eLearning solutions. Some university faculties use **Moodle LMS**, others have developed their **own LMS**⁷³ or have decided to use a **commercial LMS**.⁷⁴ Furthermore, the eLearning conference BELCOM is organized annually by the

⁷² These schools are for example primary school Šromotovo (www.srom.hranet.cz/moodle), grammar school of Karel Čapek in Dobříš (<http://moodle.gymkc.cz>), secondary industrial school in Uherské Hradiště (www.spsuh.cz/moodle) and secondary electro-technical school in Pardubice (<http://moodle.spse.cz>).

⁷³ LMS Barborka was developed at the University of Ostrava, LMS eAMOS at the South-Bohemian University. (Kopecký, 2006)

⁷⁴ The Faculty of Mathematics and Physics of the Charles University in Prague, West-Bohemian University in Plzeň and other faculties and universities use EDEN LMS, which was developed by the company RENTEL a.s. In addition, the University of Economics in Prague, the University in Pardubice and the University of J.E. Purkyně in Ústí nad Labem

Czech Technical University in Prague and the eLearning competition and eLearning workshop by the University of Hradec Králové.

Within the National Strategy for ICT in Education there are five types of courses provided for the teaching staff – courses of the type Z, P, S, N and M. Z training provides training in basic competences. Participants learn to use the computer for their day-to-day activities. P training consists of three modules (an initial one plus two elective modules; each module represents 30 training hours). Having passed the initial module, each teacher selects two of 22 offered elective modules. These are typically focused on the use of ICT in education on a specific subject. Participants finish each module by a presentation about a project. S training is intended for those teachers who are interested in the further development of their professional qualification in a specific area of ICT. Schools have an opportunity to utilise the subsidies for financing ICT educational activities, which are accredited by the Ministry of Education, Youth and Sports. N training is designed for those who act as school computer network administrators. M training is realized in the extent of 250 hours at minimum, typically in the form of a post-graduate course. Its graduates are able to coordinate the use of ICT in the school and to provide colleagues with methodology guidance and support.⁷⁵

There are several types of courses for **librarians** focused on acquiring basic ICT knowledge and skills. Some of them provide education in library web-page development. The courses are run under the programme of the Ministry of Culture “Public information services of the libraries”, particularly under its sub-programme “Out-of-school education of librarians”. The information centres, which were built in libraries, will also be used for ICT education of selected groups of citizens, including seniors, housewives, and social minorities.

Re-qualification courses are provided for the **unemployed**. Some of them are subsidized by the Ministry of Labour and Social Affairs. At each labour office there is an information centre where the list of re-qualification courses paid by the unemployed themselves and the list of re-qualification courses paid by the labour office are accessible. The lists of some labour offices can be also found on an integrated portal of the Ministry of Labour and Social Affairs <http://portal.mpsv.cz>. The ministry puts emphasis on education of handicapped citizens (both physically and socially), the education of the elderly and education of people in endangered regions, meaning those regions with a high level of unemployment and a complicated transport situation. Among the subsidized courses there are several focused on acquiring ICT knowledge, e.g. ICT courses based on ECDL syllabus, courses of the Internet, courses on web pages creation, courses for blind or sight handicapped people, etc. In 2005, approximately 32% of job applicants who had undertaken a re-qualification course took part in a course focusing on ICT usage.⁷⁶

For the **general public**, the state, in order to support digital literacy, provides subsidised courses within the National Programme for Computer Literacy and free eLearning courses on the portal of public administration.

Furthermore, there are two **eLearning information portals** providing overview information, such as definitions, news and references, on eLearning: <http://elearning.cesnet.cz> and <http://vsportal.osu.cz>. Both of them are in the stage of development; however the idea to create a place where an overview of eLearning would be accessible and the launch of the portals has been a positive step forward in the development of eLearning services.

II.5.2. Private eLearning services

Private eLearning services are used mainly at the workplace and in lifelong learning. However, as mentioned above, public institutions also use commercial eLearning tools and solutions.

use eDoceo LMS; the University of Ostrava and the Silesian University in Opava use iTutor developed by Kontis s.r.o. (Kopecký, 2006)

⁷⁵ Ministry of Education, Youth and Sports; National Strategy for ICT in Education – Brief Overview; 2005

⁷⁶ Ministry of Education, Youth and Sports; Report on Fulfilment of the Implementation Plan of the National Strategy for ICT in Education in 2005 and Financing Proposal after 2006

Recently, many larger companies have started to use eLearning courses in the training of their employees. The companies usually use eLearning courses with a general focus, such as language courses, ICT courses and courses on work security, or tailor-made courses through which the employees are informed about the new products and services of the company.

The biggest players on the Czech market in eLearning products are **Kontis**, which offers iTutor LMS, and **Trask solutions**, which offers eDoceo LMS. Both companies work on a commercial basis and only in exceptional situations use financial resources from European funds or grant projects. Another important player is the company **Rentel**, which provides EDEN LMS and cooperates with the majority of ministries and municipal governments. (Kopecký, 2006)

Kontis Ltd. has been operating in the field of development, integration and supplies of information systems since 1994. The company provides a wide range of eLearning products and services in the development of made-to-order software, including outsourcing. It is Czech-owned and has an annual turnover of approximately EUR 1 million. iTutor is the most widespread eLearning platform in the Czech Republic – it has approximately 70% of the market (www.kontis.cz). The system is used in banks, insurance companies, telecommunication and energy companies, manufacturing concerns and at schools and universities. So far there have been more than 300 000 user licences of iTutor system delivered in the corporate sphere, which is the highest number of delivered licenses in the Czech Republic.

The company Trask solutions s.r.o. (Trask solutions Ltd.) was established in 1994 and focuses on the areas of integration of corporate processes, software development, IT infrastructure and automation and business solutions. The company is Czech-owned and has an annual turnover of approximately EUR 2.5 million. In the field of eLearning, its product eDoceo LMS is used by a number of private companies.

Furthermore, on the web page <http://www.ella.cz> (Centre for the Creation of Electronic Courses), courses for future workers in the field of eLearning are provided, e.g. Introduction to Electronic Education, eDesign (the creation of future eLearning courses), Legal aspects of eLearning and Practical aspects of eLearning. The server also publishes the newest articles on eLearning and basic information on eLearning, including an explanation of key terms and summary of advantages and disadvantages of eLearning, among others.

In addition, there are many web pages that provide access to information related to eLearning, as well as information of different subjects. For example, eLearning courses can also be found in a specialised database and an encyclopaedia CoJeCo, which is of a wiki type. SCIO is one of the servers focused on students preparing themselves for leaving exams and university entrance examination.

II.5.2.1 Internet resources

eLabyrinth – Database of eLearning courses

In 2003, the Czech Society for Human Resources Development launched the eLabyrinth project. eLabyrinth is a web portal that includes a database of eLearning courses (<http://www.elabyrinth.cz>). The major aim of eLabyrinth is to create a central place that gathers electronic courses in Czech, to save time when searching for the courses and to provide basic information on courses and their suppliers.

The users can search for eLearning courses within the database, contact suppliers and order the selected courses. The suppliers of eLearning courses can also register and make their courses public; furthermore, they can add a link to demo-versions of their courses and find out the statistics on the visit rate. In 2003, eLearning courses were registered within the pilot operation period free of charge, and since 2004, the registration fee for each course has been CZK 1 000 (EUR 31).

There are three methods of searching for eLearning courses. The users can search in the list of all courses or in the list of suppliers. The third possibility is to search for courses based on their particular category. The categories available for searching are: time period of access (3 months – unlimited), field (work security, languages, EU, accounting, management, marketing, etc.), price, target group (employees, system administrators, children, managers, etc.), language of the application (Czech, English, French, German, Spanish, Italian), type (only eLearning, eLearning with workshop,

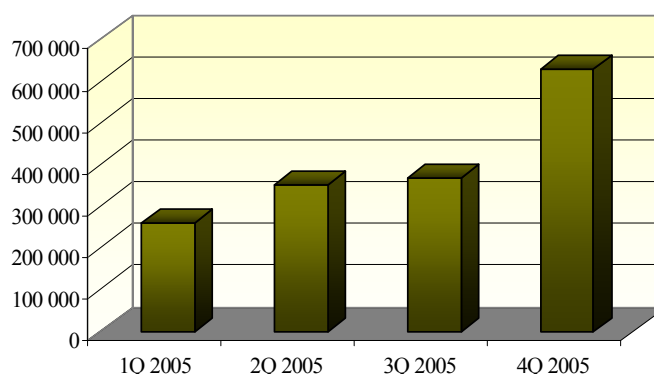
eLearning with personal course), level (elementary, advanced, professional) and technologies used (CD-ROM, Internet, Intranet).

Internet encyclopaedia CoJeCo (WhatIsWhat)

CoJeCo is a project that has formed a general Internet encyclopaedia with information in the form of text, picture, sound or Internet links. All the information is provided free of charge. Besides searching for information, the users can also contribute to the development of the encyclopaedia by sending their photographs or sound records to be included in the encyclopaedia. The project is operated by the private company Optimus s.r.o. (Optimus Ltd.).

The visit rate of the CoJeCo encyclopaedia has been increasing steadily since the time it was launched in March 2000 and in the last quarter of 2005 the total number of visits exceeded 600 000 visits. 67% of all the users were men and 76% were people with secondary or tertiary education. In contrast to other Internet projects, also people older than 40 years (39%) search intensively for information using the encyclopaedia (<http://www.cojeco.cz>).

Figure 24: Internet encyclopaedia – number of visits



Source: www.cojeco.cz

SCIO server

On the Internet, students can find many materials and online eLearning tools as a complement to their studies. For example, the server <http://www.skolazaskolou.cz> (“the school past school”) focuses on the daily preparation of the students and offers paid service packages with or without the possibility of consultations with a tutor. Other servers provide preparation for school exit exams and university entrance exams. Prepared answers on questions from school exit exams can be found for example on the server <http://vysokeskoly.cz> (“universities”) or <http://maturita.cz> (“leaving exam”). Furthermore, the students can participate in a sample university entrance examination on <http://superstudent.cz>.

One of the servers for students preparing themselves for exit and entrance exams is the SCIO server (<http://scio.cz>). The provided tests make it possible for the students to compare their results with other students. On the server, students can find a database of universities (the basic level is free of charge) and paid online tests from all secondary school subjects. Furthermore, students can purchase eLearning courses in mathematics, Czech language, civics, legal logics and biology. In these courses, there is a tutor at disposal who provides online answers to students’ questions.

The SCIO company has been active in the field of education since 1996. One of the most important activities of SCIO is the cooperation with secondary schools and universities on preparation for entrance examinations. In 2005, 30 000 students participated in entrance examinations at secondary schools prepared by SCIO. The company either completely organizes or delivers tests for the entrance examination of 11 faculties of different universities.

II.5.3. Accreditation techniques

As the basis for an evaluation of the skills and knowledge related to computer literacy, the ECDL (European Computer Driving Licence) certification system is used. It allows objective evaluation of these skills. The ECDL is an end-user computer skills certification programme. It is internationally recognized as a global benchmark. In the Czech Republic, the Czech Society for Cybernetics and Informatics is responsible for the quality of ECDL testing, the issuance of ECDL certificates and allocation of testing centres' licenses. In 2005, there were 27 653 people tested and 1 677 ECDL Start certificates and 1 834 ECDL Komplet certificates were awarded.⁷⁷

Another example of certificates are the worldwide accepted Cisco Systems exams available for the graduates of the Cisco Networking Academy Program. Graduates of the National Programme for Computer Literacy receive a certificate with confirmation of their participation.

II.6. Specific issues and solutions

At **primary and secondary schools**, the number of ICT equipment is still below the EU average. However, there has been a clearly positive trend of improvement in this respect. In addition, some schools provide educational materials on the Internet. Also, the percentage of teaching staff trained to use ICT in classes has increased. The usage of multimedia tools in education seems to have broadened in a majority of subjects. Unfortunately, there are no statistical data supporting this view.

There are several public policies focused on possible ways how to solve the lack of ICT equipment and low level of usage of eLearning solutions at schools. Under the responsibility of the Ministry of Education, Youth and Sport, the National Strategy for ICT in Education is primarily focused on the integration of ICT into education, more specifically it targets the training of teaching staff and the improvement of ICT equipment. The policy defined a basic minimum standard to be reached in this area. Additionally, the State Information and Communication Policy – e-Czech 2006 supports this effort. One of its aims is to better equip schools with ICT equipment and to connect all educational institutions to the Internet.

The usage of eLearning solutions is most common at the **university level**. However, particular universities do not intensively cooperate in this respect, meaning that they do not support each other in implementation of eLearning and do not exchange their educational content (*Kopecký, 2006*). Furthermore, there are significant differences between particular universities; some are strongly focused on eLearning implementation, whereas others use eLearning solutions only rarely. Nevertheless, the attitude of some universities to eLearning improved when they joined the project “Cooperation of universities at development of standardised multimedia educational tools”. The aim of the project is a significant cost reduction and creation of higher quality multimedia education tools and a higher usage efficiency of these tools. Achievement of the aims of the project will make it possible to reuse the already completed education resources and to implement them in other universities.

Regarding eLearning at the **workplace**, eLearning solutions have been used mainly by large and financially sound companies, but its use has been spreading (*interviews with experts carried out as a part of this study*). Also in **lifelong learning** the use of ICT including eLearning solutions has been increasing,⁷⁸ however, the tools elaborated in the public policies which were targeted to facilitate the demand for eLearning services have not been implemented. These include tax relief on expenditures for the purposes of self-learning and ICT equipment.⁷⁹

Insufficient language knowledge can form a barrier in eLearning usage. Nevertheless, a number of ICT and eLearning solutions are also available in Czech version and also the average knowledge of English language has been increasing significantly in the recent years. Since usually students choose English language as their first foreign language to be learnt, the language barrier might persist mainly

⁷⁷ Ministry of Education, Youth and Sports; Report on Fulfilment of the Implementation Plan of the National Strategy for ICT in Education in 2005 and Financing Proposal after 2006

⁷⁸ Czech Statistical Office; Results of ICT Usage Survey in Czech Households and among Individuals 2005

⁷⁹ Government of the Czech Republic; State Communication and Information Policy, e-Czech 2006

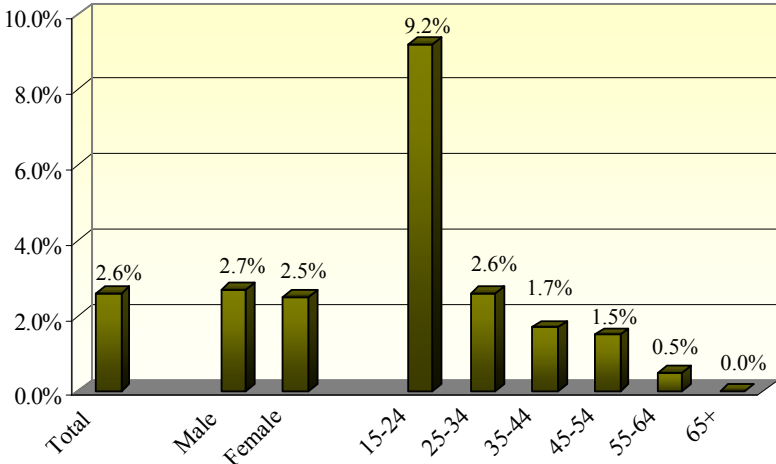
for the older generations. In 2004, 32.7% of pupils at primary schools and 75.8% of students at secondary schools were learning English as a foreign language (*Eurostat*).

II.7. Acceptance and usage of eLearning services

The usage of information and communication technologies has become more common and frequent, both in households and at schools or the workplace. Generally, as the structure of the economy changes and the portion of services on GDP increases, the demand for eLearning increases, as well. However, this development and trend can be hardly supported by statistical data focused directly on the demand for eLearning. Available data for the equipment of schools, households and enterprises by personal computers and Internet connection can be used as an approximation. Also, particular cases of eLearning solutions (e.g. at workplace) indicate a positive trend.

Furthermore, the data on the proportion of individuals who use the Internet for educational purposes are available.⁸⁰ Although it cannot be compared with historical levels, as the data are not available it does indicate the differences in attitude towards this form of education among particular age groups. There are significant differences in the perception of ICT in society. Generally, ICT solutions in education are perceived as useful, helpful and easily operable primarily by the younger generation. There is no significant difference in the usage of the Internet for educational purposes between men and women.

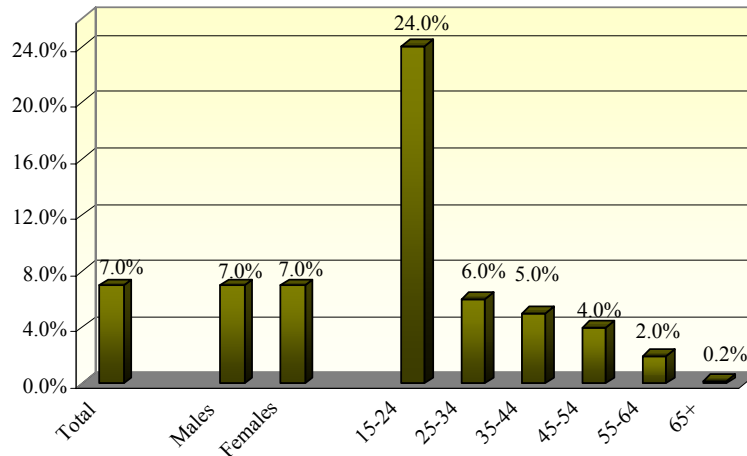
Figure 25: Percentage of individuals who used the Internet for activities related to training and education (completing a training or course) in the 4th quarter 2004



Source: Czech Statistical Office; Information Society in the Czech Republic: eEducation

⁸⁰ Czech Statistical Office; Information Society in the Czech Republic: eEducation; 2005

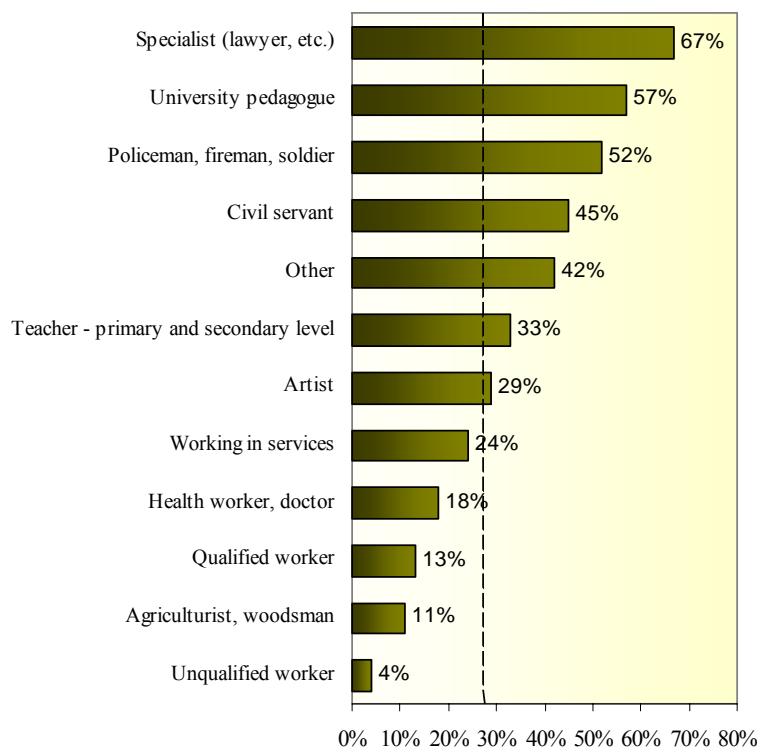
Figure 26: Percentage of individuals who used the Internet at home for purposes related to education in the 4th quarter 2004



Source: Czech Statistical Office; Information Society in the Czech Republic: eEducation

The age criterion is not the only one influencing the differences in ICT usage in society. There are differences between particular regions, between towns and smaller municipalities and naturally between employees in different fields of the economy and of different levels of education. The highest demand for eLearning services is in big towns and comes from people with a higher level of education, mainly from specialists, university professors, civil servants, etc.

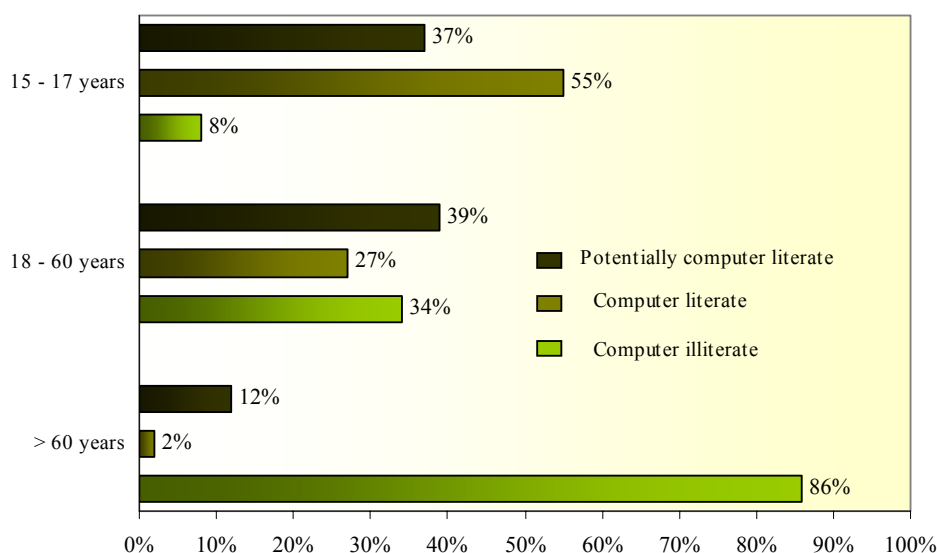
Figure 27: Basic computer literacy according to profession



Source: Ministry of Informatics, STEM/MARK; Research on Digital Literacy – presentation of main research results; 2005

On a positive note, a relatively high proportion of the population that does not fulfil criteria for computer literacy will with a high probability become computer literate in the future (see Figure 28). For more information on different perceptions of ICT, main barriers to its usage and differences in computer literacy based on various criteria, see also chapter I.3.

Figure 28: Basic computer literacy - potential⁸¹



Source: Ministry of Informatics, STEM/MARK; Research on Digital Literacy – presentation of main research results; 2005

The Internet as a source of information is regularly or occasionally used by 92.6% of students of public universities and 96% of students of private universities.⁸²

In 2006, almost 80% of teachers used PC in education process, which is slightly above the EU-25 average. For usage of PC by teachers at different education level see the table below. 80.4% of teachers used computers in literature and language classes, 78.1% in humanities and social sciences, 85.9% in science, mathematics and computer sciences and 71.3% in physical and artistic education.⁸³

Table 11: Usage of PC in class (% of teachers)

	Primary schools	Lower secondary	Upper secondary	Vocational schools	Czech Republic	EU-25	NMS
...used PC	82.4	78.9	69.5	71.0	78.3	74.3	61.3
...used PC for presentation or demonstration purposes	71.8	n.a.	67.6	69.8	71.1	63.4	55.5
...used existing online material from established educational sources	37.5	44.6	44.3	45.5	39.5	74.2	61.8
...whose pupils use PC in class	78.7	76.4	60.4	60.9	74.4	66.3	53.8

Source: Czech Statistical Office; Usage of ICT in Education; 2006 and Empirica; Benchmarking Access and Use of ICT in European Schools 2006

⁸¹ Potentially computer literate respondents are those who use PC but do not reach the computer literacy level.

⁸² Czech Statistical Office; Usage of ICT in Education; 2006

⁸³ Czech Statistical Office; Usage of ICT in Education; 2006 and Empirica; Benchmarking Access and Use of ICT in European Schools 2006

II.8. Impacts of eLearning developments

Since the development of eLearning is rather in its beginning stages, its effects on the educational system, the digital divide and the net benefits stemming from its usage can be hardly assessed.

In general, the positive impacts of eLearning usage in education are the spontaneous acquisitions of basic ICT knowledge and skills, the introduction of a new style of education into cultural and social practices and automatic ICT usage during work, visible improvements in the equal integration of handicapped pupils and more room for teachers creativity in project education. Furthermore, ICT makes it possible to use high-quality educational methods even in places without high-quality teaching staff, for example in problematic regions, small schools and home schooling. In addition, high number of teachers was trained in ICT in order to incorporate ICT usage into education. In this respect, the debate on further teachers training and motivation in general has been opened.

On the other hand, there are also possible negative impacts. These are, for example, significant burdens resulting from the necessity to maintain ICT, for teachers to prepare themselves before the class, and from increased requirements on school space and personal capacities. ICT can also lead to the trivialization of communication and a lowering of language quality and, due to preference of electronic, digital communication to personal communication, to social exclusion.

The indicator of computer literacy has reached 27% of the entire population.⁸⁴ Although there is no historical data for the comparison and assessment of the trend, taking into account the increasing role of information technology in society, the trend can be regarded as positive. On the other hand, there are visible differences in the level of computer literacy among different target groups based on age, profession and location. Several public policies and projects aim to narrow digital divide. These projects provide tools for increasing the digital literacy of socially and physically handicapped citizens, the unemployed people and in endangered regions.

At schools of all levels, ICT is being used in the process of education more and more extensively. However, eLearning has not been formally incorporated into the educational system. Some primary and secondary schools have started to administer online courses accessible to students through their web pages. ICT equipment at schools has improved significantly (see Table 6), partly due to the implementation of the National Strategy for ICT in Education and partly due to the general trend of higher ICT usage in society. However, there are significant discrepancies between particular regions. Additionally, more universities offer the possibility of a combined form of studies and in some cases students can choose to participate in distance studies. In 2002, the first accreditation of distance studies on the Masters level was given to the University of Economics in Prague. Since 2004, Bachelor studies of applied informatics have been available through distance learning at the University of Ostrava. eLearning solutions are also used by enterprises, however, so far mainly by the larger ones.

Due to increasing usage of eLearning tools, also the **cooperation** between schools and universities intensified. In 2006, around 800 schools participated in eTwinning programme and cooperated and shared information with their partners abroad. A number of universities have been closely cooperating on several eLearning projects.

⁸⁴ Ministry of Informatics, STEM/MARK; Research on Digital Literacy – presentation of main research results; 2005

III. ASSESSMENT OF THE STATE AND DEVELOPMENTS OF E-LEARNING

III.1. Current main achievements and shortcomings

III.1.1. eLearning services – extent of coverage

Based on the definition of eLearning devised for the purposes of this study, eLearning services can be generally divided into two types according to their function. The first group of services is focused on **learning how to use ICT** and the second one on the **usage of ICT for learning**.

Because the second group of eLearning services follows the first one and because of the relatively low general level of basic computer literacy in the Czech Republic, the first group (learning how to use ICT) forms an important part of eLearning services. It includes **ICT training courses** of different content (basic computer skills and knowledge, text editor, Internet, programming, etc.), different levels and designed for different target groups. Participants of the courses are either present physically at the lecture or can choose the opportunity of an electronic course or a combination of the two types.

On the other hand, the offer of eLearning tools and services is pretty wide. Firstly, in the educational process electronic equipment and software is used **directly in the classes**. At schools it is used mainly in the lectures of natural sciences and languages. Similarly, it is also used for these purposes in private or workplace courses. Secondly, eLearning courses for individuals of different content (management, accounting, EU, ICT, languages, etc.) are provided **on CDs or are accessible online via the Internet**. At universities, schools or in corporations, eLearning courses can be administered by the **learning management systems** (LMSs). Furthermore, students and the public can search for educational resources in **databases and digital libraries**. Besides the standard form of studies, university students can use the opportunity for **combined or distance education**, in which eLearning solutions play an important role. The general public can use the opportunity to search for **information sources on the Internet**, for example at various portals and information databases, in an Internet encyclopaedia or database of eLearning courses. To gather information about eLearning solutions and development, **eLearning conferences and workshops** are organised annually.

Besides these two categories, the area of **support services for eLearning** is also part of the analysis and includes for example teachers training for didactical skills in utilizing ICT, support services for infrastructural issues (portals, information databases) or eLearning research and development issues.

Main achievements

Basic computer literacy reached 27% in 2005, which is, unfortunately, not possible to compare with historical levels due to the lack of data; however, based on other indicators presented in the report (ICT equipment of households and enterprises, usage of ICT for educational purposes, etc.) it can be argued that in this respect a positive trend has been achieved. The level of ICT equipment at schools and the ratio of teaching staff trained has improved as well. In 2004, 85% of primary and 98% of secondary schools were equipped with a PC with an Internet access, as compared to 80% and 96% in 2003. In the case of universities it was 100% in both years. The improvement in the average number of computers per 100 pupils and connection to the Internet can be seen in Table 6. At the end of 2003, 74% of teaching staff at primary and secondary schools were at least trained at a basic level. With the increasing general ICT knowledge of population, the second type of eLearning services – usage of ICT for learning – has also started to expand.

Some primary and secondary schools have started to administer online eLearning courses on their web pages. Many information sources and preparation for final exams and entrance examination are available on the Internet.

Usage of LMSs of different types (open source, commercial, self-developed) by the universities is more common and some of them have launched a digital library. The majority of universities offer a combined form of studies. In 2002, the first accreditation of distance studies at the Masters level was given to the University of Economics in Prague. Also, corporations have started to use eLearning courses at the workplace for employee training and the larger companies use LMSs designed

specifically for them. For the general public, the NPCL programme and courses on the portal of public administration are available.

Main shortcomings

The level of basic computer literacy of the Czech population still seems to be below the EU average as well as the indicators of ICT equipment in schools. In addition, in the case of primary and secondary schools strong differences can be found between particular regions. However, it is important to take into account the positive trend in the development of these indicators.

The availability of online courses is not used by primary and secondary schools very often; however, it is questionable as to which extent it would contribute to the educational process, since the role of the teacher is to a large extent irreplaceable at lower levels of education.

In the case of tertiary education relatively strong differences still remain in the approach and usage of eLearning solutions between particular universities; a few are using a high quality of eLearning solutions extensively, yet others use them only at the basic level.

III.1.2. eLearning services - how “deep”⁸⁵ they are

ICT training courses at schools usually provide students with basic ICT knowledge and skills. In some secondary schools, students can attend more specialised ICT courses, e.g. in programming. In addition to courses offered at primary and secondary schools and by the employer in the workplace, basic ICT skills and knowledge (e.g. text editing and Internet usage) can also be acquired through the National Programme for Computer Literacy (NPCL) courses, courses on the portal of public administration, courses for unemployed, courses provided by private companies, and others. With regards to post-secondary education, there are higher vocational schools that offer specialization in informatics and computer technology. Comprehensive knowledge of ICT can be acquired at universities or through private courses, which include specific courses, e.g. of programming or graphics applications. The National Strategy for ICT in Education establishes five types of ICT courses for teaching staff.

The depth of **eLearning courses** differs widely according to the nature of the target group. eLearning courses designed for the general public provide relatively general information on a broad topic; however, these courses can also be adapted to advanced levels. The courses provided by schools and universities are more specific and provide students with deeper knowledge in a given field. In the workplace, either corporations use general, standardised courses (e.g. work safety, first aid), or, as in the case of many of the larger companies, they use custom-made eLearning solutions developed specifically for them. In the second case, the content of the courses for employees is highly specified to suit the field of action of each particular company.

Main achievements

Relatively detailed eLearning courses based on ECDL international standards were launched free of charge on the portal of public administration. Five courses of five different levels - from the very basic level up to the most advanced ones designed for IT coordinators - were launched for the benefit of teaching staff within the National Strategy for ICT in Education. As the quantity of eLearning courses increases, so does the depth of their content. At the workplace, enterprises have started to use the eLearning general courses and besides that, specific eLearning solutions are used by larger companies.

Main shortcomings

NPCL courses provide their participants with only basic ICT knowledge and skills. However, they can help convince the participants about the usefulness of ICT and the Internet, and thus motivate them to undertake further courses. More in-depth courses are available free of charge on the portal of the public administration, but the problem lies in the relatively low awareness of the population about the existence of such courses.

⁸⁵ The adjective “deep” reflects how profound information or knowledge a particular eLearning service provides, i.e. to what extent it is in-depth and detailed.

With regards to the promotion of eLearning and the availability of general relevant information, two specialized portals were established to gather information on eLearning. However, they do not provide much detailed information and since they were established quite recently, the scope of available information is not yet as wide as was planned.

III.1.3. eLearning services - interactivity

Moore (1992) highlighted 3 types of interaction within an instructional setting, namely:

- Learner-content interaction which was the process of learner interacting with the content, resulting in a change in the learners' cognitive structure.
- Learner-instructor interaction which was the process of learner interacting with the instructor wherein the instructor served to guide and motivate learning.
- Learner-learner interaction which was the process of learners interacting with one another, motivating and helping one another to learn.

eLearning services providing information transmission are interactive at the learner-content level. Services in this group include the ones where information and materials can be acquired in electronic form. A number of schools provide materials related to classes on their web pages, and the Internet encyclopaedia provides information at this level of interactivity. Moreover, in some cases the users can actively participate in the formation of the database by adding new content (wiki approach).

Also at rather lower level of eLearning services interactivity, the class is led and the content is explained by the teacher personally and ICT is used in the educational process only as a supporting tool, for example as in the usage of multimedia tools such as overhead projectors in classes of different subject in order to provide visual or sound information. Naturally, ICT is a necessary tool in ICT training courses in which the students are taught how to use ICT. At this level of interactivity, courses at schools, NPCL courses and the National Strategy for ICT in Education courses are implemented.

eLearning services with a higher level of interactivity but still at the level learner-content allow the user to check his acquired knowledge in a practical verification test. These tests usually form a part of eLearning courses accessible online or on CD, e.g. courses on the portal of public administration, language courses, courses on work safety, etc.

Finally, the higher interactivity levels allow students to pose questions and subsequently get answers in electronic form, to communicate with the tutor or other students and to write, save and share notices. The communication can be provided e.g. in the form of discussion forum, virtual classes or videoconferences.

Main achievements

The highest level of interactivity is provided by LMSs, which have started to be successfully used by universities and enterprises and their usage has been increasing. For students it allows communication both with lecturers and other students and participation in virtual classes, videoconferences, chats and other types of synchronous communication and discussion forums. In addition, students can use an asynchronous communication channel via email or personal messages.

For example, active participation in the creation of information content is possible in a digital library. In 2003 the DILLEO library was launched at several universities and the resorts have been interconnected since then. Registered users have the right to submit new learning objects into the library. The objects are subsequently reviewed before their acceptance.

Similar participation is possible in Internet encyclopaedias of the "wiki" type. Users can send a photograph, illustration, sound or video recording, which when accepted is linked to the appropriate encyclopaedia entry. A specific example of such service is the encyclopaedia CoJeCo (WhatIsWhat), which was launched in 2000 and its visit rate has been increasing since then.

Main shortcomings

A relatively high proportion of eLearning courses both for adults and pupils of primary and secondary schools do not have a higher interactivity level, lacking, for example, the possibility to communicate

(via the eLearning programme) with a tutor or other students (*interviews carried out as a part of the study*). Majority of courses are contact education courses with multimedia support.

III.1.4. eLearning services - usage in different target groups

eLearning services are accessible in different forms for different groups of citizens. Both directions of eLearning (i.e. learning how to use ICT, usage of ICT for learning) are extensively developed in **schools of all levels**. The entire young generation is provided with basic computer and Internet knowledge within compulsory ICT training courses and ICT and other multimedia tools are being integrated into education and are being used in majority of subjects either directly in classes or through online courses. More advanced eLearning solutions can be found at universities, where specific online courses are offered and there is a possibility of a distance education.

Some of employees acquire ICT knowledge and skills at the **workplace** through the courses paid by the enterprise. Until now, the usage of eLearning courses has been adopted primarily by larger enterprises, but smaller companies have also started to use the opportunity of standardised eLearning courses in several fields such as work safety.

In **lifelong educations** there is a wide range of eLearning training courses provided by private companies.

Subsidised courses were developed for **specific target groups**, such as NPCL courses for handicapped and re-qualification courses designed for unemployed.

Main achievements

There has been a strictly positive trend in the improvement of ICT infrastructure at schools in the recent years. In 2005, 98.1% of primary and 98.9% of secondary schools were equipped with PCs with Internet access (*Ministry of Informatics; Press release from 22 June 2006*). Furthermore, high number of teachers was trained in ICT usage in education. At the end of 2003, 74% of teaching staff from primary and secondary schools were trained at least at a basic ICT level and the teachers have been also trained in didactical skills to use ICT in education.⁸⁶

eLearning solutions are most advanced at the level of universities, many of which have started to use the LMS system and provide online libraries as well as a number of other online learning solutions. The universities are very well equipped with ICT. All of them are connected to the Internet and more than 90% of their computers have broadband connection.⁸⁷ For more detailed information on progress at educational institutions of all levels see chapters I.2.2 and I.2.3.

For the purpose of lifelong education, eLearning is being used for educational purposes more and more frequently. There is lack of data to justify this statement, however indicators of the usage of computers and Internet support this view; in the last quarter of 2004, 20% of people used the Internet at home for the purposes related to education and 32% of people used the Internet for the same purpose at the place of education.⁸⁸

Regarding the specific target groups there have been several positive achievements. NPCL was launched in 2003. For handicapped people a special ICT training course was prepared within the programme NPCL in 2005, together with NPCL Portal of Public administration. 1 500 people were trained in NPCL Handicap. Furthermore, there have been re-qualification courses organized by the Ministry of Labour and Social Affairs designed for unemployed people.

Main shortcomings

A relatively low level of digital literacy impedes the expansion of eLearning services in society. eLearning tools and solutions are not used as much by smaller enterprises due to the high initial investment needed. For more shortcomings see the sections above.

⁸⁶ Ministry of Education, Youth and Sports; National Strategy for ICT in Education in 2003 in Data – Infrastructure

⁸⁷ Ministry of Education, Youth and Sports; Report on Fulfilment of the Implementation Plan of the National Strategy for ICT in Education in 2005 and Financing Proposal after 2006

⁸⁸ Czech Statistical Office; Information Society in the Czech Republic: eEducation

III.2. Factors behind the existing developments

Economic factors

The general macroeconomic situation and economic growth influences the **purchasing power** both of individuals and households on one hand and enterprises on the other hand. In comparison to other European countries, the **prices** of ICT products (especially computers) and services (especially Internet connection) are relatively high when compared to purchasing power. In 2003, the monthly price for 20 hours of Internet use as a percentage of monthly gross national income per capita was equal to 4.5% in the Czech Republic, while in the EMU (European Monetary Union) countries it was only 1.5%.⁸⁹ According to the research of the Czech Statistical Office, more than one half of people is without Internet connection at home because of the high purchase costs of computers and connection fees.⁹⁰ On the other hand, the growth rate of the economy is relatively high compared to other European countries and the prices of ICT products and Internet connection have been decreasing, which have contributed to improvement in ICT infrastructure in general (households, enterprises, schools,...) and to higher possible to invest into eLearning products for all players.

Another economic factor that strongly influences eLearning development is the **changing structure of the economy**. The share of agriculture and also industry in the economy has been decreasing significantly and is compensated by the growth on the services side, which contributes to GDP by almost 60% (*Czech Statistical Office*; <http://www.czso.cz>). Due to the growing necessity of employee's ICT knowledge and skills in the services sector, the demand for eLearning services is increasing.

The **size of the Czech market** ranks among important factors for the development of new eLearning products (in national language).

For households, another important macroeconomic factor is the general **level of unemployment**, which can contribute to increasing differences in the purchasing power of particular households. Yet, the threat of being unemployed can create motivation for people to acquire or improve their ICT skills and thus become more competitive on the labour market.

Due to the high intensity of **international trade**, a wide range of ICT products is provided on the Czech market.

At the micro-economic level an important factor for both educational institutions and enterprises in the implementation of complex eLearning solutions such as LMS are the **high costs of the initial capital investment and subsequent costs necessary for maintenance of the equipment**. Schools must take their expected future budget expenses into account at the time of decision-making.

For the state, an important influential factor is **high relative wages in ICT commercial sector**. As a consequence it is troublesome for the state to offer competitive wages for qualified experts.

Enterprises use the opportunity of co-financing the projects from the **European Social Fund**, more specifically via the Operational Programme of Human Resources Development.

Legal factors

The use of eLearning services is supported and influenced by specific provisions in some acts. Corporate sphere has started to use the opportunity of electronic courses in the case of **compulsory training of employees** required by the Labour code because of costs reduction both in terms of money and time. These are, for example, training courses on work safety, first aid and the training of drivers. As another example driving license exams can be taken. According to the new act on traffic operations, which came into force on 1 July 2006, these exams must be taken solely in electronic form.

Although there were some suggestions to incorporate specific **tax allowances** into legislation in order to support ICT use in the education of individuals, these **have not been incorporated** yet. Allowances

⁸⁹ World Bank; World Development Indicators 2005, Chapter 5.1: The information age

⁹⁰ Czech Statistical Office; Results of ICT Usage Survey in Czech Households and among Individuals 2005

on investments into ICT and activities related to the usage of ICT for education or tax allowances for educational staff (teachers, pedagogues, lecturers, librarians) for ICT purchase and investment into self-learning in the field of ICT were also considered.

In primary and secondary schools, **the non-existence of a promotion ladder in the education system** significantly and negatively influences the motivation of the teachers in participation in further education and above standard activities.

In addition, in the recent years, the ongoing reform of educational system and consequent uncertainty about the future curricula formed another important reason of the low motivation of teachers to prepare eLearning educational content.

Relatively **low proportion of commercial eLearning courses** in adult education are **certified or accredited**.

One of the general drawbacks of the Czech **legal system** is its **time aspect**. It takes quite a long time to approve new act or amendments, which applies for eLearning issues as well.

Policy factors

There is **no institution with a comprehensive responsibility for eLearning issues**. The competences are scattered among several ministries and no eLearning strategy has been defined.

The aims of the **national policies related to eLearning** can be summarized into three points:

- ICT equipment and Internet connection in educational institutions, integration of ICT into the process of education
- Digital literacy of various groups of population (teaching staff, public administration workers, handicapped, all citizens)
- Minimum access to ICT and Internet for all citizens

The most important results of the policies can be seen in the improvement of ICT equipment and Internet connection at schools of all levels. Also, the ICT skills of the teaching staff have improved significantly as a consequence of programmes of subsidies to ICT courses designed for pedagogues. Furthermore, many people from different groups achieved computer skills through the National Programme for Computer Literacy and courses on the portal of public administration. In addition, the state supports the creation of eLearning content at universities in the form of grants.

Generally, public policies focus mainly on the support of eLearning solutions of the first type - learning how to use ICT. Development of the usage of ICT for learning at schools is also incorporated in the policies, in other fields it should be ensured mainly by the private sector (enterprises, individuals).

So far, **no central repository** has been required, where all the digital learning materials, whose development was subsidized by the state, would be stored. However, there has been established an evaluation web in the framework of the National Strategy for ICT in Education.

There is also missing a unified framework covering **cooperation of secondary schools with private enterprises**, which might help the development of eLearning content.

Ethical factors

The rights of an author to intellectual property, which include also copyright to a computer programme, are governed by the act on copyrights. Security issues do not play a crucial role in the development of eLearning in the Czech Republic.

Technological factors

Appropriate technology is available since distributors offer a wide array of software and new Czech products (e.g. LMSs) have been developed. The majority of the products fulfil **international standards** and therefore their mutual interconnection is possible. The **user-friendliness** of newly developed products is an important factor that contributes to increasing demand for eLearning services (*interviews with experts carried out as a part of this study*).

Open source software is used at schools rather **exceptionally**. Pupils (and also adults in their lifelong education) are usually expected to operate proprietary software, which they necessarily do not have installed at home. This fact consequently either motivates them to obtain illegal software or inhibits their usage of ICT.

Socio-cultural factors

A problematic part of eLearning development might be caused by the **low awareness of the ICT potential** within the general public and an attitude towards ICT of some groups of the population characterised by an **anxiety** about the first, elementary steps in ICT usage, as well as about their alleged complexity and intricacy. The majority of people who do not have computer at home (70%) don't see any reason to use a computer.⁹¹

On the other hand, a positive factor is the relatively **high average level of education** of the population (*eUser, 2005*) as it is generally easier for educated people to acquire new skills than for non-educated ones. In 2001, the share of population with a secondary education was 66.4% (43% out of that with state final exam) and 8.9% of population had finished tertiary education (*Czech Statistical Office, 2001 Population Census*). One educational factor hindering eLearning development might be **lack of knowledge of English language**.

However, **computer literacy** in the Czech Republic is rather low. At the beginning of 2005, basic computer literacy reached 27% of the population 15 years old and above. Two effects on demand for eLearning products (especially digital literacy courses) can emerge as a consequence. People with low ICT knowledge are either not interested in such products or are willing to acquire ICT knowledge. Naturally, there are significant **differences** in the level of computer literacy **between different professions**. The lowest level of computer literacy can be found by unqualified workers; only 4% of them are computer literate. On the contrary, specialized professions such as lawyers (67%), university teachers (57%), policemen, firemen and soldiers (52%) or civil servants (45%) are at a far above average percentage. (*Ministry of Informatics, STEM/MARK; Research on Digital Literacy – presentation of main research results; 2005*)

Since **the number of university students has been steadily increasing** and the personal and space capacities of the universities are limited, there has been a pressure on universities to widen the availability of combined forms of studies and use eLearning solutions more intensively.

Regional factors

Among the regions in the Czech Republic, there are also strong differences in many areas that influence eLearning. Industrial production has historically made up a notable proportion of the local economy structure. With changing structure of the economy in these regions, characterised by the shift from industry towards services, the **structural unemployment** has emerged (regions in Northern Bohemia, 20% unemployment rate in the Mostecky Region; *Ministry of Labour and Social Affairs, <http://www.mpsv.cz>*). A high level of unemployment influences the economic situation of the inhabitants in these regions, their purchasing power and their motivation to increase their ICT skills.

Furthermore, there are substantial differences between the **bigger towns and smaller municipalities**. In towns, the economic condition of people is usually better, technological infrastructure is more developed and the availability of eLearning services is wider. There is a significant difference in the basic computer literacy of people in towns (> 100 000 citizens, 37%) and small municipalities (< 999 citizens, 18%).⁹² Thus, both demand and supply for eLearning services seem to be weaker in smaller municipalities than in towns.

The density of educational infrastructure is higher in towns. Students have a wider choice of schools, at different levels and with varying specializations. Due to the higher number of students per school, there are more teachers who are specialized in subjects like ICT. Public companies providing eLearning courses are situated in towns. The distance from the training centres is a factor influencing

⁹¹ Ministry of Informatics, STEM/MARK; Research on Digital Literacy – presentation of main research results; 2005

⁹² Ministry of Informatics, STEM/MARK; Research on Digital Literacy – presentation of main research results; 2005

the accessibility of eLearning services to the inhabitants of smaller municipalities. Transportation necessary to overcome this distance can be costly in terms of both money and time.

Demographic factors

One of the most significant characteristics in the structure of the Czech population that will have a strong influence on eLearning development is the **process of population ageing**.

Usage of both personal computers and the Internet is common among young people in the age category of 15-24 years. More than three quarters of young people use personal computers, compared to 3% of elderly (age group 65+). The Internet is used by one third of young people, but by only 2% of elderly.⁹³ The indicators for older generations will definitely improve in time as young people grow older, but the differences will still persist. While all the current students undertake an ICT training course at schools and thus consider ICT skills and usage as a unquestionable part of basic skills, the knowledge of the older generation is rather limited.

Moreover, the **average age structure of teachers** could also alter the final effect of the motivation system discussed above (implementation of a promotion ladder into the education system).

Social **groups** of physically handicapped and socially handicapped citizens, groups living in endangered regions and unemployed people are all eLearning target groups and the government realizes the importance to provide them with eLearning services.

⁹³ Czech Statistical Office; Results of ICT Usage Survey in Czech Households and among Individuals 2005

Figure 29: Factors affecting the evolution of eLearning

FACTOR	CONSEQUENCE	GROUP	AREA
Economic growth, purchasing power	↑ ICT infrastructure ↑ Demand for eLearning products	All All	Economic
Relatively high prices of ICT products, but decreasing	↓ ICT infrastructure	All	
Changing structure of the economy	↑ ICT infrastructure ↑ Demand for eLearning products	All All	
Size of the Czech market	↓ Development of Czech eLearning products	All	
Unemployment	↑ Motivation of people to acquire ICT skills ↑ Differences in purchasing power	Households Households	
High wages in ICT commercial sector	↓ Quality of ICT staff	Schools, public administration	
International trade	↑ Offer of ICT products	All	
Primary investment and maintenance costs	↓ Demand for complex eLearning solutions	Enterprises, universities, schools	
European Social Fund	↑ Projects implementation	Enterprises	
Compulsory training of employees Tax allowances (not implemented) Non-existence of promotion ladder in education system	↑ Demand for eLearning courses ↓ Investment into ICT infrastructure ↓ Motivation in further education and above standard activities	Enterprises Households Teachers	
Low level of certification and accreditation	↓ Demand for eLearning products	Households, enterprises	
Slow legislation process	↓ eLearning development	All	
No central responsible institution	↓ eLearning development	All	
National Strategy for ICT in Education	↑ Digital literacy ↑ ICT infrastructure ↑ Usage of ICT in education	Teachers Schools Schools	Policy
National Programme for Computer Literacy Broadband Strategy No central repository	↑ Digital literacy ↑ ICT infrastructure ↓ Sharing of eLearning products	Households Schools, libraries All	
Copyright	Security issues not a problem	All	
Fulfilment of standards User-friendliness	↑ Demand for eLearning products ↑ Demand for eLearning products	All All	Technological
Low awareness of ICT potential	↓ Digital literacy ↑ Demand for digital literacy courses	Households Households	
Lack of English knowledge, but improving	↓ Demand for eLearning products	Households, enterprises	Socio-cultural
Digital literacy rather low	↑ Demand for digital literacy courses ↓ Demand for more complicated eLearning products	Households, enterprises Households, enterprises	
Increasing number of university students	↑ Combined form of studies and eLearning solutions	Universities	
Structural unemployment Differences between towns and municipalities	↑ Different level of ICT infrastructure and demand for eLearning products ↑ Different level of ICT infrastructure and demand for eLearning products	Households (regions) Households (towns vs. municipalities)	
Population ageing	↑ Slower closing of the gap between generations ↓ Motivation	Households Teachers	Demographic
Social groups	↑ Supply of courses	Specific target groups	

III.3. Drivers and barriers for future eLearning in the Czech Republic

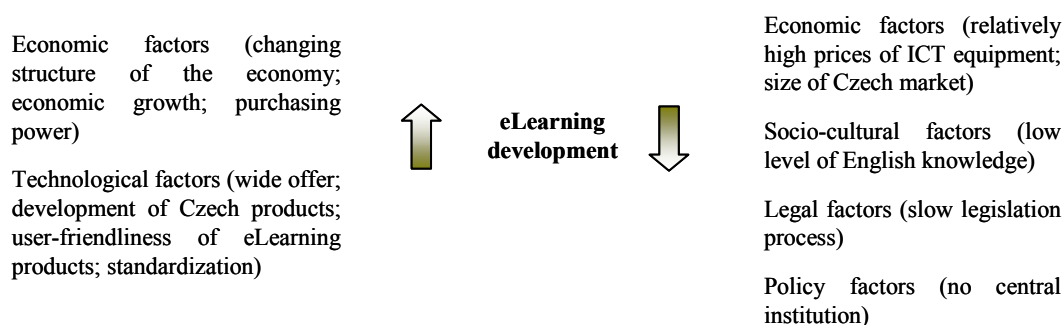
At the beginning of this section, drivers and barriers that affect eLearning development in general will be summarized. Then eLearning will be divided into two categories: learning how to use ICT and usage of ICT for learning.

III.3.1. Common drivers and barriers

A general trend of the changing structure of the economy towards services sector and the necessity of acquiring and using ICT knowledge has been increasing in the recent years,. It consequently also affected the demand for eLearning products. Sound macroeconomic growth and thus increasing purchasing power of the population makes it easier for all actors to invest into ICT infrastructure and to purchase eLearning products. Appropriate technology is available since distributors offer a wide array of software and new Czech products have been developed. The majority of the products fulfil international standards and are relatively user-friendly, what contributes to higher demand for them.

On the other hand, ICT equipment prices were relatively high in the past, but they have started to decrease. Small sized Czech market might inhibit development of eLearning products in the Czech language and at the same low knowledge of English language can mitigate the usage of eLearning products. From legal and political point of view, there are two major drawbacks – the legislation process is very slow and there is no institution with a comprehensive responsibility for eLearning issues.

Figure 30: Drivers and barriers influencing eLearning development in general



III.3.2. Learning how to use ICT

Firstly, motivators and hindrances to the development of the first aspect of eLearning, i.e. learning how to use ICT, will be analyzed.

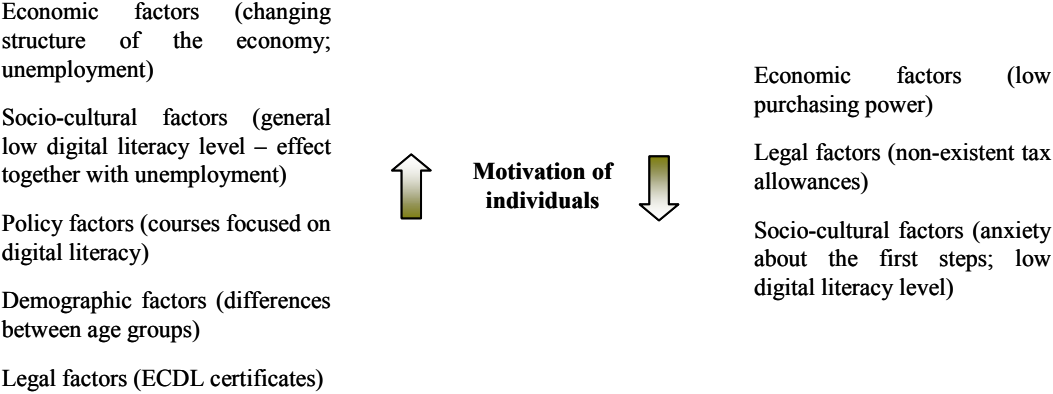
Motivation of individuals

There are several factors positively and negatively influencing the motivation of individuals to acquire ICT knowledge and skills and to increase their digital literacy level. Because of the changing structure of the whole economy towards the services sector and because of the integration of ICT into daily life, ICT skills have started to be considered as a part of general knowledge, especially among the younger generation. Also from the career perspective, ICT knowledge strengthens the chances of job applicants. Thus unemployed people, for whom the ICT skills constitute a comparative advantage on the labour market, are motivated to become digitally literate. This element influences the motivation of older generations, as the average digital literacy of this group of population is lower and thus the comparative advantage stemming from acquired digital literacy stronger. Younger people are motivated by the factors mentioned above, namely the perception of ICT skills as a part of general skills.

On the other hand, the motivation of individuals is suppressed by anxiety about the first elementary steps, which holds especially in the case of older generations. This effect is further reinforced by the

insufficient purchasing power of the population compared to the prices of ICT equipment (personal computers and Internet connection) and the non-existence of tax allowances on such equipment, which was originally planned to be incorporated into the legal framework. However, there are state policies aiming at supporting the digital literacy of individuals. For example, the NPCL courses provide an opportunity to overcome the original fear of ICT and the ICT unavailability for some citizens. Additionally, it can become a convincing tool pointing out to the usefulness and helpfulness of ICT in everyday life and to motivate people to continuously educate themselves. .

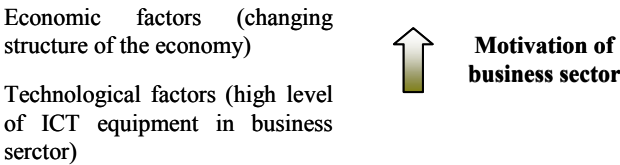
Figure 31 Drivers and barriers influencing motivation of individuals



Motivation of the business sector

Enterprises’ demand for skilled employees in the field of ICT increases with the changing structure of the economy. To remain competitive, many corporations are motivated to use ICT and to either engage skilled workers or to provide current workers with ICT training. A positive factor in this respect is the relatively high level of ICT equipment and its usage in the Czech business sector when compared to the EU average.

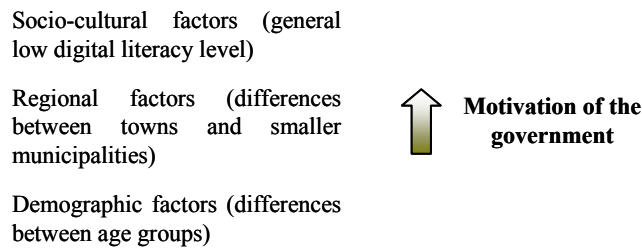
Figure 32: Drivers and barriers influencing motivation of the business sector



Motivation of the government

Due to a number of factors, the government is motivated to support the level of digital literacy of the population. In general, the relatively low level of digital literacy is the most obvious factor.. Additionally, the aim of the government is to prevent widening of the digital divide. There are inequalities in access to ICT and to ICT training courses, which are caused by regional and demographical factors. Distinct differences can be found between the groups of population living in towns and in smaller municipalities, as well as between different age groups. The process of population ageing contributes to slower closing of this gap.

Figure 33: Drivers and barriers influencing motivation of the government



III.3.3. Usage of ICT for learning

Motivating factors and hindrances in the development of second group of eLearning services, i.e. the usage of ICT for learning, can be divided according to usage at different places: at schools, universities, the workplace and in lifelong learning. Generally, it holds to all groups that relatively high level of user-friendliness of eLearning products (eLearning courses, software, etc.), their standardization (e.g. SCORM) and their possible combination facilitate the demand side.

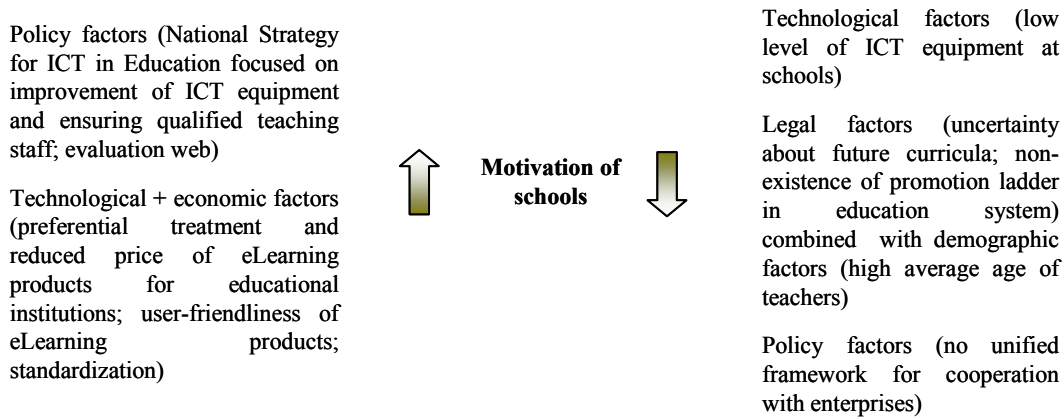
Schools

At schools the motivation to use eLearning solutions in classes is reduced because of the relatively low level and poor quality of ICT equipment. The number of computers per 100 pupils and speed of the available Internet connection form an obstacle to the usage of more developed services. Moreover, as a consequence of the non-existence of a promotion ladder in the educational system, the teachers are not sufficiently motivated to pursue further education and above standard activities. This effect might be further reinforced by high average age of the teachers, since the elderly teachers are not motivated so much as they are going to retire shortly. Also the ongoing reform of educational system and consequent uncertainty about the future curricula might have contributed to lower motivation of teachers to prepare eLearning content.

However, the National Strategy for ICT in Education focuses on the improvement of ICT equipment, the higher usage of ICT in educational processes and the training of qualified teaching staff, all of which have been clearly improving in the recent years. The teachers have been trained not only in basic ICT knowledge but also in didactical skills in utilizing ICT in education. The evaluation web established in the framework of the National Strategy for ICT in Education, where eLearning products are collected and assessed, also contributes to the usage of ICT. Moreover, the motivation of schools to implement eLearning solutions is strengthened by the fact that some suppliers of the technology offer preferential treatment and significant price reductions to educational institutions. However, a unified framework for cooperation of secondary schools with private enterprises has not been developed.

In general, all types of eLearning are not used at primary and secondary schools very extensively.

Figure 34: Drivers and barriers influencing motivation of schools

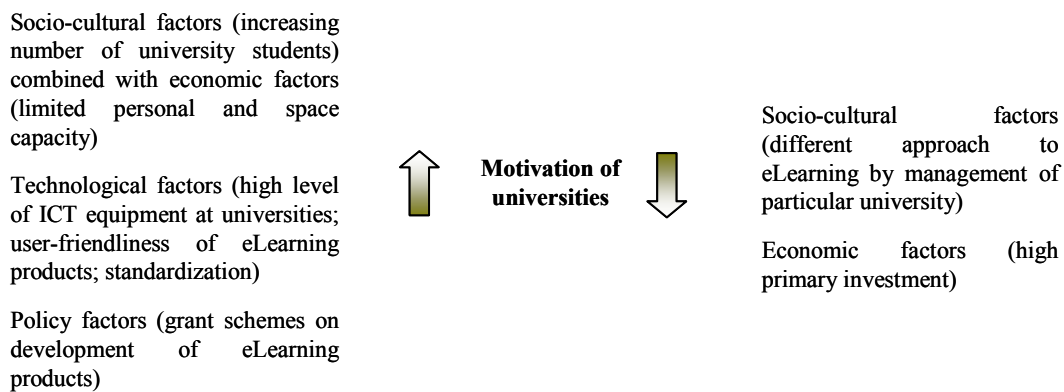


Universities

The increasing number of university students in recent years has led to a higher motivation for the universities to implement eLearning solutions. At the same time, the ICT equipment at universities is at very good level and it does not form a barrier to eLearning development. Furthermore, the state supports the development of eLearning content and products via grant schemes.

On the other hand, the management of particular schools have different approaches to eLearning, which leads to the existence of significant gap between particular universities. Moreover, the implementation of eLearning solutions such as LMS entails a high primary investment. The development of meaningful ICT approaches and creating related content is very expensive and the scope of work is usually constantly widened.

Figure 35: Drivers and barriers influencing motivation of universities



Workplace

At the workplace, a number of corporations have started exploit the opportunity of eLearning services. It is obviously a more efficient way how to fulfil the obligation of compulsory training of employees required by the Labour Code. The relatively high level of ICT equipment in the business sector also contributes to the expansion of the usage of eLearning services. Again, all these effects are strengthened by a general trend of the shifting of the economy towards the services sector and the expansion of the information society. Also, the high level of user-friendliness of eLearning products stimulates their usage.

On the other hand, the integration of more advanced eLearning solutions at the workplace is slowed down by the low level of digital literacy of the Czech population and in some cases by a distrustful attitude towards unknown modern technologies. Low level of accreditation and certification of courses

inevitably affects demand for them. Also, the costliness of primary investment into eLearning solutions can form a barrier, especially for smaller enterprises.

Figure 36: Drivers and barriers influencing motivation at workplace



Lifelong learning

From the lifelong learning point of view, there are several factors that negatively influence the usage of eLearning solutions. Firstly, the same hindrance to the motivation of households in acquiring ICT skills applies in this case, as well. The anxiety about the first elementary steps and the low general level of digital literacy is complemented by the low level of technical equipment of households and the low purchasing power of the population compared to the prices of ICT equipment. The purchase of ICT equipment necessary for further education in the form of eLearning is not supported by the legal set-up of tax allowances. Open source software is used rather exceptionally in ICT courses, and people are usually trained to operate proprietary software which they do not necessarily have installed at home. Thus, it might further inhibit their usage of ICT.

Additionally, the motivation to use eLearning courses in self-education is further reduced by the relatively low level of interactivity of the majority of courses designed for the broader public. Similarly to workplace, low level of accreditation and certification of courses has impact on demand for them. When the low digital literacy level is taken into account, some users prefer to attend courses where the content and explanation is provided by the teacher, who can directly reflect the feedback of students.

On the other hand, in regions where this type of courses is not provided, either because of the low demand or significant distances to training centres or other reasons, people may prefer to use eLearning solutions. Also, the user-friendliness of many eLearning products contributes to a higher demand for them. The amount of information accessible via the Internet has been increasing rapidly. Information can be searched through structured portals or information databases. In addition, eLearning provides new educational opportunities for specific population groups such as handicapped people, elderly or women on maternity leave.

Figure 37: Drivers and barriers influencing motivation in lifelong learning

Regional factors (distance to training centre)

Economic factors (in combination with regional factors – low demand in some regions)

Technological factors (user-friendliness of eLearning products; standardization)

Demographic factors (new opportunities for specific population groups)



Economic factors (low purchasing power)

Legal factors (low accreditation and certification of courses; non-existent tax allowances)

Socio-cultural factors (anxiety about the first steps, low digital literacy level)

Technological factors (low usage of open source software)

Other factors (low level of eLearning services interactivity)

IV. ANALYSIS OF POLICY OPTIONS

This chapter summarises the information provided in previous sections regarding the policy measures that seem to be the most appropriate for the Czech government to address technical, social, economic and institutional challenges in the field of eLearning, based on interviews with national experts.

IV.1. Education and training system

In the education and training systems, the State can take measures to support digital literacy, eLearning development at schools and universities and can be helpful in the organisation of ICT related re-qualification courses and courses for specific target groups. However, its potential to intervene into development at workplace (except for public administration) and lifelong learning is rather limited (*interviews with experts carried out as a part of this study*).

IV.1.1. Schools

Teachers' motivation and education

Problems posed by the general relatively low motivation of teachers in pursuing further education could be solved by the **implementation of a promotion ladder into the education system**. If teachers had a perspective of promotion accompanied by both higher wages and higher social status, their motivation to participate in educational courses would significantly increase. However, one of the obstacles in this respect, which should be also taken into account and which could alter the final effect of the motivation system, is the average age structure of teachers.

Similarly, **a more flexible financial system and greater liberty in the evaluation of teacher work and above-standard activities**, including the development of eLearning content, would also create a better motivation scheme. Encouraging the more wide-spread usage of financial rewards in return for good performance could help solve the widely reported low teacher motivation (*OECD; Economic Survey of the Czech Republic 2006*). On the other hand, the application of such a system would necessitate the definition of detailed conditions for the awarding of bonuses and the creation of a controlling mechanism to ensure the fair and efficient usage of financial resources.

There are several arguments against teacher rewards, e.g. the difficulty of fair and accurate evaluation due to the impossibility of objective observation and evaluation of teacher performance and reduced cooperation between teachers. However, there are a number of performance-evaluation mechanisms in other European countries that can serve as an inspiration for the Czech Republic. For example, in Denmark, since 1999, teachers' wages have been determined by four factors: a basic wage, a function wage, a qualification wage, and a results wage. The results wage is based on the attainment of quantitative and qualitative results, and it works as an individual performance-based reward. (*Harvey-Beavis; 2003*)

In devising an appropriate performance-evaluation scheme, the following dimensions should be beard in mind (*Harvey-Beavis; 2003*):

- Whether the programme focuses on individual teacher performance or school-based performance;
- Whether the compensation is pecuniary or non-pecuniary, and whether sanctions exist for poor performance;
- The duration of the reward, and, in particular, whether the reward is given only once, for a limited duration, or permanently;
- The reward levels, and, in particular, whether there are ascending rewards for increased teacher or school performance, or whether the performance evaluation allows teachers to progress to a new salary scale;
- What is evaluated, and, in particular, whether the evaluation is made on the basis of observation, a portfolio, acquired qualifications or student performance;
- Who evaluates the teacher, and in particular, whether the evaluation is completed by the principal of the school, an external review, or peer review;

- The scope of the reward, and, in particular, whether all teachers who fulfil criteria are rewarded, or just some of them according to the pre-set quota; and
- Whether the performance-based rewards supplement or replace the existing salary scale system.

In addition, in recent years, the ongoing reform of the educational system and consequent uncertainty about the future curricula has also contributed to the low motivation of teachers in the preparation of eLearning educational content. In the future, therefore, the State should adopt a clearly defined and transparent attitude.

The easiest way for the State to promote the **education of teachers in the ICT field** is to continue to use the existing design and framework defined in the National Strategy for ICT in Education. Until the end of 2005, a large share of teachers (more than 140 000 out of total 200 000) took part in a “basic user skills” course established in the framework of the policy. In addition, one half of teachers participated in more advanced courses for the “training of informed users” and one fifth in higher level courses. Therefore, in light of these results, more advanced courses should be emphasized in order to expand teachers’ ICT knowledge and skills in the design of effective educational usage of ICT and to avoid the gradual depletion of acquired knowledge.

Open source software

The State could also spur the development of eLearning services and encourage general ICT use by **supporting of the usage of open source software at schools**. Currently, pupils in a vast majority of schools are thought to operate purchased software to which they do not necessarily have home access. As a consequence, students are either tempted to obtain illegal software or are forced to settle for limited ICT usage. In addition to the provision of free software to students, open source software has other advantages, including flexibility and the possibility of adapting it to specific requirements.

A study dealing with open source software at schools published by the British Educational Communications and Technology Agency in 2005 demonstrates that, although the implementation of open source software at schools demands careful planning and support, it can offer a cost-effective alternative to proprietary software. The schools’ main motivation for introducing open source software was the potential cost savings, as well as transparency, flexibility and the educational value of providing pupils with a broader experience in operating systems and software. Furthermore, teachers seemed positive about using the open source software and generally viewed the applications as easy to use. Some teacher considered it to be reliable. Overall, pupils at all schools liked using open source software and found it reliable. On the other hand, the main disadvantages of open source software were its lack of compatibility with some curriculum software, its inability to read files created in other applications, and resistance to its usage on the part of teachers and students due to a lack of familiarity with the software.⁹⁴

IV.1.2. General public and specific target groups

To promote the ICT education of the general public, the State should **continue in its support of digital literacy**, specifically the National Programme for Computer Literacy, and maintain the provision of free ICT courses at the portal of public administration. This allows access to affordable beginners’ courses, which can help to overcome the primary anxiety and low self-confidence impeding the ICT usage.

Since only 27% of the population between 18 and 60 years is digitally literate, there seems to be wide room for the implementation of these programmes. According to comparable statistical measurements of digital literacy, the average Czech citizen is slightly less digitally literate than the average citizen of the EU-15. While the index for the Czech Republic equals to 0.6, it reaches 0.8 in EU-15 countries (*SIBIS Pocket Book, 2002/2003*). Moreover, there appears to be enough interest among the digitally illiterate part of the population to warrant the establishment of training programmes, as demonstrated

⁹⁴ British Educational Communications and Technology Agency; Open Source Software in Schools: A study of the spectrum of use and related ICT infrastructure costs

by the fact that during two years of the operation of the National Programme for Computer Literacy, more than 190 000 people received training.

Also, there should be support for programmes directed towards specific target groups, such as seniors or the handicapped. Under the section of the National Programme for Computer Literacy designed for handicapped citizens, 1 500 participants were successfully trained. The regional project “Internet for the elderly,” can serve as a model for the ICT education of seniors. In the project secondary school students acted as individual teachers for seniors and instructed them in basic ICT knowledge. It also has the additional benefit of strengthening intergenerational communication.

IV.1.3. Other

In European countries increasing attention has been given to the “public good” benefits of public funding in research in the recent years. The attention was devoted to the funding of research and innovative approaches in education and training, as well.⁹⁵ There has also been much support for the provision of free access to the results of publicly funded projects. This could be accomplished by establishing a **central portal – repository** in which all digital learning materials whose development was subsidised by the State would be stored and accessible to others. In addition, offering an evaluation of the eLearning content gathered at the portal would provide users with information on particular products and would make it easier for them to choose the most appropriate materials. Best practices could be also shared in that way. Consequently, financial resources would be used more efficiently by avoiding redundancy in eLearning content development and increasing user access.

In this respect, the evaluation web has been established in the framework of the National Strategy for ICT in Education which provides schools with the opportunity to choose both commercial and freeware eLearning products. The evaluation web includes assessments by two independent reviewers, expert opinions, and basic information on each type of educational software.

In addition, the State can define specific requirements on new products, which ensure, for example, a higher level of interactivity of subsidised products.

Furthermore, the State should continue to offer **grant schemes for universities** focusing on the development of new eLearning products.

IV.2. Institutions

There should be **one institution with a comprehensive responsibility for eLearning issues** and Internet support, especially broadband penetration (*interviews with experts carried out as a part of this study*). If the Ministry of Informatics such an institution would be, its position should be significantly strengthened. If the Ministry of Informatics is, however, dissolved, another government body, such as the Ministry of Education, Youth and Sports or the Ministry of Labour and Social Affairs, should be considered to fulfil this role.

Although it could be suggested that one public authority systematically coordinates and promotes the development of eLearning, the content must be naturally developed by field experts, in cooperation with private companies that develop the software, and must pass through certification procedures similar to traditional teaching materials.

The State should also support the cooperation of the public sphere with private enterprises in the form of **public private partnership**, which has already been successfully accomplished in the National Programme for Computer Literacy.

Also, a framework covering the **cooperation of secondary schools with private enterprises** would help to accelerate the development of **eLearning content**. Since schools have the knowledge necessary for content preparation and commercial enterprises have the experience and appropriate technology for course design, their cooperation would be mutually beneficial.

⁹⁵ Danish Technological Institute; Study of the e-learning suppliers’ “market” in Europe

The European Commission's eLearning Action Plan acknowledges the potential to unite the interests of the education and training sectors to quickly acquire the capacity to deliver eLearning, and to link this to private sector interest in developing new service opportunities and ensuring that relevant skills are available in the workforce. There are many potential benefits from this partnership. Private sector participation in education already stimulates the exchange of experience and the transfer of knowledge and expertise. Furthermore, emerging models of public private partnerships may also involve joint investments and new funding models that have the potential to provide a solution to existing capital shortages. (*Declaration of the European eLearning Summit; 2001*)

Educational institutions and teachers need not master all the areas of expertise required in eLearning. By creating partnerships, they can concentrate on their core competence: teaching. Partnerships increases the distribution of knowledge and effective practises within the network, which is advantageous to both public and private partners. This type of cooperation between schools and private enterprises is described in the Finnish research paper "Enhancing Content Production in E-Learning by Public Private Partnerships." The paper presents a model for the enhancement of content production in which teachers contribute their expertise in the field educational content the nature and private companies provide the appropriate technology. (*Partanen and Kilpio; 2002*)

The **cooperation with the EU** could be more intensive to avoid inefficiencies resulting from the development of eLearning products and solution of technology problems in parallel. The most effective practises should be shared in the most possible extent at all levels – national, regional, and municipal – but individual schools and companies should also intensify their collaboration in order to learn from the experience of others.

IV.3. Legal and regulatory framework

As mentioned above, the implementation of a promotion ladder into the education system would increase teachers' motivation to continue with their studies. The ladder should be incorporated into the legislative framework, with a set of attestations in particular fields to support the transparency in its implementation.

Furthermore, the quality of eLearning is not a well-defined measure. Therefore, the existence of **standards and norms for eLearning products** would enable potential users to distinguish between particular products according to verified characteristics. Also, a **system of accreditation and certification**, not only for schools, but also for commercial products, would be beneficial. It holds also for mechanisms for quality assurance, accreditation, certification and other related aspects of adult education (*eUser, 2005*). Consequently, people would be more motivated to participate in courses leading to final certification and it would be easier for employers to use accreditations to assess the knowledge and skills of job applicants in a variety of fields.

One of the general drawbacks of the Czech legal system is its time aspect; the approval of new acts or amendments involves a lengthy process, which applies for eLearning issues, as well.

IV.4. Infrastructure and technology

The commercial spheres bear mainly the responsibility for ensuring development and provision of new technology, and there is therefore almost no need for State support.

State funding of learning management systems' development is highly questionable since the market is already almost saturated. However, there is an argument in favour of using funding instruments to encourage the implementation of an open source system, which might stimulate eLearning services usage.⁹⁶

On the other hand, it is the responsibility of the State to ensure the existence of quality ICT infrastructure and Internet penetration at schools.⁹⁷ The implementation of the **National Strategy for**

⁹⁶ Danish Technological Institute; Study of the e-learning suppliers' "market" in Europe

⁹⁷ Naturally also in public administration and in libraries.

ICT in Education can be regarded as successful; although the indicators of ICT equipment at schools have remained below the EU average; there has been a clear positive trend in the development of both areas: ICT equipment and Internet penetration. To further support ICT usage at schools, the State could exploit experience gained from this venture and its existing framework and to **continue** implementing this type of policy.

In order to make ICT at schools more user-friendly, the State should consider investing additional finances into human resources and ensure that IT support is available for both pedagogues and students. Technology expenditures must balance the need for investment in infrastructure and the training and technical support required for system maintenance.

Support of broadband penetration is already covered by the Broadband Strategy.

IV.5. Financing

The financing scheme related to eLearning is derived from state intervention in particular areas. The State should financially support digital literacy, eLearning development at schools and universities, and courses for specific target groups; however, financing lifelong learning and eLearning at the workplace should be based to a large extent on commercial principles.

In financial decision-making, the State has to take into account future expected expenditures related to both the maintenance and renewal of ICT equipment at schools. Also, it is necessary to ensure the availability of financial resources for programmes supporting the digital literacy of the broad public, as well as for grant schemes focused on the development of new products.

In the education of the unemployed, the Ministry of Labour and Social Affairs should replace the relatively costly **re-qualification** ICT courses by a single **eLearning course** (or a set of more structured courses), which would entail a high primary investment; however, the variable future costs of such course would be much lower. In some cases, both types of courses could be combined, depending upon the field and profession.

The introduction of tax allowances on ICT equipment for individuals is controversial, since it is believed by the general public that the equipment of households with ICT should be left to market forces. Similar subsidies targeted for the computer acquisition for teachers, as opposed to all private individuals, are another option. PC subsidies for new primary school pupils remain an additional consideration.

IV.6. Summary

Figure 38: Possible policy options

POLICY MEASURE	CHANNEL (BARRIER)	AREA
Promotion ladder in education system	↑ Motivation of teachers	Education and training system
Performance evaluation mechanism	↑ Motivation of teachers	
Further ICT education of teachers	↑ Teachers' ICT skills	
Support of open source software at schools	↑ ICT usage	
Support of digital literacy programmes	↓ Anxiety	
Repository of eLearning products	↑ Efficiency of the usage of publicly funded projects	
Grant schemes for universities	↑ Development of new eLearning products	
One responsible institution	↑ Concentration of responsibilities	Institutions
Public private partnership projects	↑ Combination of knowledge and technology	
Cooperation with EU	↓ Development in parallel	
Promotion ladder in education system	↑ Motivation of teachers	Legal and regulatory framework
Standards and norms for eLearning courses and their accreditation and certification	↑ Demand for eLearning courses	
Encourage open source software usage	↑ Stimulation of eLearning usage	Infrastructure and technology
ICT equipment at schools	↑ Digital literacy	
IT support at schools	↑ Digital literacy	
Support of broadband penetration	↑ ICT usage	
eLearning in re-qualification courses	↑ Cost efficiency	Financing
Tax allowances and subsidies on ICT for teachers, pupils, general public (?)	↑ ICT usage	
Financing of policy measures		

V. MAJOR R&D CHALLENGES FOR ELEARNING⁹⁸

Technology

In general, high quality ICT equipment at schools, households and businesses could stimulate eLearning take-up. This will depend heavily upon the purchasing power of the Czech population and, therefore, on macroeconomic development. Furthermore, widespread broadband penetration will be crucial to facilitate usage of eLearning services. Although these indicators still lag behind the EU averages, there has been a clear positive trend in their development.

The technology as such is well developed and there are no major problems in this respect. It is widely available and the market is capable of solving user needs. A number of eLearning products are to a large extent user-friendly and also often fulfil standardisation criteria for eLearning product development (e.g. SCORM), what allows them to be mutually supportive (*interviews with experts carried out as a part of this study*).

However, the challenge is to **harmonise the development of the technology with the development of appropriate content**, since these two elements are both necessary in the formation of quality eLearning products (another important dimension is the pedagogical approach for using the content in certain technological settings).

One of the drawbacks to the development of eLearning content is the small **size of the Czech market**. Despite the relatively low level of English language literacy in Czech society, it might be unprofitable to develop specific Czech eLearning content for such a small market. On the other hand, there are several companies that have been successfully operating on the eLearning content market, which weakens the argument.

Moreover, the **market seems to be almost saturated** with software such as learning management systems, and it will be a challenge for the suppliers of technology to launch new products on the market. **Innovation** will be necessary. There will also be greater opportunities for the development of open source software.

One future challenge will be the **more intense usage of the “wiki” approach** in the education system, which would permit the cooperation of the students in the development of educational materials. “Wiki” makes it possible for the users to add, remove, or edit available content, which makes it an effective tool for collaborative authoring. If this method of creating educational materials is accepted, it will be necessary to develop appropriate software facilitating the cooperation of a number of authors in a sufficiently user-friendly way.

An additional challenge relates to products and services provided for **handicapped people**. There has been a growing emphasis on the importance of social inclusion, and, as mentioned above, eLearning provides a new range of opportunities for handicapped people. Therefore, in the near future, the development of new technologies enabling communication between ICT technologies and disabled users, who suffer from, for example, eye-sight problems, might come more to the centre of attention of companies developing new technologies.

Financing

Financing **costly initial investments** in the implementation of eLearning technologies like learning management systems remains an important challenge for schools, universities and for many small and medium enterprises.

In the case of schools there is a wider range of possible solutions. Either producers or distributors of eLearning services can offer them a lower price for the license, which would allow them to benefit from the scale, or the State can financially support such investments. The question remains if it is more beneficial for the State to purchase a central licence for a single LMS for all schools, thereby

⁹⁸ As one of the main sources for this chapter interviews with national experts were used.

increasing cost efficiency, or to subsidise particular schools separately and allow them to choose the most appropriate LMS on an individual basis.

The use of eLearning technologies in private enterprises can be encouraged by either sound macroeconomic growth or a future decrease in the prices of eLearning services. Furthermore, it will be helpful for companies to prepare a cost benefit analysis on eLearning investments.

High relative wages in the ICT commercial sector present another challenge for the State because they make it more difficult for the State to offer competitive wages to qualified experts.

The State will also have to deal with increasing requirements regarding **financial resources for the maintenance and renewal of ICT equipment at schools and at public administration**. Positive trends in the development of these indicators will pose certain burdens on the State budget in the future. In this respect, it appears beneficial to shift from the purchase of equipment and thus paying high costs for its upgrade to direct outsourcing of the services on the market. In addition, a cost-benefit analysis on a case by case basis would be needed.

Maintenance and renewal present problems for both hardware and software. Technology and software are developing very quickly and the demand for better (faster, more user-friendly, with bigger memory, etc.) products is to a large extent be satisfied by commercial companies, which cover the research and development expenses. In order to keep up pace with this development, the State needs to take into consideration the consequent requirements on public expenditures.

Security

In the Czech Republic, users as well as providers of eLearning services do not see identity and security aspects as crucial (*interviews with experts carried out as a part of this study*).

The data provided, for example, by the users of eLearning courses are usually very limited, as the customers provide only their name, email address or mailing address. Therefore, there is low motivation for misusing the data.

However, as eLearning services develop problems with certifying user identity might emerge. Distance education courses that award final certificates currently require the personal attendance of the student or client at least for the final examination. In the future, to satisfy the demand for distance courses conducted entirely through computer technology, including exams, it would be necessary to ensure proper identification and also to monitor the proper course of the entire exam.

The issue of security is certainly a very important aspect that must be seriously considered on all levels (government, companies, households), and one that applies to all aspects of ICT policies, not only eLearning. The issue of security is too wide to explore in detail for the purposes of this report.

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Interviewed experts

- Bednář, K.; Eliška Krásnohorská grammar school, Director
- Bureš, M.; Trask solutions, s.r.o., Project manager
- Kábrt, B.; Lužiny primary school, ICT teacher and administrator
- Kopecký, K.; Palacký University in Olomouc, Expert on eLearning
- Kukul, P.; Computer Help, spol. s r.o., Department of IT Education of Adults
- Malá, I.; Czech Efficiency Learning Node, Director
- Mikulecká, J.; University of Hradec Králové, Faculty of Informatics and Management, Rectress
- Molčan, F.; Společnost pro výzkum a podporu Open Source (Company for Research and Support of Open Source), Director
- Neumajer, O.; Ministry of Education, Youth and Sports, Department of National Strategy for ICT in Education
- Pejša, J.; Kontis, s.r.o., Director
- Silber, R.; Institute for Information in Education, Department of Information Products, Director
- Šolc, J.; City of Prague, Department of Informatics, Head of the Strategic Development Unit
- Šubrt, J.; Ministry of Education, Youth and Sports, Department of National Strategy for ICT in Education
- Trnčík, L.; Hostivař primary school, ICT teacher and administrator
- Voldřich, M.; Sázavská primary school, Director

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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, Czech Republic.

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.

