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

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PREFACE

Policy context

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

Information and Communication Technologies, and related policies, play a key role in achieving the goals of the Lisbon strategy. In 2005, the new strategic framework for Information Society policy - i2010[2] - 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 learning[3] 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 Programme[4] and the Lifelong Learning Programme[5] 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

IPTS[6] has been researching IS developments in acceding countries[7] 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 States[9] 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

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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

face, the lessons other member states may learn from them, and the related policy options. National experts from each country gathered the relevant qualitative and quantitative data for analysis, in order to develop a meaningful assessment of each country's current state, and trajectory, and to find out the main factors. This allowed them to derive the relevant conclusions in terms of policy and research.

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

In addition to national monographs describing eGoverment, 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 Cyprus

This report was produced by the Department of Computer Science at the University of Cyprus, the consortium member from Cyprus, and it presents the results of the research on eLearning in Cyprus.

First, the report describes Cyprus'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 Cyprus, 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 education[10] (schools and higher education), the use of ICT in training and learning at the workplace (professional education), the use of ICT in non-formal[11] education (including re-skilling and training for jobseekers) and the use of ICT in everyday life (digital literacy/digital competences and informal learning[12]).

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).

TABLE OF CONTENTS

ACKNOWLEDGEMENTS **3**

PREFACE **4**

EXECUTIVE SUMMARY **11**

INTRODUCTION **15**

General data 15
Economic situation 15
Population developments 19
Major education indicators 20
General ICT usage indicators 21

I. CURRENT EDUCATIONAL SYSTEM AS THE PLACE OF ELEARNING **23**

I.1 Description of the current education and training system 23
I.2 Place of eLearning in the educational system 30
I.3 ICT skills and attitudes towards ICT usage 32

II. OVERVIEW OF ELEARNING IN CYPRUS **35**

II.1 Institutional structures and resources for eLearning 35
II.2 Strategies, policies, action plans and projects 42
II.3 The legal framework supporting eLearning 48
II.4 Dedicated ICT infrastructures and applications 49
II.5 eLearning services 50
II.6 Specific issues and solutions 52
II.7 Acceptance and usage of eLearning services 53
II.8 Impacts of eLearning developments 54

III. ASSESSMENT OF THE STATE AND DEVELOPMENTS OF ELEARNING **57**

III.1 Current main achievements and shortcomings 57
III.2 Factors behind the existing developments 59
III.3 Drivers and barriers for future eLearning in Cyprus 61

IV. ANALYSIS OF POLICY OPTIONS **63**

IV.1 The most important policy options in Cyprus 63
IV.2 Suggested policy measures 64

V. MAJOR R&D CHALLENGES FOR ELEARNING **69**

V.1 Educational reform challenges 69
V.2 Technological challenges 70
V.3 Financing challenges concerning the funding of eLearning 70

BIBLIOGRAPHY **73**

List of Tables

Table 1: Key Macroeconomic Indicators 16
Table 2: Selected Fiscal and Government Debt Indicators 17
Table 3: Funds allocated for R&D during the period 2004-2006 19
Table 4: Age-specific demographic trends (end of year population estimates for government-controlled area) 20
Table 5: Key education indicators for Cyprus 21
Table 6: Public expenditure on education 21
Table 7: Percentage of population aged 24-64 participating by kind of education 28
Table 8: eLearning usage 31
Table 9: Take up of internet services (as % of population) 32
Table 10: Public eServices provision 33
Table 11: eGovernment service provision 33
Table 12: ICT equipment in Cypriot schools 2006 50
Table 13: Teachers using ICT (2006) 53
Table 14: Internet usage for educational purposes (2005) 54

List of Figures

Figure 1. Map of Cyprus 15
Figure 2. The educational system in Cyprus 24

List of Abbreviations

2D/3D	2nd Generations / 3rd Generation
ADSL	Asymmetric Digital Subscriber Line
ATM	Asynchronous Transfer Mode
BEPG	Broad Economic Policy Guidelines
CAPA	Cyprus Academy of Public Administration
CIIM	Cyprus International Institute of Management
CIP	Community Initiative Program
CMS	Content Management System
CUT	Cyprus University of Technology
CPC	Cyprus Productivity Centre
CVT	Continuing Vocational Training
CY	Cyprus
CYSTAT	Cyprus Statistics Department
CYTA	Cyprus Telecommunication Authority
DSL	Digital Subscriber Line
EC	European Commission
ECDL	European Computer Driving Licence
EDIPED	European Digital Portfolio for the Evaluation of Educators
EES	European Employment Strategy
ENQA	European Association for Quality Assurance in Higher Education
EIS	European Innovation Scoreboard
ERP	Enterprise Resource Planning
ETSI	European Telecommunications Standards Institute
EU	European Union
EUREKA	Pan-European Network for Market-oriented, industrial R&D
FDI	Foreign Direct Investment
FP6	6th Framework Place
FWA	Fixed Wireless Access
GDN	Government Data Network
GDP	Gross Domestic Product
GIN	Government Internet / Intranet and Extranet
GPRS	General Packet Radio Service
GSM	Global System for Mobile Communications
HPCI	Harmonized Consumer Price Index
HRDA	Human Resource Development Authority
HTI	Higher Technical Institute
ICT	Information and Communication Technology
IST	Information Society Technologies
IS	Information Society
IT	Information Technology
ISDN	Integrated Services Digital Network
LEM	Lykeion Epilogis Mathimation (General Lykeio)
LLL	Life Long Learning
LMS	Learning Management System
MBA	Master in Business Administration
MIM	Mediterranean Institute of Management
MLSI	Ministry of Labour and Social Insurance
MoEC	Ministry of Education and Culture
M.Ph.	Master in Philosophy
MPSM	Master in Public Sector Management
MSc	Master in Science
MTBF	A medium-Term Budgetary Framework
MTTE	Master in Tourism and Environmental Economics

NAP	National Action Plan
NRP	National Reform Programme
OUC	Open University of Cyprus
PAPS	Public Administration and Personnel Service
PC	Personal Computer
PENEK	Program for supporting young researchers
PES	Public Employment Services
PPP	Public Private Partnerships
PPS	Purchasing Power Standards
PSI	Public Sector Information
R&D	Research and Development
RPF	Research Promotion Foundation
RTD	Research & Technological Development
TVE	Technical and Vocational Education
S&E	Science & Engineering
SEKAP	Council of Educational Assessment and Accreditation
SME	Small Medium Enterprise
STVE	Secondary Technical and Vocational Education
TETRA	Wireless Network that is based on ETSI standard
UASA	University of Applied Sciences and Arts
UMTS	Universal Mobile Telecommunications System
UCY	University of Cyprus
UK	United Kingdom
UN	United Nations
VET	Vocational Education and Training

EXECUTIVE SUMMARY

Cyprus is a functioning market economy with sufficient macroeconomic stability. In Cyprus, per capita income in PPS was equivalent to 90.6% of the EU25 average in 2007. The good performance of the economy of Cyprus during recent years contributed to the integration of Cyprus into the Euro area from 1 January 2008. Real GDP growth reached 3.8% in 2006 and 4.6% in the third quarter of 2007.[13] Cyprus' economy is supported by a workforce that is relatively flexible in terms of labour market regulation, and has an unemployment rate that has rarely exceeded 3.5% over the last 20 years.

Over the last few years there has been noteworthy progress towards the utilization of the opportunities offered by Information Society (IS) in Cyprus. According to Eurostat's selected basic indicators in 2006, the increase in Internet access in households in Cyprus was 36.7%, while in enterprises it was 86.2%, as compared to the related EU25 figures of 51% and 93% respectively. Nevertheless, only 12.5% of households and 54.6% of enterprises in Cyprus have broadband connection as compared to EU25 figures of 32% and 74% respectively. Similarly, only 29.2% of individuals used the internet regularly in 2006, as compared to the EU25 figure of 46.7% in the same year. Also, only 12.7% of individuals and 44.3% of enterprises used online public services in 2006. Both these figures are visibly below the respective EU25 figures of 23.8% and 63.7%. It can be concluded that despite noteworthy growth in 2006, Cyprus is still considerably below the EU25 average for some IS indicators.

According to a comparable measure of digital literacy, the average Cypriot citizen is significantly less digitally literate than the average citizen of the EU25.[14] This particular problem in Cyprus is more intense in the 25 to 54 age group, in which 53% lack basic skills, as compared to an average of 29% of the EU25 in 2005.

Currently, almost all primary and secondary schools in Cyprus have computers and Internet access. The use of computers in classrooms reached 89% in 2006, as compared to the EU27 average of 68%. There is one computer for 12.4 pupils, as compared to the EU27 average of one computer for 9 students.[15] However, there is a large variation between school types regarding the sophistication of the ICT infrastructure provided. Only 14% of primary schools have broadband Internet connection, while penetration is 73% in upper secondary schools, and 85% in vocational schools. There is also a considerable variation between urban and rural areas in broadband access: 41% of schools in densely populated areas have broadband access, compared to 21% of schools in thinly populated areas. On top of this, only 51% of schools have a website, 49% offer e-mail to teachers, and only a very few schools (7%) to pupils. Furthermore, current ICT infrastructure does not provide interconnections among all different schools.

When compared to other European countries Cyprus still has quite a way to go to fully exploit the potential of eLearning. At the primary and secondary educational level, eLearning is mostly associated with the improvement of the ICT infrastructure, i.e. indicators of student access to PCs and Internet penetration. Even though there is a general effort to promote ICT at all levels of education as a tool in the teaching process, learning provision is still based on rather traditional techniques. Nevertheless, a Learning Management System (LMS), i.e. the use of a platform at public schools that enables communication between teachers, students and parents, was launched as a pilot in September 2007, and its implementation in all schools is expected to be completed in 2009 (Cyprus Ministry of Education and Culture, 2007). Private schools use ICT to help students in their use of the Internet for searching and delivering information, using specific learning applications and supporting self-

13 Ministry of Finance, National Reform Programme of Cyprus, Progress Report, 2007

14 Commission Staff Working Document, Progress towards the Lisbon objectives in education and training, Indicators and benchmarks, 2007

15. Use of Computers and the Internet in Schools in Europe 2006, Country Brief: Cyprus, Empirica, 2006

directed learning, but there is no observable on-line learning activity in these schools. At the higher education level, different institutions have their own ICT infrastructures for the provision of web-based courses and online libraries. The Open University of Cyprus uses web-based courses mostly as a lifelong learning opportunity for adults. However, the use of web-based LMS and content management is almost non-existent in higher education institutions. Moreover, there is a low level of cooperation between individual universities regarding the implementation of eLearning solutions and exchange of educational contents. In the private sector, mostly large enterprises, specifically those with an international profile like banks and information technology companies, make use of eLearning applications for training and supporting the learning needs of their staff.

The demand for the use of Internet for educational purposes in Cyprus, especially in higher education, has been growing over the last few years, and has almost reached the EU25 average. 9% of Internet users use it for formalised educational activities. At primary and secondary educational levels, the usage of ICT-supported learning in traditional education depends mainly on whether the educators have the ICT skills needed and are willing to take advantage of ICT tools. In 2006, 25% of teachers in Cyprus did not use computers in class.[16] Moreover, many teachers are sceptical about the idea of learning on the Internet, because they see human interaction as an essential part of the study process, and feel that eLearning in some way diminishes this factor (Cyprus Ministry of Education and Culture, 2006).

The first comprehensive government policy relating to Information Society was the *Information Systems Strategy* of *1998.* This aimed to improve the public administration through the effective use of information technology. Cyprus has successfully achieved many of the objectives of eEurope 2002 (i.e. to increase Internet penetration, provide a telecom framework, and ensure low Internet costs). Regarding eLearning, Cyprus has defined its main national eEurope 2005 objectives as the provision of computer literacy and Information Society skills for all citizens and the exploitation of the potential of ICT for enriching and extending learning across all curricula. These objectives have been only partially achieved. To rectify this, the Cyprus *Strategic Development Plan 2007-2013* puts strong emphasis on the upgrading of education infrastructure and also on the elaboration of a comprehensive lifelong learning strategy. As regards funding, one of the most influential strategies for education has been the *National Strategic Reference Framework for Cohesion Policy (from March 2007- 2013)*. This presents the development strategy framework for the utilisation of the Structural and Cohesion Funds for the period 2007-2013, in which the promotion and improvement of eLearning and lifelong learning opportunities are given high priority.

eLearning take-up has been supported, above all, by sound macroeconomic stability which has influenced the purchasing power of both households and enterprises and also by the fact that education has been a policy priority for the last few years. In 2008, funding for education was increased by 28.1%, making it the largest area of government expenditure. One of the actions this funding will be used for is to reinforce the reform of educational processes to make use of ICT. Another achievement over the last few years in the area of eLearning, apart from the integration of ICT in education at all levels, has been the training of secondary general and vocational education teachers, with a view to encouraging the acquisition of basic ICT skills and their use in the educational process. Moreover, the reconstruction of the National Curriculum has been suggested (Ministry of Education and Culture, 2006) at the level of objectives and activities, in order to promote the use of ICT in the educational process. With respect to the government priority defined in the National Lisbon Programme of reinforcing higher level education locally, an important achievement was the establishment of two new public universities which became operational in 2005 and 2007 respectively.

While Cyprus may present various specific achievements in eLearning, there are several general shortcomings. A critical shortcoming is that eLearning is not incorporated in the overall education reform at different levels of education. Moreover, a comprehensive approach to the development of

[16] Benchmarking Access and Use of ICT in European Schools, Empirica, 2006

ICT in education is lacking – in particular, there is no consensus as to the role of ICT at different educational levels. Additionally, there is no clearly defined eLearning strategy and the few existing eLearning plans are scattered among broad development, IS and education policies. Furthermore there is no committed owner of eLearning policy and the collaboration and coordination among the different related stakeholders needs improvement. Another shortcoming is the fact that, even though there has been a constant increase of the education expenditure in the last years, no specific budget has been allocated to eLearning development. Additionally, R&D expenditure is mainly carried out by the public sector, without substantial participation of the private sector.

In Cyprus, ICT has been mostly regarded as a means of improving the quality of traditional learning methods and not as a means of supporting the creation and use of new ICT-based learning styles. There is a need for policy reform to promote a stronger integration of ICT in education in Cyprus in a way that empowers a future educational model based on innovative ICT-based learning methodologies and processes in order to bring education in Cyprus in line with related EU educational directives. There is also a need to define schemes to assess the quality of teacher training in the use of ICT in teaching. The goal of these schemes would be to improve teachers' skills in providing ICT-related teaching to students. Furthermore, evaluation criteria should be defined to measure the effectiveness of the use of ICT and eLearning in the curriculum up to lyceum level. Finally, there is a need for a specific eLearning strategy based on the specific characteristics and needs of the Cypriot economy and this strategy should be promoted at all levels of society.

In order to foster the successful implementation of the above policy options, specific measures need to be considered like: the definition of a model ensuring financial resources for eLearning developments, including the development of funding mechanisms to increase investment from the private sector, households and individuals. Furthermore, R&D and ICT expenditure needs to be increased, including financial resources for eLearning implementation. Other important measures include the further upgrading of the ICT infrastructure to interconnect all the different schools and the enhancement of the broadband infrastructure to cover both the urban and rural areas. Further measures concern the increase of eLearning services at all educational levels, the production of electronic content for all curriculum subjects and the assignment of a committee, made up of representatives of the competent authorities, as the body responsible for eLearning developments.

One of the main R&D challenges, that need to be addressed regarding the development of eLearning in Cyprus, is how to incorporate eLearning in the overall educational reform in order to improve the quality of the traditional learning processes. Another critical issue is the exploration and implementation of new related learning approaches, where the challenge will be to find ways to promote an eLearning culture among students, teachers and principals, which would support eLearning expansion. An important aspect is the assessment of the appropriateness/sufficiency of the ICT infrastructures in enabling new ICT-facilitated approaches for learning at all educational levels and for different subjects. An important technological challenge is how to ensure the interoperability of eLearning services between different educational levels and the private sector and also how to set up efficient ICT networks among schools for the exchange of web-based courses and education practices, among others. Important financing challenges are related to the: i) sustainability of public finances guaranteeing long term financial resources for eLearning development; ii) evaluation and benchmarking of the overall outcomes of eServices, including eLearning; iii) establishment of Public Private Partnerships to fund eServices and iv) definition of business models for producing eLearning content.

INTRODUCTION

General data

Figure 1. Map of Cyprus[17]

Capital:	Nicosia
Surface area:	9 251 sq. km
Population:	784 301 by year 2006
GDP per capita, CYP:	10 870 by year 2006
GDP growth rate:	3.8% by year 2006
GDP per capita in PPS, EUR:	19 269 (2006)
Inflation rate:	2.3% by year 2006
Government debt/GDP:	65.3% (2006)
Unemployment rate:	4.5% by year 2006
Public balance (government deficit or surplus/GDP): -1.2% (2006)	

Economic situation

Cyprus (see Figure 1) has an open, free-market, service-based economy, that developed step by step over the years into a modern economy, with dynamic services, industrial and agricultural sectors and advanced physical and social infrastructure.

Macroeconomic Aspects

The good performance of the economy (see Table 1) of Cyprus during the last years, in spite of a challenging external environment, has resulted to the integration of Cyprus into the Euro area from 1.1.2008. These achievements validate Cyprus' Government economic policies during recent years, enabling Cyprus to meet all necessary preconditions for a successful accession to the Eurozone. Cyprus per capita income, in purchasing parity standards (PPS), is equivalent to 90.6% of the EU-25 average in 2007, rising from 85.6% in 2002.[18] Real GDP growth reached 3.8% in 2006 despite the escalating tendency of oil prices, with private consumption and the export of services being the main

[17] Commonwealth Local Government Forum, 2006.
[18] Source: Ministry of Finance, GDP per capita in the EU-25 July 2007.

driving forces. However, the susceptibility of the economy to external shocks has been evident in the volatility of exports, which, in large part, are due to the impact from tourism.

Table 1: Key Macroeconomic Indicators

% annual change	1995-2004	2005	2006	2007 (proj.)
GDP	3.7	3.9	3.8	3.9
HCPI	2.8	2.6	2.3	2.0
Unemployment Rate	3.8	5.3	4.5	4.3
Employment Growth	1.8 (1996-2004)	3.0	2.7	1.5
Nominal Earnings	5.7	5.4	5.5	4.1
Productivity growth	1.6	1.7	1.5	2.4
Current Account Balance (as % of GDP)	-3.7 (1996-2004)	-5.6	-5.9	-6.1

Source: National Reform Programme of Cyprus, Progress Report, 2007

Inflation, as measured by the Harmonised Consumer Price Index (HCPI), has remained relatively low, with HCPI expected to decline further, to 2% in 2007, from 2.6% in 2005 and 2.3% in 2006. HCPI core inflation (excluding volatile items) in 2007 is expected to remain subdued, at 2.2%.

Employment creation was robust, exhibiting a growth rate of above 2% per annum in most recent years. Labour market conditions remained tight, with the unemployment rate, based on the labour force survey, declining to 4.5% of the labour force, in 2006. The unemployment rate is expected to decline further to 4.3% in 2007.

Increases in nominal earnings are expected to decrease to 4.1% in 2007 compared to an averaged 5.7% over the 1995-2006 period, reflecting tight labour market conditions. With labour productivity growth being modest, unit labour costs expanded at an annual rate of 4% over the same period, adversely affecting competitiveness, in particular in labour intensive activities and inducing a reallocation of productive resources to less labour intensive activities. However significant sectoral differences have been observed. The rapidly rising number of foreign and Turkish-Cypriot workers has exerted a dampening effect on wages, which is reflected in the moderation of earning increases of 4.1% compared to 5.5% so far. The moderation trend is expected to become more pronounced in the coming years.[19]

The fiscal consolidation programme has been central to the successful efforts of the Government to bring about economic stabilization. Indeed, fiscal consolidation has been the cornerstone of the Convergence Programmes and its effective implementation contributed to the positive decision of the European Council for the accession of Cyprus in the Eurozone in 1.1.2008. The general government balance improved considerably over the period 2003-2006 which brought the deficit below the reference value in a sustainable and credible manner. The improvement of the general government balance is also reflected in the structural balance whereby, the structural deficit of 5% of GDP in 2003 was reduced to approximately 1% in 2006. The improved outcome for the public finances is also reflected in the general government debt where the former upward trend was. The consolidation of the public finances is mainly due to the acceleration of GDP growth, particularly of the banking, international and property sectors impacting favourably on revenue performance and to the lower growth of government expenditure (see table 2).

[19] Source: Ministry of Finance, National Reform Programme of Cyprus, Progress Report 2007.

Table 2: Selected Fiscal and Government Debt Indicators

In percent of GDP	2003	2004	2005	2006	2007 (est.)	2008 (proj.)	2009 (proj.)	2010 (proj.)
Government revenue	38.8	38.8	41.2	42.4	43.0	43.1	43.7	43.6
Government current expenditure	41.1	38.7	40.0	40.0	40.3	40.0	40.2	40.1
Interest payments	3.4	3.3	3.4	3.3	3.2	3.1	2.9	2.8
Government capital expenditure	4.0	4.2	3.6	3.9	3.7	3.6	3.6	3.6
Overall budget balance	-6.3	-4.1	-2.3	-1.5	-1.0	-0.5	-0.1	-0.1
Primary balance	-2.9	-0.8	1.1	1.7	2.2	2.6	2.8	2.7
Government debt	69.1	70.4	69.2	65.3	61.0	52.9	49.4	47.0

Source: National Reform Programme of Cyprus, Progress Report, 2007

While the fiscal deficit has been reduced significantly, the current account deficit increased to 5.9% in 2006. Transitory as well as more structural reasons are behind the moderately high current account deficit. Rising oil prices have caused imports of oil-related products to be significantly higher. In addition, higher investment and related imports of capital goods and materials have raised the underlying current account deficit. While the transitory factors will dissipate in the medium term, the process of real convergence will tend to maintain the current account deficit at somewhat modest levels, which can however be financed by non-debt creating flows (net foreign direct investments in 2006 accounted for 4.7% of GDP), in particular if there is success in the efforts to boost productivity and enhance competitiveness. The current account deficit is expected to remain at around 6% of GDP in 2007.

Growth is expected to remain close to potential, of around 4%, in the next years amid buoyant private consumption and continued strong appetite for new homes among non-residents, the high investment of capital goods and materials, and the rapid credit expansion. The growth outlook remains subject to a number of risks however. Most important are the potential effects of higher oil prices, with Cyprus dependent on oil imports for its energy needs, the rate of growth in the rest of the EU, the primary market for Cypriot exports of goods and services and the deterioration of competitiveness due to the continued appreciation of euro against the most major currencies. Cyprus' economy is also relatively small and undiversified, which increases the risk of sector specific shocks. Tourism, which accounts for around 20% of GDP, is vulnerable to regional geopolitical events and increasing competition from cheaper Mediterranean destinations.[20]

In the longer term and following the adoption of the euro, the primary challenge will be to maintain economic competitiveness. The absence of national interest and exchange rate policies after the euro adoption underscores the need for the strengthening of the role of sound macroeconomic policies for providing conditions of price stability. Key to addressing the competitiveness issue will be the implementation of structural reforms associated with EU's Lisbon Agenda.

One of the main macroeconomic challenges identified by the Cyprus government is to improve the quality of public finances via a redirection of public expenditure. A measure undertaken related to this challenge is that the budgetary process for 2008 required all ministries to provide forecasts on their expenditure needs for 2009 and 2010 as well. These forecasts were distinguished between current obligations and future needs. The additional available resources were allocated to the areas with high priority. The main areas that exhibit a marginal or no growth are agriculture, security and defence, transportation and public administration. In contrast to the above the areas which exhibit high rates of growth compared to the budget amount of 2007 are, education expenditure with an increase of 28.1%,

[20] Source: Ministry of Finance, Stability Programme 2007-2011.

health expenditure with an increase of 13.5%, labour with an increase of 7.8% and research and development with an increase of 4.9%.

Microeconomic aspects

A main characteristic of the economy of Cyprus is the upward trend in the contribution of the tertiary sectors of services to GDP and employment, at the expense of both the primary and the secondary sector.

In the period from the Turkish invasion in 1974 until the early 1990s increasing resources were channelled to the tourism sector. The hotels and restaurants sector's share of GDP rose throughout the 1980s (3.6% in 1980, 10.6% in 1990). During the 1990s and over the first five years of the new century, however, the sector exhibited fluctuations, and its share to production was contained to 7.1% of GDP in 2006, confirming its vulnerability to exogenous and imponderable factors. It is noted, that there is a dependency, to a certain extent, of the economy on the broader sector of tourism, whose medium- and long-term prospects will depend, to a decisive extent, on the further success of the efforts for upgrading and enriching the tourist services.

The remaining tertiary sector of services, exhibits a strong dynamism, reflected in high rates of growth, an increase in its share to GDP and an expansion of its share in international markets. This development is attributed to the comparative advantages that Cyprus possesses in these sectors, which can be further utilized during the coming years. In this context, the accession of Cyprus to the EU and particularly the safeguarding of the right of establishment and the freedom to provide services create additional opportunities through the unhindered access of Cypriot services to the large internal market of the EU.

The prospects in the sectors of business services, private tertiary education and health, financial services, shipping, trade and telecommunications seem particularly favourable, especially if production focuses on high quality services. Indeed, with the dynamism of these segments of the services' sectors, the share of private services value added, excluding restaurants and hotels, in GDP rose to nearly 50% in 2006 compared with less than 48% in 2002.

In contrast to the increasing share of the services sectors, the agricultural sector's share to GDP has been declining (10% in 1980, 7.1% in 1990 and 3.1% in 2006). Particular restraining factors constituted the Turkish invasion and occupation of a significant percentage of its fertile land, the chronic scarcity of water for irrigation, as well as the small size of the agricultural units, hindering the utilization of modern methods of production and the exploitation of economies of scale.[21]

Another sector that exhibits a fall in its share to GDP since the early 1980s is that of manufacturing (18.2% in 1980, 14.7% in 1990, 8.5% in 2006), which is marked by problems of competitiveness, with the concentration of production on low value added activities, where quality, design, innovation and the level of specialization is low. A positive development in the sector constitutes the dynamism exhibited by certain sub-sectors such as pharmaceuticals, but also by manufacturing units in traditional sub-sectors, giving emphasis to the production of advanced technology and knowledge intensive products.

R&D Investment

R&D expenditure as a percentage of GDP increased to 0.5% in 2006 as compared to 0.41% in 2005 and 0.37% in 2004 which is a positive sign towards the target set by the government in the March 2006 European Council for increasing R&D to 1% of GDP in 2010.[22] Although this figure is among the lowest in the EU-25, Cyprus has on average one of the highest annual growth rates of R&D expenditure in the 5-year-period 2001-2005, which reaches 11% (Eurostat, 2006). Despite the high

[21] Source: Ministry of Finance, Convergence Programme of the Republic of Cyprus 2006-2010.
[22] Cyprus Statistical Services, 2007

rate of increase the share of the GDP of Cyprus devoted to R&D activities continues to be low as compared to the EU average of 1.84% in 2005.

About 45.3% of R&D in 2005 was financed from government funds, as compared to 43.8% in 2004. The contribution of industry to R&D expenditure was only 17% in 2005 as compared to 19% in 2004, which is well below the target set in Barcelona 2002 (two-thirds of R&D expenditure should be privately funded).

The need to further increase R&D investment is one of the main priorities cited in the Cyprus National Reform Plan 2007. The aim is to reach 0.65% of GDP in R&D investment by 2008.[23] This will be achieved through a policy mix which focuses on boosting the country's scientific base and developing human resources. The programme also envisages increasing private R&D with the creation of innovation poles, along with 'business incubators' to help emerging companies survive and grow during the start-up period.

As per the allocation of funds of 2004 to 2006 (Table 3), registering an 18% average annual growth of R&D expenditure, it can be extracted that Cyprus is on good track of the ambitious target set for increasing R&D expenditure to 1% of GDP by 2010. It is planned that Structural Funds will finance the largest part of the Research Promotion Foundation (RPF) Framework Programme 2007-2010. An important contribution to the target set, is also expected through funds raising from the EU Framework Programme for Research and Technological Development (FP7) 2007-2013, based on the success of Cypriot researchers in the previous two EU Framework Programmes, where the funds absorbed were 20m Euro in FP5 and 27m Euro in FP6.

Table 3: Funds allocated for R&D during the period 2004-2006

	2004	**2005**	**2006**
Total Amount of Financing (mEuro)	6.1	6.6	11.2

Source: National Reform Programme, Progress Report 2007.

There was an increase of the number of persons engaged in R&D activities from 2235 in 2004 to 2470 in 2005. In full-time equivalent terms, this number is estimated at 1157 persons, of which 442 or 38.2% were women. Of these persons, 25.1% were holders of PhD level degrees. Progress was also observed in the number of full-time researchers, which was increased to 1157 in 2005 from 1017 in 2004, that is an annual increase of 11%.

Population developments

Based on the demographic projections prepared by the Cyprus Statistical Services until 2027 (see table 4), the population in the government-controlled area is expected to reach 845500 by 2027 compared to 784301 in 2006 (Cyprus Statistical Services, 2006). The population over 60 years of age is estimated to reach 25.8% in 2027 in comparison to 16.7% in 2005. The above data indicates the ageing effect on the population which will affect the labour force supply. The low fertility rate (1.4 in 2005) is expected to gradually aggravate the existing labour shortages and bottlenecks.

In the light of the development dynamics of the economy in conditions of full employment, but also in view of the population ageing trends, the need to increase participation in the labour market, especially of target groups that are lagging behind, such as women and older workers, becomes a central challenge for Cyprus. Moreover, further promotion and improvement of continuing training activities is expected to contribute to the adaptation and improvement of the knowledge and skills of the labour force and to productivity increases.

[23] Ministry of Finance, 2007

***Table 4**: Age-specific demographic trends (end of year population estimates for government-controlled area)*

Age Group	2004 (%)	2005 (%)	2027 (%)
0-24	35.0	34.2	24.3
25-29	48.5	49.1	49.9
60+	16.5	16.7	25.8
Total	749.2	766.4	845.5

Source: Cyprus Statistical Services, 2006

Major education indicators

The five European reference levels of European average performance in education and training (Benchmarks) are seriously taken into account by the Cyprus government and an Action Plan is in the process of being developed by officials of the MoEC in order to accelerate progress as to their achievement

As regards the target set by the European Council of 85% of 22 year olds completing upper secondary education in 2010, Cyprus seems to be on the right track with a percentage of 79.1% in 2006, which is higher than the corresponding EU average of 77.8%. It must also be noted that a gap exists between the completion rates of nationals (83.7% as per Cyprus Statistical Services) and non-nationals (70.6% as per Eurostat LFS) estimations. According to the Cyprus government this is attributed to the fact that the calculated Eurostat rate does not consider the number of Cypriot students leaving Cyprus before the age of 22 and completing upper secondary education abroad, mainly in Greece.

There has been constant improvement as regards early school leavers, but faster progress is needed in order to achieve the Lisbon target of 10% by 2010. The percentage of early school leavers, in Cyprus, has fluctuated around 16-20% in 2000-2006. In 2006, the percentage of early school leavers decreased to 16% as per Eurostat LFS. Cypriot students abroad and soldiers aged 18-20 are not included in the LFS sample, while temporary foreign workers usually of low educational attainment are included.

Considering the benchmark adopted by the European Council, that the percentage of low-achieving in reading literacy in the European Union should have decreased by at least 20% compared to the year 2000, no comparable PISA data exists for Cyprus, due to the fact that Cyprus does not participate in the PISA study. However, new data will be available by December 2007.[24]

Participation in lifelong learning (see table 5) showed a positive trend until 2005, but this may have been overstated given breaks in national series. Cyprus has a 7.1% lifelong learning participation rate in 2006 based on Eurostat LFS as compared to the related 9.6% of EU-25[25] and is far from the Lisbon target of 12.5% of the adult working age population (25- 64 age group).

According to Eurostat, the MST graduates per 1000 population (aged 20-29) in Cyprus for 2005 was 3.6% with female graduates reaching at 38.1%. The corresponding figures for EU-27 were 13.1% and 31.2% respectively.

Regarding the gender balance in MST graduates Cyprus is one of the NMS countries that showed the biggest increase for the period 2000 to 2005, from 31.0% to 38.1% respectively. At EU level the female share of MST graduates increased slightly, from 30.8% in 2000 to 31.2% in 2005.
Despite the general positive trend, Cyprus showed a considerable decrease (-5% and more) in the numbers of graduates (in 1000). The number of graduates (in 1000) was fluctuated from 0.3% in 2000 to 0.5% in 2004 and 0.4% in 2006. It has to be mentioned though that over half of the total number of

[24] Source: Implementing the Education and Training 2010 Programme, 2005 Programme Report.
[25] Progress towards the Lisbon Objectives in Education and Training, Indicators and Benchmarks, 2007.

Cypriot tertiary students study abroad. However, there is an increase of tertiary MST students from 1.8% in 2000, to 3.5% in 2004 and further increase to 3.6% in 2006.

Table 5**: **Key education indicators for Cyprus

	2001	2002	2003	2004	2005	2006	2006 (EU-25)
Early School Leavers	17.9	15.9	17.4	20.6	18.2	16.0	15.1
Upper Sacondary Educational Attainment (20-24)	80.5	83.5	79.5	77.6	80.4	83.7	77.8
Lifelong learning (25-64)	3.4	3.7	7.9	5.9	5.9	7.1	9.6

Source: Cyprus Statistical Services, 2007

According to Cyprus Statistical Services the percentage of people in 2006 aged 20 and over who have completed in 2006 university or university-like (tertiary-level) education was 27% of the population, while the corresponding EU-25 highest amounted to 35% which is noted in only 17 EU regions including among others capitals such as Brussels, London, Paris, Helsinki, Madrid and Amsterdam. There is a strong cultural trend among the Cypriot population in favour of general secondary education followed by higher education. Family plays a significant influence in encouraging and supporting young people to continue with higher education. A large proportion of young persons that continue in higher education are enrolled in education institutions abroad. High education attainment is also enhanced by economic reasons, as tertiary education graduates usually receive higher remuneration.

The relative share of educational costs in GDP has been increasing over the years. Public expenditure on education (see table 6) has increased from 3.9% of the GDP in 1990 to 8.6% in 2006 and is relative high compared with the EU-25 average of 5.21%. In 2007 education has been allocated the highest expenditure among the other domains for 2008 with an increase of 28.1%.[26]

Table 6**: **Public expenditure on education

as % of GDP	2003	2004	2005	2006
	7.4	6.9	7.0	8.6

Source: Cyprus Statistical Services, 2007

General ICT usage indicators

During the last year there was noteworthy progress towards the utilization of the opportunities offered by the IS. According to Eurostat's selected basic indicators, the progress made is reflected in the following:

- *Increase in internet access from both households and enterprises*. Specifically, internet access from households was 36.7% in 2006 as compared with 31.7% in 2005, whilst in enterprises the respective percentage was 86.2% in 2006 and 84.6% in 2005. The EU-25 respective figures for 2006 with regards to households was 51% and for enterprises 93%.
- *Significant increase in broadband connection from both households and enterprises.* For households, the indicator increased from 4.5% in 2005 to 12.5% in 2006, whilst the respective increase for enterprises was from 40% in 2005 to 54.6% in 2006. The EU-25 respective figures for 2006 were 32% and 74% respectively, which means that regarding broadband connections Cyprus is still well below the EU-25 average.
- *Slight increase in the regular use of internet by individuals* from 26.2% in 2005 to 29.2% in 2006, while for the same year the corresponding figure for EU-25 was 46.7%.

[26] National Lisbon Programme, 2007

- *Improvement in the use of online public services both by individuals and enterprises*. Indicatively, the percentage of individuals who used online public services in 2006 increased to 12.7% from 11.4% in 2005, whilst the respective percentage for enterprises increased from 39.5% in 2005 to 44.3% in 2006. Compared to EU-25 in 2006 with regards to individuals the figure was 23.8% while for enterprises 63.7%.

It can be concluded that despite the noteworthy growth in 2006, Cyprus is still among the lowest performers in Europe in IS with a great negative deviation as observed between national and European statistics. The latter leads to the conclusion that the rate of the sector's improvement in Cyprus, is much lower than that of Europe, hence there remains a vast potential for higher utilization of the opportunities offered by information society.

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

The purpose of this chapter is to give a background on the E&T system[27] and information about the structure, major problems and issues of eLearning in Cyprus. It will address the following major issues:

- Description of the current education and training system;
- Place of eLearning in educational system;
- ICT skills and attitudes towards ICT usage.

I.1 Description of the current education and training system

The public educational system in Cyprus is highly centralized with head-masters and teachers appointed, transferred and promoted by the Educational Service Commission, an independent five-member body, appointed for a six year period by the President of the Republic. The MoEC is responsible for the enforcement of educational laws and the preparation of educational legislation. It prescribes syllabuses, curricula and textbooks. The construction, maintenance and equipment of school buildings are the responsibility of school committees under the supervision of the Technical Services of the MoEC. In urban areas these committees are appointed by the Council of Ministers, while in rural areas are elected by the communities. Private schools are owned and administered by private individuals or bodies but are liable to supervision by the Ministry of Education. A number of private schools are run on a non-profit basis.

The education system in Cyprus (see fig. 2 below) is divided into the following educational levels:[28]

- **Basic level – primary school and gymnasium cycle**
  The basic level lasts for 9 years and comprises primary education. It constitutes the primary school (Dimotiko scholio), of 6 years duration, and the lower secondary level, taking place in the gymnasium, of 3 years duration. At the end of the gymnasium, they receive a certificate. Education at this level is compulsory, requiring no entrance admissions and is free of charge. Most students in primary and secondary education (86.2% in 2006) attend public-sector schools, which are set up and funded by the government. The rest attend private-sector schools, which are mainly self-funded. The gymnasium offers all pupils a basic general education. Specifically the main educational objectives at gymnasium level are to enable pupils to broaden their traditional value system.
- **Public upper secondary level – Lykeio and technical cycle**
  Upper secondary education lasts for 3 years, for students at the ages from 15 to 18. There are two types of upper secondary school, namely, the unified lyceum (eniaio lykeio) and technical and vocational schools (technikes kai epaggelmatikes scholes), respectively.

The eniaio lykeio is a comprehensive Upper Secondary School with the aim of meeting growing demands for mobility and flexibility where the emphasis is on learning mechanisms, research, knowledge of foreign languages, exploitation of the *new information technology*, and preparation for lifelong learning.

The Technical and Vocational schools provide two major directions of upper secondary education. One is the technical (theoretical) and the other is the vocational (practical). The technical schools

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[27] The chapter will use the publications and data of the information network "Eurydice"[27] besides other sources (such as the EU Education and Training 2010 benchmarking results: http://europa.eu.int/comm/education/index_en.html, and the Ministry of Education and Culture, annual report: http://www.moec.gov.cy/).

[28] http://www.moec.gov.cy/

curriculum concentrates on general education subjects with technical subjects, giving emphasis to the acquisition of general skills and abilities and it is enriched with new topics that reflect new technological trends (like ICT) and the emerging need of the Cyprus economy.

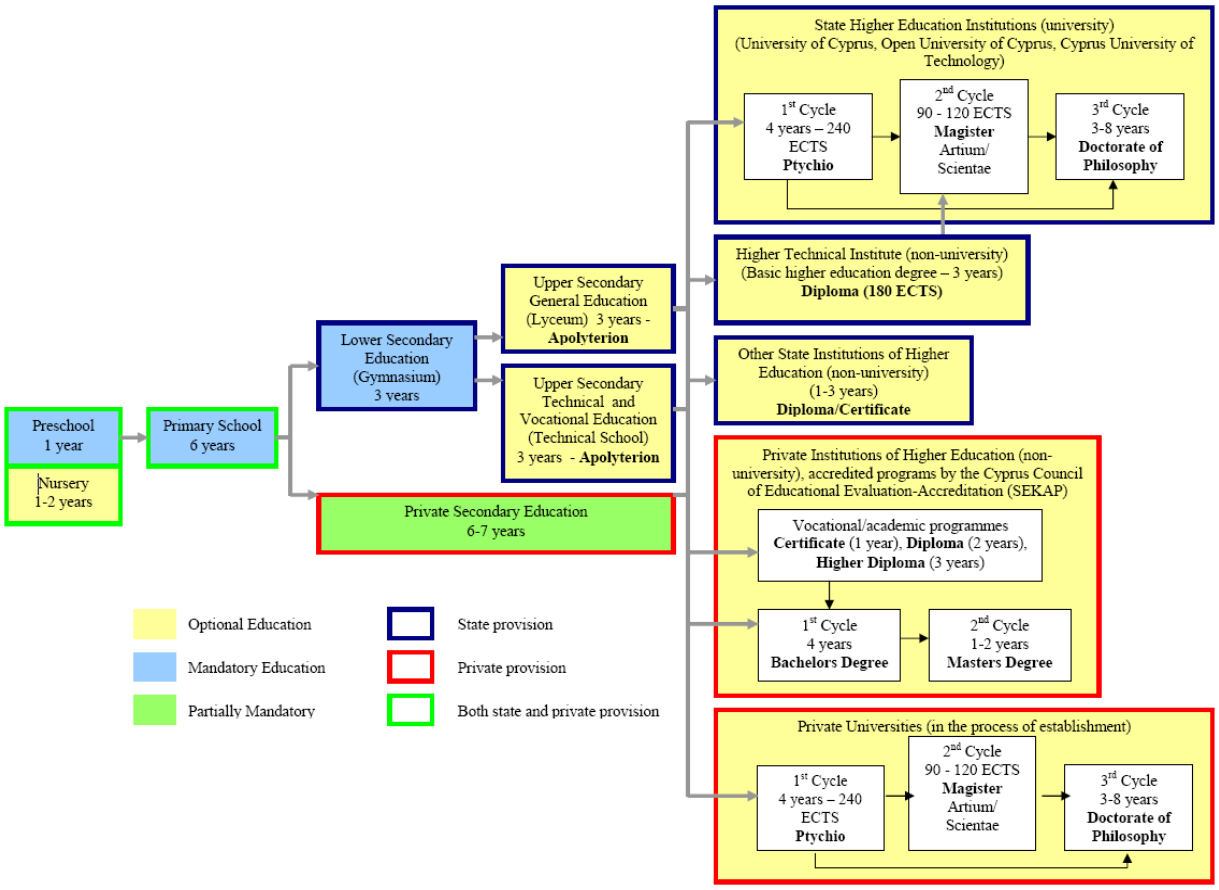

Figure 2. The educational system in Cyprus[29]

Reforms in public upper secondary level

Cyprus implemented a major reform to the public secondary level in the late 1990s, designed to improve the quality and supply of training and educational opportunities. The reform focused on the development of the two main institutions of: the Unified Lyceums and the institutes of Technical and Vocational Education. The Unified Lyceums were specifically designed to take into account international changes in pedagogy and teaching, including the findings of the 1997 UNESCO study on the Cyprus Educational System.

The curricula were reformed to improve both general and subject-specific learning as well as personal electives, and offer a more learner-centred basis of education. Provisions were made for lifelong learning and to prepare the student for an active life of citizenship and employment. Several new curricular subjects were introduced, including languages (English and French were already offered; the range was broadened to include German, Spanish and Italian); ICT studies, environmental studies, tourism and electives such as theatre, journalism, child-care, photography and others.

In addition, a series of changes were made in the management of the educational process and the institution. Reforms were undertaken to enhance and reinforce the position of Head of Studies, school libraries, teacher training, school facilities, special teaching, professional counselling and guidance, laboratories, class sizes, school computerisation and internet access, and others. A series of new

[29] Source: http://www.moec.gov.cy/

initiatives and programmes were launched, including the programme "Creativity-Action-Social Contribution" and "New Analytical Skills". New methods of grading and student evaluation were introduced, while the role of teacher evaluation was strengthened.

The vocational stream was reformed following policy decisions made in September 2001. The vocational schools offer upper-secondary-level technical and vocational education as well as lifelong learning. Curricula were modernized and additional options in ICT, business studies and tourism studies were added. Budgeting of three new schools as well as maintenance and renovation of existing schools has been confirmed, while investment in ICT resources and teacher training has also been approved (Planning bureau, 2006). At the upper-secondary level, two tracks are established: the Theoretical and the Practical. Fields include mechanics, electronics, civil engineering & architecture, design, chemical technology, woodworking & furniture-making, fine arts, fashion, garments & leather goods, hairdressing, hydrology, services and hotel and tourist studies.

Enrolment in vocational schools is offered to those students that successfully complete the Third Class of Gymnasium (lower secondary). School-industry links were strengthened with better-designed placements for students and teachers in Cypriot companies. Furthermore, the links between vocational schools and lifelong learning opportunities were strengthened by giving vocational schools students the change of enrolling in the Evening Technical Schools developed across Cyprus.

In addition, to vocational education reform, the Apprenticeship System has also been reviewed. Responsibility for apprenticeships has been centralised and new curricula and training methods introduced, including the use of modular classes and the integration of ICT in learning. Links with European Pathways and Europass are being established to improve European mobility.

Although extensive vocational and training education reforms have been implemented (HRDA,[30] 2004) certain barriers could not be alleviated:

- Vocational education is still perceived as being of lower value than higher education. Despite reforms, there is still little horizontal mobility between vocational and academic streams;
- While work has begun on occupational standards, there is still no national vocational qualification and certification system;
- While social partners play a role in defining occupational standards, the final decisions are still driven by the MoEC;
- While work has begun on accreditation of prior learning and recognition of workplace learning, there is not an established system in place;
- Many of the vocational occupations continue to be perceived as "men's work" (i.e. carpentry, welding, masonry), implying that there continues to be a strong gender split between participation and completion in vocational training;
- A number of quantitative and qualitative weaknesses are identified in the vocational education and training system, including the need for closer alignment with the labour market, improvement of counselling and professional qualifications, teacher training, integration of ICT into learning, school facilities, and limited tertiary education possibilities.

It is noteworthy that even though, in the context of reforms carried out in the public upper secondary level, emphasis has been given to the introduction of ICT, informatics or computer studies are not compulsory courses, neither at primary nor at secondary level. This kind of approach may not be effective in the long run as it does not provide the national system with the means to concretely enhance overall ICT skills and to combine eLearning with the national curriculum (ReferNet, 2006).

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[30] http://www.hrdauth.org.cy/

The tertiary level

Tertiary Education in Cyprus is provided through a wide range of means and methods in public or in private institutions, through full-time, part-time, distance and other forms of attendance. The tertiary level comprises several institutes of higher education. There are 3 public universities (University of Cyprus (UCY), Open University of Cyprus (OUC), and Cyprus University of Technology (CUT)), 3 private universities (University of Nicosia, European University of Cyprus, and Frederick University Cyprus), and several other public institutions (like the Higher Technical Institute, the Higher Hotel Institute of Cyprus, Nursing School, Mediteranean Institute of Management, etc.), as well as private colleges (like the Americanos College, CTL EuroCollege, College of Tourism and Hotel Management, Atre Music Academy, etc.), with a continuous increasing number of students registered.[31] Currently, 24 Private Institutions of Higher Education are registered with the MoEC, and offer programmes of study at the undergraduate and postgraduate levels offering academic as well as vocational programmes of study.

The competent body for quality assurance and accreditation of the programmes offered by private institutions of Tertiary Education is the Council for Educational Evaluation-Accreditation (Symvoulio Ekpedeftikis Axiologisis Pistopiisis, SEKAP), which is a member of the European Digital Portfolio for the Evaluation of Educators (ENQA).[32]

The development and enhancement of tertiary education has long been identified as a critical national strategic priority by the Cyprus government. The Cyprus Strategic Plan[33] has confirmed this principle, and a number of steps have been taken to improve tertiary education across all streams:

- The UCY was founded in 1989 and began its operation in 1992.
- In the context of lifelong learning, Cyprus established the OUC in 2001. Funding has been granted, and the OUC has started to operate in September 2005.
- The CUT has started its operation in 2007 and includes the following schools: School of Technological Applications, School of Health Services, School of Administration and Economy, School of Geotechnical Sciences, School of Applied Arts and Communications. It will eventually absorb the Higher Technical Institute, the Higher Hotel Institute, the School for Nursing, the Forestry College and possibly the Mediterranean Institute of Management of the Cyprus Productivity Centre.
- The establishment of the Council of Educational Evaluation-Accreditation, the competent authority responsible for the educational evaluation-accreditation of programmes of studies. The first programmes of studies were evaluated in January 2000. The result of this evaluation was the institutions' significant effort to improve their infrastructure, which contributed positively to the increase of the number of students both Cypriot and international attending these institutions.
- The creation of suitable institutional framework for the operation of Private Institutions of Tertiary Education (PITE).
- Approval of the Law which regulates the establishment and operation of Private Universities in June 2005 by the House of Representatives for further upgrading the private tertiary education.
- The Cyprus International Institute of Management (CIIM) began its operation in January 1991. This is a private non-profit organization founded by leading local public and private institutions. The primary aim of CIIM is to train and provide Cyprus with skilled managers. The main programs provided are the MBA (Master in Business Administration) and the MPSM (Master in

[31] Source: http://www.highereducation.ac.cy/
[32] Source: http://www.enqa.eu/index.lasso
[33] The 2004-2006 Strategic Plan sees Cyprus developing into a regional centre for higher education, and allocates resources for a number of new institutions to be developed as well as an upgrading of existing ones.

Public Sector Management). Both programs last for two years. Nearly all trainees are sponsored by their employers or are employers themselves.

- Plans are being developed for the development of the new University of Applied Sciences and Arts, the expansion of the OUC and the expansion of the UCY.
- In 2007 three private tertiary education institutions were accredited to be the first three private universities.

Quality assurance in the higher education area

In compliance with the Bergen standards and guidelines, specified in the context of Bologna Process[34] for quality assurance in the European Higher Education Area, a proposal for the establishment of the Cyprus Quality Assurance and Accreditation Agency was approved by the Council of Ministers on September 2007. The aim is to correct the weaknesses of the existing system (like duplication and contradictory decisions) while, at the same time, to extend the area of responsibility of the system so as to cover, in addition to private tertiary education institutions, the public ones, as well as to cover institutional and also internal evaluation and accreditation, in addition to programme quality assurance conducted by the present system. The Agency aims also to incorporate the functions that are currently performed by KYSATS – the Cyprus Council for the recognition of Higher Education Qualifications.

Adult education system

The MoEC is the main promoter and coordinator of adult education in Cyprus. Public adult education courses are mostly offered in cities, so that residents from the rural areas have difficulty in reaching such courses. **Formal adult education** offers organized and systematic education, in the form of part-time study and evening courses within the regular educational system (use of public schools' facilities are made) which lead to the certification of diplomas recognized by the MoEC. More specifically, the MoEC provides learning opportunities to the ageing population, older workers, adults living in rural areas and especially to women. The courses are based on specific targets and follow a flexible curriculum, which corresponds to the people's interests and needs (MoEC, 2005).

Non-formal education refers to the learning activities which take place outside the regular educational system. Various public and private institutions provide miscellaneous courses at various levels (ReferNet, 2006):

1. The Apprenticeship Training Scheme (Systima Mathiteias) which accepts students who leave formal education between grades eight and ten. The programme lasts for two years and is a combination of general education and vocational training at school and practical training in industry. Responsibility is shared between the MoEC and the Cyprus Productivity Centre (CPC) of the Ministry of Labour and Social Insurance.
2. The Human Resource Development Authority, HRDA (Archi Anaptyxis Anthropinou Dynamikou, AnAD) of the Ministry of Labour and Social Insurance approves and subsidises company initial training programmes organised in cooperation with training institutions, enterprise-based initial training and the practical training of students of certain specialisations in public secondary and tertiary education institutions.
3. The Productivity Centre provides courses for upgrading and/or training of managerial and supervisory personnel and skilled workers.
4. The Cyprus Academy of Public Administration of the Ministry of Finance aims to train and enhance the capability of the civil servants in managerial skills.
5. The State Institutes of Further Education offer courses in languages, commercial and other subjects.
6. The Adult Education Centres provided by the MoEC offer courses in various fields such as vocational training, literacy courses, first aid and foreign languages.

[34] Bologna Process: Template for National Reports: 2005-2007.

Private institutions offer various part-time courses including foreign languages, music, secretarial and vocational training. Some provide coaching for external examinations especially for British and American examining bodies. There are also a few private institutions that provide middle vocational courses on a semi full-time basis and the most popular subjects are dressmaking, hotel and restaurant trades (MoEC, 2005).

Over the period 2000-2006 there was a considerable improvement in the educational attainment of the working age population in all the EU countries. All EU countries reported a decline in the share of the population with low adult educational attainment and an increase in the population with medium to high levels of education. Recent data from the EU Labour Force Survey make it possible to analyze participation by the European population aged 25-64 by kind of education**.** As shown in table 7, in 2006 some 2.3% of Europeans aged 25-64 participated in formal education, while 6.4% participated in non-formal education. Under 1% of persons aged 25-64 participated in both formal and non-formal education.

As per the survey Cyprus showed with 1.2% a low rate participation of population aged 25-64 in formal education as compared to the EU-27 average of 2.3%. Participation in **non-formal education** is more typical of this age group with an average EU-27 participation rate of 6.4%. In Cyprus, the rate was 5.8%.

Table 7: Percentage of population aged 24-64 participating by kind of education

Formal education only | Non-formal and formal education | Non-formal education only

	EU27	BE	BG	CZ	DK	DE	EE	IE	EL	ES	FR	IT	CY	LV	LT	LU	HU
	2.3	1.8	1.0	1.3	4.8	2.5	3.2	3.0	1.3	2.2	0.7	2.8	1.2	3.0	3.0	1.1	2.3
	0.7	0.2	:	0.2	1.5	0.4	:	0.2	0.1	0.3	0.0*	0.2	:	:	:	:	0.1*
	6.4	5.5	0.3*	4.1	22.9	4.6	3.0	4.2	0.6	7.8	6.8	3	5.8	3.5	1.7	7.1	1.4

Source: Eurostat (EU-Labour Force Survey), 2007

Stressing that lifelong learning is central to achieving the Lisbon objectives, the 2005 spring European Council confirmed that investing more and better in human capital is at the heart of the Lisbon Strategy[35]. Lifelong learning is crucial, not only for competitiveness, employability and economic prosperity, but also for social inclusion, active citizenship and the personal fulfillment of people living and working in the knowledge-based economy.[36]

In 2006, an average of 9.6% of Europeans aged 25-64 participated in education and training activities over a period of four weeks which is even slightly less than in 2005 (9.7%). Cyprus achieved in 2006 a rate of 7.1%. The main barriers hindering the participation of adults in lifelong learning are primarily:

- Limited supply in rural areas of Cyprus;
- The family oriented mentality does not allow much time for lifelong learning;
- There is no formal service or office for anyone that wishes to be informed about eLearning opportunities on the island; some support is supplied by private institutions who are providers themselves, but even these are not well known by potential learners;
- The overall low unemployment rate means that people who are unwilling to learn are unlikely to be punished on the labour market by increasing risk of becoming unemployed.

[35] Presidency Conclusions, European Council 22-23 March 2005, paragraph 33.
[36] Presidency Conclusions, Lisbon, 23-24 March 2000.

Educational reform

The Lisbon Strategy has proved to be a big challenge for reform and development in the education and training system of Cyprus. The efforts for restructuring and modernizing the educational system culminated in 2003 with the appointment, by the MoEC of an *Education Reform Committee* consisting of seven academics, in order to study the Cyprus Educational System and make suggestions for its improvement to comply with the Lisbon Strategy. The Committee submitted, in August 2004, a Report indicating the main priority areas for reform with suggestions for the restructure and the modernization of the Cyprus Education System (MoEC, 2005). The main priorities identified to promote the educational reform were the following:

1. Reorientation and reform of the Cyprus education for an open, democratic and multicultural society of knowledge;
2. Reform of the institutional framework of administration and decision-making with emphasis on decentralization;
3. Reform of the structure of the education system from pre-primary education through to tertiary education, with a view of extending the school day in primary education and possibly to lower secondary education; eliminating the gap between primary and secondary education; and, establishing Post-secondary Vocational Training Institutions;
4. Updating the content of education – curricula and teaching methods - with a focus on the development of a unified curriculum for a ten-year compulsory education from pre-primary to lower secondary education;
5. Further development of higher education, both public and private, aiming at turning Cyprus into a regional centre of education;
6. Development of a new scheme for the evaluation of the work of the school unit, the school task and the educators, and establishment of a Centre for Educational Research and Evaluation;
7. Improving and restructuring the system of the pre-service and the in-service education and training of educators.

Even though a number of measures have been undertaken on accelerating action and development in education in certain priority areas given above, the picture is still that of an ad hoc approach that needs to be more fully structured and planned (Planning Bureau, 2007). In general, since the adoption of the Lisbon Strategy some progress has been achieved on the following identified areas:

- Integrating ICT in education at all levels;
- Supporting and consolidating structural changes in the sector of upper secondary general education and the upper secondary technical and vocational education;
- Expanding the sector of higher education.

Developing ICT skills and the embedding of ICT within the curriculum has been a focal point for reform and development in both the primary and the secondary sector of education. At the secondary level of education, ICT is used both as a subject in the school curriculum, aiming at computer literacy, and as a teaching aid. At the level of primary education, ICT is only used as a dynamic tool in the teaching and learning process.

Structural changes in the sector of upper secondary general education entailed the introduction of a new institution offering pupils more flexibility in deciding on their optional subjects, while in the sector of secondary technical and vocational education, structural changes were connected with the reorganization of the system of directions offered. In both cases changes were coupled with the development of new curricula and the promotion of new teaching methods (Empirica, 2006). As regards the sector of higher education, a number of developments as described in the Tertiary education related section given above indicate a consistent effort on the part of the Government to enhance higher education.

Since the establishment of the Republic of Cyprus in 1960 its educational system has been centralized, with no serious reforms as to the administrative structure having taken place as yet. However, decentralization is one of the recommendations of the Education Reform Committee (mentioned above), which forms part of the government reform priorities. Private provision of services in education is not very common in Cyprus. However, steps are taken to promote private initiatives in this domain (MoEC, 2006). Such is the case with the following:

- A new policy established since the current year for the production of textbooks, providing that private agents will write the textbooks following a competition based on the EU legislations for tenders;
- The architectural plans of school buildings, which are often adopted following a competition;
- A number of research contracts, which have been signed between the MoEC and private organizations, e.g. the contract signed some months ago with a Private Enterprise to provide a plan for teacher appraisal; and
- A number of projects in education that have received private sponsorship and support, e.g. 'Europe at School'.

I.2 Place of eLearning in the educational system

Even though eLearning has been placed as priority in both the Cyprus National Plans of 2004-2006 and of 2007-2013, it is still undervalued in the Cyprus education sector, with many stakeholders and institutions not being aware of the real benefits and the positive impact it might have. Moreover, eLearning is not incorporated in the overall education reform or strategic plans and its association with building up the knowledge-based society as stated in the Lisbon strategy is not clear (Planning Bureau, 2006).

eLearning is at its very initial stage of development. At the primary and secondary education level eLearning is mostly associated with the integration of ICT in education, specifically use of computers and internet. Even though there is a general effort for promoting ICT in all the levels of education as tools in the teaching process, one initiative being the organization of training programs for teachers on the use of technology in the classroom, another one the task of finding electronic content for curriculum subjects, learning provision is still based upon rather traditional techniques.

The use eLearning services in public schools is at an initial state, as noted above, and therefore content cannot be researched in that phase. In the Cyprus school system eLearning content can be found mostly in private schools. They use ICT for supporting their pupils in different aspects of learning, like the ones listed below, but there is no observable on-line learning activity in those schools:[37]

- Using computers for pupils' homework and assignments, by researching on the Web;
- Using applications, like Autocad and Photoshop for learning purposes (intra-curriculum activity);
- Using specially designed CBT for learning, for example Educational software in Geography.

At the higher educational level no specific emphasis has been given on the provision of distance learning and the emphasis has so far been on-campus education. This is shown by the low number of web-based curricula, apart from the ones provided by the OUC. Nevertheless, the UCY is very active in carrying out research in the area of eLearning and has been participating in a number of related EU funded projects under the Information Society Framework of the 6th and 7th Framework Programme. There are also several occasions where Cypriot educational institutions collaborate with other international organizations in offering online degrees.

[37] Source: Cyprus Statistical Services, 2006.

As per MoEC publications[38] the limited usage of eLearning services, as shown in table 8, can be attributed to the following issues:

- More preference of traditional face-to-face education, as distances in Cyprus are short and access to educational institutes is easy;
- ICT is not a compulsory subject in the different education levels;
- There is a tradition of Cypriots owning first level degrees in different subjects to register for correspondence courses offered by providers from other European and oversees countries for achieving further education and degrees, like M.Sc. and M.Ph. Such degrees are usually recognized by the Cyprus MoEC;
- In the case of using ICT in subjects the teacher takes the risk that there is not enough time to go through the entire subject programme as it is demanded and controlled by academic placement tests and national examinations;
- At the higher educational level the content of curricula is not under the jurisdiction of the relevant ministries, as the universities have rather big autonomy and much depends on their strategies, leading to a diversity of eLearning efforts without a common long term approach of development and implementation;
- Only a few smaller private education institutions offer limited number of Web-based courses.

Overall, the computer-based learning in Cyprus is 14.9%, as compared to the EU-10 of 10.6 % (Eurostat, 2006 – see table 8). eLearning has been very slowly starting to become a known form of study in higher, vocational and adult education, but is still at early stages.

***Table 8**: eLearning usage*

	2005	
	CY	EU-10
Computer based learning participants by sex		
Total	14.9	10.6
Male	18.7	11.1
Female	11.3	14.2
Computer based learning participants by age		
Between 25 and 34 years	24.5	23.9
Between 35 and 44 years	15.4	15.7
Between 45 and 54 years	11.7	12.9
Between 55 and 64 years	4.3	5.2
Computer based learning participants by educational attainment and working status		
Total population	14.9	10.6
Employment	18.1	14.4
Unemployment	12.7	5.4
Inactive population	3.4	2.8

Source: Eurostat, 2006

In the private sector mostly large enterprises specifically the ones with an international profile like banks (i.e. Laiki Group,[39] Bank of Cyprus,[40] and Hellenic bank[41]), information technologies (i.e IBM Cyprus[42]), auditing (i.e. PricewaterhouseCoopers,[43] Deloitte[44]), and research oriented companies (like

[38] Source: http://www.moec.gov.cy/
[39] Source: https://www.laiki.com/web/w3cy.nsf/ContentDocsCountries/Greek
[40] Source: http://www.bankofcyprus.com/main/default.aspx
[41] Source: http://www.hellenicbank.com/HB/content/gr/index.jsp?lang=gr
[42] Source: http://www.ibm.com/cy/
[43] Source: http://www.pwc.com/cy
[44] Source: http://www.deloitte.com/dtt/home/0,1044,sid%253D6803,00.html

AC Nielsen[45]) make use of eLearning applications for training and supporting learning of their staff, using the same educational system for employees in more than one country. An important aspect of eLearning in the workplace in Cyprus is the need to have and develop (at least basic) ICT skills as a crucial qualification for work.

Regarding lifelong learning the main eLearning opportunities for adults are provided by the *Open University of Cyprus* in the form of web-based courses. The OUC[46] aims to meet the fundamental need for broad education and offers the inalienable right to education for everybody, irrespective of age.

I.3 ICT skills and attitudes towards ICT usage

Even though during 2006 there was noteworthy progress towards the utilisation of the opportunities offered by the IS Cyprus is still among the lowest performers in Europe. A slight increase in the regular use of internet by individuals from 26.2% in 2005 to 29.2% in 2006 was registered in Cyprus compared to that of 46% in EU-25 and 49% in EU-15 (Eurostat, 2007). The higher take up of internet services (see table 9) was mostly for looking for information about goods and services (26.8%) and for sending emails (24.6%) having Cyprus ranked on place 23rd and 26th respectively among the EU-27. Internet banking in Cyprus is quite modest – only 6.1%. Using the Internet for phone calls is also relatively new (4.6% used the service in 2006 and 2.3% in 2005), but the number of users has more than doubled over the years, showing the growing popularity of the service.

Table 9: Take up of internet services (as % of population)

Take up of internet services (as % of population)	2004	2005	2006	EU-25	Rank
Sending emails	24.1	23.3	24.6	43.8	26
Looking for information about goods and services	21.4	24.4	26.8	42.9	23
Internet telephoning or videoconferencing	2.8	2.3	4.6	7.1	24
Playing/downloading games and music	17.6	15.4	17.3	18.2	18
Listening to the Web radio/watching Web tv	11.5	8.7	9.0	11.8	22
Reading online newspapers/magazines	17.2	15.0	19.9	19.0	16
Internet banking	4.1	5.7	6.1	22.0	26

Source: i2010 Annual Report Cyprus

In 2006, the percentage of all individuals who accessed the Internet at home (as % of individuals aged 16 to 74) is 23.6% in Cyprus as compared to 43% in EU-25 (Eurostat, 2007). Internet access at work in 2006 was 17.2% as compared to 23.0% in EU-25 and at educational place was 5.3% as compared to 8.0% at EU-25. The Internet connection of households in rural regions is even worse as there is almost no DSL coverage in rural areas.

According to a comparable measure of digital literacy, the average Cypriot citizen is significantly less digitally literate than the average citizen of the EU-25. The particular problem in Cyprus is more

[45] Source: http://www.cy.nielsen.com/
[46] Source: http://www.ouc.ac.cy/index.php?page=study_methodology&lang=en

intense in the 25 to 54 age group in which 53% lack basic skills as compared to an average of 29% of the EU-25 in 2005.[47]

In 2006 Public eServices provision (see table 10) in Cyprus is limited as compared to the EU-25. Additionally, the level of uptake among households is one of the lowest among the EU-25 (13% as compared to the EU-25 average of 26%) whilst the respective percentage for enterprises increased from 39.5% in 2005 to 44.3% in 2006 (as compared to 63.7% for EU-25).[48]

Table 10: Public eServices provision

eServices Indicators	CY	EU-25
% basic public services for citizens fully available online	25.0	36.8
% basic public services for enterprises fully available online	50.0	67.8
% of population using e-Government services of which for returning filled in forms	12.7 3.4	23.8 8.1
% of enterprises using e-Government services of which for returning filled in forms	44.3 8.3	63.7 44.8

Source: Convergence Programme of the Republic of Cyprus 2005-2009, Ministry of Finance, December 2005

Regarding the provision of eGovernment services to businesses and individuals the table 11 below shows that the internet interaction of enterprises with public authorities is much higher than with individuals. This can be due to the fact that services directly generating revenue for government, such as company tax, VAT, customs declarations, were given higher development priority than individuals' related services. These services tend to be also the eGovernment services which are easiest to implement as they are provided centrally (thus minimising implementation costs and maximising the scale of returns), as well as being relatively simple administrative procedures with a high degree of pre-existing standardisation. In contrast, the eGovernment services which do not generate direct revenue for government, which are based on existing complex and differentiated procedures have not been rolled out to the same extent.

Table 11: eGovernment service provision

	Enterprises (%)	Individual (%)
Obtaining information	34.8	10.4
Download forms	24.3	3.5
Returning filled forms	11.0	1.4

Source: Convergence Programme of the Republic of Cyprus 2005-2009, Ministry of Finance, December 2005

Most of the services provide online information about public services and downloading of forms. Only very few services provide processing of forms including authentication full case handling, decision and delivery (payment).

[47] Commission Staff Working Document, Progress towards the Lisbon objectives in education and training, Indicators and benchmarks, 2007

[48] Source: Eurostat 2007

II. OVERVIEW OF E-LEARNING IN CYPRUS

The purpose of the second chapter is to give a synthetic overview of the building blocks that affect the evolution of eLearning in Cyprus. Within the broad range of the relevant factors, it will focus on assessing the following main points:

- Institutional structures and resources for learning;
- Strategies, policies, action plans, and projects;
- The legal framework supporting eLearning;
- Dedicated ICT infrastructures and applications;
- eLearning services;
- Specific issues and solutions;
- Acceptance and usage of eLearning services;
- Impacts of eLearning developments.

II.1 Institutional structures and resources for eLearning

II.1.1 Organisational structure and major public actors for eLearning

Cyprus state structure is highly centralized consisting of the central government and 6 administrative districts which constitute the local government. Information Society policy and the development of eServices, including eLearning, in Cyprus is largely formulated by the central Government and only implemented in the local Government (Cyprus Public Information Office, 2006). A number of government and semi-government bodies are playing different roles in advancing the Information Society and the development of eServices in Cyprus.

At a policy/strategy level the Cyprus **Planning Bureau (PB)**[49] is the responsible authority for the development of the Information Society in Cyprus. It is a semi-government organization responsible for assisting in the formulation of a long-term strategy in the area of economics and in controlling and implementing the development policy as set by the government. PB is responsible for the overall planning for education. All proposals for education reforms have to be endorsed by the PB in order to be considered for approval by the Council of Ministers and the House of Representatives. It prepares educational development plans and monitors the allocation of related funds (including the ones addressed to eLearning). IT also carries out the coordination of state IT-policy actions and development plans in the field of state information systems.

Concerning IS policies, it has a crucial role in the allocation of financial resources and projects in the 5-year development plans that were initiated since 1998. The first one commenced in 1998 and its goal was to create the necessary conditions for Cyprus to become an international business and services centre. The Cyprus National Information Society Strategy for 2004-2006 has been prepared by the Planning Bureau in cooperation with the Ministries concerned, aiming at the development of IS in Cyprus and has included eLearning as one of the eServices areas, together with eGovernment and eHealth, for which political priority was to be given. eLearning has been also given emphasis in the Cyprus National Information Society Strategy for 2007-2013, with the **MoEC**[50] as main coordinator, which has the overall responsibility for the enforcement of education laws and the implementation of education policy related to eLearning.

At the implementation level the **Department of Technical Services**, under MoEC, has the mission to safeguard the necessary material and technical infrastructure for public education. Public education

[49] Source: http://www.planning.gov.cy/
[50] Source: http://www.moec.gov.cy/

includes the school units of the MoEC, from Pre-primary through Primary, Secondary lower and upper circles to Technical and Vocational Education. The material and technical infrastructure refers to premises, technical works and equipment; it does not include teaching aids. The process of producing and maintaining the material and technical infrastructure induces works to cover rising needs resulting from pupil population changes or from changes in education processes and works of maintenance, repair and improvement of existing infrastructure (including ICT).

Furthermore, the **Human Resource Development Authority (HRDA)**[51] is a semi-government organisation whose mission is to create the necessary prerequisites for the planned and systematic training and development of the human resources by making use of new ICT based learning methods and creating appropriate learning material. The HRDA refers to the government through the Minister of Labour and Social Insurance who is, by law, the competent Minister. It is managed by representatives of employers, unions and the government. The training activities that are promoted by HRDA are designed to meet the needs of the economy, the enterprises and the labour force taken as a whole, which are set in the form of guidelines by the HRDA, in co-operation with the Planning Bureau.

In the last few years the HRDA has increased the number of training courses in the field of ICT that receive a subsidy and has further promoted the adoption of eLearning methods and techniques. The continuing training programs that are approved and subsidised by the HRDA are designed on the basis of the HRDA's annual priority setting, which is communicated to all training institutions and providers. Main thematic priorities under which the training institutions or providers can submit to the HRDA training programs for approval and subsidisation, include Technology and Information technology, Management/Supervision, Marketing and sales, Economic and financial subjects, Development and Utilisation of Human Resources, and others.[52]

The **Cyprus Pedagogical Institute**[53] under the MoEC has a developmental mission which covers all levels of education. Its main activities are the in-service training of teachers, the pre-service training of secondary school teachers, educational research and evaluation, educational documentation, educational technology (eLearning) and curriculum development.

The **Research Promotion Foundation (RPF)**[54] serves as a national institute, established in 1996, for the promotion of scientific and technological research in Cyprus. It is an independent organisation governed by a 12-member Board of Directors, which is appointed by the Council of Ministers for a five-year period. A primary objective of the foundation, amongst others, is to promote eLearning with the opening of specific calls for proposals for the development of related projects implemented into various application fields.

The **Department of Information Technology Services (DITS)**[55] which is under the Ministry of Finance is the government department responsible for ensuring that the full potential of information technology is harnessed to support the government policies and objectives. In particular, DITS is in charge of the development of government-wide strategic application systems. DITS provides additionally consultancy and/or technical advice and support to all Ministries, including the MOEC. It is also in charge of the procurement of consultancy services from the private sector, IT management and technical services, and maintenance services for hardware, firmware and software packages for all government bodies.

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51 Source: http://www.hrdauth.org.cy/
52 Evolving eLearning, HELIOS yearly report 2005/2006.
53 Source: http://www.pi.ac.cy/
54 Source: http://www.research.org.cy/EL/index.html
55 Source: http://www.mof.gov.cy/mof/DITS/DITS.nsf/DMLoffers_en/DMLoffers_en?OpenDocument

The **Audit Office**[56] is an independent office responsible for the audit of all public expenses, including educational expenses and eLearning related ones, of the inspection of all accounts of moneys and other assets administered and of liabilities incurred by or under the authority of the Republic. In addition to the audit of government accounts, the Audit Office is also responsible for the audit of statutory bodies, special funds, local authorities and other public organizations. However, there is no concrete system for monitoring activities of the different public actors taking place regarding eLearning issues. They act independently and there is no coordination among them.

It must be noted that **local government** does not play any significant role in eLearning. The tasks of local authorities are to support schools to acquire ICT equipment and to take responsibility for providing ICT support for schools.

Summarizing, there is no concrete organizational structure and coordination system in place for eLearning activities. There are a number of institutions responsible for eLearning practices but there is not any practical co-operation amongst them since there is not a committed owner, so far, that could coordinate the developments and set specific guidelines that they could comply with. This results in a lack of coordination of activities and a weakness in ensuring quality and efficiency of eLearning applications' impact.

II.1.2 Other eLearning players

The development of eLearning in **higher education institutions** depends on their own plans for the future and the place for eLearning activities in these.

The **University of Cyprus** promotes eLearning through the provision of different web-based courses developed especially for the university itself. The university has developed its own ICT infrastructure. One of the main reasons for this has been the strong collaboration with other tertiary education establishments in other countries and the joint offering of some online courses.

The **Open University of Cyprus** offers undergraduate and graduate courses, as well as training and vocational programs using a certain style of learning which is called "open and distance learning", the purpose of which is to satisfy the demand for lifelong learning and continuing education. The use of web-based courses has started becoming a common form of the provision of education by the OUC. It offers individuals the opportunity to pursue or complete university education. Likewise, the OUC offers, to those who already hold a university degree, the possibility to further their studies at a graduate level or even study different subjects aiming at career progression.

II.1.2.2 Other actors playing a role in eLearning developments

Academic Institutions
The three recently accredited private universities in Cyprus (European University Cyprus, Frederick University Cyprus, and University of Nicosia Cyprus) have put the promotion of innovative learning practices based on new technologies in their research agendas but they are still in an initial stage regarding the development of eLearning solutions.

Industry Players
In the last years the private sector, especially large enterprises, have started promoting the use of eLearning tools, in terms ICT training or tailor-made courses through which the employees are informed about the new products and services of the company. Indicatively, leading larger companies that provide eLearning opportunities in Cyprus are: IBM Cyprus, slowly adapts and offers training of emerging technologies such as automatic expertise locators and Web 2.0 social networking tools, upgrading the skills of current employees, and understanding and tackling issues related to employee

[56] Source: http://www.audit.gov.cy/audit/audit.nsf/index_en/index_en?OpenDocument

engagement[57]; Deloitte Cyprus, has developed a series of e-Learning training modules on International Financial Reporting Standards, which are offered for free as a public service;[58] Inteliscape provides custom project services in e-Business based on quality standards and processes;[59] and Virtual IT, using the Microsoft e-Learning suite of products, provides solutions to educational institutions.[60] However, the provision is directed towards the needs of enterprises and individuals, mainly employees, and the role of them in eLearning developments has remained limited. Reasons have been the low uptake of developed eLearning products by the Cyprus educational market and the high financial investment needed for the development of such products (Planning Bureau, 2007). Also the private sector (especially smaller organizations) is lacking on appropriate expertise for the development of eLearning practices.

Other Players

A coordination arrangement between different departments responsible for innovation matters (including the field of eLearning) is the **Technical Committee** for the promotion of High-tech Industry in Cyprus, which is composed of representatives from the Ministry of Commerce, Industry and Tourism, the Planning Bureau, the UCY, the Cyprus Chamber of Commerce and Industry, the Cyprus Employers and Industrialists Federation, the Cyprus Institute of Technology and the Research Promotion Foundation and has been appointed by the Ministry of Commerce, Industry and Tourism for the needs of the New Industrial Policy. The aim of this committee is to exploit options for the creation of a viable high-tech industry (software development, digital content, biotechnology, designing of electronic equipment and energy), as well as the improvement of the island's attractiveness to foreign direct investment regarding new business opportunities. Under the framework of the business incubators scheme of the Cyprus New Industrial Policy, the Technical Committee has already established four incubators providing funding to new companies working on innovating research ideas coming from different areas, including the eLearning area. However, a limited submission of eLearning related funding proposals has been noted.

In Cyprus there has been a long-standing tradition of tripartite consultation (government, trade unions and employers associations) and social dialogue. This is reflected in the active participation of **Social Partners** in the various bodies and committees. The social partners also participate in an advisory and consultative capacity in the development planning process. Furthermore, the social partners as main stakeholders with a formal role usually participate on the Board of Governors of institutions dealing with human resources. Finally, the social partners participate in consultative committees (Education Council, Consultative Committee of Technical and Vocational Education, ad hoc committees for curriculum development). Participation ranges from policy development to the design of training programmes and curricula. As a consequence of the size of the country all major eLearning related decisions are taken at national level. Thus it is at this level that the social partners have specific roles and responsibilities. The Social Partners participate further in the development of the National Lisbon Programme and the National Strategic Reference Framework for Cohesion Policy.

However, until now eLearning has not been a specific topic in the agenda of the Technical Committee and the Social Partners, and their real influence on the topic can not be measured.

The **Cyprus Productivity Centre (CPC)** is a department of the Ministry of Labour and Social Insurance, established in 1963. It offers a wide range of management development programs in all the major towns, as well as upgrading and adding initial vocational training programs for technicians. In that way the CPC is assisting both private and public organisations in developing their human resources and in improving their productivity. Additionally, the CPC organises a Post-Graduate

[57] Source: http://www-01.ibm.com/common/ssi/cgi-bin/ssialias?infotype=AN&subtype=CA&htmlfid=877/ENUSZP07-0379&appname=lenovoeurope&language=en#Header_12

[58] Source: http://www.deloitte.com/dtt/press_release/0,1014,sid%253D%2526cid%253D92257,00.html

[59] Source: http://www.inteliscape.com/icustomers/inteliscape/iWeb/iWeb.nsf/WebContentDocsByID/ID-BC4DA0FA4E384073C2256D09004D196F

[60] Source: http://www.virtual-it.com.cy/frames/fsservices.htm

Management Diploma Programme annually in cooperation with the Mediterranean Institute of Management (MIM), designed to increase the employability of unemployed young university graduates or to improve the managerial skills of the active labour force.

Furthermore, another active player is the **Cyprus Computer Society**, a professional and independent non-profit organization founded in 1984. It is a body of the Computer Science and Information Technology Professionals with over 750 members. Main goals of Cyprus Computer Society, among others, are: promote the Computer Science and Information Technology area and their related subjects within the Cypriot economy, society, businesses and organizations of the public and private sectors; to inform and educate the public and raise its awareness on IT related issues; to offer services in the areas of Research / Development / Education of Computer Science and Information Technology; to organize events (i.e. seminars, lectures, conferences etc) that contribute to the achievement of its goals; and to co-operate with the government, the general and IT industries for the effective introduction and use of IT in all aspects of economic and social activity in Cyprus Computer Society. In this respect, it is actively participating in the promotion of the ECDL - European Computer Driving Licence, the European Certification for end-user IT skills.

Role of European Union

The European Union has a role in policy making by setting relevant guidelines and policy priorities. Cyprus prepared the National Lisbon Programme, as envisaged by the European Council in order to advance the targets set out in the Lisbon strategy including the ones related to education. Additionally, the European Structural Funds finance projects relating to education and employment. The government makes use of those funds and has allocated an amount of 18m Euro for the implementation of eServices, including eLearning, under the Cyprus National Strategic Reference Framework for Cohesion Policy 2007-2013 (NSRF) that was completed in March 2007.[61]

II.1.3 Main public and private eLearning projects and investment

Within the framework of a knowledge based economy Cyprus has understood that the integration of ICT in education has to play an important role. Strong efforts have been undertaken in the last years for the development of a related ICT infrastructure, mainly as regards the provision of internet and the ratio of computers per students, teachers or principals. The importance of eLearning in education has been mainly tightly associated with such ICT developments and there were thus no targeted investments in developing ICT enabled learning and teaching practices. Financial support has been mainly aiming at improving the quality of traditional learning methods and not of supporting the creation and use on new ICT-based learning methods.

II.1.3.1 Projects improving the ICT infrastructure and skills

Information Communication and Technology programme in Education

The MoEC has initiated in 1993, a long term *Information Communication and Technology in Education* programme aiming to enhance the educational process by promoting access to computers and to the internet and to examine the impact of computers and other technologies in the process of teaching and learning at the primary and secondary school levels.

In 2003 the government has signed with the European Investment Bank (EIB) a finance agreement of total 325m Euro for financing of investments in education and information technology in Cyprus including the already running *Information Communication and Technology in Education* programme. An amount of 200m Euro was made available to the MoEC for enhancing primary and secondary education, including the installation of ICT in schools, for more than 130 000 pupils. Additionally, it fostered the development and use of ICT networks, catering in this way to the needs of students enrolling in higher education and the UCY.

[61] Source: http://www.mof.gov.cy/mof/mof.nsf/DMLindex_en/DMLindex_en?OpenDocument

Over the period 2004-2007 the MoEC has been further promoting and enhancing the existing *Information and Communication Technologies in Education* project with a budget allocation of 110m Euro and a co-financing by the European Social Fund with a budget of additional 20m Euro (Planning Bureau, 2007). The project's action plan has been focusing on three areas: technical infrastructure, analytical programmes and training of trainers (MoEC, 2006).

Technical infrastructure

It includes hardware, cabling, networking, IT labs, computer libraries, and equipment for specialisation teaching rooms. The targets set by the MoEC[62] are the following:

- By 2007 the ratio of pupils per computer should be 4 for primary education and 3 for secondary education;
- By 2007 all computers in schools should be connected to the Internet;
- By 2007 all secondary education schools should be interconnected through an Intranet.

The estimated cost of the above measures is about 27.7m Euro.

By October 2007 the ratio of personal computers (PCs) to the number of pupils in the primary education had reached 1:5, giving high expectations for meeting the target of 1:4 set for 2007. A similar situation was observed in secondary education, as the respective ratio for 2006 was 1:3.6 and the target set for 2007 is 1:3. Another target achieved in October 2007, was the establishment of internet connections in all schools in both primary and secondary education (NRP, 2007).

However, all secondary schools are planned to be interconnected via the internet in 2009. The progress so far is that the needed internet infrastructure was completed in primary and technical education schools in 2005 and 2007 respectively, whilst in secondary schools is currently 70% and expected to reach 100% in 2008.

Analytical programmes

This action includes the incorporation of ICT into the analytical programmes and the identification and acquisition of suitable software. The targets set by the MoEC are the following:

- Certification of skills on ICT according to European standards (European Computer Driving Licence) for Gymnasium third grade pupils (age 15). The implementation started in the school year 2006-2007 and is in progress. The estimated cost of this measure is 2.3m Euro and a relevant provision has been made in the National Budget of 2006.
- Use of multimedia in teaching through the development of electronic content: multimedia is currently used only in the subjects of Physics and Mathematics in the primary and secondary education respectively. Through the production and / or import of content mainly from Greece, it is anticipated that multimedia will be used in most of the subjects by 2008-2009. The implementation of this measure is at its very initial stage and no official cost estimation has been provided.
- The provision of a Learning Management System, which refers to the use of a platform that enables the communication between teachers, students and parents in issues like absences, homework, examination grades etc, was launched on a pilot basis in 8 schools in September 2007, whilst its implementation in all schools will be delayed until 2009.

Training of teachers

It includes the training of teachers towards the acquisition of the necessary basic skills for using and implementing ICT into the educational process. Every teacher will have the opportunity to attend more advanced training programmes if they so wish. However a pedagogical training for developing ICT supported learning approaches is not included in the training programmes. The Pedagogical Institute of the MoEC provides this training for both primary and secondary education:

[62] Source: http://www.moec.gov.cy/

- Primary education: The content of teachers' training is similar to that of the first four core modules of the European Computer Driving Licence (ECDL), certificate, but teachers do not have to undergo the relevant exams. It is anticipated that 4 000 teachers (75% of the total) will be trained by end of 2007. The estimated cost of this measure is 8.8m Euro and the funds will be raised from the existing loan from the European Investment Bank.
- Secondary education: Teachers will be obliged to pass the first four core modules of the European Computer Driving Licence (ECDL), and they will have the option to continue with the other three modules required for obtaining the ECDL certificate. The target set by the MoEC is that 6 600 teachers (65% of the total) will attend the training for the first four core modules of ECDL by end of 2007. The estimated cost of this measure is 9.1m Euro and the funds would be raised from a 20m Euro budget co-financed by the MoEC and the European Social Fund.

Official data of October 2007 states (NRP, 2007) that the training of teachers in basic IT skills is progressing with delay, reaching 70% and 65% in primary and secondary education respectively. This training session is expected to be completed in 2009. Also, in September 2007, the implementation of the next training session planned for teachers was started, which concerns the use of multimedia in class. It is expected that 50% of the teachers will be trained by 2009. However, there is still reluctance by a large percentage of teachers to use ICT as a learning tool due mainly to the traditional mentality and methodologies they employ for their classes.

Even though the project has been running since 2006 up to date there is a lack of ICT qualification standards for teachers but also for students. It is expected that the final decision will be taken by 2008. Also the achieving of ECDL (European Computer Driving Licence) certification regarding IT skills for secondary education teachers is not compulsory.

Furthermore, the development of electronic content for subjects taught in schools is at an early stage and advances slowly as it is carried out by teachers over and above their working hours, but no related official data exists about the additional hours spend. There is not a professional setup of quality assurance and production of such material. At present, there is software for some subjects in secondary education and only 3 subjects in technical education. Additionally, the development of digital content for higher education is carried out separately by the different institutions using a diversity of productions methods as there is no coordination among all these institutes regarding this topic.

Program of Reinforcing R&D related activities

The reinforcement of R&D related activities including the new establishments of the OUC and the Technological University is an important factor in the development of new technology-based learning practices (DITS, 2007). The reinforcement of R&D activities has been a substantial part of the National Reform Programme (NRP).[63] Related progress in the implementation of the NRP actions with a view of promoting R&D, by the end of 2007 includes:

- An ambitious target of increasing R&D expenditure to 1% of GDP by 2010 and be in line with the Lisbon strategy.
- Recently the RPF Framework Programme 2006 has been launched with a total budget of 16EUR million and an RPF contribution of 10mEuro. This measure has been undertaken by the government as a strategic measure to increase the R&D innovation budget to 1% by 2010 and be in line with the Lisbon strategy. One of the main research areas supported in the RPF programme is the development of eLearning services.
- Aiming at the increase of private sector participation in R&D activities, and to enable stronger collaboration between the public and the private sector for the provision of eServices including eLearning services, greater emphasis has been attached to enhancing the links between research institutions and private enterprises via a substantial increase in the budget of the relevant programmes that are included in the RPF Framework 2007-2010 (17.1m Euro) as well as for the new Framework Programme 2007-2010 (102.6m Euro).

[63] Source: National Reform Programme of Cyprus, Progress Report, 2007.

In addition to the above mentioned public eLearning main projects and investment, the role of the private sector is negligible in investing in web-based educational solutions.

From the information provided above regarding the developments in ICT usage for learning purposes it is clear that significant investments have already been made and more are expected in the future (MoEC, 2007). However, most of the investment has been allocated for the establishment of an ICT infrastructure and there is no official data about specific investments for eLearning services provision in the last years.

II.2 Strategies, policies, action plans and projects

II.2.1 Description and evolution of the major government policies related to eLearning

The government has adopted a number of policy initiatives that directly or indirectly affect the eLearning evolution in the country.

Initially, the government focused on improving the public administration through the effective use of Information Technology aiming at serving the citizens directly by providing integrated and seamless services, information and transactions. These objectives were incorporated in the ***Information Systems Strategy*** (the final version was approved in 1998), a master plan for the computerisation of all Ministries and Government Departments. Within the framework of this Strategy, a number of information systems have been developed to support the internal operations of Ministries and Departments, a Government Data Network (GDN) was developed, and a Government Internet Service was established to provide the gateway between Government Systems and the public network. To date, almost all the Departments have been connected to the Network. Main Governmental priorities at this stage are the upgrading, expansion and continuous modernisation of the current network to also include, amongst others, the provision of eLearning services. The development of information systems is an ongoing procedure and depends (a) on the latest technological advances, (b) on the government Ministries / Departments / Services IT needs, and (c) on the European Union guidelines. For this reason, the Information Systems Strategy is continuously updated, in order to adjust to the new technology environment. Strategic projects are continuously being developed and /or enhanced in order to satisfy the increasing Information Society needs.

Many of the objectives of eEurope 2002 (increase of internet penetration, telecom framework, low internet costs) have already been achieved. Following the objectives of eEurope 2005 DITS has given a user-centred definition of eLearning as *the process of development of individuals to becoming lifelong learners, equipped to live and succeed in an Information Society*. Regarding eLearning Cyprus has defined its main national eEurope 2005 objectives to be (Planning Bureau, 2006, 2007):

- provision of computer literacy skills and Information Society skills for all citizens;
- improvement of Information Society skills of educational staff;
- progress regarding virtual learning environments;
- extending electronic publication, classification and distribution of research information and teaching material;
- exploiting the potential of ICT Technology for enriching and extending learning across all curricula.

Although the use of the Internet through different multimedia programs in schools, public institutes and the UCY has been promoted by the Information Technology Department of the MoEC jointly with the UCY and the Higher Institute of Technology, the implementation plan for the above mentioned eLearning strategy is lagging well behind schedule and this has created concern among stakeholders.

A fundamental eLearning related infrastructure has not yet been built delaying thus the promotion and adoption of eLearning practices.
The Council of Ministers approved in 2003 the ***Strategic Development Plan 2004-2006***. The plan constituted the basis for the preparation of the programming documents, which included the actions and schemes proposed for co-funding by the Structural Funds, the Cohesion Fund and other Community initiatives of the European Union. The plan aimed at the achievement of a satisfactory sustainable development rate and at assuring the highest possible benefit from the accession of Cyprus to the European Union, thus contributing to a greater, real convergence with EU member states. The government has included vocational training in its 2004-2006 Strategic Development Plan[64] that sets the milestones to promote employment and vocational training through the implementation of a modern and effective ICT based training and retraining system, to actively support employment and increase participation rates of population groups that have been lagging behind. The objective was to boost the average level of participation in lifelong learning to at least 10% (was 3.7% in 2002) of the adult working age population.

Through the ***Strategic Development Plan (2007-2013)*** the Cyprus government gives great emphasis on the development of human capital, the promotion of equal opportunities and the strengthening of social cohesion. The main priority areas for intervention in the field of human capital are:

- Promotion of the education reform in all stages of education, within the framework of the social dialogue.
- Elaboration of a comprehensive lifelong learning strategy.
- Modernisation and upgrading of the apprenticeship system.
- Upgrading of the infrastructure of education and training.
- Preparation and introduction of a System of Vocational Qualifications.

The overall strategic approach of the ***National Lisbon Programme*** focuses on the need to tackle effectively the challenges faced by Cyprus. The main policy priorities for Cyprus related to the development of human capital and the progress made for each priority are:

Continuous improvement of the quality and flexibility of the educational system
A programme, which aims at reforming the curricula of all subjects/courses of Secondary Schools with activities using modern technology and software over the period 2006-2009, has started to be implemented. Another action aims at ensuring that all secondary education teachers will become digitally literate until 2008.

Increase opportunities for university studies in Cyprus
The UCY introduced the Department of Biological Science. The OUC has accepted its first students in September 2006, while the CUT started operations in September 2007. The first private universities are expected to be established in the academic year 2007-2008.

Continuous upgrading of skills to labour market needs
The implementation of actions aim at strengthening the quality and attractiveness of the Secondary Technical and Vocational Education, improving its organisation and upgrading the Apprenticeship System.

[64] HRDA of Cyprus, "The vocational education and training system of Cyprus: a thematic overview", Dec 2004, see www.hrdaauth.org.cy, and www.refernet.org.cy

Development of a comprehensive national framework for lifelong learning
The elaboration of a comprehensive Lifelong Learning (LLL) Strategy for Cyprus is one of the four main policy priorities.

HRDA has defined its ***main strategic objectives for the planning period 2007-2013*** to be:

- Upgrading the country's human resources, through the systematic lifelong training of the employees, the new entrants in the labour market, the unemployed, the inactive females and the low skilled and older age persons.
- Improving the productivity and strengthening the competitiveness of Cypriot enterprises through the better utilisation of their human resources and the improvement of their adaptability potential.

From the financial aspect, one of the most influential strategies on education is the in March 2007 developed ***National Strategic Reference Framework for Cohesion Policy 2007- 2013.***[65] This presents the development strategy framework for the utilisation of the resources of the Structural Funds and the Cohesion Fund for the period 2007-2013. The thematic priority "Human Resources and Social Cohesion" features prominently in the policy under which the following four important interventions will be pursued:

- Promoting and improving eLearning and lifelong learning.
- Attracting and keeping more people on the labour market.
- Improving social cohesion and integration.
- Improving the administrative capacity of the public sector.

At the ***Cyprus higher education level***, the trend is not only to support ICT-related education, but to promote eLearning, mainly in the form of Web-based courses and curriculum. At the end of 2004 the UCY has approved a general policy of active promotion of eLearning. The policy assumes an active role in incorporating eLearning in education by organising educational workshops and demonstrations on how different eLearning tools may be used, from a technical and didactical point of view. Individual support is also offered to instructors who aim to upgrade their teaching, by assisting them in developing the learning material with the use of eLearning tools.

II.2.2 Implementation of eLearning policies

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

The action plans, especially the Strategic Development Plan 2004-2006, are in a very general from the standpoint of education, pointing out only some fields to be developed. The eLearning related national objectives under eEurope 2005 have been defined in a very broad sense and given that no specific authority for the implementation has been defined the undertaken implementation measures were scattered among different stakeholders, thus resulting not in the expected outcome of providing a fundamental eLearning infrastructure.

The implementation of the National Lisbon Programme in the period 2006-2007 has been progressing well regarding the reforming of the educational system with activities using modern technology and software and the establishment of two new universities as planned. There was also satisfactory implementation of the ICT infrastructures in schools and the training of teachers in basic IT skills is delayed but in progress (Planning Bureau, 2007). However, lifelong learning is in the poorest condition in the field of eLearning. One of the main problems in the field is the lack of recognition of learning as an essential part in everyday life in the whole society; and secondly, the lack of a legal and

[65] Source: http://www.mof.gov.cy/mof/mof.nsf/DMLindex_en/DMLindex_en?OpenDocument

organisational system for lifelong learning at the state level to support the implementation of the priorities set.

A serious problem is that the eLearning policies are scattered among broad development policies, information society policies and education policies. Therefore provision of eLearning services by the public sector is quite fragmented. Furthermore, even though the implementation of some of the higher education strategies has been positive, no coordination among the different higher educational institutes has been achieved.

II.2.3 Major public and private projects and programmes in eLearning

In general there are limited attempts for eLearning project developments in Cyprus. This is due to the lack of readiness of a large number of institutions to accommodate eLearning processes and the inadequate levels of required knowledge for such implementations. Furthermore, many stakeholders are still not convinced of undertaking such a change that implies further investment and reorganization of processes and activities. A serious public attempt is the eUniversity project of the UCY.

eUniversity

A vital strategic initiative taken by the UCY is eUniversity[66] (started end of 2004 with an expected date of completion within 2008). The eUniversity initiative can be defined or depicted as an "umbrella" or framework which supports any current or upcoming project that aims to develop or improve a web-based environment for supporting and enriching the access to the university systems and services. Some of these services are already in the development stage and some others are in the process of been initiated. After the completion of this project a number of services (i.e. the eUniversity portal, administrative services, library services, etc. as listed in section II.5)), will be available to all people in the university at all levels (faculty, administration, students an so on). The scope of the eUniversity initiative and its resulting projects is to develop a technology platform and a framework of thought that will lead to innovative and creative technologies and new trends in the area of an electronic university that will provide quality learning through its infrastructure and content.

Other projects

In the last years some serious attempts focusing on boosting the learning process have not been undertaken from the public and private sector in Cyprus. Even though most of these projects are already completed it is noteworthy mentioning them as they are regarded as initial innovative attempts (directly or indirectly) related to future eLearning developments in Cyprus. In particular:

Educational programme "IKADE"

The educational programme "IKADE" (duration period was 1 year (1999)) has been supported by the MoEC and sponsored exclusively by the Bank of Cyprus and aimed at developing the spiritual and cultural bonds among pupils attending schools in Greece, Cyprus and young Greek migrants attending schools elsewhere in the world. The main vision was to support the migrant Greeks in the countries they live, by maintaining a bridge of communication among them, Cyprus and Greece. "IKADE" operated in two levels: a) the level of the Internet, where a Greek planet is created, to which everyone, wherever s/he lives, could visit or navigate, and b) the level of teleconferences carried out between young Greeks attending Greek speaking community schools everywhere in the world and their classmates from Cyprus and Greece. The current school year was a period of change in the way of communication through videoconference between schools.[67] With an initiative from the Bank of Cyprus–Greece, the technology was gradually replaced with an alternative one, offering the opportunity for more schools to take part in the programme and exchange even teaching courses material.

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[66] Source: Technology Foresight Summit, Experts Papers, Budapest 2003.

[67] http://www.beepknowledgesystem.org/ShowCase.asp?CaseTitleID=417&CaseID=1322

Educational programme "ODYSSEUS"

The programme "ODYSSEUS" (started in 2000 and completed in 2004) was considered as the functional extension of the programme "IKADE". It was a educational research programme that implemented open and distant education and it had duration of three years. Pupils and teachers of the participating schools attempted to become the constituent elements of an open learning environment in the framework of which concepts like tele-teaching, figurative classroom and tele-cooperation were applied in practice. Among the main objectives of the programme were the following:

- to familiarize pupils and teachers with the new technologies of modern transmission;
- to develop a pedagogic model for distant learning in a Primary School environment;
- to develop an evaluation methodology for all the phases of the programme;
- to create educational material.

The development of a comprehensive methodology for open and distant learning between Primary Schools in Cyprus constituted the main core of a collective effort in which the MoEC, the Computer Department of the UCY, the Departments of Education of the Universities of Athens and Crete and the Bank of Cyprus participated. The programme completed its cycle during the school year 2004-2005 with the Publication of a Guide of Good Practises for Distance Learning. Eight Primary Schools participated in the organised activities[68] with positive results accumulated.

E-LEN - A Network of eLearning Centres

The project (partly sponsored by the European Commission under Socrates Minerva programme, commenced in 2002 and ended in 2005, with main partner the UCY) aimed to create a Network of eLearning Centres and leading organisations in the learning technologies. It supported a diverse constellation of learning centres around the world, had a strong capacity for developing and delivering teaching-focused technology for effective eLearning experiences and disseminated these experiences to other institutions.

The main objectives of the project were:

- to establish the necessary infrastructure and organisational structure for the network of eLearning centres;
- to identify and gather best practice, "design patterns", research roadmaps on eLearning and to enhance the dissemination of such results;
- to produce guidelines for establishing learning centres.

The activities of this project included the survey, analysis and evaluation of existing eLearning centres, the establishment of the E-LEN network, the design and development of a portal for the gathering and exchange of eLearning resources and expertise and the evaluation of the project's achievements.

ODL-NET EXPERIENCE - Open and distance learning network for exchange of experiences

The project's (partly sponsored by the European Commission under Socrates Minerva programme, commenced in 2003 and ended in 2005, with main partner the UCY) general objective was the creation and consolidation of a network for the analysis and exchange of ODL experiences on the Internet, within Institutions of Higher Education. A network of universities and institutions from Spain, Ireland, Finland, Portugal, Czech Republic, Cyprus, Great Britain and Greece constituted the partnership of the project.

The main outcomes of the project were the creation of a database addressing ODL analysed experiences, problems and solutions and the definition of related strategies and measures that need to be considered from European Institutions of Higher Education.

[68] http://www.beepknowledgesystem.org/ShowCase.asp?CaseTitleID=418&CaseID=1323

Weblabs - New representational infrastructures for eLearning

WebLabs (the project commenced in 2002 and ended in mid 2004, with main partner the UCY) investigated creating new ways of representing and expressing mathematical and scientific knowledge in European communities of young learners (10-14 years). The focus was on collaborative construction, description and interpretation of how things work. The aim was to transform the Web into a medium in which European students collaboratively construct and critique each others' evolving knowledge and working models.

WebLabs investigated mathematical and scientific concepts in three knowledge domains: Numbers, Big numbers and Infinity, Kinematics and Dynamics, and Model Systems and Randomness. A further component was Tangibles: it was built an interface with physical devices together with the set of sensors and actuators capable of instantiating a two-way mapping between experiments in the real and virtual worlds.

WebLabs consists of sets of "Transparent Modules", which can be combined and re-used for the building of more complex functionalities. They are shareable and adaptable to multiple grain sizes according to learner needs, transparent (mechanisms can easily be inspected and modified) and employ multimedia and multimodal functionalities. These tools are built in ToonTalk, a state-of-the-art programming system where abstract computational concepts were represented by concrete animated analogues.

Students across European sites created, shared and modified web-based reports on different mathematical and scientific areas by making use of the well designed sets of Transparent Modules. The developed webreports included working models in the addressed areas along with multi-media descriptions, interpretations and reflections.

EDIPED

EDIPED (European Digital Portfolio for the Evaluation of Educators) has been carried out with the support of the European Community within the framework of the Socrates Programme, commenced in 2003 and completed in 2006. It has been developed by the University of Nicosia in collaboration with the Cypriot industry.[69] It aimed at the development of a new, dynamic, digital appraisal tool for the collection and presentation of portfolio evidence of a educator's competencies, which could be used in the various educational and appraisal systems throughout the European Union. The project intended to address the self-improvement/self-evaluation of educators (such as teachers, educational administrators, inspectors, teacher trainers and trainees) and their objective and transparent evaluation with the help of new technologies.

The main activities covered are:

- Analysis of the existing appraisal systems in particular in the countries of the project partners;
- Analysis of tools used for the evaluation of educators in particular Portfolios and Digital Portfolios of achievements/competencies with emphasis in the countries of the project partners;
- Creation and implementation of a draft Digital Portfolio of achievements/competencies;
- Implementation, evaluation and finalization of the Digital Portfolio tool;
- Dissemination of the Digital Portfolio and evaluation of the project.

Main outcomes included:

- The development of an European Digital Portfolio in which personal documents of different types (texts, films/videos, tapes) can be stored and presented in a purposeful order.
- The development of a training course on how to use the European Digital Portfolio.

[69] Source: www.ediped.com

This project intended to help enhance the quality of portfolio assessment and by increasing its appeal and credibility increased its use through the EU so enabling greater mobility of recognised professional teachers while at the same time it enhanced the self-awareness and professional development of educators.

II.3 The legal framework supporting eLearning

Based on the Constitution of the Republic of Cyprus, the MoEC is responsible for managing the various levels of public education. Other ministries also are active in the provision of education and training. All such activities are legitimised by decisions of the Council of Ministers and/or Acts passed by the House of Representatives.

In Cyprus there is lack of laws for the functional area of eLearning and also of a solid and comprehensive legal framework making use of ICT in the educational sector. Further there are no special Intellectual Property Rights (IPR) laws for materials in digital form. Currently digital learning materials are mostly developed by higher educational institutes but only very limited exchange of such materials is taking place among those institutions. The main reason for this is the missing of an official recognition procedure of authorships rights.

Informatics or computer studies are not compulsory courses either on the primary or secondary education level. This kind of approach may not be effective in the long run as it does not provide the the national system with the means to concretely enhance overall ICT skills as it is requested in different related national policies. The main issue is how to combine eLearning with the national curriculum. Nevertheless, ICT qualification standards for teachers (and students) especially in vocational educational level need to be further developed and should have stronger legal base.

At workplace there is no strong tendency to cover obligatory training by making use of Web-based courses. However, recently (especially large enterprises) have started to use the opportunity of providing Web-based courses to their employees (see sections I.2 and II.1.2.2) especially regarding compulsory trainings of employees regulated by the legislation labour code, like course for work safety, first aid, training of drivers, etc.

The missing law for eLearning means most of all that there is no clear legal basis for financing specifically eLearning initiatives. However, EU structural funds have been identified to be a strong financial driver in promoting ICT based developments in different domains including education. Substantial resources of the structural funds of the period 2007-2013 have been allocated for eServices developments including eLearning.

There is also a lack of legislation providing mechanisms for quality assurance, accreditation, certification and other related aspects of adult education. As a consequence there is a low possibility to compare and assess the quality of these products, which may hinder the demand for them (OUC, 2006)

In Cyprus there is a private sector in education covering primary, secondary and tertiary levels. There are two basic sets of laws, which empower and control private education institutions. One is the Law (No 67 (I)/96) for the Establishment, Control and Operation of Institutions of Tertiary Education. The other is a set of laws (Nos 5/71, 56/83, 123/85 and 154 (I)/99), which cover the pre-primary, primary, secondary general and secondary technical/vocational institutions, including coaching classes. However, those laws do not cover the use of ICT in education in the private sector. This leads to a diversity of approaches using ICT at the different educational levels in the private sector that are not in line with related public sector educational initiatives (MoEC, 2005)

To expand the provision of continuing vocational education and lifelong learning, the MoEC is currently in the process of preparing legislation in cooperation with the MLSI and the HRDA, which

will govern the establishment and operation of schools for continuing technical and vocational education.

II.4 Dedicated ICT infrastructures and applications

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

II.4.1.1 ICT infrastructure in educational sphere

Currently the existing ICT infrastructure for educational purposes for the primary and secondary educational level provides computers and internet to almost all schools in Cyprus (see table 12). However, there is a large variation between school types regarding the sophistication of the ICT infrastructure provided: while only 14% of primary schools have a broadband internet connection, the penetration is highest among upper secondary schools, with 73% and vocational schools with 85%. There is also some variation with regard to broadband access between urban and rural areas: 41% of schools in densely populated areas have broadband access compared to 21% of schools in thinly populated areas. On top of that, only 51% of schools have a Website, 49% offer e-mail to teachers, and only very few schools (7%) do so to pupils. The existing infrastructure provides for the use of computers in classrooms and not only in labs. The use of computers in classrooms has reached to 89% for 2006 as compared to the EU-27 average of 68%. It provides for one computer for 12.4 pupils, as compared to the average of EU-27 of one computer for 9 students.[70]

The ICT infrastructure does not provide for interconnections among all the different schools. Additionally, it does not provide for eLearning services and the related electronic content. In this context, the implementation of a Learning Management application which will enable the communication between teachers, students and parents in issues like absences, homework examination grades etc. is at a pilot stage in eight schools.

At the primary level of education, the ICT infrastructure has been in use on an experimental basis as a tool in the teaching/learning process in a number of primary schools (about 10% of the public primary schools). Since 2004 all schools of primary education are connected through Internet.

At the lower level of public secondary education, computers have been introduced as tools in some topics of the curriculum (e.g. Design Technology, Home Economics, etc) and there is a provision for a subject aiming at developing computer literacy on a systematic basis.

[70] Source: Use of Computers and the Internet in Schools in Europe 2006, Country Brief: Cyprus, Empirica.

Table 12: ICT equipment in Cypriot schools 2006

				Educational Level (CY)				Type of locality (CY)		Internet Access (CY)	
	Total CY	Total EU25	Total NMS10	Primary	Lower secondary	Upper secondary	Vocational	Densely populated	Intermediate and thinly populated	Narrow-band	Broadband
Computers per 100 pupils [a]	12.4	11.3	7.1	7.3	*12.1**	*18.6**	*19.8***	12.9	11.3	9.5	15.1
... of which internet connected	8.9	9.9	6.4	6.1	*9.9**	*12.1**	*9.6***	9.0	8.9	7.4	10.7
Percentage of schools having...											
Computers for teaching [b]	98.9	98.7	96.7	98.5	*100.0**	*100.0**	*100.0***	97.9	100.0	100.0	100.0
Internet access [c]	95.0	96.2	94.7	93.9	*94.4**	*100.0**	*100.0***	90.3	100.0	100.0	100.0
Broadband internet access [d]	31.0	66.9	43.4	14.3	*64.4**	*73.4**	*84.7***	40.7	20.6	0.0	100.0
A website [e]	50.9	63.0	66.7	34.0	*87.5**	*93.6**	*100.0***	61.8	39.3	41.3	79.1
An e-mail address for the majority of teachers [f]	49.1	65.2	48.1	45.1	*57.5**	*61.0**	*57.6***	38.3	60.5	55.5	43.6
An e-mail address for the majority of pupils [g]	6.9	23.5	24.4	2.5	*14.7**	*18.5**	*15.3***	3.8	10.2	7.2	7.5
A LAN [h]	22.8	55.2	60.4	16.8	*42.6**	*33.4**	*42.4***	22.2	23.5	17.5	37.6
An intranet [i]	17.3	40.8	26.9	18.7	*21.5**	*8.3**	*42.4***	15.1	19.7	20.2	14.2
An external support or maintenance contract [j]	33.3	47.1	44.3	30.1	*47.0**	*36.9**	*42.4***	27.7	39.4	36.0	33.2
Percentage of schools using computers for education in...											
Computer labs [k]	73.4	80.5	94.6	62.0	*100.0**	*100.0**	*100.0***	78.7	67.8	65.5	93.4
Classrooms [l]	89.5	61.4	29.5	95.3	*74.1**	*77.4**	*84.7***	82.1	97.2	93.4	80.1
School library [m]	41.2	33.4	36.8	22.7	*75.8**	*90.3**	*100.0***	42.5	39.8	30.5	68.5
Other locations accessible for pupils [n]	38.3	27.0	20.2	27.1	*56.1**	*72.8**	*15.3***	38.5	38.1	31.8	56.4

Source: LearnInd HTS 2006; Base: a: all pupils; b-j: all schools, k-n: schools using computers for educational purposes for pupils (cf. index b)

At the higher education level different institutions have their own ICT infrastructures, like the eUniversity infrastructure of the UCY.[71] Those infrastructures are mostly used for the provision of web-based courses and limited for eLearning services provision. However, there is no ICT infrastructure interoperability among the different institutes and there is also no sharing regarding digital content, as IPR issues seem to be a burden.

There is also no dedicated ICT infrastructure and application for eLearning provision regarding lifelong learning. The main eLearning opportunities for adults, so far, are provided by the OUC in the form of web-based courses.[72]

II.5 eLearning services

The provision of eLearning services in Cyprus is still in its infancy and the implementation of planned services is moving very slow at all the different educational levels. Even though there are some good initiatives, like the implementation of the eUniversity from the UCY, these are on an early stage of implementation and only under pilot use.

In private sector enterprises rarely make use of eLearning practices to train their employees (especially the smaller companies). Additionally, there is no formal service or office for anyone who wishes to be informed about eLearning opportunities on the island. Therefore, a vicious cycle is created by the limited available eLearning services on the one hand, and the inadequate information of the public on the other, rendering the situation in the eLearning sector stagnant.

Nevertheless academia has been participating in various EU and national funded eLearning projects and has initiated the deployment of some promising pilot services, like the ones listed below:

InterLearning

InterLearning Learning Management System (LMS – commenced in 2002 and running efficiently since summer 2005) has been developed by the Nicosia University.

[71] Source: Towards CY eUniversity – The strategic plan for the University of Cyprus, 2005.

[72] Source: http://www.ouc.ac.cy/

InterLearning is an in-housed developed project, running locally at the college intranet, that allows lecturers to develop and post on the faculty Intranet, educational material. Students have access to the material through the college Student Intranet and also through the Web. The InterLearning interface is showing the facilities available to the lecturer. It is important to mention that for the moment the InterLearning software has been developed to provide on-line educational material supporting lectures and not to be used for developing material that will replace teaching.[73]

The eUniversity Services

The eUniversity 'framework' project (that was introduced above), is composed of a number of services that are currently either on the development or planning stage. The major ones are discussed below:

eUniversity Portal

The aim of this portal is to use the internet in order to provide access to the university services for the major constituencies of the university (students, academic stuff, external or internal collaborators, administration stuff, alumni). These accessed services can be categorized as follows:

a) *Administrative Services*: This category covers all services and activities of the university's Administration Division (both student- and academician-related): student registration, course registration, student financials, research program monitoring and management, degree requirement monitoring, grade reports, academicians' payroll, etc.
b) *Library*: This category covers all the traditional services and activities of a university library, for both the user perspective (student, academician, external visitor) and the library stuff perspective: library card issue and monitoring, student account, search capabilities to other linked libraries, link to the student account in the administration service, etc.
c) *eLearning*: This category will cover all services available to the academic and student body in order to support and enrich the course teaching through more advanced and state-of-the-art multimedia forms and methods and through the utilization of internet channels in addition to the traditional in-person, in-class teaching process.

Both the intranet and extranet will be accessible either wirelessly or through internet-capable computers.

Scheme for the provision of portable computers with wireless access capabilities to all university students

The university has taken the initiative during the last 3 years of developing a technical framework for mobile wireless access within the physical area of the university campus. A pilot project has been implemented and tested successfully with the allocation of 30 wireless-access-capable portable computers to students of the department of Computer Science. The plan is to go full-scale within the next year. The future challenges are (1) to enrich the technical infrastructure in order to expand the geographical physical area, (2) to expand and enrich the network capabilities for a wider user base, and (3) to develop a scheme that will cover both the financial and operational/logistic aspects of providing a wireless-access-capable computer to every student. The scheme must ensure long-term viability, sustainability, and continuity.

eUniversity Research Lab

The University plans to create an eUniversity Research Lab. The lab will serve as a platform / environment for contacting applied and theoretical research and other development activities. The lab will research, develop and promote technologies and trends in the eUniversity area. The resulting solutions and services will become available and be deployed not only by the university systems but also by other academic and educational organizations both locally and globally.

[73] Pouyioutas, P, Poveda, M, & Apraksin, D. (2003). The Impact of Web-based Educational Software: Off-the-Shelf vs. In-House Developed Software, *Journal of Information Technology Impact*, Vol.3, No.3, pp. 121-130.

eUniversity Consulting Services Center

By leveraging on the experiences and the technical and business/conceptual expertise that will be derived from the above projects, the university plans to set up a team of experts, who will provide consulting services to the solutions and services that other organizations with related projects will undertake. The target market will not only be other Cypriot educational organizations; the eUniversity Consulting Services Center will provide consultation to other private or governmental organizations that are in the process of developing eLearning systems, also for developing the technical and organizational infrastructure of Web-based eLearning.

The Open University of Cyprus services

The main goals of the OUC are to contribute significantly to the fundamental aims of lifelong learning and to expand the number of beneficiaries from a systematic development of eLearning. The OUC places great emphasis on the field of research and promotes programmes which aim at the development of methodologies and corresponding high technologies for open and distance learning. It utilizes a variety of media to help students learn no matter where the students are located. The following services, techniques and methods are employed:

- By means of course material in digital form, received either over the Internet or through CDs and DVDs, or from printed course materials;
- By attending lectures via the Internet and, in the near future, using subscription television, at fixed timetables, specified by the teaching personnel;
- By using the Electronic Portal in order to:
  - Find relevant information concerning thematic units, which are the basic operational units of each course;
  - Contact professors or lecturers using synchronized and non-synchronized technologies such as chat, videoconferencing, and forums;
  - Exchange ideas, thoughts and opinions with other students who are studying the same thematic units;
  - By directly communicating with the teaching personnel over the telephone at predetermined times.

II.6 Specific issues and solutions

Even though a main objective in Cyprus in the last years was the introduction of ICT in education, this was not understood as a measure of improving and reorganizing the overall learning process through technology, but only as the provision of computers in all the schools and the provision of internet connections. Learning is still based on rather traditional techniques and eLearning is understood as a way of working with computers and accessing the internet. Furthermore, even though the educational reform has put as an objective the updating of content of education, curricula and teaching methods related to eLearning are only very restrictedly taken into consideration. There is the need of raising awareness and understanding of eLearning as a modern educational learning method that should be fully integrated in the traditional learning methods. For that eLearning has to be assigned a clear role in the national related policies, and measures needs to be defined of how to raise awareness among all stakeholders regarding its importance in achieving the Lisbon objectives.

Another issue is the fact that even though the financial resources allocated for education are among the highest in EU-25 (Public expenditure on education has increased from 3.9% of the GDP in 1990 to 8.6% in 2006 as compared with the EU-25 average of 5.21% and in 2007 education has been allocated the highest expenditure among the other domains for 2008 with an increase of 28.1%) no specific resources have been allocated to eLearning developments. Specific expenditure for eLearning needs to be defined as part of the public expenditure and also of the structural funds 2007-2013.

Furthermore the centralized institutional framework of administration and decision-making combined with the lack of respective eLearning competence among in the ministerial level handicaps related developments (MoEC, 2006). The creation of stronger partnerships among the public and the private, including stronger collaboration among academia and public, in promoting eLearning developments could be a solution for this issue. Such partnerships could also contribute to the increase of financial investments from the private sector regarding R&D and eLearning developments.

II.7 Acceptance and usage of eLearning services

In the last years the usage of ICT, which is considered a significant factor for the eLearning services progression, has become more common and frequent, in households, at schools and the workplace.

At primary and secondary schools the majority of the government initiatives are focused on the improvement of ICT infrastructure, i.e. indicators of accessibility of PCs to the students and Internet penetration. Noteworthy is the significant improvement of the indicators on the number of computers per 100 pupils and computers connected to internet in both primary and secondary education observed in 2006. In 86% of the schools in Cyprus computers and internet are integrated into the teaching of most subjects. This holds especially true for primary and secondary schools (84% - 87%) but less so for vocational schools (58%) in 2006.[74]

In addition, in order to utilize the capacity of ICT equipment at the highest possible extent, ICT training is provided to the teaching staff (see table 13). These investments into both physical and human capital are crucial for creation of necessary conditions for eLearning take-up.

Table 13: Teachers using ICT (2006)

	CY	EU-25
Percentage of teachers		
with no or next to no user experience	8	7
with novice ICT skills	10	11
with good ICT skills	33	42
who use existing online material from established educational sources	80	74
who use material available on the School's computer network and database	54	63
who use other learning material. using computers in class	7	9
Percentage of teachers who or whose pupils use		
a computer in class	51	66
a computer in 5% of all lessons	18	19
a computer in 11 to 24% of lessons	27	22
a computer in 25 to 50% of lessons	27	20
Percentage of teachers who have used a computer in the last 12 months		
to prepare lessons	87	89
in class	75	74
in class to present or demonstrate	68	63
Percentage of teachers stating as a reason for not using computers in class		
Lack of computers	57	49
Subject does not lend itself to being taught via computers	21	24
Lack of adequate content/material	21	20
Lack of adequate Skills of teachers	14	23

Source: Use of Computers and the Internet in Schools in Europe 2006.

Nevertheless, at the **basic and secondary educational level**, the usage of ICT-supported learning in traditional education can be considered to be in a quite early stage and depends mainly on whether the

[74] Source: European Commission: Benchmarking Access and Use of ICT in European Schools, 2006

educators have the needed ICT skills and are willing to take advantage of ICT means. In the Benchmarking Access and Use of ICT in European Schools Report, 2006, it is stated that 25% of teachers in Cyprus still do not use computers in class. Moreover, at 36%, the percentage of teachers with insufficient access to ICT and the internet in Cyprus is significantly above the European average of 20%. Moreover, many teachers are reluctant to the idea of learning on the Internet because they regard the teacher's human interaction with the students as an essential part of the study process, and feel that eLearning in some way diminishes this factor.

However, according to the same study, teachers in Cyprus are very much in favour of ICT use in class and clearly see the benefits. Less than 1% state that there are "no or unclear benefits in using ICT". Again, less than 1% of the teachers not using ICT express this opinion. This compares to a European average of 16% and puts Cyprus in the top position in Europe. Also, the motivation of teachers for using ICT is high in Cyprus. Over 95% of Cypriot teachers see significant learning benefits for pupils using computers in class and say that pupils are more motivated and attentive when computers and the internet are used in class. With this figure, Cyprus ranks second in Europe, and is first at primary school level. Cypriot teachers seem to have fully internalised the use of ICT as a key element of teaching in schools.

At the **higher education level**, computers are mostly used by professors as a tool for text editing, for information retrieval from the Internet or for email exchange. Usage for Web-based LMSs, data analysis and content management is almost nonexistent.

The demand for the use of Internet in Cyprus for educational purposes, especially in the higher education, has been growing in the last years reaching almost EU-25 average. From the Internet users, 9% of individuals are using it for formalised educational activities (see Table 14).

Table 14: Internet usage for educational purposes (2005)

	CY	EU25
Percentage of individuals who used Internet, in the last 3 months, for formalized educational activities (school, university, etc)	9	8.5
Percentage of individuals who used Internet, in the last 3 months, for other educational courses related specifically to employment opportunities	1.8	6.9
Percentage of individuals who used Internet, in the last 3 months, for post educational courses	4.1	5.4

Source: Eurostat, 2006

In the **private sector** the usage of eLearning courses has been adopted primarily by larger and multinational enterprises (banking and telecommunication sector being the most active ones in this area). The companies usually use either eLearning courses with a general focus, such as language courses, ICT courses or courses on work security, or tailor-made courses through which employees are informed about new products and services of the company. Nevertheless, it can be argued that smaller companies are reluctant to use eLearning in their training process, mainly due to the high costs involved and the absence of the dimension of human interaction.

II.8 Impacts of eLearning developments

To date, eLearning is at its very early stage of development in Cyprus. eLearning services are almost nonexistent apart from some pilot services carried out by the academia and some scattered developments in the private sector for the internal training of employees. These implementations are few and isolated, which means that they do not belong under a common eLearning umbrella, so that someone can not assess their impact for Cyprus in general. Additionally, currently, there are no evaluation strategies and/or tools adopted by the various actors to measure the performance and impact of the various eLearning initiatives and/or projects. Particular methodologies and surveys have only developed for the collection of data on ICT and Internet usage. There is also no data available

regarding the influence of eLearning services to the spread of ICT use. Nevertheless, the use of some successful systems, like the eUniversity, and the willingness of Cyprus to adopt methodologies and procedures taken from best practices around Europe, as mentioned in the National Lisbon Programme of 2006, as well as the transfer of knowledge from programmes actively participating, show a good potential in affecting positively the growth of ICT use.

Nevertheless, as eLearning is tightly associated with the establishment of an ICT infrastructure in education and the improvement of ICT skills especially for teachers, and given that ICT in general has a positive impact on different educational aspects (i.e. improving teaching methodologies, online availability of various courses, promoting training opportunities, shifting individual research approaches to the establishment of group research networks with common objectives, etc.)[75], one can deduce that eLearning could also prove to be of benefit for the Cypriot education, when in place. At all different educational levels, it can be also be argued, that an initial positive effect, through the high rate of Internet has been observed regarding the availability of information and on making communication easier between students and educational institutions.

However, eLearning has not affected much the ICT industry and the training industry. Much progress has been made in teacher ICT training; however, the management of ICT tools in teaching activities, especially the training of didactical skills, needs further improvement.

Furthermore, it can be argued, that the use of ICT-supported learning has deepened the country's IS. However, it is clear that various eGovernment and private sector services (online banking) have had a positive impact. Moreover, eLearning has had only limited effect on growth and competitiveness as well as on achieving Lisbon targets.

[75] "Delivering on the Modernisation Agenda for Universities: Education, Research and Innovation" COM(2006)208 final, of 10.5.2006, [on-line]: http://ec.europa.eu/education/policies/2010/doc/comuniv2006_ en.pdf

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

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

III.1 Current main achievements and shortcomings

Based on data presented and analyzed in previous chapters we the main achievements and shortcomings in Cyprus with regards to the eLearning domain are pointed out in this section.

Main Achievements

eLearning context

- The integration of ICT in education at all levels and the development of a related ICT infrastructure, especially as regards the provision of internet and the ratio of computers per student, teacher or principal, has been positively progressing in the last years. Internet connections have been established in all schools in both primary and secondary education. Cyprus ranks around the European average as concerns the increase of the number of computers in total and per pupil. These achievements have established an initial strong basis regarding eLearning developments;

eLearning in general, vocational and higher education

- The training of teachers for secondary general and vocational education aiming at the acquisition of basic skills for ICT tools has been progressing positively;
- A Learning Management System referring to the use of a platform that enables the communication between teachers, students and parents has been launched on a pilot basis in 8 schools in September 2007, whilst its implementation in all schools is expected to be completed in 2009;
- The government has included the exploitation of the potential of ICT for enriching and extending learning across all curricula;
- Government laid down in the IS Cyprus National Strategy for the period 2007-2013, as one of the main priorities, the continuous upgrading of the infrastructure of education and training by making use of new technologies in the learning processes;
- With respect to the priority of reinforcing the higher level education locally, there were favourable developments concerning: the UCY, where an additional department has been established; the Technological University, which started its operations in the academic year 2007-08; the OUC, which has expanded in the same academic year with two new post-graduate programmes; and private-sector tertiary education, with the accreditation in 2007 of the first three private Cyprus universities. These developments proved to have positive effect on eLearning, especially the establishment of the OUC.

eLearning for lifelong learning (including workplace learning and other adult education)

- There is a strong trend by large enterprises to use the opportunity of providing web-based courses to their employees;
- eLearning opportunities for lifelong learning have started to have been provided by educational institutions – the most important are the web-based courses provided by the OUC.

Main Shortcomings

eLearning context

- A critical shortcoming is that at different levels of education eLearning is not clearly incorporated in the overall education reform and its association with building up the knowledge-based society, as stated in the Lisbon strategy, is weakly defined;
- eLearning policies are scattered among broad development policies, IS policies and education policies. Therefore provision of eLearning services is quite fragmented. Additionally, the few existing national strategies and policies addressing eLearning are practically disconnected to each other. For example in the Strategic Development Plan 2004-2006 the use of ICT in education is given in a very general form not building up on the specific objectives of the Cyprus national eLearning strategy under eEurope 2005;
- There is no single authority appointed for eLearning policy and the collaboration and coordination among the different related stakeholders needs substantial improvement. For example even though the promotion of ICT in schools is under the responsibilities of the MoEC, the responsibility of the development of eLearning services has been allocated in the structural funds budgets of 2007-2013 under DITS, but also under the MoEC;
- eLearning is at its very initial stage of development and is very much related and closely associated with the integration of ICT in education, specifically the use of computers and internet, and the provision of web-based courses address mainly the higher level of education;
- There is not a solid and comprehensive legal framework regarding the incorporation of ICT in the learning process; For example there is a lack of ICT qualification standards for teachers (and students) especially at the vocational education level, a lack of legislation providing mechanisms for quality assurance, accreditation, certification and other related aspects of adult education and finally a lack of Intellectual Property Rights (IPR) laws regarding content in digital form.
- Even though there has been an increase in the provision of broadband services in the last two years reaching 12.5% in 2006 it is still quite below the EU-25 average of 32%;
- There is a lack of eLearning awareness among politicians and related stakeholders;
- In the national budget, only small share is devoted to ICT initiatives and R&D innovation; at a national level there is not any significant investment concerning R&D activities promoting ICT expansion for the provision of eLearning services.

eLearning in general, vocational and higher education

- Even though almost all schools in Cyprus now use computers for teaching and have internet access only 31% use the internet via a broadband connection. With this figure Cyprus ranks at number 25 of the EU-27 countries;
- There is only limited amount of digital learning material that can be used for eLearning purposes especially in primary schools;
- Even though computer sciences are taught as a subject in all secondary schools it is not a compulsory course. At the general education level the curriculum remains traditional (e.g., ICT is dealt with in the national curriculum as a horizontal theme) allowing thus different levels of ICT skills usage among students;
- At the higher educational level the stress has so far been on on-campus education and not on distance learning, influencing negatively the development of eLearning services. This is shown by the low number of web-based curricula, apart from the ones provided by the OUC;
- The development of electronic content for subjects taught in schools is at an early stage and moves slowly as it is carried out by teachers over and above their working hours. There is not a professional setup of quality assurance and production of teaching material reducing thus the usability of such material. At present, there is software for only a few subjects in secondary education and only three subjects in technical education. Additionally the development of digital content for higher education is carried out separately by different institutions using a diversity of

productions methods. Overall there is a serious the lack of digital learning materials. Also IPR issues arise when it comes to the use of the produced material. For example digital material produced by one university can not be used by other public universities because of a lack of means for the appropriate protection of authorship rights;

- At the same time, there is a lack of interoperability among the ICT infrastructures of the primary and secondary education and the higher education; This handicaps the exchange and sharing of common eLearning resources;
- There is a lack of ICT qualification standards for students and teachers. Moreover, the secondary education teachers are currently not obliged to achieve the European Computer Driving Licence (ECDL).

eLearning for lifelong learning (including workplace learning and other adult education)

- eLearning in the field of lifelong learning is very limited, as lifelong learning is at its infancy itself. This can be attributed to the lack of recognition of learning as an essential part in everyday life in the whole society; and secondly, the lack of a legal and organisational system for lifelong learning at the state level to support the implementation of the priorities set;
- The implementation of a coherent and comprehensive lifelong learning policy is for the government a very challenging task. The high cost that such an initiative implies for the public budget is a major obstacle. The need for coordination amongst the various ministries, organisations and other stakeholders involved in lifelong learning is a further obstacle;
- Private sector cooperation with the public sector remains limited in developing eLearning content. Additionally, there is a limited cooperation in the field of R&D, as can be seen from the limited financial contribution of the private sector to R&D expenditures;
- At workplace there is only a limited tendency to cover obligatory training by making use of eLearning.

III.2 Factors behind the existing developments

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

Economic factors

Cyprus is a functioning market economy with a sufficient degree of macroeconomic stability to cope with competitive pressures within the EU. It has been classified by the World Bank as a high-income country; in effect, Cyprus per capita income in PPS is equivalent to 90.6% of the EU-25 average in 2007. Cyprus's economy is supported by a workforce that is relatively flexible in terms of labour market regulations and highly educated. Unemployment has rarely exceeded 3.5% in the last 20 years. The education system in Cyprus is well developed. The fact that education is a policy priority in Cyprus is supported by the high allocation of financial resources to educational expenditure in the last years reinforcing among other actions the reforming of educational processes to make use of ICT. Macroeconomic stability has been playing an important role why Cyprus has been able to take large strides in Information Society and specifically in the ICT sector.

Legal factors

From the legal point of view there are a number of factors that have handicapped eLearning developments. Such factors are the fact that informatics or computer studies are not compulsory courses, neither at primary nor at secondary level; the lack of ICT qualification standards for teachers (and students), especially at the vocational educational level; the lack of legislation providing mechanisms for quality assurance, accreditation, certification and other related aspects of adult education and also the lack of Intellectual Property Rights (IPR) laws for content in digital form. Additionally the missing of a legal basis in the area of eLearning and its associated financing; the slow

process of introducing and approving the legislation needed and the lack of a solid and comprehensive legal framework towards ICT contributed negatively to eLearning developments.

Main positive factors from the legal point of view regard the legal establishment of two new state universities and the fact that at workplace recently enterprises (see sections I.2 and II.1.2.2), especially large ones, have started using the opportunity of providing Web-based courses to their employees especially regarding the compulsory training of employees regulated by the legislation labour code (Cyprus Statistical Services, 2006).

Policy factors

Attempts to build up an IS as well as a knowledge-based economy in Cyprus have been present since 1999. This strategy is tailored at the structure, characteristics and the needs of Cyprus' economy. IS became a political priority, IS policies have been aligned to EU policies and goals, and there is a high recognition of the economic importance of the IS in terms of business development. Furthermore, ICT has always been regarded as one key priority to ensure Cyprus' economic growth and to build up a strong society – an idea which is also adopted in the Lisbon Strategy. However, there is a lack of vision on how ICT can create added value in non-economic sectors like education, and hence support building up sufficient bases for future innovations. Even though the eLearning domain has been defined as one of the main pillars of the Cyprus National Information Society Strategy for 2004-2006 and also for 2007-2013, no coherent strategy for eLearning has been defined yet. At present, eLearning is promoted through the different IS policies and strategies in the E&T systems. This kind of rather fragmented public sector provision of eLearning reflects the absence of a consensus, and hence priorities, about the role of eLearning in the Cyprus educational system, and about how the available ICT applications, environments and content should be incorporated into the study process. One of the results is a misconception of the term "eLearning" resulting in narrowing down its definition to a tool supporting traditional learning methods. There is also a strong association of eLearning with the development and provision of an ICT infrastructure and such a relation hinders the government in understanding it as an enabler in building up the knowledge-based society.

A number of government and semi-government bodies are playing different roles in advancing the development of eLearning in Cyprus. However there is no collaboration among different main actors and there is still not a single appointed authority for IS policy and specifically eLearning provision. Furthermore, there is limited coordination among public and private sector activities, but also among the public and the academia, with regards to eLearning developments. Additionally, the implementation responsibility of eLearning services is centralized at the MoEC not providing for a flexible monitoring mechanism for the implementation of eLearning as a measure to accelerate its deployment.

Technological factors

The fact that Cyprus holds a good position concerning some IS indicators has been positive for eLearning developments. More specifically, Internet penetration is high among private households using the Internet through personal computers and internet enabled mobile phones and also the existing ICT infrastructure for educational purposes for the primary and secondary educational level provides computers and internet to almost all schools in Cyprus.

Nevertheless, the majority of Internet connections are dial-up since broadband penetration in Cyprus is well below the EU-25 average. Additionally there is a large variation between school types as regards broadband internet connections especially between urban and rural areas and the existing ICT infrastructure does not provide for interconnections among the different schools.

Ethical factors

Currently, there is an overall lack of knowledge about the possibilities to protect authorship rights.

This creates difficulties regarding the sharing of digital material among educational institutes.

Socio-cultural factors

The general image of ICT usage is very positive in the society of Cyprus and the share of Internet users is rapidly increasing over the years. A positive attitude towards the IS has been generated during the last years from the political sphere. There is a high motivation of teachers to use ICT in the courses, especially in the primary and secondary education. The problem is the lack of content. Cyprus' low participation in lifelong learning over the last years has been slowing down related eLearning developments. In the case of the private sector, eLearning is dependent on the size of the organisation. Large enterprises provide more Web-based courses that smaller ones to their employees.

Demography

In view of the decreasing population the Cypriot government has started getting aware of the need to enhance the skills of elderly people in the framework of ICT and raise awareness regarding lifelong learning participation as a measure to promote active ageing (National Lisbon Strategy, 2007).

Regional specificities and factors

Cyprus is a small-sized country and even though it is divided into six regions, this is only an administrative division and does not play any role in the provision of eServices. However the economic growth observed in the past decades cannot be described as balanced between the different regions of the island, and as a result regional inequalities were created, with economic growth being concentrated in the urban regions. Public adult education courses are mostly offered in urban areas, so that residents from the rural areas have difficulty in reaching such courses.

III.3 Drivers and barriers for future eLearning in Cyprus

The major goal of this section is to identify the main drivers and barriers for eLearning developments considering all the above-mentioned major factors for the domain.

Drivers to eLearning developments

Future major factors that will facilitate the developments of eLearning in Cyprus include:

- Functioning market economy with macroeconomic stability with high economic performance supported by a highly educated workforce and low unemployment;
- There is a strong political will to build up an IS in Cyprus;
- eServices have been assigned political priority and are highly promoted in the National strategies of IS defined for the periods 2007-2013; Specific focus in those strategies has been also given in the implementation of a well established ICT infrastructure (refers to high computer and Internet penetration rates) with the main aim of taking advantage of ICT in education.
- As an effort in advancing better the IS and the development of eServices in different domains, including the eLearning field, different government and semi-government bodies have been assigned different specific roles and responsibilities regarding related implementations;
- Reinforcing higher level education and private sector tertiary education has been defined to be a political priority in the next years;
- There is a need to increase participation in lifelong learning in order to be in line with EU directives, and overall it means more efforts to be undertaken to take advantage of ICT tools in everyday life;

- EU structural funds have been identified to be a strong financial driver in promoting ICT based developments in different domains including education. Substantial resources of the structural funds of the period 2007-2013 have been allocated for eServices developments including eLearning;
- Due to a reallocation of expenditure according to the priorities set in the National Reform Programme of 2007, education has been allocated the highest expenditure compared to other domains with an increase of 28.1% for 2008.

Barriers to eLearning developments

There are numerous factors slowing down the developments of eServices in Cyprus, namely:

- eLearning has been more associated with IS advancements and has been understood less as a tool in building up the knowledge-based society;
- eLearning has been tightly associated with ICT developments (means number of computers and internet). Main emphasis has been given, in the first instance, to ICT infrastructure and then to eLearning mainly under the narrow understanding of an ICT tool supporting existing learning processes;
- The lack of a comprehensive approach to the development of ICT in education – in particular, a lack of consensus for the role of ICT at different educational levels;
- There is no legal framework that supports eLearning and ICT for all educational levels (especially at general education level). The legal gaps are also described by the lack of ICT qualification standards for predefined skills for students, teachers and principals. Additionally the process of introducing and approving needed legislation is very slow, involving many administrative obstacles;
- There is nobody responsible specifically for IS and eLearning developments. Additionally there is a lack of coordination among the different main actors; There is a missing effective collaboration model among the government and academia of how eLearning developments can be achieved in a long term view;
- Less attention has been awarded to the co-operation between government and industry/private sector on key policies and eLearning developments, especially regarding the provision of digital content;
- There is a slow growth of the IS indicators in Cyprus specifically regarding broadband connections. The latter leads to the conclusion that there remains a vast potential for higher utilisation of the opportunities offered by IS;
- There is no specific budget allocation for eLearning developments. Developments in the field have been associated with financial resources coming from the structural funds, especially with the structural funds of the period 2007-2013. This association can have negative effects in building up a long term Cyprus eLearning strategy as the structural funds approach is more a short term project-based approach than a long term strategy-based one taking into account the Cyprus specificities and needs in the field;
- R&D expenditure is mainly carried out by the public sector and only limited from the private sector;
- ICT solutions employed by different government authorities, and different actors in the public and private sector are taking only limited consideration of interoperability issues; The problem means that every agency is developing its own ICT solutions that are not interoperable to others;
- eLearning has been weakly promoted by the government and the awareness by citizens and public administration of the positive impact, that such services could have on the Cyprus economy, is low;
- There is a high percentage of people lacking basic computer skills which is regarded as an important issue of the taking up of eLearning services.

IV. ANALYSIS OF POLICY OPTIONS

The aim of this chapter is to analyse the most important policy options in order to tackle effectively the challenges faced by Cyprus related to the development of eLearning. These policy options address decisive policy issues that need to be solved. The chapter defines also a framework with regards to economy, infrastructure and technology, legislative and institutional aspects through which major breakthroughs in the areas of eLearning may occur pending the implementation of the proposed policy measures. In section IV.1 the most important eLearning related policy options are identified and in section IV.2 specific measures are defined that need to be undertaken in order to foster the successful implementation of the identified policy options.

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

IV.1 The most important policy options in Cyprus

IS became a political priority for Cyprus, with the IS policies to be aligned to EU policies and goals, and a high recognition has been assigned to the economic importance of the IS. However, despite the noteworthy growth regarding IS indicators in last years, especially in 2006, Cyprus is still among the lowest performers in Europe and current developments did not have the expected positive effect in areas like the educational sector. In the case of the educational sector this can be attributed to the fact that ICT has been mostly regarded as a means of improving the quality of traditional learning methods and not of supporting the creation and use on new ICT-based learning styles. There is the need of a **reform promoting a stronger integration of ICT in the education in Cyprus in a way that empowers a future educational model based on innovative ICT-based learning methodologies and processes and brings Cyprus education to be in line with related EU educational directives** (Ministry of Finance, 2006).

Within the framework of a knowledge based economy Cyprus has understood well that the integration of ICT in education has to play an important role. Strong efforts have been undertaken in the last years for the development of a related ICT infrastructure, mainly as regards the provision of internet and the ratio of computers per students, teachers or principals. The importance of eLearning in education has been mainly tightly associated with such ICT developments and also with the provision of web-based courses. There is a **big necessity of incorporating eLearning in the overall educational reform aiming at improving the quality of the traditional learning processes and enabling the building up of the knowledge-based society as stated in the Lisbon strategy.** The greatest challenges that will be addressed in the Cypriot society are the wider utilization of ICT in education are the enhancing of productivity and growth potential of the economy by boosting investment in human capital (MoEC, 2006).

General, vocational and higher education

Even though the digital training of secondary general and vocational education teachers on basic skills and ICT has been proceeding well since 2006, its impact on education is associated with a diversity of other factors like the willingness and motivation of the teachers to make use of such skills in the class, the time needed to prepare and carry out a course as compared to the traditional method, the provision of web-based courses, the preparation of digital material, how computer-based courses are integrated into the existing curriculum etc. Thus, there is the need of **defining assessment schemes on the quality of teacher training for using ICT in teaching**. The goal of such reform policies is the improvement of the skills of the teachers in providing ICT related teachings to students (Planning Bureau, 2007).

Another policy definition should be related to **defining evaluation measures on the quality of education, and the curriculum up to the lyceum, as related to the use of ICT and eLearning** and **based on the outcome of such assessment related educational reform policies should be defined.**

There is a low awareness of eLearning among citizens and the impact that such services could have on the Cyprus economy. This can be attributed to the fact that the government itself is not aware enough of the strengths of eLearning. A definition of eLearning as the *development of individuals to become lifelong learners equipped to live and succeed in the context of an IS*, made by DITS under the framework of e-Europe 2005, has not been followed up with the definition of any specific implementation strategy to achieve it. Thus, there is the need to **define a specific eLearning strategy based on the specific characteristics and needs of the Cypriot economy** and to **promote the mission of such a strategy at all the different levels of the society.** The strategy should undertake measures for the organization and delivery of informative seminars targeted at middle and top level in different educational institutions in an effort to gain their acceptance and commitment for eLearning initiatives, so that they will be able to disseminate the positive message to pupils, support the change process and also to promote the importance of Lifelong learning in general.

Lifelong learning

Lifelong learning has been less promoted in Cyprus and is at its early stages. This has as a consequence that eLearning developments for lifelong learning have only limitedly been undertaken. However, since 2005 efforts have been undertaken regarding the definition of a coherent and comprehensive lifelong learning national strategy recognizing the field as a sine qua non for a knowledge-based society. There is an **urgent need for stronger efforts regarding the definition and implementation of a strategy with the main objective to empower citizens to be lifelong learners.** The strategy should take into consideration the needs and specificities of Cyprus and set lifelong learning quantitative targets in line with the corresponding EU benchmarks (Ministry of Finance, 2007).

IV.2 Suggested policy measures

As mentioned also above, identified policy options address decisive policy issues that need to be solved in the important structures of: **economy, legislative, infrastructure and technology,** and **institutional** (Ministry of Finance, 2007, 2006). For each one of these areas measures are defined to foster the successful improvement of the provision of eLearning in Cyprus.

Policy measures concentrating on economy

Cyprus' functioning market economy in the last 25 years is characterized by a sufficient degree of macroeconomic stability has been playing an important role in enabling Cyprus to take large strides in the IS. There is the need to sustain economic and fiscal sustainability, as a basis for maintaining macroeconomic stability and boosting growth in the long run and safeguarding improvements in the development of IS especially in the ICT sector. Within this broader context, a reallocation of resources to areas that were identified as priorities in the NRP 2007 was carried out. Among those areas, two areas which exhibited high growth rates, compared to the budget amount of 2007, are education expenditure, with an increase of 28.1%, and R&D, with an increase of 4.9%.

A key challenge for policymakers is to define a model ensuring financial resources for eLearning developments, as part of the educational expenditure but also from other financial sources. Also a substantial R&D expenditure increase needs still to be made if the target set by the government for 2010 (1% of GDP) is to be achieved.

General, vocational and higher education

- Today eLearning expenditure in general education is mostly associated with resources allocated for ICT infrastructure development (i.e. computers and internet). There is the need

for **financial resources allocation for eLearning specific related development areas, like production of digital content, enhancing resources for teacher training, collaboration schemes among higher educational institutes etc.**

- Educational reforms and eLearning developments in general and vocational education have been strongly associated with the use of EU funds. There is a need for **concrete eLearning related financial funds and programmes developed by the MoEC**;
- There is a need to develop **funding mechanisms to increase private investment from the private sector, households and individuals**
    - This kind of approach should especially support higher and lifelong learning. In the case of higher education, this would mean private funds and expert knowledge as well to be available to participate in the R&D programmes of universities. In lifelong learning, this would mean the provision of training programmes by universities, which, in turn, is financed by the private sector;
    - Government policies to encourage family investment in education could involve for example benefit systems, free provision of additional school training, after teaching hours for pupils with learning difficulties, etc.
- **R&D activities need to include in their research priorities the issue of eLearning** as one of the fields for which extensive research should be carried to adjust it to Cyprus parameters. In that way a better utilization of resources will be achieved serving both the R&D advancements and the eLearning developments.

Lifelong learning

- There is the need to define **collaboration models among public authorities and economic and social partners regarding local specific needs for further training and retraining of individuals and promote lifelong learning** as a support measure of such needs. Identified collaboration models should address private funding possibilities for lifelong learning opportunities;
- The government should **financially support digital literacy** and **eLearning development at workplace** that will be based to a large extent on commercial principles in order to assist the smaller companies and amongst others increase competition.

Policy measures concentrating on laws and regulations

General, vocational and higher education

- There is a need for the definition of an **overall eLearning strategy** or there is at least the need for inclusion of eLearning in other significant strategy/policy documents in order to be legally backed up. This kind of strategy should give an overall view of the current situation of the Cypriot educational sector upon which concrete goals and vision for eLearning could be possibly set up. This strategy should be an enabler of implementing reforms and building up the knowledge society;
- There is a need for **synchronizing the policies of different fields related to ICT** in view of building the knowledge based society through an official definition act or a law;
- The **higher education institutions should have their own eLearning strategies** in order to guarantee their autonomy;
- An **overall framework for ICT qualifications** at the different levels of education regarding both the pupils and the teachers needs to be defined;
- A decision about the **role of the IT subject in the educational curriculum** needs to be taken;
- Development of **assessment schemes on the quality of education, teachers training and the curriculum** up to the lyceum, as related to the use of ICT and eLearning, needs to be carried out; ICT competences for teachers should be established in more legally binding way than it is done currently;

- Establishment of an **independent Centre for Educational Evaluation** responsible for on-going, formative evaluation of several reforms and programmes in the Cyprus educational system;
- Even though at present there is not much **digital learning material** around, a **Quality Assurance Certificate** measuring the level of appropriateness of such material for ICT-based learning should be worked out and coordinated at EU level as a measure of achieving uniformity in digital material production.

Lifelong learning

- There is the need of the **definition of a coherent and comprehensive lifelong learning strategy** taking into consideration the Cyprus specific needs.

Policy measures related to the use of ICT and content for eLearning

General, vocational and higher education

- In general, the support from the state is still needed to expand and upgrade the existing **ICT infrastructure** by making use of state-of-the-art technologies in order to interconnect all the different schools;
- There is the need to provide **training of teachers** not only in basic IT skills, but also in state of the art technologies, like **multimedia**, and how to make use of such technologies for educational purposes;
- Important policy measures include the **increase of access and expansion of the broadband infrastructure to cover both the urban and rural areas**; additionally the following broadband related measures need to be carried out:
    - Introduction of digital terrestrial television broadcasting:
    - Fixed Wireless Access Networks: For the introduction of Fixed Wireless Access ('FWA') networks in Cyprus, a public consultation needs be conducted to explore relevant issues, such as the number of licenses to be granted, the regulatory framework, geographic coverage and network roll-out requirements.
    - TETRA Networks: The decision for granting licenses for TETRA networks has already been taken. The next step is to conduct a public consultation to define the number of licenses to be granted, the geographic scope of each license and the policy framework, especially in relation to public safety and commercial services.
- There is the urgent need of the **increase of eLearning services** at all the different levels of education;
- There is the need of **production of electronic content** for all curriculum subjects;
- Implementation and promotion of a **Learning Management System**, which will enable the communication between teachers, students and parents in issues like absences, homework examination grades etc.
- **Interoperability of eLearning services** in higher as well as vocational education levels should be promoted;

Lifelong learning

- Lifelong learning **Web-based courses** need to be developed;
- In order to support lifelong learning, a **state-financed programme to equip adult learning centres with ICT** should be developed and implemented.

Policy measures concentrating on the institutional structure

General, vocational and higher education

- A number of government and semi-government bodies are playing different roles in advancing the development of eLearning in Cyprus. Main policy measures concern the **assignment of committed owner for eLearning developments** and the **improvement of collaboration among main actors**;
- A further policy option includes the **establishment of an effective monitoring mechanism** for the implementation of eLearning as a measure to accelerate its emergence.

Lifelong learning

- An **organizational structure** should be setup consisting of representatives of the competent authorities and key social partners, **as the body responsible for following up the implementation of the lifelong strategy** to be defined and making suggestions for its future adjustments.

V. MAJOR R&D CHALLENGES FOR E-LEARNING

The purpose of this final chapter is to identify the most important technical and non-technical future R&D challenges specific to eLearning so as to address the local and global needs identified in Chapter III. The major issues raised in this chapter include educational reform, technological and financing challenges.

V.1 Educational reform challenges

Within the framework of a knowledge based economy Cyprus has understood well that the integration of ICT in education has to play an important role in achieving the Lisbon objectives (Planning Bureau, 2007, 2006). eLearning has been tightly associated with such ICT developments. An important challenge is how to **connect eLearning expansion with the reform of the educational sector**. eLearning-supported educational reform sets a number of challenges for all the related stakeholders (policy makers, educators, researchers, technology developers and teachers) on how to prepare learners to engage in innovation and knowledge creation, enabling thus the building up of the knowledge-based society.

The first challenge is how to incorporate eLearning in the overall educational reform in order to **improve the quality of the traditional learning processes but also explore and implement new learning approaches** which are in line with current ICT developments, and support the quality of education. An important question that needs to be considered in employing new learning approaches regards the assessment of the **appropriateness and sufficiency of ICT infrastructure** to enable re-orientation of education at all the different educational levels, but also in terms of different subjects in each different level. In addition, before working out and supporting the usage of new learning approaches, research needs to be implemented to assess whether the **possibilities of using eLearning are the same in terms of different subjects,** and if not, how they differ.

Associated with the introduction of new learning methods is the challenge to define ways of promoting an **eLearning culture** among students, teachers and principals as a support measure **regarding eLearning expansion** (MoEC, 2006). In Cyprus there is a lack of awareness of the impact that the wider utilization of ICT in education can have in the society and eLearning is regarded just as another electronic tool of supporting existing learning methods. Additionally, there is the challenge of working out **evaluation methods and improvement strategies regarding the ability of educators and learners** to make use of the new ICT-based learning approaches in the educational process but also in the lifelong learning field. Such evaluation methods should not only take into account ICT skills but also other criteria, like changes in the communication way among students and teachers, and the ability of students to make use of digital content. Also the **reconstruction** of the **curriculum** to accommodate the appropriate inclusion of new ICT-based processes at all the different educational levels is a challenge.

Taking into consideration that, in Cypriot education, the human dimension plays a very important role, a challenge lies in supporting the **communication and socialization aspect** among educators and learners by eLearning services leading to the successful take-up of ICT.

Finally, the establishment of an **effective monitoring mechanism** for the implementation of eLearning services is an important challenge. Such a monitoring mechanism should cover all eLearning services' development stages including analysis, design, implementation and roll out regarding time, quality and budget delivery but also efficiency and effectiveness of related project management.

V.2 Technological challenges

One of the technological challenges in the area of eLearning is the **need to create interoperability**. This key research challenge covers technical, semantic and organisation levels, as well as standards in order for eLearning to work across different infrastructures of educational schools and institutions. Currently there is very limited interoperability among educational schools resulting in a diversity of teaching approaches. To this aim, research needs to be carried out to understand how the educational sector at all different levels should work together to ensure sharing learning systems. Also the **degree of interoperability** among public and private sector needs to be examined as a measure of promoting lifelong learning practices.

Another challenge concerns the **development, quality assurance and production of electronic content.** Coordination models among all the different actors in the public and private sector need to be defined taking into consideration distribution mechanisms of digital learning material. This means that digital content developed for example by higher institutions, like the OUC, will be shared with the private sector avoiding thus the duplication of efforts and expenses for example by different enterprises.

The setup of **efficient ICT networks** among schools regarding the exchange of web-based courses and participation in web-based courses provided by other schools at general and upper secondary educational levels is an additional challenge. Models on the exchange of teaching knowledge and course material among Cypriot schools with different specific profiles need to be researched.

In the case of eLearning, much more emphasis must be given to the issue of **IPR** related to **digital learning materials.** Currently digital learning materials are mostly developed by higher educational institutes, like the UCY and OUC. Flexibility models of authorship rights needs to be researched in order to allow other educational institutes to use the materials and at the same time to recognise and complement the initial authors. Another challenge for Cyprus, but also for the larger EU level, is the **technical support required to guarantee authorship rights for digital content and software**. This is important as a unique technical support model needs to be developed that will set a European production standard which Cyprus has to also follow.

V.3 Financing challenges concerning the funding of eLearning

Sustainability of public finances. There is the need to define models to ensure economic and fiscal sustainability, as a basis for maintaining macroeconomic stability, boosting growth in the long run and safeguarding improvements in the development of IS especially in the ICT sector in Cyprus. A key challenge is to define a model ensuring **long term financial resources for eLearning** developments not only based on public and structural funds resources, which is the current situation in Cyprus. In the Cypriot implementation of the Lisbon strategy emphasis is given in the establishment of **Public Private Partnerships** to **fund** eServices, including **eLearning**. Once sources of public funding for eLearning have been assessed and decided, the capital improvement budget process needs to consider potential sources of private sector funds based on the definition of appropriate models. The definition of such models is a challenging task at local and global level.

Another challenge deals with the **evaluation and benchmarking** of the **overall outcomes of eServices**, including eLearning, particularly as regards costs and benefits, economics and financing, as well as overall evaluation frameworks and methodologies. The reason of such evaluation and benchmarking will be an improved **impact assessment of eServices,** addressing their **contribution to public good and public value**, including the main EU and national policy goals of competitiveness, economic growth, employment and jobs, social inclusion and regional development.

The implementation of a coherent and comprehensive lifelong learning policy is for Cyprus a very

challenging task. The high cost that such an initiative implies for the public budget is a major obstacle. The need of **defining coordination models amongst the various ministries, organisations and other stakeholders** involved in **lifelong learning** is a further challenge influencing **eLearning expansion.**

A further financial challenge is deciding on the use of **business models** for **producing eLearning content**. Firstly, the best commercialization strategies of produced digital learning materials need to be explored. Secondly, both the public and private sectors must work together in implementing eLearning applications, irrespective of the origin of a particular application, so that they can do business and enlarge their market in a way that is acceptable for the users.

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Abstract

In 2005, IPTS launched a project which aimed to assess the developments in eGoverment, 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, Cyprus.

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 eGoverment, 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.