The Evolution of E-Learning in Greek Universities and Technological Education Institutes – the Government Intervention

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Abstract— The idea of e-learning has by now spread to hundreds educational organizations and significant higher and adult education institutions in Europe. In Greece, distance learning is applied in all levels of tertiary education (graduate, post-graduate and doctorate). In this paper a review of the situation that followed the introduction of e-learning in the field of Greek higher education takes place. In addition, a brief analysis of the European and national education policies related to ICT integration and distance learning is presented. Useful conclusions on the effectiveness of e-learning applications in the Greek educational framework were drawn during the survey and are stated below. Finally, several key factors that need to be taken into account for the upgrading of education through the efficient and effective use of e-learning are demonstrated. The research on the applications of e-learning systems and innovative education methods was mainly conducted through the official websites of Universities and Higher Technological Institutes.

Index Terms— E-learning, Asynchronous, Synchronous Education, Tele-education, E-class, Moodle, Higher Education

I. INTRODUCTION

Following the Lisbon European Council summit in 2000 the European Commission produced the EU’s ‘eLearning initiative’. The goal was to accelerate the use of the internet and promote multimedia technologies in European education. The decision No 2318/2003/EC of the European Parliament and the Council of 5 December 2003, adopting a multiannual programme (2004 to 2006) for the effective integration of ICT in education and training systems in Europe (eLearning Programme) was aimed at improving the quality and accessibility of European education and training systems through the effective use of information and communication technologies [1].

After 2006, the eLearning programme, as a part of the information and communication technology (ICT) was included in the new ‘Transversal Programme’, part of the EU’s new integrated lifelong learning programme (2007-2013). The general aim of this programme is to foster interchange, cooperation and mobility between European education and training systems, so that they become a world quality reference [1].

By 2007, the idea of e-education had spread to almost all primary and secondary education institutions and hundreds of higher education and adult learning institutions across Europe.

The promotion of the Information Society in Greece is one of the main goals of the Greek educational policy, not only for primary and secondary but also for tertiary education.

In the Greek higher education system, the first attempt to introduce information and communication technology in the field of distance learning was in 1998 by the Hellenic Open University.

Today, distance learning is offered by the Hellenic Open University and the National & Kapodistrian University of Athens which offers a range of distance learning modules [2].

New facilities for distance education are in progress in all Higher Education Institutes in order to support both horizontal educational actions and other educational needs. This is taking place in the context of the Information Society programme and in compliance with the Ministry of National Education & Religious Affairs’ relevant policies [3].

II. METHODOLOGICAL RESEARCH - QUESTIONS

The main research problem of this paper is the outline of the effectiveness of e-learning applications in the Greek Higher Education.

Within the framework of the current research we review the implementation and operation of e-learning methods in the institutions of tertiary education. We provide a detailed description of the Greek University Network’s aims and objectives, its projects, plans and the services it supports. We analyze the tele-education projects of each University and Higher Technological Education Institute separately and we present, briefly, the Greek education policy on ICT.

The information accumulated for the completion of the research was retrieved, mainly, from the official websites of the Greek universities and education institutes and concerned data on distance learning applications and similar on going telematics projects.

The collected information about each university and institute was analysed in terms of content, type of distance learning, its objectives, the target groups and the technical support it is provided with. A special interest was given to the governments support on the e-learning project, through national policies and European funding.
III. SYNCHRONOUS AND ASYNCHRONOUS E-LEARNING IN THE GREEK HIGHER EDUCATION

1. Greek University Network (GUnet) [4]

GUnet is a non-profit civil company called “ACADEMIC NETWORK” and was founded in 2000. Its members are the Greek Higher Education and Academic Institutions (20 Universities and 16 Technological Education Institutes). The aims of the company are determined by the broadband network needs and objectives of the Greek academic community in the framework of Information Society aiming at servicing research and education. Given that all the institutions of higher education created the non-profit civil company GUnet, the latter has the ability to rely on and use the experience and the know-how of Network Operations Centres (NOC) of all institutions. These centres have successfully implemented in the past a significant number of projects, supplies and studies, while they actively participate in the processes regarding the determination and implementation of the GUnet’s actions and tasks.

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<th>Universities</th>
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Table 1: The institutions that participate in the Greek University Network are the following Universities and HTEIs of the country.

Projects and Actions of GUnet

a. Project: Tele-education services for the members of GUnet (01/05/2005 ~ 31/03/2006)

The particular project focuses on the following actions:

- Education - Training of GUnets institutions NOCs technical staff.
- Actions of continuous informing and promotion of tele-education services as well as scientific/educational seminar/lectures and tele-cooperation of teaching members in the higher educational institutes.
- Production and support of digital educational material.

b. Action: E-UNIVERSITY

The action of e-University concerns the digital services of information and administration of the higher education that are provided to the citizens, e.g., students, candidate students (pupils), graduates, the teaching and research personnel. Its objective is to complete and unify the existing operations in each institution in order to achieve a very high level of provided digital governmental services, having as a main characteristic the easier access and exploitation of services offered via Internet.

c. Advanced Telematics Services for GUnets Institutions.

This project constitutes the continuation of “Academic Internet - GUnet: Access Network and Core Services for the Education” project that was financed by the 2nd Communal Support Field. With the exploitation of both the experience and the living potential of the institutions-members, advanced telematics services of horizontal character and digital content will be implemented, aiming at covering the needs for information and use of advanced applications by Academic Institutions’ members.

GUnet Services

GUnet deploys and supports centrally the Voice over IP network and the national wide virtual learning environment. It provides and consults in designing broadband multimedia based services:

- e-Learning & Multimedia Support Centre
- Webcasting
- Web based
- Videoconferencing

It applies two scenarios and services Scenarios/models:

1. Synchronous e-teaching model
- E-teaching classrooms: students from other Higher Education Institutes may attend from the remote e-teaching classroom.
- Lecture broadcasting: students may attend live the lecture from their home.

2. Asynchronous e-learning model
Students may access the organized course material from their home.

Open eClass - Asynchronous e-Learning Platform

The GUnet eClass platform is a complete Course Management System that supports Asynchronous e-learning Services via a simple web browser. Its goal is the incorporation and constructive use of the Internet and web technologies in the teaching and learning process. It supports the electronic management, storage and presentation of teaching materials, independently of the spatial and time limiting factors of conventional teaching and creating the necessary conditions for a dynamic teaching environment.

Up to now the usage results of e-class platform in Higher Education Institutes are:

- 54 installations in the HEI
- more than 9.500 courses online,
- more than 210.000 registered users,
- more than 33% of teaching staff participating (4.100 teachers).

GU eLearning & Multimedia Support Centre

The e Learning & Multimedia Support Centre covers a wide range of needs in the field of e-learning.
1. Video production  
- Studio for recording lectures  
- Digitization and processing of video and teaching material  
- Publishing video presentations  
2. DVD production  
3. Other services  
- Webcasting  
- H.323/H320 & Web based video conferencing  

WEB Based Videoconference  
The webcasting in the higher Education Institutes comprises the broadcasting of conferences and workshop whereas it does not support the broadcasting of lectures. Most universities use their own video streaming server. GUnet provides a service for announcing webcasts.

2. The Case of Universities  
Apart from inter-university activities related to the GUnet projects and services, many different initiatives have been undertaken by tertiary education institutions individually or in collaboration with others.

2.1 Hellenic Open University [5]  
In 1992, the Greek government decided the establishment of the Hellenic Open University. The University was finally established in 1997 in the city of Patras and began operating in 1998.  
The HOU is the 19th Greek State University but the only one that provides distance education in both undergraduate and postgraduate levels, via the development and utilization of appropriate learning material and teaching methods.  
Among the goals of the HOU is to promote scientific research in a flexible and innovative way, develop technology and methodology in the field of distance learning and offer University studies to those who cannot attend classes or laboratories for whatever reason. In particular, the institution provides the possibility of higher education studies irrespective of the candidates age, i.e. it ensures them a “second chance” for lifelong learning and training.

2.2 National Kapodistrian University of Athens  
The National and Kapodistrian University offers a wide range of distance learning modules with an established set of further professional education on-line courses.  
At undergraduate and postgraduate level the UOA is using the GUnet e-Class platform on its own servers to offer on-line courses. Currently, on this platform there are 580 courses on offer with more than 300 teaching staff and 18,000 students registered [6], [7].  
The UOA also offers adult education modules based on the Distance Learning model. These modules were designed in response to increased education requirements in various job environments.

2.3 University of Piraeus  
The University of Piraeus invests on improving its network structure using up to – date technologies and developing telematic applications for teaching and research purposes.

The University’s Network Management Centre (NMC) supports a number of web course tools, available only for potential students. It is also responsible for:  
- The management of the data and voice network  
- The design, implementation and evolution of the University network  
- System and user support  
- The provision of teleconference services  
- The provision of internet and web services  
- The provision of dial-up access services [8]  
The departments of the University of Piraeus use the e-Class platform to offer several courses in an asynchronous distance learning environment. A Typical example of an e-learning programme is offered by the department of Banking and Financial Management, which is launching the E-learning Programme of Banking and Financial Management using distance-learning products based on web technology. The software is an educational platform that provides a user-friendly electronic environment and enables anytime, anywhere access for all participants. It allows the classroom to extend onto the web by posting electronic journals and resources or assigning and collecting assignments. Moreover, the computer-based training incorporates technologies that support interactivity and achieve ease of access and attendance using on line education tools and non-synchronous activities such as blogs and discussion forums [9].

2.4 University of Ioannina  
The University’s Computer and Media Centre organises all computer services for teaching and research operations and administers the campus-wide network, which includes access to global computer networks.  
An Open and Distance Learning Centre operates in the University of Ioannina. It is a regional office of the German Open University, which supports students who are enrolled at the Open University by supervising their studies and preparing for exams [10].

2.5 Aristotle University of Thessaloniki [11]  
The Telecommunications Centre of Aristotle University provides distance-Learning services to all University members since 1997.  
The videoconferencing systems installed offer full duplex real time audio and video connections with remote sites.  
The A.U.Th. provides a pioneering Network of six fully equipped Distance-Learning Classrooms in several Departments (Dept. of Electrical and Computer Engineering, Dept. of Physics, Dept. of Medicine, Observatory, “Ippokratio” and “AHEPA” University Hospitals), as well as a smaller videoconference room in the Telecommunications Centre. The lecturers can present simultaneously their educational material both to local and remote audience by using appropriate equipment for each case.

2.6 University of Macedonia  
The University of Macedonia leads a distance e-learning programme called “telemathos”, which is subsidized by the Ministry of National Education of Greece together with the European Union. “Telemathos” aims at the provision of distance education services and the collection and analysis of elements which will enrich
the know-how of contemporary tele-education. The project will offer new technology material, a tele-education classroom and four e-classrooms together with a fully equipped "mobile e-classroom" [12].

2.7 National Technical University of Athens
The integrated communication network of the NTUA provides high quality facilities to support both teaching and research. The Network Management Centre (NMC) is responsible for the management of the network as well as the promotion of the networking culture among NTUA students and staff. It also provides technical support for the advanced tele-teaching infrastructure of the NTUA. The NMC has a close collaboration with GUnet, providing the technical management for interconnecting all Greek Universities and Technological Institutions to GRnet [13].

2.8 Agricultural University of Athens
The academic departments of the Agricultural University of Athens use the e-class platform to offer a large number of online courses. The Institution provides its academic staff with services aiming at distance teaching, multimedia and digitalized educational material. It has implemented 2 tele-education classrooms, an area in the library and a conference room for the same use. It also allocates 3 teleconference systems, one of which is mobile. All the above equipment can offer services of synchronous tele-education, where trainers and trainees may communicate from distance simultaneously [14].

2.9 University of Thessaly
The Network Operation Centre (NOC) of the University of Thessaly offers a great number of pilot services, such as videoconference and tele-education over IP, Video on Demand, live transmission of TV programmes and local radio station programme through Internet. It has set up two fully equipped videoconference rooms which can accommodate 176 people. The NOC has also configured and operates a "click-to-meet" platform for Pc based teleconferencing. Through this application, up to 15 people may gain access to the virtual teleconference rooms concurrently and be in teleconference by just using the Internet Explorer. The NOC supports the GUnet e-class platform which offers 845 courses of several departments [15].

2.10 Athens University of Economics [16]
The AUE’s Network Operation Centre supports the Open eClass platform and operates the eClass server which was installed during the EPEAEK-II programme, co-funded by Greece and the European Union.

During the last few years, a real-time multimedia, distance learning classroom has been implemented. This specially designed classroom can function either independently, as a multimedia classroom, equipped with audiovisual and digital devices or as a virtual, distance learning classroom. It is equipped with state-of-the-art network and audiovisual devices which allow full duplex communication among this and other classrooms. It enables high interaction among participants of a course delivered simultaneously in different classrooms by simulating all operations taking place in a traditional classroom, thereby creating a virtual classroom.

2.11 University of Patras
The University of Patras allocates a fully equipped tele-education room which can support any distance educational process. Students may attend the webcasting of a lecture via the Internet or participate in a distance lecture, in real time with full audiovisual contact [17].

The eClass platform of Asynchronous eLearning Services is supported by UPnet and the Library of the University.

2.12 Aegean University
The University of the Aegean is considered to be the first Greek University to fully utilise Information and Communication Technologies (ICT) in everyday activities [18].

In 2004 the University implemented WebCT Vista(TM). This purchase was an initiative of the University’s library so as to offer to its Academic community an e-learning service based on WebCTVISTA. This is of great importance, considering that the University’s departments are dispersed on several Aegean islands. With a single instance of the WebCT Vista the University hosts e-learning services to share content and information across 17 departments situated on five different campuses (located on five different Greek islands). It provides the Aegean University with an expanded set of Web services interfaces, which allow it to customize the system and ensure that each school retains its own identity and control over its information. The purchase of WebCT Vista was co-funded by the European Union and the Greek State [10].

2.13 Ionian University [19]
The Network Operations Centre of the Ionian University provides e-Learning and e-Conference services to the University community, within the framework of Information Society programmes and other related activities. The e-Class platform has been implemented for the provision and management of online courses. Apart from GUnet e-class, the Ionian University offers the GUnet Blackboard platform, which provides an evolved communication system between teachers and students, the virtual classroom and a specialised system of project management.

In the field of synchronous tele-education the Ionian University offers a fully equipped e-classroom, with a capacity of 25 study places, where distance learning takes place.

2.14 University of Crete [20]
The directorate of the Technical University of Crete has carried out successfully several projects concerning the development of e-learning and tele-cooperation facilities for TUC, the equipment for infrastructure upgrade and the support of advanced telematics.

The TUC allocates two fully equipped tele-education rooms to the purpose of distance learning services. Wireless Access Points located at over 40 spots around the campus are also available to the academic staff. Finally, the university offers an e-class platform comprising 51 courses’ contents.

2.15 Athens School of Fine Arts
In the framework of the project “Integral Tele-education System of the Athens School of Fine Arts” the School of Fine Arts aims at the development of supporting services to improve and reinforce the operation of the School’s tele-education room.

The main goal of the project is the optimal exploitation of the existing resources and infrastructure by all
members of the academic community and the incorporation of the tele-education room in the educational procedures of the School, in order to create an integrated and efficient distance education environment [21].

2.16 Harokopio University of Athens
The Network Operation Centre of the Harokopio University of Athens hosts a modern infrastructure and constantly develops operations to support Synchronous and Asynchronous tele-education. It has implemented a fully equipped tele-education room, aiming to provide synchronous education methods and high quality teleconferences [22].

3. The Case of Higher Technological Education Institutes
All the Higher Education Institutes of Greece use an e-learning platform to support asynchronous e-learning services. Particularly, 14 out of 16 Technological Institutes use the GUnet e-class platform, whereas only two of them use a different one: the TEI of Serres (Moodle) and the TEI of Piraeus (LVC and Moodle). The TEI of Athens uses both GUnet e-class and Moodle [23].

3.1 TEI of Crete
The TEI of Crete has created four rooms appropriately equipped to support teleconference services. These rooms are sufficiently equipped to offer synchronous tele-education. One of them is located in the Library of Herakleion and has a capacity of 20 workplaces. The other three are smaller and are located in the departments of Chania, Siteia and Rethymnon [24].

3.2 TEI of Piraeus
Since 2004, the TEI of Piraeus has provided its academic staff with a tele-education system called LVC (IBM Lotus Learning Virtual Classroom). LVC may be used either as an independent tool for group collaboration or as front-end of IBM Learning Management System (LMS) and Lotus Sametime (Teleconference System). These systems are intended to design scenarios of synchronous and asynchronous education [25].

The IBM Lotus Sametime platform provides a framework of designing and managing virtual conferences or virtual classroom courses [25].

The General Department of Mathematics of the Institute established in 2005 the Laboratory of e-Learning Systems & Interactive Multimedia to fulfill the teaching and research needs within the wide area of e-Learning.

The Laboratory operates the Moodle platform (Modular Object Oriented Developmental Learning Environment), an Open Source Learning Management System which produces modular internet-based courses. It also applies web and communication technologies in learning procedures, plans and delivers applications of multimedia for e-learning and supports mobile learning [26].

3.3 TEI of Athens [27]
The Technological Education Institute of Athens has installed a tele-education hall which allocates the most up-to-date technology and equipment. Its goal is to support the operation of distant learning. The members of the academic staff have access to its facilities providing they are assisted by the Administration Group of the Hall and abide by the Regulations of Use.

The Technological Education Institute of Athens apart from the GUnet e-class provides its academic staff with the Moodle e-learning platform.

3.4 TEI of Patras
A tele-education lecture hall has been operating at the TEI of Patras since 2004. It provides the teaching staff with asynchronous and synchronous tele-education services. It supports the distribution of digital educational content and the video recording of lectures, events, and other activities that take place in the Institute. Its activities are funded by the Information Society’s Corporate Programme, within the framework of “Advanced Telematics and tele-education activities in the T.E.I of Patras act”, and the EPEAEK “Undergraduate Education Programme reformation” [28].

3.5 TEI of Serres
The TEI of Serres allocates a fully equipped tele-education hall to accommodate educational teleconference meetings. The Hall offers several services:
- Distance teaching via internet or ISDN in real time.
- Collaborative (and simultaneous) teaching of the Institutes’ professors and other Greek or foreign Institutes’ professors.
- Video recording of courses and posting them on the Internet.
- Use of reviewing methods and web resources during teaching.

The tele-education infrastructures are technically supported by the Network Operation Centre of the Institute [29].

IV. EDUCATION ICT POLICIES
The promotion of ICT for learning has been a priority of the Greek educational policy during the last decade. Numerous actions have been implemented and are being further developed in relation to ICT integration; such actions are coordinated by the Ministry of Education and Religious Affairs in the framework of the Information Society Programme. In the framework of this programme, the infrastructure is being further developed and maintained, digital content and services are being enriched and expanded and teacher training continues to emphasise the exploitation of new technologies in educational practice.

The Hellenic Ministry of Education and Religious Affairs has launched a coordinate effort for the utilization of ICTs and their incorporation into the everyday educational procedure. This effort is implemented in the fields of the third Community Support Framework mainly from the Operational Programme of Information Society (OPIS), under the direct supervision of the General Secretary of the Hellenic Ministry of Education and with the support of the Hellenic Ministry of Education Information Society office and the “Strategy for ICTs in Education” Committee. It is constructed onto four lines of action, which include the installation and support of network and computational equipment, the development of software and digital content for educational and administrative purposes, the training of the educational community on ICTs targeting to the utilization of the above areas and the modernization of administration areas [10].
V. CONCLUSIONS

There has been substantial progress in the use of ICT in higher education and training in Greece during the recent years. However, it has not yet had as significant an impact as expected.

Many university departments, research institutes and academic researchers are involved in e-learning projects at national and EU levels. In almost all Higher Education Institutions of the country, there is a Network Operation Centre that operates all e-learning services and aims at the implementation of new technologies within the Institutions. All Greek institutions of tertiary education have adopted the e-class platform and have by now gained the experience needed in order to apply and evolve e-learning technologies in their every day education procedures.

Nevertheless, the implementation of e-learning activities in tertiary education, (except the case of the Open University) remains on a pilot stage and relatively poor. In most cases the application of tele-education methods is taking place in computer laboratories of the Higher Technological Education Institutes, in courses that typically require practice with desktop applications and professional software. Course contents that are uploaded on the university web portals are in most of the cases digitised versions of texts that are usually developed by tutors and are also distributed to the students in paper. However, the main problem when producing learning modules is the visualization of theoretical fundamentals. Most of the e-learning systems are heavily text oriented. A good balance of theoretical text oriented content, animated and interactive multimedia content is of prime interest.

The implementation of e-learning technologies in teaching requires a change of the way of lesson planning and integrating ICT in the organization and presentation, but also in the educational practice. Many Greek Universities and Technological Institutes, while having by now all necessary infrastructure for the application of new instructive technologies, cannot easily ‘get rid’ of the conventional way of teaching.

Nevertheless, the acquisition of expertise on behalf of teachers and learners concerning ICT applications, together with the evolving technological infrastructure of the Greek Higher Education Institutions are expected to introduce more effective ways of teaching support and organisational innovation in the field of tertiary education in the near future. A key factor which would enhance the applications of e-learning could be the interconnection and sharing of platforms/tools/facilities in all levels of Higher Greek Education, in order to reach integration into a single system/platform.

The main goal of the Greek education policy, within the frames of the EU lifelong learning programme 2007-2013, is to foster the uptake of ICT for learning in education and training systems, including open and distance learning and open educational resources.

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