Open Access Courses in an E-Learning Process: Lessons from a Pilot Case Study

Kyvelle Constantina Diareme, Agricultural University of Athens, Hellenic Republic
Maria Dimitra Papoulia, Agricultural University of Athens, Hellenic Republic
Theodore Tsiligiridis, Agricultural University of Athens, Hellenic Republic

Abstract
Learning, in terms of academic or scholar education, used to be a privilege for few. Nowadays, with the use of new technologies and under the changing demographics in education, even higher academic knowledge can be acquired from people leaving in the most remote places at their convenience. In this paper we exemplify how Open Courses (OCs) in terms of Open Educational Resourses (OERs) can assist the process of e-learning in university level, especially that of autonomous and asynchronous. We present the lessons learned from the Open Academic Courses of the Agricultural University of Athens (AUA) in Hellas experimental pilot case. We review the project's progress so far, the challenges of converting traditional courses into OCs, the technologies used and the steps that were followed in order to ensure, intellectual property, accessibility and openness of the content. Furthermore we present future work, which includes a survey amongst tutors for the evaluation of such OERs and of the used methods. Open Academic Courses of the AUA is a project part of a major programme for converting the Hellenic University's courses into OCs. Lectures converted to OCs (Type A-, A and A+ according to the percentage and type of multimedia used) are hosted in the project's preliminary platform and are being implemented to both the University's portal, Open *e*Class and Open Delos platforms, and the national repository for OCs. Project's target group includes academia, graduates, and people with special needs, professionals and individuals as well as local authorities.

Keywords: open courses, OER, e-learning

Introduction – the Notion of Openness

Higher Educational Institutions (HEIs) aim to provide expert education, as well as, to contribute to the development of harmonic personality and students training in the sense of democratic values, humanism and tolerance, and equip students for whole life with knowledge and information that are from general level. Today HEIs are challenged by great changes caused by multiple external factors. World demographics and reductions in the traditional 18-to-25-year-old student age group (OECD, 2007) affect institutions and participant rates, while longer living and longer working can lead to more carrier changes and thus people being more flexible and open to acquire new knowledge. Moreover higher education is highlighted as a key policy area where reforms can directly contribute to jobs and economic growth (European Commission/EACEA/Eurydice, 2013). Educational practice is expected to change from a pedagogical approach closed, tightly controlled by the teacher, in an open, transparent, integrated in society, with parents and community involvement that supports student initiative, facilitating collaboration, personal skills and lifelong learning (Chimos, Karvounidis, Basios, & Tsiligiridis, 2013). This swift to lifelong learning is also depicted in the policy of the European Union (EU). One of the EU new strategic framework "Education and Training" (ET 2020) benchmark is that by 2020, an average of at least 15% of adults (age group 25-64) should participate in lifelong learning (European Commission/EACEA/Eurydice, 2013; Eurostat, 2015).

Electronic learning (eLearning), by means of using internet to deliver courses, or web based educational systems are being installed more and more by universities, schools, businesses, and even used by individual instructors in order to add web technology to their courses and to supplement traditional face-to-face courses. E-learning as a concept derives from the use of Information and Communication Technologies (ICTs) in order to deliver teaching and learning and aims to promote distance learning via the use of distance teaching techniques. E-learning has undergone rapid development over its fifty year history, since its beginning in the 1960s, and developed into highly sophisticated online applications (Fryer, Nicholas Bovee, & Nakao, 2014). Nowadays, an eLearning course may be delivered in various ways. According to Kostis, Basios, Chimos, Karvounidis, Douligeris & Katsanakis (2012) these are interactive course content consisting of homework assignments, lessons, quizzes, Sharable Content Object Reference Model/ Aviation Industry Computer-based training Committee (SCORM/AICC), vote banners and workshops; static course content consisting of files and folders, Instructional Management Systems (IMS) content packages, web pages, links of URLs; social course content including chats, forums, glossaries, wikis, databases, surveys, etc. A thorough list of benefits for eLearning, disadvantages, actions to overcome them as well as mistakes in its application are given by Khoury, Eddeen, Saadeh, & Harfoushi (2011).

Digitized content can be used in a synchronous and asynchronous way. Aynchronous eLearning programs are becoming more prevalent and research issues have been progressed from eLearning to mobile learning (mLearning) and form mLearning to ubiquitous learning (uLearning) (Hwang, 2006; Inthachot, Sopeerak, & Rapai, 2013). Additional top eLearning trends include Massive Online Open Courses (MOOCs),

personalized learning, augmented learning, Application Programming Interface (API) such as SCORM and Tin Can, cloud Learning Management Systems (LMS), flash HTML5 conversion, wearable learning (wLearning), video in learning and gamification.

The idea of openness represents approaches that focus on opening access to education and training provision, freeing learners from the constraints of time and place, and offering flexible learning opportunities to individuals and to groups of learners. Content of asynchronous eLearning, when opened, can be used as Open Educational Recourses (OERs), digitized materials offered freely and openly for educators, students and self-learners to use and reuse for teaching, learning and research (OECD, 2007). OERs/courses provided by HEIs are typically referred as OpenCourseWare (OCW) and are defined as "free and open digital publication of high quality college and university- level educational materials, organized as courses, often including course planning materials and evaluation tools as well as thematic content, free and openly licensed, accessible to anyone, anytime via the internet (Open Education Consortium, n.d.). Increasing need of lifelong education and geographical barriers, amongst others, led to the massive use of OERs, a specific initiative that is increasing in popularity under MOOCs (Coursera, Futurelearn (Europe)).

Typical examples of OCW are MIT OpenCourseWare and NOVA's OER-based General Education. In Europe there can be found a number of analogous initiatives e.g. Norway's national portal of education, UK's OpenLearn and other initiatives funded mainly by the EU Lifelong Learning Programme. Further information can be found in the Europe's OpenCourseWare page. In Hellenic Republic, the Greek Universities Network (GUnet), funded by the EU Operational Programme "Information Society" and aiming in provisioning academic community in such matters, is currently supporting the programme "Hellenic Academic OpenCourses". This is a major programme for converting the Hellenic University's courses to Open Courses (General aims of GUnet 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).

The set of rules and best practices defined by the programme and suggested by GUnet provide a common conceptual model of open academic courseware developed at national level that could set the scene for the basis of a unified/ standardized higher education eLlearning policy. The overall budget of this programme is supported by structural European and National funds and (according to Avouris, Komis, & Garofalakis, 2015) around 1/3 of Hellenic HEIs participated though the implementation took place in the midst of a severe economic crisis, where all society and of course Hellenic Universities were particularly affected by. Part of the above mentioned programme is the project of the "Open Academic Courses of the Agricultural University of Athens (AUA)". The project implementation period is January 2013 - September 2015.

The paper structure is as follows: Following the Introduction already presented, we abstractedly describe the Agricultural University of Athens, the project methodology, which is mainly defined by the programme framework and the technologies used in

the case of AUA. In sequel the project progress is reported, whereas in the end we discuss the lessons learned, recommendations as well as future work to be done.

Agricultural eLearning

Towards the needs of growing global demand for food, agricultural sustainability, as well as other environmental issues, various eLearning initiatives (targeted mostly in the rural sector and sustainable agriculture) are explored. Perhaps this justifies the limited cases found in the literature. A particular example is the eLearning Center of the Food and Agricultural Organization of the United Nations (FAO) that is targeted in the areas of food and nutrition security, social and economic development, hunger reduction and sustainable management of natural resources. All such courses are of small duration, offered free of charge and designed for self-paced learning, e.g. the International Network of Food Data Systems (INFOODS) eLearning Course on Food Composition Data (Charrondiere et al., 2014).

Knowing the Agricultural University of Athens

The AUA is the third oldest university in Greece. Since 1920, it has been making valuable contribution to the Hellenic and European agricultural and economic development, by conducting basic and applied research in the agricultural sciences, and by producing high quality graduates as well as cutting edge scientific knowledge. The AUA has two Schools, and in total six Departments; specifically the School of Agriculture Engineering and Environmental Sciences (Departments of Crop Science, Animal Science and Aquaculture, and Natural Resources Management & Agricultural Engineering) and the School of Food, Biotechnology and Development (Departments of Biotechnology, Food Science & Human Nutrition, Agricultural Economics & Rural Development). All the Departments aim to promote knowledge and educate scientists specialized in research on agriculture and related sciences, able to tackle problems connected with the rural sector. Hence a wide variety of courses, from different disciplines, are offered to students.

The AUA offers a 5-year Bachelor degree (300 ECTS), as well as postgraduate studies in various fields. There are 10 semesters for the undergraduate studies where the final one is dedicated to a thesis. In every semester the taught courses last for 13 weeks including semi-semester and final exams. In order for undergraduates to obtain their degrees they must also complete a 4 month internship. The University has 184 tutors, 78 tutors' assistants. There are 366 academic courses, and 324 lab courses, that include both compulsory (241 courses) and non-compulsory or elective ones (159 courses). It should be noted that courses are interrelated between different departments of the AUA.

According to AUA records the enrolled students for the year 2013 were 5.057. Table 1 shows the number of students per Department admitted to the University in the academic year 2015-2016.

DEPARTMENT	NUMBER OF STUDENTS
Agricultural Economics and Rural Development	110
Animal Science and Aquaculture	110
Biotechnology	110
Crop Science	160
Food Science and Human Nutrition	110
Natural Resources Management & Agricultural Engineering	120
SUM	**720**

Table 1: Number of students admitted to the AUA in the academic year 2015-2016.

Methodology

Open Academic Courses of the AUA main objective is to convert a number of AUA's courses to OCs. Below follows a list of rules, as well as eligibility criteria set by the programme:

- Traditional courses are formatted into three types of OCs according to the material available and the needs of the tutor(s), namely Type A-, A and A+.
  - Type A- consists of accessible presentations that corresponds/cover 100% of the course's syllabus or equivalently course's teaching hours.
  - Type A consists of audio narrated presentations.
  - Type A+ consists of video lectures that correspond/cover to a percentage of at least 80% of the course's syllabus or equivalently course's teaching hours.
  Interesting to note is that no flexibility in creating mixed types of courses is allowed. For example an OC with 70% accessible presentations and 30% video lectures will be considered as A- OC, meaning that the video lectures will not be compensated.
- For all Type of OCs (A-, A, A+) extra material can be used i.e. small videos, exercises and notes in the form of electronic elements such as slides, audio–annotated slides, photographs and schemas.
- Courses are structured with respect to and following the AUA's curriculum for each semester, leading to the format of courses following 13 weeks duration each, 2 to 5 academic hours/week depending on the courses' nature and scientific topic.
- For all Type of OCs documentation is gathered from the tutors that provide authoring information/description of the open academic course. These information has been found to cover the 18 different elements that (according to Sampson & Zervas, 2012) are used in describing an open academic course.
- For all type of courses images and other content are being handled with respect to intellectual property, i.e. references are mentioned and no copyrighted pictures are used without prior agreement or are replaced by others distributed under Creative Commons. All digital material and resources produced by the

project are published with Creative Commons (CC); in our case the CC/BY-SA license.
- Common platforms are used for providing the content to the public and ensure integration with the Hellenic Repository for OCs.
- Participation of tutors and assistants (lecturers) is voluntary.
- An independent board/ committee checks if finalized OCs are according to the resources' specifications, according to each OC Type.

Additional rules concerning budgetary issues include:
- Only 10 % of the initial budget is eligible for all equipment purchases.
- A 70% of the budget should be allocated directly to the development of Open Academic Courses of which only 15% could be allocated for Type A+; however this limitation of 15% was recently removed.
- The remaining 20% can be allocated for supporting, promotional and other actions.

Technologies used in the AUA Pilot Case

Type A- OCs

Lecture notes are formatted, according to specifications, to PowerPoint presentations and then converted to accessible portable document format (pdf) files. The equipment used for this type of OCs is the MS Office PowerPoint (2013) and an Accessibility add-on.

For this type of OCs six PowerPoint (2013) templates, one for each department of the University, were prepared at the beginning of the project with standards of making the presentation courses readable with ease, and with respect to the needs of visually impaired and colorblind learners. These standards include that all texts have certain font size, each slide is titled to facilitate frame identification and navigation, no random use of images, charts etc. is done, a text equivalent for every non- text element (alternative text) is provided, foreground and background color combinations provide sufficient contrast when viewed by someone having color deficits or in black and white screen.

For each day of lesson or for each academic hour a PowerPoint presentation, in the majority of the cases, is provided by the tutor, however traditional lecture material is often redesigned to meet the project's standards. Course material should correspond to 13 sections, and contain 15-20 slides for each academic hour. As said, additional slides or notes can be included in the lecture as assisted material. To better guide the learner, presentations also contain information given by the academic staff, a brief description of the course, and educational goals of each specific section, references, and keywords. In order for the learner to follow the logical flow of the course in each file is indicated with the number of the specific section and the number of academic hour it corresponds to.

Type A, A+ OCs

Type A OCs refers to audio narrated presentations of the course's material. Though practical and very informative for some types of courses, no Type A OCs were prepared due to low desirability amongst the tutors and due to the nature and teaching environment of many AUA courses, i.e. lab courses, open field lectures. To our knowledge the same has occurred in several other Hellenic HEIs.

For Type A+ OCs, lectures are captured into high quality videos (minimum 720p resolution and maximum 1080p). In this Type of OCs the equipment can be divided into fixed and portable. Lab courses or courses held on the field, in orchards or other places in the University are captured using portable cameras.

Three (3) amphitheaters/lecture rooms of the AUA have been equipped with Internet Protocol (IP) (AXIS P1347-E) cameras, microphones and all other electronic equipment needed. Specifically the fixed equipment has been placed in the main library room (5 Mpixel IP camera), in one large and one small amphitheater in the AUA (3Mpixel IP Camera), and finally in an IT laboratory (3Mpixel IP Camera). The selected amphitheaters/lecture rooms are easy to monitor for security reasons. It should be noted that the IP camera is a tool for the live streaming broadcast of the courses. This occurs either by directly connecting with an IP address (requires a maximum bandwidth) or through the AUA server. In the current project such a live streaming connection was possible; however up to now it has not being implemented as it affects learning methods (in class courses) as well as institutional policy.

The fixed equipment in each classroom implies the use of IP cameras as mentioned above. A shotgun microphone is placed above the lecturer's desk to capture the sound. An alternative process of recording is also available via microphone lice. When the sound is received, it is then sent to the IP line-in via a sound mixer. The IP camera recording can be downloaded or sent directly to Wowza media server of the AUA. The portable equipment includes two cameras (a Sony Digital HD Camcorder HXR-NX5E NXCAM Camcorder and a Sony HXR-NX30U NXCAM Palm-Sized camcorder) with all the appropriate related equipment. The purpose is to record and create video-lectures and indoor and outdoor workshops. This is of outmost importance to the AUA because of the nature of its courses. In case of lectures in which the use of smartboards is necessary or in the case where the lecturer desires it, there possibility of screen recording is also provided. The software that is used for editing are MSOffice 2013, eLearning Suite 6.0 and Camtasia Studio. After video editing (montage) OCs comes out in MPEG-4 format for better Quality of Service (QoS) (Chimos et al., 2013).

Software Platforms

The final digital content of each OC is:
- Uploaded to the project's preliminary portal (opencourses.aua.gr), this is mainly done for Type A- OCs.
- Implemented to the AUA Digital Repository - DSpace (SCORM standards).

- Uploaded to specific platforms (in the AUA webserver) that provide integration with the Hellenic Repository for OCs.

The specific platforms used are the Open eClass and OpenDelos management systems. The Open eClass e-learning platform version 3.1.2 provides an integrated course management system whereas the OpenDelos version 0.91 video platform for asynchronous eLearning, provides multimedia management system functionalities i.e. lecture player, video editor and slide synchronization. Both platforms are supported and distributed by GUnet and, as said, provide integration with the Hellenic Repository for OCs.

Current State of the Project

According to the initial plan of the project all departments of the university would be covered equally (Table 2). It should be noted that the active participation of department members was characterized as key determinant for the success of the project (Mpasiou, Mpasios, Chimos, Karvounidis, & Tsiligkiridis, 2013). Table 3 presents the allocation of courses (resources) between Departments of the AUA, according to the last year modification of the project's framework.

DEPARTMENT	A- COURSES	A COURSES	A+ COURSES
Agricultural Economics and Rural Development	10	2	1
Animal Science and Aquaculture	20	1	2
Biotechnology	20	1	2
Crop Science	20	1	2
Food Science and Human Nutrition	20	2	2
Natural Resources Management & Agricultural Engineering	10	1	1
General	10	2	2
SUM	116	10	20

Table 2: Allocation of courses (resources) between Departments of the AUA, according to the initial framework

DEPARTMENT	A- COURSES	A+ COURSES
Agricultural Economics and Rural Development	14	6
Animal Science and Aquaculture	8	1
Biotechnology	8	1
Crop Science	10	4
Food Science and Human Nutrition	14	2
Natural Resources Management & Agricultural Engineering	5	1
SUM	59	15

Table 3: Allocation of courses (resources) between Departments of the AUA, according to last year modification of the project's framework.

Below is given a brief summary of the number of AUA's courses opened so far per Department (Tables 4, 5) as well as a comparison of Type A- OCs and Type A+ OCs between the current state of the project and the project's framework (Tables 6,7). The numbers provided in the tables refer to courses already opened, from the

beginning of the project, as well as those that are currently being finalized. Currently eight (8) Type A- and three (3) Type A+ OCs are being finalized. As the AUA's curriculum has been undergoing changes for the past two years, the information provided in the bellow tables are according to the curricula that was active at the time each lesson was opened.

DEPARTMENT	A- COURSES	A+ COURSES
Agricultural Economics and Rural Development	9	5
Animal Science and Aquaculture	5	0
Biotechnology	4	0
Crop Science	3	3
Food Science and Human Nutrition	13	0
Natural Resources Management & Agricultural Engineering	1	0
SUM	35	8

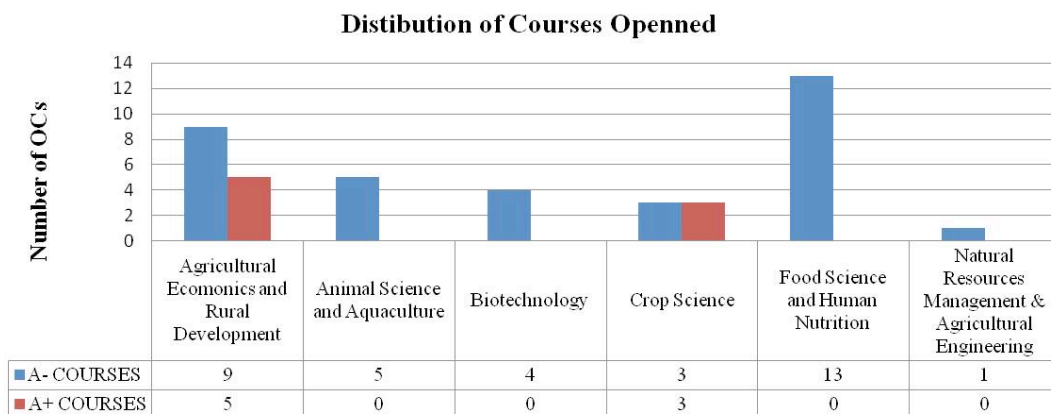Table 4: Courses of the AUA opened from the beginning of the project.

Distibution of Courses Openned

	Agricultural Ecomonics and Rural Development	Animal Science and Aquaculture	Biotechnology	Crop Science	Food Science and Human Nutrition	Natural Resources Management & Agricultural Engineering
A- COURSES	9	5	4	3	13	1
A+ COURSES	5	0	0	3	0	0

Table 5: Distribution of courses opened between Departments of the AUA.

A- Initial framework - Current State
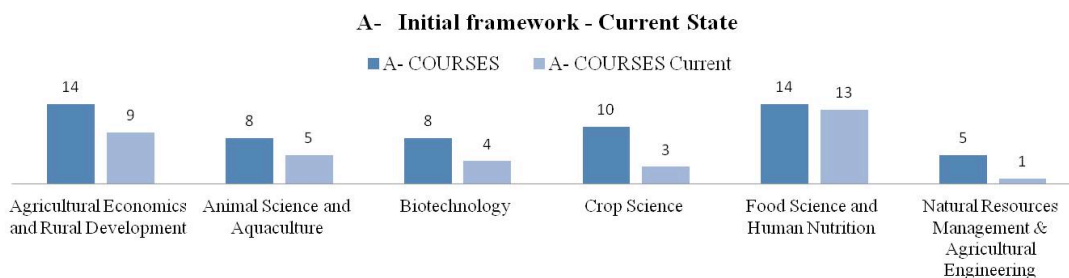
Tables 6: Comparison of A- OCs according to project framework and current state.

A+ Initial framework - Current State

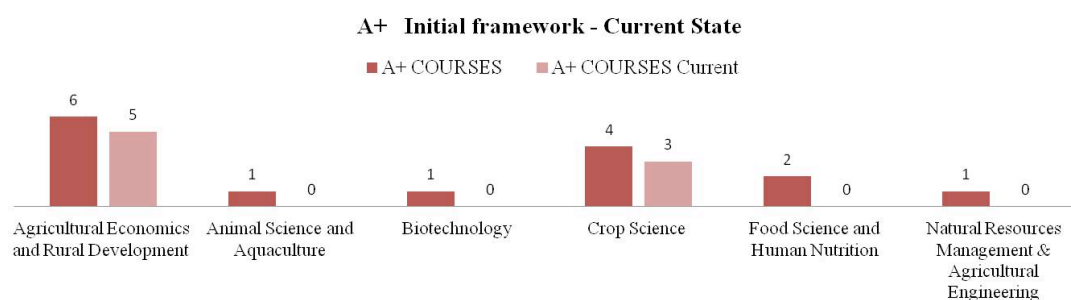■ A+ COURSES   ■ A+ COURSES Current

Table 7: Comparison of A+ OCs according to project framework and current state.

Discussion and Recommendations

During our experience we conclude that there are two types of factors that play a significant role in the project implementation itself as well as the programme's framework. The first type of factors relates to the participants' motivation in the AUA as follows:

- The programme sets the scene for future implementation/recommendations of eLearning activities. The openness of the project promotes knowledge dissemination as well as flexible learning opportunities available to all free of geographical boundaries. It also gives access to knowledge to persons with disabilities.
- The project offers educational opportunities and quality improvement of the courses and the taught material. In particular, it offers repetition and backup of the course material for the students, as well as it enhances the lecturers' capabilities in using new technologies and educational tools. It also allows collection and compilation of the course material, as well as clarification and safeguarding of copyright issues. Finally, it promotes the teaching activities and learning methodological tools used.
- The use of fixed and portable equipment is proven to be beneficial for the project since it allows flexibility for indoors and outdoors recording.

The second types are suspending factors for the project implementation. These are the following:

- As already mentioned, methodology imposed by programme's framework concerns the course's material coverage. In cases these rules create certain difficulties in opening a course. For example in the co-taught courses, not all lecturers who are co-teaching agree to participate in the program despite their initial high interest; note that the lecturers' participation is voluntary. Moreover, sometimes the standard teaching schedule is changing suddenly for many different but well justified reasons. For the Type A+ OCs there are additional course specificities which make the lecture recordings difficult, e.g. in microbiology we should use microscope with camera. In addition in courses where the entire lecture takes place in front of a screen, as is the case, for example, of programming languages courses, the use of IP camera is not

appropriate. An alternative idea would be the use of video tutorials instead of courseware in this form.

- Lecturers see with skepticism the idea and practical use of open licenses, particularly in cases they are not familiarized with the use of Creative Commons. Best practices concerning open licenses and CC, on both third parties' material and open resources produced by the project are subject to constant change.
- During the project implementation period the AUA underwent several changes in its curriculum.
- For the production of an appropriate courseware, the lecturers were asked to use technological tools such as screen video recorder, smart board, microphones, etc. Some lecturers need technical assistance to operate part of the above mentioned equipment.

The project team has to overcome challenges concerning video, lighting and sound conditions. IP camera with higher resolution can render better video quality of the lecturer's physical presence as well as of the use of whiteboard or blackboard. It goes without saying that amphitheaters and lecture rooms were not initially planned to be used as studio, hence lighting conditions are not ideal in some cases. Concerning sound issues, we have to deal with two major problems. First, there are no personal microphones to facilitate the students' participation in the recordings. Second, isolating the main sounds from external noise, especially in the outdoor recordings is needed.

Based on the present project experience we may provide the following main recommendations. First, more flexibility in allocating courses of different Types is needed. Mixed Type(s) of OCs (mostly OCs consisting of accessible pdf files and video lectures) should be an option as they were highly demanded by lecturers. Towards this, we propose that the material coverage limitations for Type A- and A+ OCs could be applied to each thematic subject and not to the entire course material. This will be also beneficial in cases of co-tough courses.

Another aspect that should be considered is copyright issues. Already established open licenses do not seem to facilitate the openness of eLearning as they follow common practice. Experts should provide a flexible solution, possibly by using IT to combine open licenses i.e. Creative Commons (CC), standard copyright licenses and openness.

Finally Universities should develop and establish a specific policy relating to all eLearning issues including matters such as the openness and funding opportunities of similar projects. On the same line, there should be opportunities for the training of both tutors and students on using ICT tools in order to disseminate/ receive and apply higher academic knowledge and ensure high teaching quality.

Conclusions and Future Work

In this paper we provided a brief introduction concerning eLearning and openness in HEIs. We presented in brief the programme "Hellenic Academic OpenCourses" and

especially its project pilot case "Open Academic Courses of the AUA", the project's framework, methodology and technologies used. In this respect a brief description of the structure and curriculum of the AUA was given. Furthermore we presented the current state of the project and the basic factors that, according to our so far experience, play significant role for the project implementation. In addition we gave basic recommendations that could be taken into account for a University policy to combine both eLearning and openness.

During the project implementation period we came across few cases of opposition to the idea of openness. We are under the impression that mostly this along with the already mentioned suspending factors, have led to small deviation in the participation rates between current status of the project and the project's initial plan.

Future work includes a survey (ongoing) to reveal the exact reasons behind lecturers' skepticism, and specific aspects of their attitude towards the idea of openness. Concrete conclusions are expected to derive from this research.

Acknowledgements

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Contact email: tsili@aua.gr