Assessing the Contribution of Lecture Video Service in the Hybrid Learning Ecosystem of Harokopio University of Athens

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Abstract

After the wide acceptance of hybrid learning methods in the Harokopio University of Athens, it was decided to explore the support of a lecture video service and its impact in hybrid learning process. Such evaluation should explore the affect of the specific technology in the learning process and focus on the relation between technology and participants and also participants' relations. Towards this direction, the concept of the Hybrid Learning Ecosystem is adopted. The scope of this paper is, first to explore the interactions evolving between instructors, students and the underlying technology utilizing the lecture video service and, second, to assess the usefulness of this new service based on the identified relations. To evaluate the contribution of lecture video service in the Learning Ecosystem of Harokopio University, this new service was supported for an undergraduate course in two Departments of the University having students with diverse background and skills. The study was conducted for a period of three years.

1. Introduction

Hybrid learning offers new capabilities for education, as it may significantly enhance the interaction and communication between educators and learners. As stated in (Rooney, 2003), the American Society of Training and development identified hybrid learning as one of the top ten trends to emerge in the knowledge delivery industry, while it has been recognized as the most promising emerging tread in higher education (Bonk et. al, 2006; Garrison and Hanuka, 2004; Young, 2002). According to (Graham, 2006), *Hybrid Learning or Blended Learning* is defined as the combination of face-to-face with computer-mediated instruction, identifying the central role of computer-based technology in the delivery of knowledge. In practice, one could realize hybrid learning as e-learning methods combined with traditional face-to-face teaching (So and Bush, 2008; Olapirivakul and Sher, 2006; Bonk et al., 2006).

While e-learning emphasizes on learner-material interaction, face-to-face learning environments place priority to human-human interaction. The challenge of hybrid learning is to balance the weaknesses and strengths of face-to-face and e-learning teaching environments and effectively combine them to provide enhanced learning capabilities. This is not a trivial task, especially since computer-based and more specifically e-learning technology is constantly evolving (Varlamis I and Apostolakis I, 2007), and new learning methods or tools are made available. Apparently, hybrid learning methods create more complex relations between instructors, students and technicians, depending on e-learning technology utilized in the learning process. The introduction of new e-learning tools or methods in the learning process affects both the e-learning platform and face-to-face learning and alters the relations between educators and learners.

For hybrid learning to be successful, the introduction of new e-learning technology features should be evaluated. Such evaluation should explore the affect of the technology in the learning process and, more specifically, focus on the relation between technology and learning process participants, as well as its affect on the relations between them.

To this end, we propose the concept of *hybrid learning ecosystem*, based on the principals introduced in (Udan and Damiani, 2007) for e-learning environments, in order to specify all required constituents of such an environment and study their respective interactions in a consistent manner. In biology, an ecosystem is a complex, dynamic functional unit consisting of a community of groups of organisms, interacting with each other as well as with the environment within which they live. A change in a specific organism may result in a changed behavior altering its relations with the other members of the community, affecting the overall ecosystem.

Likewise the hybrid learning ecosystem formed in an academic environment comprises individual collaborative groups (instructors, students, consultants, technicians) utilizing e-learning technology. Their interactions dynamically transform the ecosystem, thus leading to the gradual formation of a new learning paradigm. In such case technology may play a dominant role, since any change in the technological tools utilized in the learning process may affect the relation of individual groups with technology and also the relations between them.

The ecosystem discussed in this paper is formed in the Harokopio University in Athens, Greece, where hybrid learning methods have been systematically explored since 2004, on undergraduate and postgraduate studies. Though this is not mandatory, many instructors provide hybrid courses utilizing a web-based learning management system (LMS), called *e-class* (http://eclass.hua.gr). E-class is an open source LMS supported by the Greek University Network (GUnet) association for e-learning purposes. Through e-class, instructors can provide e.g. on-line lectures' agenda, announcements that can be automatically sent by email to the students, self-testing exercises such as multiple choices, and digital material, such as presentations, text files, useful links and videos. Besides managing their courses, instructors, using e-class, may also manage the group of students that attend them. A course may be specified as open, or require registration or be restricted to certain students defined by the instructor. Lastly, instructors can view statistics concerning student participation and access in their lectures. Since Harokopio is a public University and education is offered free of charge, there is no cost for the students, accessing e-class platform.

The recording of lectures as streaming videos, made available on line in a synchronous or asynchronous fashion, is a common practice in Universities worldwide, while there are several attempts on evaluating the contribution of such technology by instructors and students (Collie et. al, 2009; Friedland et al, 2004; Lauer et al, 2004; MacKenzie, 2005; Traphagan, 2005). After the wide acceptance of hybrid learning methods in Harokopio University, it was decided to explore the provision of a lecture video service and its impact in the learning process. An additional motivation was the provision of content in the Greek language, which could be easily available through the Web. To assess the contribution of lecture video service in the Hybrid Learning Ecosystem of Harokopio University, this new service was supported for an undergraduate course in two Departments of the University having students with diverse background and skills. The study was conducted of a period of three (3) years. The scope of this paper is, first to explore of interactions evolving between instructors, students and the underlying technology utilizing this new feature and, second, to assess the usefulness of this new feature based on these evolving relations.

The paper is organized as follows: First, the concept of hybrid learning ecosystem is introduced, while its contribution on assessing specific features of hybrid learning is discussed. The supported Lecture Video Service is briefly presented on section 2. The research approach, data analysis and result interpretations are described in the following sections. The last section includes conclusions and considerations for future work.

2. The Concept of Hybrid Learning Ecosystem

As discussed in (Gütl and Chang, 2008), the term e-learning ecosystem has been adopted by a number of researchers to explore the complexity of e-learning environments. Ecosystem-based models are introduced to describe the constituents of e-learning environments in different levels of complexity and study their interaction to enhance e-learning capabilities and services. The ecosystem-based model introduced by Brodo (2006) is used by (Uden et. al., 2007) to explore e-learning features. As suggested by Brodo, an e-learning ecosystem comprises three main elements: content providers, consultants and infrastructure. All three elements should interact effectively to provide high-level e-learning services.

Based on these concepts, we introduce the term hybrid learning ecosystem, to effectively explore the relationships between the participants involved and the necessary computer-based technology. As in e-learning ecosystems, content providers and consultants are identified as participants. Furthermore, since face-to-face learning also takes place, content consumers play an important role, actively contributing in the learning process. It follows that e-learning technology is an intrinsic part of the ecosystem. According to our point of view, a hybrid learning ecosystem consists of four main elements and their relationships, as presented in Figure 1.
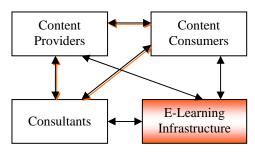

Figure 1: Hybrid learning Ecosystem

Content providers are those developing and/or offering the content for learning, while *content consumers* are those expressing interest in exploiting the content for educational purposes. *Consultants* are responsible for supporting education either from a strategic point of view, i.e. offering advice and guidelines for the deployment and application of educational practices and evaluating educational content, or from a technological perspective. i.e. offering technical help and maintaining the technological infrastructure and assist in the creation and deployment of digital educational material. *Infrastructure* comprises all necessary hardware and software for providing e-learning services and as such it plays a significant role in hybrid learning ecosystem.

In essence, the introduction of e-learning infrastructure is the component that has differentiated the traditional educational model and has introduced new complexity in the interactions of ecosystem individuals. The introduction of technology, e.g. e-learning infrastructure, created three additional relations: a) between content providers and infrastructure, b) between content consumers and infrastructure, c) between consultants and infrastructure. Moreover, it altered existing relations as implied by the shade in the respective arrows. The role of Consultants is also affected. In traditional learning, consultants are people designated by the educational institute itself or by another authority in order to provide guidelines or specifications for various educational matters. Such consulting can be regarded of strategic nature. In hybrid learning, another consultant group was been added. *Technology specialists,* regarded as consultants, are responsible for supporting the use of e-learning technology and digital material creation. By adding new technology features, e-learning technology is constantly evolving, thus all the relations depicted in figure 1 also evolve. This is why the term ecosystem was chosen to describe a hybrid learning environment. Furthermore, in order to evaluate the introduction of a new technology feature, one should explore the way it affects all the relations between the ecosystem elements (depicted in figure 1).

Based on these principles, we conducted a study to explore the contribution of the lecture video service supported on an experimental basis. The scope of the study was to assess the usefulness of this service and its impact on the learning ecosystem of Harokopio University. To determine them, we explored the relations between the ecosystem elements.

3. Description of Lecture Video Service

The recording of lectures as streaming videos, made available on line in a synchronous or asynchronous fashion, is a common practice in Universities worldwide. After the wide acceptance of hybrid learning methods in Harokopio University, it was decided to explore such features and their impact in the learning process. Face-to-face lectures are recorded, combined with digital presentations used within the classroom and stored as medium quality streaming video. These videos are uploaded in e-class and can be viewed by students at their convenience during an academic year.

The goal of the new service is to provide lecture videos using the course material in conjunction with a video and audio feed. The instructor provides the material used during the lecture in digital form, for example, a PowerPoint presentation. Lecture recordings are performed in a lecture theater with multimedia equipment: A computer with multimedia support, a digital presenter for the projection of lecture notes (for example, the slides on a PowerPoint presentation), two lost cost cameras for recording the instructor and a wireless microphone attached on the instructor in order to record sound during the lecture. Camtasia Studio Professional software (http://www.TechSmith.com/CamtasiaStudio), installed on the computer, is used for recording and editing all the recorded (Presentation/Video/Audio) material.

Before the beginning of each lecture the instructor simply starts the Camtasia software responsible for recording the video/audio/data feeds, and initiates the recording process. The system records all audio, video and data and stores them into a single editable file. After the completion of the recording, one of the software engineers working in the Network Operating Centre (NOC), responsible for e-learning administration and support, or even the instructor himself/herself can simply edit the recorded material by using almost simple cut/paste commands. The material can then be exported in various formats and uploaded within e-class environment. Lectures last for two or three hours and are divided into parts lasting up to 50 minutes each. A discrete lecture video is created for each part. The lecture video comprises of the digital lecture material and medium quality video recording of the instructor, as depicted in figure 2. The two streams are synchronized with each other, so that each lecture slide is accompanied by the video stream of the instructor explaining it. Each lecture video is time stamped, so that the user can skip parts of the video simply by selecting points in the lecture timeline that are of interest, or even by selecting a slide name or number.
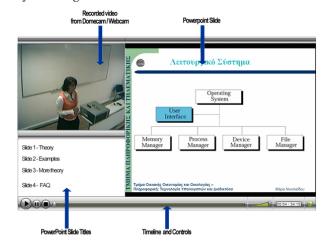

Figure 2: Lecture Video Sample

Lecture videos are provided through e-class environment and can be viewed by anyone having access to the specific course, simply by using a personal computer and a broadband Internet connection or even a mobile phone. The format chosen for lecture video files

was medium quality jpeg to keep the size of video files relatively small. Students access lecture videos from the University's computer laboratories or their home.

4. Methodology

To evaluate the contribution of lecture video service in the Learning Ecosystem of Harokopio University, a study was conducted during the academic years of 2006 – 2007, 2007 -2008 and 2008 – 2009 respectively. The Lecture video service was supported for same basic course "Computer and Internet Technology", which is an introductory course on how to use computers taught to the first semester of most Departments of Harokopio University. It was selected, since the two instructors responsible for the course volunteered to participate in the study. Students from the Departments of Home Economics and Ecology and the Department of Dietetics and Nutritional Science, where the two courses are taught, participated in the study. The aim of the study was to investigate the experiences of both students and instructors in an organised fashion and collect feedback for the overall improvement of the provide service.

The hybrid learning ecosystem formed in the Harokopio University of Athens is described in following in respect to the four constituents identified in figure1.

Technological Infrastructure: It consists of the e-class platform used for providing e-learning services and the technology used to create lecture videos.

Content Consumers: The undergraduate students from the Departments of Home Economics and Ecology and the Department of Dietetics and Nutritional Science have quite different background and skills. Based on the observations of our research team, students of the Department of Dietetics and Nutritional Science fell usually more comfortable with technology, while students of Home Economics and Ecology are less exposed to information technology, as the theoretical nature of this department does not encourage them to use technology.

Content Providers: Both instructors (1 male and 1 female) hold Ph.Ds, are in their early 40s and are familiar with e-learning technology.

Technology Specialists: Instructors are given some technical guidelines and support by the software engineers responsible for e-class platform administration and support, which also aid instructors to develop lecture videos. They play the role of technology consultants, while their main objective is to facilitate the familiarization of instructors and students with the e-learning platform and their affective support to promote e-class usage.

To determine the impact of the specific service in the learning process the following relations where focused: a) the relation between content providers and technology infrastructure/consultants and, b) the relation between content consumers and technology infrastructure/consultants and c) the impact of technology on the relation between content providers and content consumers.

To evaluate these relations a research was conducted among students based on a structured questionnaire, while interviews were conducted to record the opinion of instructors and technology specialists. The questionnaire consisted of 27 questions. 18 of them were of closed-type, 4 of them free and 5 of them involved demographics (age and sex) and availability of computer and Internet connection at the students' residences and the student's self-assessment of their computer literacy. There were also questions on the frequency of the students' access to Lecture Video Service, about its usefulness, about which e-learning services they used more often that it, what difficulties they faced and on how the service influenced their physical presence in lectures and helped them in their everyday educational tasks.

A total of 301 questionnaires were collected by students of the 3 years on a voluntary fashion. 72% of them were female and 28% male. 59% of them were from the Department of Dietetics and Nutritional Science and 41% of them from the Department of Home Economics and Ecology. Due to the nature of the subject under investigation, qualitative analysis was performed. This process utilized the extraction of conclusions regarding the way students were using the service with respect to their previous experience with information technology and the way it affected their relationship with their instructors.

Lecture Video service was assessed by the two instructors and technology specialists though structured interviews. The instructors provided answers about the contribution of service to the educational procedure, the difficulties/problems that they encountered in supporting the service, possible enhancements or additional services that could be offered and the students' receptiveness to the new methods. The three technology specialists supporting lecture video service were interviewed separately regarding their experience working with both students and instructors during a period of three years. Only qualitative analysis of those data was performed.

5. Discussion

The most important results of the evaluation from all the participants are presented in the following sections.

Relations between Content Providers and Technology infrastructure/consultants

Both instructors were experienced users of computer and Internet technology. Since participation was

decided on a voluntary basis, their basic common characteristic was their willingness to explore the potential of lecture videos, thus they were willing to invest time and effort to create the videos. They were quickly familiarized with Camtasia software features and had no difficulty initializing video equipment and perform recordings. They also had an excellent cooperation with technology specialists. They reported no technical obstacles in creating the lecture recordings, while they depended on the technology specialists for editing them. Both of them admitted that they were skeptical the fist time they provided lecture videos for their lessons. Both of them previewed and edited all the videos prior their upload in e-class e-learning environment. After providing the service for three years, both of them are more comfortable with it. One of them rarely edits the videos and when doing so, she does this on her own. The other one still depends on the technology specialists. Both of them believe that they spent a lot of time to create the lecture videos, specially the first time they employed this feature, since they also revised the slides used in their lectures. The instructors also have agreed upon the fact that the introduction of lecture video services contributed to a better course planning and coordination.

Both of them claim that this service had no effect on their teaching style. Their decision to employ (or not) this service to other courses as well, mainly depends on the time they had to spend on lecture video editing. They also indicated as a prerequisite for other instructors to utilize the service that instructors should already use digital material (for example slides) in their lectures. Since the development of a course in electronic form requires a substantial investment in man-hours, this would be a major obstacle in the endorsement of the service from other instructors who do not use electronic material in their teaching. The contribution of technology specialists in the creation of digital material is vital, while the usage of existing on-line resources should be explored. A main obstacle is language, since all pre-graduate courses and teaching material must by law be in Greek. Technology specialists also share this opinion, although they indicated, that they expect, that instructors with weaker technology background shall eventually employ lecture video service in their courses, even if they do it partially (for some lectures only), if they are technically supported.

Relations between Content Consumers and Technology infrastructure/consultants

Most of the students (93%) have a computer at their residence, while 72% of them have Internet access. These statistics are almost the same for students of the two Departments participating in the study. All the students assessed themselves as computer literal, while almost 55% of them consider themselves as expert users. None of them reported any actual difficulty in

familiarizing with the service. Though, almost 40% of them didn't actually use the service (accessed lecture videos less than 3 times within the semester), this had nothing to do with their familiarization with technology. Although Lecture Video service usage improved during the three years of the study by 7%, this was not regarded as significant. Even if the students didn't use the service, they considered it useful by 92%, although they didn't benefit from their existence. Since attending lectures is not mandatory in Greek Universities, we assume that there are students which simply are not interested for the specific course. In fact, it was proven that most students, who attended classes regularly, used the service by 82%. Though, only half of them were regular users, e.g. access the service on a weekly basis. Furthermore, most students (almost 61%) prefer more interactive services (for example chat, student assignments/project management) and consider them more useful than lecture video service.

Students access lecture videos mainly from their home. Residential Internet connection speed was the only obstacle reported in accessing lecture videos. Though, a lot of students reported the quality of videos and sound could be improved. Gender, computer literacy and scientific field had no impact on their familiarization with the service and their willingness to use it.

Relation between Content Providers and Content Consumers

Both instructors and students endorse the utilization of e-learning features complementary to the traditional learning process. None of them experienced any disadvantage in the teacher-student personal communication by lecture recording. Furthermore, instructors indicated that their lectures benefited from the existence of lecture videos.

Regarding physical presence of students in the classroom, there was no evidence that it has been reduced. Attending lectures is not mandatory in Greek Universities. In Harokopio University of Athens usually an average of 65% of registered students for a course are regularly attending lectures, while an average of 75% participate in the examinations. Though students admitted that the existence of lecture videos may encourage them to skip classes, we could not relate such claim to the usage of the platform. On the contrary, students who were systematic in class attendance were also systematic in downloading lecture videos. Apparently, it favoured those who were circumstantially absent, without altering the configuration of the classroom. Furthermore, students, not attending lectures, had not benefited from lecture video service at all. To summarize our observations regarding student involvement, the creation of lecture videos has contributed to lecture planning without eliminating the physical presence of the students in the classroom.

Face-to-face instructor-student communication was also not affected.

Lecture videos can improve the performance of instructors, though the creation and maintenance of electronic material is a time-consuming effort. To successful support such service it is important to provide effective technical support to all the instructors willing to participate in such process, especially in their first attempt. Furthermore, technology specialists may actively assists instructors to benefit from the employment of such feature. This should be a personalized effort taken to account skills and views of each specific instructor. Only a few students (less than 6%) endorse the mandatory adoption of lecture video service in all the courses.

Although lecture video service considered having a positive affect in the learning process by both students and instructors, they both indicated that interactive e-learning services, as discussion boards or student assignment/project management, may have a more significant contribution in the improvement of the learning process than this specific service.

6. Conclusions – Future Work

The challenge of hybrid learning is to balance the weaknesses and strengths of face-to-face teaching and e-learning services and effectively combine them to provide enhanced learning capabilities. To this end, we evaluated the contribution of the lecture video service, described in this paper in a hybrid learning environment. The impact of this service is explored by applying the Hybrid Learning Ecosystem concept and examining the relations between the ecosystem constituents.

By examining the relations between hybrid learning ecosystem constituents, we concluded that the provision of lecture video service does not affect the physical presence of students in the classroom and student-instructor interaction. Though it is considered as useful, its impact on hybrid learning is less important that other interactive e-learning services. Both students and instructors agree upon this conclusion regardless of their gender and computer literacy. Applying the ecosystem approach facilitated the systematic exploration of the contribution of the lecture video service in the hybrid learning environment.

To further explore the potential of the hybrid learning ecosystem concept, we plan to apply this method to evaluate other more interactive e-learning services as well.

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