# Evaluation of Combined Collaborative and Problem-based Approach in a Web-based Distance Education Course

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**Abstract**
Technological Educational Institute of Lamia, Greece, an institution that belongs in the technological sector of higher education, provides distance learning opportunities to adults, via LAMS. The curriculum contains 22 online courses mainly in Computer Science, but there are also some interdisciplinary courses. Two learning models were adopted: (a) a more traditional directed learning approach, (b) a more constructivist learning model integrating problem-based with collaborative learning. The former has been applied to the majority of courses whereas the latter to selected courses. Here we present the derived results related to the application of constructivist method on a "E-commerce" course, aimed at presenting basic concepts and technologies for creating an "electronic" store. Our approach was to provide to groups of learners, a virtual "budget" that would be used for the development of their Internet store. The method was organized in stages. Each stage was represented in LAMS as an independent sequence of learning activities using specific purpose tools like shared resources, forum, and chat, submit files and voting. Assessment procedure depicts positive results for the combined method. LAMS tools were in general able to support an educational sequence representing the selected educational method.

**Keywords:** distance education, problem based learning, learning design, LAMS

## Introduction

Distance learning is becoming an increasingly important part of lower and higher education. This type of education can take place over the Internet, in which occasion instruction and educational content are delivered via the Internet. The North American Council for Online Learning (NACOL) surveyed over thirty countries aiming to highlight international trends in distance learning for K-12 students mainly, identify distance learning initiatives and projects in individual countries, and promote international dialogue for future collaboration (Powell & Patrick, 2006). Survey results showed continuous growth in use of distance learning programmes in all countries.

Nowadays, there is a growing interest in higher education institutes to offer lifelong learning programmes. In (Abel, 2005) the results of a set of surveys and interviews conducted in twenty-one higher education institutes of various types are summarized. Results showed that the usage of distance learning is considered successful mainly for undergraduate students. Additionally, some potential insights into the common success factors for successful adoption of Internet-supported learning are provided.

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In order to support distance learning and collaborative work, various Web-based Learning Management Systems (LMSs) commercial and open source have been developed, such as the Web Course Tools (WebCT) and the Blackboard Learning System (now merged as one company), the Moodle, the Sakai, the ATutor and Ilias, the Web Course Homepage System (WebCH), and the Desire2Learn. Selecting a LMS requires balancing management and learning. Traditional LMSs have become popular since they incorporate a suite of functionalities addressed to learners, tutors and system administrators. These functionalities are designed, among other services, to create, deliver and manage learning content, track and report on learner activity and progress, enable synchronous and asynchronous collaboration/ communication and provide centralized control and administration to tutors and system administrators. All such services are integrated within a robust, web-based environment effectively supporting many simultaneous users (Siemens, 2006).

Various LMSs have been used for distance learning programs offered by higher education institutes. To name a few, in (Gotthardt, et al., 2006) a curriculum in nuclear medicine and radiotherapy was designed. It consisted of self-directed learning, an online discussion forum and discussion rounds. Online courses were delivered via Netlearn LMS. Exams and evaluation of the curriculum were taken online. In (Selim, 2007), distance learning critical success factors (CSFs) are specified as perceived by university students. A survey involving 538 university students revealed eight categories of distance learning CSFs, each including several critical acceptance and success measures. In (Ngai, et al., 2007) the Technology Acceptance Model is extended to include technical support as a precursor and then the role of the extended model in user acceptance of WebCT is investigated. In (Jeong, 2007) effects of message constraints and labels on collaborative argumentation in asynchronous discussions via Blackboard LMS are examined. After almost a decade of LMS experience in higher education sector, educators and administrators are beginning to question the prominence of an LMS. What it does well and how well it does it, what it would like to do, and how it might do this? Traditional LMS offer their greatest value to the organization by providing a means to a sequence content and statistics of "students enrolled in our LMS" and "learning objects views by students" as an indication of success/process. The underline assumption is that if we just expose students to the content learning will happen! Learning activities based environments are a new recent trend addressing the limitation of an LMS.

Technological Educational Institutes (T.E.I.) in Greece comprises the technological sector of higher education. T.E.I. of Lamia provides distance learning opportunities to adults, who are Computer Science graduates, or graduates that use computers as a tool in their work. Teaching process used Blackboard LMS (basic edition) for the first four semesters (Antonis, et al., 2007), but LAMS was used as the main teaching platform for the last semester. This paper presents the methodology, distance learning setting and derived results. The curriculum now contains 22 online courses mainly in Computer Science, but there are also some interdisciplinary courses. So far, five semesters have been completed, with totally over 700 participations in courses. The assessment procedure considers both the overall distance learning setting and knowledge acquired by learners. Assessment results assisted the enhancement of the educational process from semester to semester and depict satisfaction of all participants from the activity as a whole.

Although many organizations nowadays provide distance learning through use of an LMS, to the best of our knowledge the approach presented in this paper concerns aspects of a distance learning setting not usually dealt with in other similar approaches. Firstly, this paper presents a systemic treatment of administrative, technical and pedagogical issues taking into consideration the group of learners, appropriate learning methods, assessment methods, and social and economical aspects concerning distance learning and technological infrastructure in place (Lampsas, et al., 2006). Secondly, it involves a curriculum of courses offered online whereas other approaches usually involve a specific course or a group of courses. Thirdly, learners are graduates/professionals living and working in geographically dispersed areas. Fourthly, each course is conducted exclusively through the use of LMS and does not involve traditional classroom instruction. Finally, we present the derived results related to the application of constructivist method on a "E-commerce" course. The rest of the paper is organized as follows. Section 2 discusses the overall design of the distance learning setting, including a brief description of the concept, the architecture, the learning method and a brief description of the E-Commerce course. Section 3 presents analytically how the learning method used, comprising of a combination of collaborative and problem-based leaning, applied to our "E-Commerce" course. Section 4 presents assessment methodology and results. Finally, section 5 concludes and points out aspects for future work.

## The Distance Learning Environment

## Overview

In this section, we present the overall design of the distance learning setting, encompassing learning model, human resources (teaching, technical and administrative personnel) and available technology. This design caters for effectively providing a setting for distance learning through the Learning Activity Management System.

To meet the needs of various users, learning environment selection criteria were generally considered important such as easy of use by faculty and students, cost, transition ease and cost from existing platforms and integration with available tools. During the last decade LMS has moved from a support tool to the learning process. The growth of alternative models of online engagement, as well as parallel conversations found through use of blogs and RSS feeds – such as social bookmarking, tagging, social networks – reveals a dynamic where end-user control grows in prominence (Siemens, 2006). Educational Institutions need more flexibility and control over their e-learning environment to enable instructors to select and deploy the most appropriate e-learning tools suited to their pedagogy. For this reason the definition of an educational institute learning philosophy is critical in guiding learning activities and learning management system supporting.

During last semester, 22 distance learning courses were provided involving various Computer Science and interdisciplinary fields (e.g. Bioinformatics, GIS, and Computers in Education). All of them were taught via LAMS (http://cs26.lib.teilam.gr:8080/lams). It was the first time in our project that we used LAMS. In previous semesters the Blackboard basic edition was used. As learners moves beyond contents consumption and into stages of critical thinking, collaboration, and content creation, LMS weakness become apparent. Seeking alternatives directions not based on management, LAMS was our first experience with teaching distance learning courses using a learning design platform, and in this we try to present all this gained experience.

Tutors are experienced in teaching the same or quite similar courses at higher education institutes. A fraction of them have experience as tutors in distance learning courses. Courses have been organized into three categories (Introductory, Intermediate and Advanced-Masters) to meet learners with different background and interests needs.

To facilitate the learning process, learners attending a course are limited to twenty at most. The learning content of each course is organized into units and consists of theory, examples, self-rating tests, unit tests, mid-term and final tests. The learning content includes presentations, documents, animations and audio/video files. Synchronous and asynchronous communication encourages time for reflection and reaction among tutors and learners using LAMS's collaboration tools and / the media server.

We adopted two learning models: (a) a directed learning approach, namely learner-oriented model and (b) a constructivist learning model, integrating problem-based with collaborative learning. The former has been applied to the majority of courses whereas the latter to selected courses. Our experience from applying the learner-oriented model was illustrated in Antonis, et al. (2007). In this paper, we focus on the experience gained from applying the combined method integrating problem-based with collaborative learning. E-commerce is one of the courses where the latter method was adopted and we analytically present how we applied this method via LAMS and corresponding assessment results.

Apart from the learning model, other crucial factors affect success of a distance learning course as well. In (Roblyer, 2005), some of these factors are identified, namely degree of interaction, support during course and administrative/ technical issues. In the following sections, our efforts to address these factors are integrated within the learning environment. In our design considerations, we took into account that, as far as web-based courses and programs are concerned, characteristics of successful online courses include among others well-designed and structured courses, engaging collaborative activities and an interactive learning community (Roblyer, 2005).

The overall distance learning environment contains the LAMS LMS as the primary software platform. The LMS communicates with a MySQL RDBMS storing data concerning learners, tutors and offered courses. The application server also hosts the project's Web site (http://esp.inf.teilam.gr) and the management information system (MIS) supporting the overall process. The project's Web site provides information regarding the project such as course outlines, tutors and prerequisites. The MIS consists of an RDBMS and a Web-based user interface. It provides administrative services (e.g. submission and management of candidate learners' applications, submission and management of learner and tutor questionnaires, etc.) and learning process services (e.g. statistics regarding learners' performance and learning process). Audio and video transmission can be done either synchronously or asynchronously. This is achieved with the operation of the Media Server (Helix DNA Server), which in cooperation with the Helix DNA Producer enables webcasts and video streaming (http://www.real.com/). The Helix DNA Server, provided that adequate network and hardware infrastructure exist, can support numerous simultaneous audio and video transmission sessions.

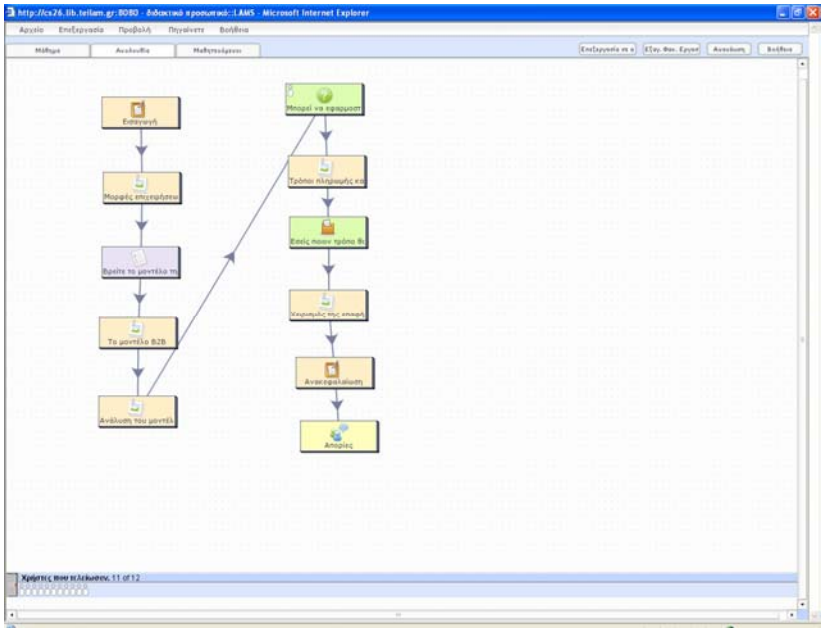

**Fig. 1. An e-commerce course organized in LAMS as a sequence of learning activities.**

T.E.I. of Lamia provides tutors with a room fully equipped with videoconference hardware/software and also the assistance of experienced staff in order to prepare the learning content and conduct the course. Tutors can also be assisted in synchronizing static learning content with his/her video and making it available as streaming media.

## The E-Commerce Course

The e-Commerce course aimed at presenting basic concepts and technologies for creating an "electronic" store. Our approach was to provide to groups of at most three randomly selected class members each, a virtual "budget" that would be used for the development of their Internet store. This budget was given at the beginning of the course prior to any educational activity and as a consequence, upon starting the students had little or no idea of the way budget should be exploited. The method was organized in stages. The questions that were expected to be raised from the students for each stage could only be answered by the forthcoming educational activities. Each new stage was designed in such a way that would cause students to reflect on decisions they made after completing earlier stages. Each stage was represented in LAMS as an independent sequence of a shared resources, a forum, a chatting, a submit files and a voting learning activities.

The purpose of the course was to provide basic knowledge and principles of the electronic commerce from not only the business point of view but also from the customer's point of view. The e-commerce

course consisted of nine main educational activities in LAMS addressing topics as terminology, models of e-commerce companies, business organization issues (payments, delivery of services and goods, client support), marketing for electronic companies, functionality of an electronic shop, underlying technology and security. **Fig. 1** illustrates the fourth educational activity (models of electronic shops) organized in LAMS.

## The Combined Collaborative and Problem-based Learning Model

This learning method combines problem-based with collaborative learning. We first briefly present the two combined pedagogical methods and then the combined one.

### *Problem Based Learning*

Problem Based Learning (PBL) is a pedagogical method focusing on learners (Ertmer & Newby, 1993). It is primarily a 'learning-by-doing' procedure. A typical course structured according to PBL starts with presentation of a complex and (preferably) applied problem that cannot be dealt with by learners based on current knowledge status. Further on, the learning process focuses on two main aspects involving learners: (a) how to determine lacking knowledge skills contributing in problem handling and (b) to learn how to acquire these skills. That is, learners learn 'to know what they do not know'.

The primary characteristics/advantages of the method are the following: (a) learners actively participate in the learning process, (b) learners learn to handle problems with initially unknown parameters, (c) learners learn how to effectively exploit various information sources (i.e., books, papers, technical reports, the Web, etc.) when searching for specific knowledge items determined by them, and (d) the tutor's role is to guide, supervise and encourage learners (Hoffman & Ritchie, 1997). In certain (extreme) cases, learners may have to find the answers to their questions by themselves.

### *Collaborative Learning*

Collaborative Learning (CL) in general adopts a socialized view to learning by considering that learners cooperate in order to achieve their common learning goals (Vygotsky, 1978). CL aims to enhance individualized learning through cooperation of individuals in working groups when fulfilling a learning task. There may also be 'group goals' requiring teamwork to be achieved. CL acknowledges that every person should play an active role for the formation of his/her knowledge. CL is applied to a 'class' encompassing the following characteristics: (a) knowledge is shared among learners and also among tutors and learners, (b) tutors act as mediators of knowledge and (c) there may be heterogeneous groups of learners.

The tutor acts as knowledge mediator through discussion and cooperation. Mediation can be defined as scaffolding, coaching, modeling and facilitating learners throughout the learning process. Ideally, tutors should train learners to the point they have matured enough to learn by interacting with other group members (Slavin, 1990).

### *The Combined Learning Model*

Research has shown difficulties in applying PBL and CL in early stages of a learning process. In fact, PBL resembles (to a large degree) the research process during postgraduate studies. More specifically, the roles of postgraduate students and supervising teaching staff resemble the roles of learners and tutors in PBL (Albanese & Mitchell, 1993).

A combined pedagogical method was applied integrating PBL and CL methods. The instructional process consists of two main phases: an initial phase resembling (to a large degree) the learner-oriented method and a subsequent phase based on the integration of PBL and CL methods. A more constructivist approach seems reasonable in an adult distance learning setting, taking into account that adults pursuing lifelong learning are generally exposing motivation in achieving learning objectives and willingness to cooperate in learning communities (Wenger, 1999).

In the initial phase, the teaching scenario resembles the learner-oriented method. Individual and group projects are frequently assigned to learners. The purpose of these projects is threefold. Firstly, the learners' response is used to evaluate their performance. Secondly, they contribute in acquainting each learner with the other group members. Thirdly, learners within groups get used to collaborating. During

the initial phase, the tutor creates groups of learners based on their knowledge level, place of residence and maturity to pass on to the next phase of the learning process. By and large, the purpose of the initial phase is twofold. On the one hand, it introduces learners into the learning process by providing the essential knowledge background. On the other hand, it points out possible problems within learners' groups and primary aspects of each learner's performance (Jonassen, et al, 1999; Miao, et al, 1999; Wilson, 1996).

In the second phase, a PBL approach is employed. The tutor assigns each group a specific problem that is part of a larger problem to be dealt with. Thus, special care should be given to organizing the task each group has to fulfill. Some amount of time should be initially given to learners to ponder over the posed problem. Meanwhile, group members can use LMS communication tools to discuss problem issues. Recording of these discussions enables the tutor to observe the thinking process within each group, as well as commitment and contribution to shared objective.

After the initial 'pondering' phase, a 'seek' phase should follow. The tutor should provide additional tips or teaching material regarding the problem. The main purpose of this phase is to assist the coordination between group members in order to figure out by themselves how to proceed. Learners employ available communication tools to communicate with each other and with the tutor. This interaction also assists learning process coordination, an issue dealt with within each group, with tutor's guidance.

## Applying the Combined Learning Model on our E-Commerce Course

Our class sample consisted of 15 adult students with little or no experience to the "E-Commerce" topic. Our approach was to provide to the class members a virtual "budget" that would be used for the development of their internet store. This budget was given at the beginning of the course, prior to any educational activity and as a consequence, upon starting the students had little or no idea of the way that should perform their "investment".

The application of the method was organized in a modular way as a sequence of four LAMS sequences of activities. Intentionally, the questions that were expected to be raised from the students for each module could only be answered by the oncoming educational activities. For example, only after the first two or three educational activities the students became familiar and understood the first topics that should be addressed for the organization of their internet store (e.g. the type of the store, the target group of the customers, the way that they would accept payments and deliver goods to the clients etc.).

Moreover, the method was designed in such a way that each new module would cause the students to reconsider their decisions that were taken after completing the previous modules. For example, in one module the students had to decide for the underlying technology of the store (e.g. J2EE, Microsoft, Open Source etc.) and the related cost of the application development. In the next module, they had to decide about the type of the installation (an in house data center, hosting in a provider, etc.).

Apparently, for many of the students, the cost of licensing and hardware for an in house data store made them to re-evaluate the previous step and choose as an underlying platform the one that could be supported by a hosting provider.

Each module was represented in LAMS as a separate sequence. This sequence included activities with independent tools of

- a shared resources,
- a forum,
- a chat,
- a submit files
- a voting

In a preliminary sequence we used the grouping tool in order to split the class into groups of 3 members each. The grouping was based on a random selection. This decision was taken intentionally in order to make students to cooperate independently of their educational profiles, their professional skills and their locality.

The shared resources were the first step of the activity. It was used for the delivery of the module to the students including the description of the work that should be done and any corresponding material that might help (documents, URLs etc.).

The forum was used in order to enable each group of students to exchange information, ideas and draft documents during the progress of their work in the module. They also were able to submit their questions and find the answers of the teacher.

The chat was included as an optional activity for the group members. The students could use it if they decided to "meet" and cooperate in certain time. Actually, this activity was rather a tool to attract the members of the group and invite them to cooperate and not an essential part of the module since its functionality was covered by the forum component.

The submit files tool was used from the group in order to submit their work at the end of the activity.

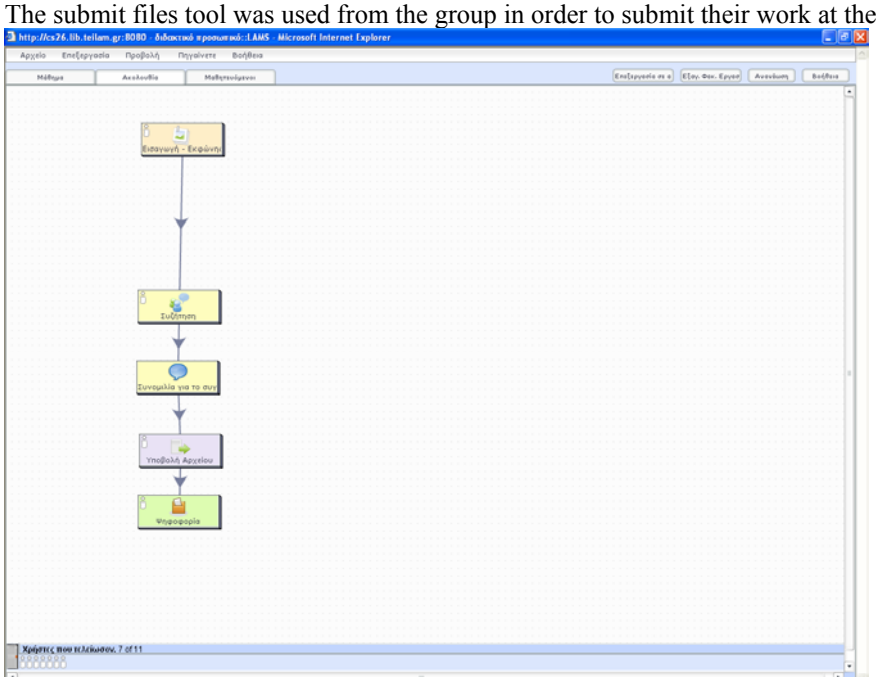

**Fig. 2. An e-commerce combined learning model course organized as a sequence of learning activities using LAMS tools.**

The voting tool was used to summarize key decisions of the groups and expose them to all members of the class. The subjects of the voting were relative to each module (e.g. type of the e-commerce company, type of the accepted client payment methods, underlying technology, in-house data center or hosting etc.). **Fig. 2** illustrates an overview of the module.

Regarding the applications of the combined method to the E-commerce, the four (4) modules were containing the following topics:

The first one was dealing somehow the feasibility study for their planned electronic company, namely the type of the company, the goods or the services that were going to be sold, the target group and the profit model. In order to accomplish this module the students had to attend the first three educational activities of the course. At the end of the module, the students voted for the model of their company (Business to Business or Business to Consumer).

The second one was a study about the business structure of the company. The students had to address topics as logistics, delivery of goods to the clients, client support, accepted payment methods, budget and media that were going to be used for advertisement purposes and personnel. These topics were covered by

the three next oncoming activities. At the end, the students had to vote about the payments methods that they intended to use in their company. At that point, some students were forced to revise their feasibility study made in the first module. For example, some considered the payment with a credit card a potential risk for the client and they rejected it. They preferred cash on delivery but this method could only be used in selling "real" material and not in selling services, so they had to revise their plans.

The third was a high level design of their internet application representing the store (the functionality that was going to be offered to the clients, an abstract image of the first page and the underlying technology (J2EE, Microsoft, Open Source). At this point we also had many revisions of the first two steps. The students that were planning to offer something innovative realized that a notable percentage of their budget should be devoted on the development of the store. On the other hand those that planned a more "traditional" approach (an ordinary store with product catalogues, shopping carts etc.) were able to find many existing solutions and thus reduce the development cost and transfer funds to other activities (e.g. advertisement). At the end, the students had to vote about the underlying technology (a snapshot of this voting where the "open source" is ahead is depicted in **Fig. 3**).

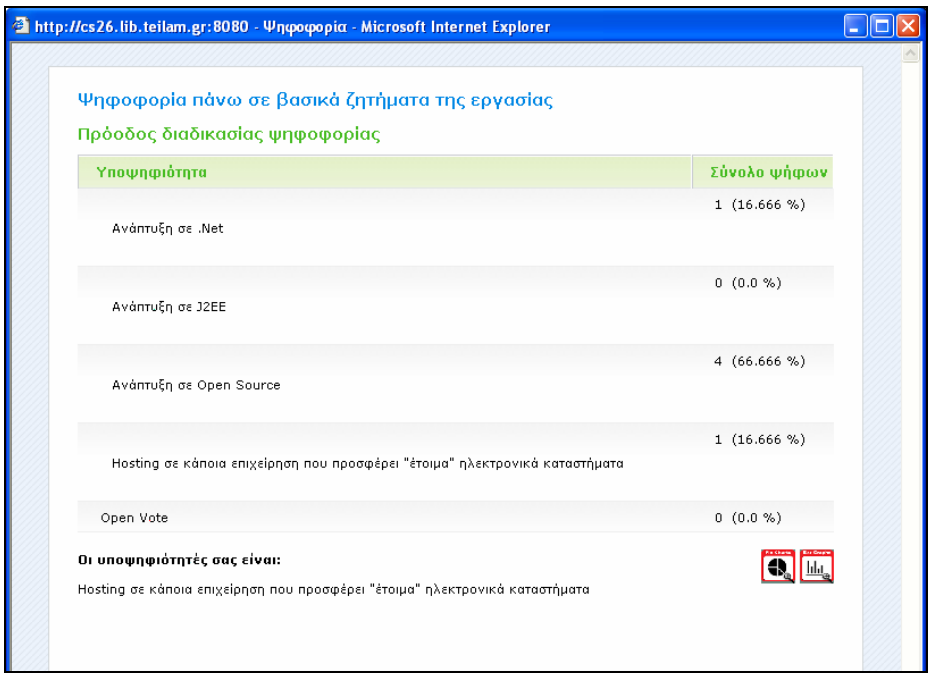


**Fig. 3. A snapshot of a voting tool during the progress of a combined learning model course.**

Finally, in the last module the students had to decide about the implementation of their "data center" and the security of their application. Clearly, the amount of the investment for an in house data center (building, IT personnel, servers, networks, firewalls, licenses) led them to choose a hosting solution whereas some of them had also to revise their choice in the third module and choose an underlying technology that could be supported in low prices by a hosting provider (mainly open source). At the end the students had to vote about the choice of an internal data center against the hosting solution.

## Assessment Methodology and Results

## Assessment Method

Apart from typical LMS assessment options, we adapted and applied an assessment methodology tailored to the specific needs of our web-based courses. Among the forms of assessment applying to online learning (Roblyer, 2005), we selected to use the portfolio assessment in which students create a collection of their work throughout the learning process best determining their efforts and achievements. A pass/fail mark for learners in a course is determined as a combination of all these factors.

Specifically for the combined learning method, assessment of individual and group achievement is accomplished using the portfolio approach. Evaluation of student achievement in a course is based on the following factors: test results, assignments and participation in the discussion forum and online sessions. Students take the following types of tests:

- A pre-test prior to course beginning. This test assists tutors in obtaining an indication of students' knowledge level regarding the course. By comparing pretest and posttest results, an indication of learner's progress is obtained.
- Unit tests upon completion of a course unit.
- A midterm test (optional) and a compulsory final test (post-test) or project.

Student's degree of interaction with the LMS is an essential component of his/her portfolio, because it demonstrates commitment in the course. This parameter involves aspects such as learner's recorded activity in the shared resources of the LMS. Another dimension of assessment is that learners and tutors assess the distance learning setting by completing questionnaires, preparing reports and conducting face-to-face meetings.

For assessment purposes, all interactions among learners using communication tools of the LMS are recorded (Lave & Wenger, 1991). In this way, the tutor will be able to observe how the learning process progresses. Progress will be assessed not only based on the final outcome but also on the recorded interactions among group members, among group members and tutor and among whole groups. Therefore, the tutor will be able to obtain a thorough view to individual and group progress. Moreover, useful conclusions could be reached concerning actions required in order to improve the learning outcome. Such actions could involve group support and encouragement of group members to collaborate among themselves and with learners of other groups.

Tutors and students completed questionnaires to evaluate the overall process, point out aspects requiring improvement and propose their suggestions. Learners were asked to complete three questionnaires: prior to course beginning, at midterm and right after the end of courses. The questionnaire prior to course beginning includes general questions regarding the interests of each learner and reasons for choosing to participate in the distance learning process. The other two questionnaires involve the following: (a) learning content evaluation, (b) evaluation of the overall process, (c) LAMS evaluation, (d) problems encountered during learning process, (e) suggestions for improvement of overall process. Tutors were asked to complete questionnaires at midterm and right after the end of courses. Tutors were asked to make remarks about their interaction with learners and learners' response to overall process.
Learner and tutor questionnaires (in Greek) are available online at the project's Web site (http://esp.inf.teilam.gr).

## Results

### *Students view*

The majority of the students (90%) said that the course satisfied their initial expectations, while the same percentage found the LAMS interface user friendly and easy to use. Another important result came from the students' questionnaires is that 50% of them thought that the performance of the other members of the class affected their own performance, while the other 50% said that the performance of the class had no influence of their own performance. 90% of them criticized positively the whole learning process, the teaching material and found the communication with the teacher very sufficient. Finally, 75% of the students believe that they should use the collaboration tools more often communicating with the other group members.

### *Teacher's view*

The students found very helpful the fact that everything about their work was included in the same "logical" entity (one LAMS activity). Their questions, the answers of the teacher and their colleagues, their working documents and their decisions were all depicted in the forum component. In case of a reconsideration imposed by a decision in a next module, the students were able to remember the reasons that caused them to follow a decision and thus it was easier to re-evaluate their plans.

The submit files component was also proved to be very useful since the teacher was able to track the different versions of a group's deliverable and compare the differences from version to version (the students were advised to upload each different versions as a separate file with different file name). In case of a major change, the teacher was able to submit a question to the group members by using the forum and collect their answers.

The voting provided to the students a quick reference to other group's decisions. It was helpful for them to discover the trends of the majority and see how they differentiated from this.

The monitoring of the sequence was also a useful tool for the teachers since they were able to watch each group's progress and respond quickly to the students' questions (in the forum) and the deliverables.

The grouping facility was a major advantage since any group was able to work independently from the others and keep privacy in their results. On the other hand the random criterion for the selection of the group members was not proved to be a good choice for all groups. Since the students faced an unknown problem prior attaining relative courses, the different member profiles (different ages, different educational status, different time frames that could be dedicated to work, different expectations from the course) caused problems in their cooperation and some teams were not able to deliver even a single module of work.

Regarding some proposed improvements, a virtual classroom tool with a supporting whiteboard will be very helpful for the online sessions. Moreover, we would like to be able to upload files bigger than 1.0 Mb in the submit files component. Also, in the voting tool it would be helpful to be able to change a vote during the activity and see the progress of the results after the reconsiderations that caused a change of votes (e.g. a "history" of the voting). Due to these limitation, in our case we had to include the voting only as a final component of the activity and the students were able to see only the final results (after all reconsiderations) and not interim results.

## Conclusions and Future Work

The complex process of teaching and learning requires to meet the needs of all stakeholders in various stages of education and to consider a multi-faceted (holistic) view of teaching and learning. Traditional LMS will not meet all needs in all contexts. In new learning contexts students have the same possibilities to act those instructors and other staff members have in regular, less student-centered educational approaches. This model does note exclusively replace traditional learning approaches, but provide greater alignment with the life long learning. Instead of learning housed in learning objects and content, learning is embedded in rich learning activities and social spaces.

Distance students are very active with technology, but once in an LMS space they seldom do more than the minimum required. This may be a function of learners on taking "the student role" – defaulting to passive behavior – once in academic environment. It may also be due to the change in behavior expected by tutors – where students must leave their tools behind and adopt tools with limited functionality.

Different type of teaching strategies requires different approaches. Universities and educational institutions need to explore broad applications of technology – beyond simple LMS implementations.

To conclude, the combined learning method was successfully deployed in our case in LAMS. The LAMS components were in general able to support an educational sequence representing the method. LAMS motivates tutors and students providing an easy to use and friendly learning environment.

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## Acknowledgement

This work was partially supported by the European Social Fund and National Resources - (EPEAEK-II).