E-learning system evaluation for in-service education and training

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Abstract: This paper addresses the issues concerning summative evaluation of Learning Management Systems (LMSs) with the aim to provide a guideline for businesses that have as their goal to incorporate forms of asynchronous distance education into their existing training methods and techniques. This kind of training constitutes a competitive advantage for corporations that wish to reduce educational costs along with the transformation of this process to a more flexible one that covers all of their employees' needs.

Key-Words: Learning Management Systems, Assessment, Business Training

1 Introduction

The design, development and function of e-learning systems is dictated by a demand for life-long learning and training, covering the following needs: a) the need for renewal as well as knowledge and skill specialization, b) the need for retraining, due to the fact that there has been a frequent work change and c) the need for alertness so as the increased information flow on the Internet is pursued (Aggelaki et al., 2011). Educational needs arise when knowledge or skills are considered to be incomplete. For the purpose of covering these needs, adults take part in educational and training programs, where the participants' specific educational, professional and social characteristics should be taken into serious consideration (Vergidis, 1999).

E-learning systems are software using the Information and Communication Technology (ICT), aiming at not only supporting distance education in a useful, economical and pedagogically correct way (Kirginias, 2011), but also at improving teaching and learning quality (Stansfield et al, 2004). An e-learning system used to cover the training needs of a company constitutes an integral part of its information system. Thus, the evaluation of an information system is considered to be important for several reasons and more particularly, so that the most appropriate system is chosen as the most efficient to fully answer the needs and calls of the educational institution.

E-learning can be defined as a way of learning that can be supported by Information and Communication Technology, through which teaching and learning quality is improved (Stansfield et al, 2004). An electronic learning system comprises an information system. The evaluation of an information system is pivotal, so that a better understanding of its success and acceptance by its users is accomplished. An information system can be evaluated either as it is (IT system as such) or in use (IT system in use) (Cronholm et al, 2003).

The purpose of the specific paper is the adaptation and specialization of the general evaluation criteria for the evaluation of e-learning systems, aiming at the in-service employee education and training.

This paper is structured as follows. Initially, the criteria for the evaluation of an educational software are defined and the Learning Management Systems are specified. Further, the research method followed is presented, along with the data analysis and the results, while the paper comes to a conclusion with some suggestions drawn from the present study.

2 Theoretical Framework

In the sections that follow, the concepts of in-service education and training, as well as Learning Management Systems (LMS) are analyzed, as well as those of educational software evaluation.

2.1 In-service education and training

In the last few years, the ever-changing structure of economy, e-commerce evolution and an increase in the number of professions in the service sector brought about a demand, on the part of the companies, for employees with improved skills (Noe et al., 2003). This resulted in considering human resource and in particular knowledge to comprise a competitive advantage for companies. In-service education and training, provided to employees by a company, contributes to the acquisition and retaining of such a competitive advantage, so that the challenges of contemporary society are met.

In-service education and training programs comprise a form of adult training programs with few but important differentiations. As basic prerequisites for effective learning are regarded the following (Kokkos, 2005b): a) the content of education should be in immediate relation with trainees' needs and experiences, b) the educational program should be fully organized, c) educational objectives should be clearly stated and d) education should be voluntary. However, in-service educational programs are not voluntary (Kokkos, 2005a), as the decision is made by the Human Resources Department of the company along with the Director of the Department, which the employees that are going to be trained belong to and the Manager's approval is sought for. Moreover, in most cases the goal is the company's profit maximization.

In-service education and training programs are distinguished in programs that take place in the workplace (on-the-job training) and in those that take place outside the workplace (off-the-job training). More specifically as the former are regarded, training is realized in the workplace under real working conditions, while in the latter, it takes place in teaching classes that can potentially be inside or outside the premises of the company (Chitiris, 2001).

Various factors such as the cost, the time framework the specific programs will be implemented in, the time span (when-how) allocated by the employees and the need for individualization constitute the use of e-learning systems as of outmost importance.

2.2 Learning Management Systems

Learning Management Systems (LMSs) are indisputably accepted as the most widely spread tool of synchronous and asynchronous e-learning. A Learning Management System can be defined as an Information System based on the Internet, so that teachers are not only enabled to handle and administer their educational material easier, but teacher-student communication and cooperation is facilitated as well (Meerts, 2003).

E-learning systems can be regarded as being a means of putting socio-cultural learning theories into practice. As claimed in these theories, learning is accomplished through social processes. Cooperative learning, scaffolding, team work, learning communities as well as cooperative learning environments are ways through which socio-cultural theories are realized. The aforementioned are provided by the existing e-learning systems, via the interactive tools offered, such as fora, wiki, chat, to mention but a few.

Through e-learning systems, the teaching of the majority of cognitive subjects is facilitated and all limitations are raised, regarding either traditional teaching or teaching supported by software used in autonomous computer units (Fakiolakis & Papadakis, 2011), and consequently can be used in in-service education and training programs. Nowadays, there is a wide variety of this kind of systems, available either as commercial software (WebCT, Blackboard, Desire2Learn, eCollege) or as free software (Moodle, Claroline, Open e-Class, ClassWeb, Open USS, Sakai Eledge, Manhattan, ATutor, Fle3, ILIAS) (Kirginas, 2011).

Some of the traits and basic functions of the Learning Management Systems that can form the basis on which these systems could be evaluated, are (Retalis, 2005): (1) Course Management, (2) Class Management, (3) Communication Tools, (4) Student Tools, (5) Content Management, and (6) Assessment Tools.

2.3 Educational Software Evaluation

According to Scriven (Scriven, 1976) and Panagiotakopoulos, Pierrakeas and Pintelas (Panagiotakopoulos, Pierrakeas & Pintelas, 2003), four major evaluation categories are distinguished: predictive evaluation, interpretative evaluation, formative evaluation and summative evaluation, with those of formative and summative evaluation to be of outmost importance.

In the aforementioned four categories or types of evaluation, one or more implementation methods of the evaluation can be used. As Benyon, Devies, Keller and Rogers claim (Benyon et al, 1990), the main evaluation methods are the following: 1) analytic evaluation, 2) expert evaluation, 3) empirical evaluation, 4) experimental evaluation, 5) Models of Lawton and 6) heuristic evaluation.

The choice of a particular method depends on various factors such as: the stage of the implementation of the software, the type and the

degree of the users' involvement, the kind of the expected data, the limitations of time, available equipment, human resources and the predicted cost.

2.1.1 Evaluation criteria

Educational software evaluation is pertinent, so as its inclusion to a company's educational structures is accomplished.

Educational software evaluation is regarded as of pivotal importance, so that its inclusion in formal education is seriously considered. However, the assessment of teaching appropriateness is based on the consideration of several characteristics that make up the educational software. After their grouping together, these characteristics will be the vaulting bar so that the basic axons and the individual evaluation criteria will emerge. Notwithstanding, it is more than evident that only by looking through the relevant bibliography, one can say that there is no common ground as far as these axons and criteria are concerned. Extensive references to groups of criteria can be found in Squires and McDougall, 1994, Squires and Preece, 1999, Squires and Preece, 1996, Mikropoulos, 2000, Jonassen, 1999, Panagiotakopoulos, Pierrakeas and Pintelas, 2003, and Dagdilelis, 2007. In an effort to combine the views of various researchers with our own, we have come up with the following list of characteristics (Pantelopoulou et al., 2010):

- Content evaluation (if it exists)
- Evaluation of the pedagogical or teaching method
- User Interface evaluation
    - Language
    - Data – Information
    - Structure – Design
    - Software-users Interaction
    - Multimedia
    - Software Messages
- Technical Evaluation
    - Functionality Criteria
    - Software Compatibility Criteria
    - Software Support Criteria
- Teaching Support Evaluation
    - Teacher-Student Tools Assessment
    - User Manuals along with the Manuals for the Software Administration
- Student and Learning Outcome Evaluation («Teaching Efficiency»)
- Cost Assessment

3 Proposed Evaluation Method

In this section, the proposed evaluation method of e-learning systems and in particular of in-service education and training will be presented.

The specific systems under evaluation are not in the analysis or design phase as their development has been completed. E-learning systems are complete and readily available to be used. Hence, the methods appropriate for the previous development stages of the software are rejected.

The evaluation of the in-service education and training system at hand is advisable to be made with the appropriate adaptations by various groups of users (teachers, students, usability experts, field experts, teaching experts) and not exclusively by expert evaluators. Moreover, a time-consuming method, with the requirement of several use scenarios, is not desirable. Also, our aim is not to come up with compatibility checks based on rules and design models, but with a more holistic approach.

According to the methodology suggested which is the heuristic evaluation, based on the heuristics of Nielsen and adapted on education characteristics (Squires & Preece, 1999), the application characteristics are examined via criteria that can measured and are thus, more objective regarding their processing. A relatively small number of evaluators is necessary and the whole procedure is not vigorous/painstaking. Furthermore, it is not time-consuming and its cost is low.

Judging from the aforementioned evaluation criteria, the content evaluation criteria, the pedagogical or teaching method criteria and those of the interface are in direct correlation with the course content that can be found on the E-learning system. More specifically, the content evaluation and the pedagogical or teaching method criteria are of outmost importance, since, as it is claimed by Clark (1983) and Schramm (1977), learning is dependent on the learning material, its content and the teaching methodology followed and not on the technology used for its delivery (course delivery).

Consequently, E-learning systems can be evaluated based on the criteria of technical support, teaching support, student and learning outcome evaluation, as well as of cost assessment.

In particular, as far as cost assessment is concerned, it is worth mentioning that the current trend is that educational institutions are directed towards Free / Open Source Software for Learning Management Systems. This kind of software, apart from the obvious reason that it eliminates the system's purchase and upgrading cost, enables education institutions to adapt it so as their own specific needs

are met, without the need for specialized technical staff (Papadourakis et al., 2006, Franklin & Hart, 2006).

4 Conclusion

Despite the fact that e-learning systems go through a more mature phase, the choices related to the cost, the provided features, the underlying teaching approaches and the way of their integration into the in-service training, will not cease being of primary concern for the institutions using them for the realization of their education and training programs. Thus, acknowledging the evaluation method and consequently choosing the most appropriate of those offered constitutes an asset for the institution

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