Assessment Criteria of E-Learning Environments Quality

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Abstract

The paper will present the criteria used for the assessment of an e-learning project quality assurance with a focus on the e-learning tools designed and implemented through the project. The title of the project was E-Learning Education Center in Medicine (e-EDUMED) funded from EU funds under Leonardo Da Vinci LLP Programme, focused on the various needs of the health sector such as improvement of training and long life learning, harmonisation of specific curricula in higher education, continuous medical education and EBM (evidence based medicine). From quality assurance perspective there were some specific steps and criteria taken and used in building and assessing the e-learning environment which will be presented in the paper underlining their importance for e-learning environments and the future steps for research and development.

Keywords: e-learning; e-learning education; e-learning environment; quality assurance

1. Introduction

It is a well-known fact that, in Europe, higher education is facing various problems in order to attain EU sole dimension represented by the necessity of integrating new information/new study topics as well as a reaching a high economic income level for young university graduates.

A survey conducted in June 2007, by the Grenoble School of Management Time Centre on behalf of the European Commission (CEC, 2008), showed that „the European e-Learning Initiative created a dynamic around e-

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learning issue in Europe. Nevertheless, as the geographical origin of the partners stems from France, UK, Italy, Germany, Spain and Belgium, the e-Learning Initiative did not manage to equally reach all EU countries”.

The enlargement of EU meant using common instruments, references and principles to support reforms and development of all types of education training and practices at local, national, regional and European levels. In this spirit, lately there were a lot of initiatives to create virtual environments that functioned and function based on e-learning tools in various fields of higher education.

There are currently many e-learning platforms on the market, either open source or proprietary. Many software companies and research centres use computer-based co-operative tools to overcome the geographical distance and benefit from access to qualified resource pools and a reduction in development costs. However, the increased globalization of software development creates software engineering challenges due to the impact of temporal and geographical differences.

“Every e-learning platform has implemented a mechanism for assessing the quantity of accumulated knowledge for a certain topic and course. A problem that frequently arises is that the system in place may not be fair regarding the ordering of students based on the accumulated knowledge. Usually, there are situations when the grades distribution is not normal, as many students are therefore clustered although there are differences regarding their accumulated knowledge” (el Zayat, 2008).

In the area of e-learning resources, the DIPEx project - Virtual Europe, elaborated by a consortium of Medical Higher Education Institutions provided a variety of personal experience on health and illness matters, aimed at clients and practitioners by the means of e-learning (COHEHRE, 2010). It showed that e-learning strategies are focused on actively engaging students with “opportunities for reinforcement and consolidation through reflections shared, and feedback from tutors and peers. However, as a relatively new area, it is expected that this basic pedagogic model will continue to evolve in line with advances being made in researching new models of learning with virtual communities” (Kolb, 1994).

Similarly, Nesta’s report on Savannah (Pulman, 2007) continues to highlight an important point - increasing awareness that young people’s digital culture is “as likely to be shaped by interaction with mobile and games technologies and that all educational settings, including higher education, should start to engage these tools too”.

This growing recognition that the areas of simulation, online communities and virtual world are seen as important future learning and teaching tools has also been reflected in the late years’ research funds granted by Eduserv (2007) and in many papers and reports.

Extending the e-learning dimension by joining networks of professional institutions and groups, internet databases of didactic and pedagogic materials, EU websites and close contact with e-learning experts and forums at national, regional and European level, it will enhance the access, development and quality of higher education in European countries, developing and improving a European dimension and supporting the harmonisation in higher education.

The paper will present the criteria used for the assessment of the e-Learning Education Center in Medicine (e-EDUMED) LLP Leonardo da Vinci EU project quality assurance with a focus on the e-learning tools designed and implemented through the project. The project, funded by EU LLP Leonardo da Vinci grant and developed between 2011-2013, focused on the various needs of the health sector such as improvement of training and long life learning, harmonisation of specific curricule in higher education, continuous medical education and EBM (evidence based medicine). The project aimed to answer the needs of medical staff in improving, updating and providing accessibility and equal chances to knowledge and harmonised training (Avramescu, 2011). The overall project objectives were to support the development of a comprehensive virtual medical education system, with various modules, added to an already created structure, such as echography, nurses and patients health education, to implement the medical modules as part of a curriculum in medical VET, to assure technical support for further extending the e-learning platform to other medical specialisations, a Virtual Training Centre and Educational Network in order to develop the quality and attractiveness of VET systems and practices and, finally, to offer a common European quality standard in medicine (Avramescu, 2013).

Thus, among other outputs, there were developed online learning materials by cooperation in educational innovation, facilitating the elimination of barriers for international specialists’ education among the countries involved in the project. Moreover, by concentrating on the on-line delivery and interactivity, there was established
full potential for continuous update. The developed e-platform serves as host for the necessary knowledge databases and similar reference resources (Avramescu, 2012).

From quality assurance perspective there were some specific steps taken in building the e-learning environment:
• establishing standards on quality assurance and control, process and output indicators;
• building an internal quality control system on project outcomes - Quality Module and evaluation during the project lifetime by survey tools integrated into the e-learning platform;
• pilot testing with users involvement and assessment;
• analysing the feedback information to create the final form of the e-platform;
• developing questionnaires for target group regarding the training modules and e-learning platform features.

The new products developed and implemented were:
• a WEB site (http://www.e-edumed.ro/), a Virtual Training & Communication Center with a range of various e-tools and applications, a Virtual Learning Environment (VLE - curriculum, delivery, assessment, tutor support, communication, feedback, quality management) as well as access to related references, organisations, scientific events and research area.
• new content and on-line courses creating a module in general echography (interactive section for diagnostic, clinical signs and echographic images).

2. Development of the e-learning platform

The process of developing and implementing the e-platform made the following steps:
• collect the needs of the project target groups;
• elaborate the technical architecture of the project e-learning platform;
• design and implement the new adapted e-learning platform;
• integrate the specific modules in the e-learning platform and deploy the platform on a dedicated server;
• evaluate the e-learning platform and implement the corrections obtained through evaluation;
• provide guidelines for using the e-learning platform and the integrated virtual classroom.

Based on these steps, the methodological framework included:

I. Deciding on final curricula and teaching level was done by the educational team. This included main training topics and contents necessary for skills and competencies improvement as identified by needs analysis and national policies; they were divided into units, periodical assignments, course objectives, didactic materials (downloadable), available support services (chat, video conferences, forum), timetables.

II. Deciding on e-platform transfer/improvement/extension. All project partners decided on the architecture of project e-learning platform taking into account the target group needs assessment and the innovative multimedia courseware and applications that were developed for the new training packages. This referred to both the e-learning platform and e-learning methodology.

IIa. With regards to the e-learning platform, based on the experience and desire to increase the impact of learning process on target group and improve the sustainability of the project outcomes, it was decided to use an open source e-learning platform, Claroline, with a relevant added value, as it is free, built in modules, flexible, customizable and, finally, it has a huge community of developers and users that means new enhanced releases and bugs.

IIb. With reference to the pedagogic material, the online course published on Claroline revealed important features. In order to increase the quality of the didactic outcomes and ensure project sustainability and multiplication for lower costs, the courses and learning objects were SCORM compliant, as they followed the most widespread international standard on e-learning, reusable learning objects in any LMS SCORM compliant, easy to handle and process tracking data and finally, easier exploitation and commercialisation of results during sustainability project period due to these characteristics.

III. Deciding on training design - specific content of modules and the pedagogical approach providing opportunities for learning followed the principle of didactic materials within the e-learning platform with interdisciplinary, intercultural and international character in a practical learning pathway.
The training packages were based on innovative educational methods and contain lecture notes in PDF format, PowerPoint presentations with included ultrasound images, multimedia lessons (video), real-time virtual classroom, recording of virtual classes and self-assessment tests.

3. Project e-platform description

Claroline was the environment used for the e-learning platform. This platform is suitable for the delivery of distance learning, in particular through Internet. The platform is distributed under the GPL license which is the standard licence for Open source software. There are no fees to pay for installing it on a WEB server to provide professional E-Learning courses through Internet. The online students have found this platform very easy to navigate and use.

Login Page of the e-Learning platform allows the access based on the use of username and password. Three main types of accounts were implemented on the LMS, represented by Administrator, Course manager, and Normal user or student.

I. Administrator has the total control of the platform and its main role is, as indicated by the name, to administer the LMS using the administration panel. The main areas are: Users, Courses, Platform, and Tools.

II. Course manager has the total control of the course where he or she is enrolled. He or she is able to develop learning materials, upload files, and manage files and tutor students within the course.

III. Normal user or students is the final users of the platform and they cannot manage course materials. After logging in, users will be available to access the E-COURSE or the PBL repository.

e-COURSE area provided students with extensive learning materials and the PBL environment where users and facilitators run their PBL sessions. Teachers and tutors access as course manager in order to develop learning contents and tutor students as necessary. All the learning and communication tools are accessible from the home page of the course.

Course description shows all about the general presentation of the course such as a description, targets, topic list, help desk contacts, staff involved, and learning tools. Course managers can insert and edit the different parts of the course description while students can only look at (read only) what is displayed on the screen.

Agenda allows teachers, tutors or course managers to insert important course deadlines together with a title of the event or activity to be carried out, a description of the event or activity to be carried out. The event or activity list is displayed from the most recent (decreasing order by date). The student can also see the agenda in a different way from „My Calendar“ tab in the menu. Here the visualization is like a calendar with the event or activity titles and, all the description is displayed by clicking on the respective title.

Library provides a comprehensive mechanism for organising files and links that a teacher can choose to make available to students. It is possible to create various directories, and to have directories within directories in order to enable the grouping of files. This area has been conceptualized for storing all types of resources that do not have to be tracked by the system. Only course managers are allowed to create / edit folders or upload / edit files while students have available the following tools:

- „up” in order to access the parent folder
- „search” in order to find quickly a file or link by inserting a fragment or all the name in the available text box.
- „download current directory” in order to download a zip file with the selected folder and its contents.
- download a single file.

In the project, this area was the right place to put all the materials (other than lessons) useful for students to acquire more knowledge that is necessary for the resolution of the case studies presented during the PBL sessions (deepening and reflection phase), e.g. lecture notes.

The assignment tool is a publication area for students. Teachers can create one or several project works, where students were able to publish their work. Teachers were able to give feedback on their works and assess students directly on-line. The assignment is a valid tool to assess students in a qualitative way while quizzes to be provided within the learning paths are closed questions i.e. their goal is to make a quantitative evaluation of students’ learning progress. Depending on the peculiar didactic strategies, teachers can ask students to provide project works by writing online in an appropriate text box and / or upload a document which has been prepared offline previously.
Forum is a classic asynchronous communication tool. The Forum will be set up to encourage communication among users, teachers and tutors and providing the opportunity to post ideas, opinions, and information on the course in an organized manner. For this project, the forum was set up for the communication among users and between teachers / tutors and users.

Learning route is the core tool of the platform together with the PBL virtual rooms and the PBL repository. The learning route covers various components, according to the education strategy. Within each component or, technically, module, there are various types of learning objects, represented by: a. Multimedia lessons, b. Video lessons, and c. Quizzes.

4. Criteria used for the assessment of e-platform quality

The key performance indicators (KPI) used when assessing the quality of e-platform and its features from the e-learning environment are reflected below in the table below (table 1). The allotted values or quantitative/qualitative image are considered adequate to describe the overall performance of the e-platform and the specific features, describing the real success rate.

Table 1: Key performance indicators (KPI)

<table>
<thead>
<tr>
<th>Code</th>
<th>KPI</th>
<th>Description</th>
<th>Estimated Targets</th>
</tr>
</thead>
<tbody>
<tr>
<td>KSA1.1</td>
<td>Number of incidents</td>
<td>Number and trends of incidents registered by the project support (in total and per category)</td>
<td>The trend follows standard Rayleigh (decreasing) curve</td>
</tr>
<tr>
<td>KSA1.2</td>
<td>Incident Resolution Time</td>
<td>Average time for resolving an incident by the 3rd-level support (possibly per category)</td>
<td>Within the SLA specifications</td>
</tr>
<tr>
<td>KSA1.3</td>
<td>Number of Problems</td>
<td>Number and trends of problems (defects) submitted (in total and per category)</td>
<td>The trend follows a standard Rayleigh (decreasing) curve</td>
</tr>
<tr>
<td>KSA1.4</td>
<td>Number of Urgent Changes</td>
<td>Number of changes (defects or enhancements) with priority Immediate</td>
<td>A precise target cannot be estimated, but too frequent immediate changes are symptom of poor Quality Control. It is tentatively set at &lt; 1 per month</td>
</tr>
<tr>
<td>KSA1.5</td>
<td>Change Application Time</td>
<td>Average time, from incident submission to release, for applying a change (possibly per category and priority)</td>
<td>Within SLA specifications</td>
</tr>
</tbody>
</table>

Based on the information gathered from target group regarding e-platform quality assurance assessment, the following conclusions were provided: the respondents answered questions regarding overall content, ease of navigation and overall look, links, visuals, style as well as content of information provided. Accordingly, the assessment criteria based on the KPI above were built and used in order to evaluate various features of the e-platform (Sitnikov, 2013):

* content of e-platform courses: subjects and topics importance, relevance of specific aspects, key points for further assessment, quality of content and structure.

* e-platform modules in terms of content and delivery: time spent, evaluation tests, clearness of stated objectives and requirements, complying with stated objectives, topics conformity with target group needs and expectations, courses usefulness in terms of content, future application, personal and professional growth, didactic methodology in terms of efficiency and effectiveness, case studies content and delivery, virtual classroom experience, learning path management, guidance, support provided before and during the course, commitments punctual observance during course development.

From the two perspectives above, the quality of the overall e-platform was seen as high to very high by all members of project consortium. To “poor” or “average poor” grades, specific improvement was provided. The quality of the various features of the e-platform (content and topics of modules, courses, virtual classes etc.) was seen as high to very high by more than 70% of respondents. To “average” or “poor” grades, specific improvement was provided.
• **tools for didactic content delivery**: the criteria used for assessment are tools for course management, assistance / tutoring tools, tools for teaching/learning assessment during the course and at its end, capability to manage different courses and groups, tracking and reporting tools, course usability from students view point.

• **technological features of e-platform**: support to different server/database systems, features of system project design, integration modularity, portability, and flexibility.

• **management tools of e-platform**: the criteria used for qualitative assessment were represented by the functions and procedures allowing efficient management of access to system, possibility to personalize the graphics, modularity of the system’ roles, permissions and processes linked to management of competencies and related certification.

The e-learning platform has a high usability given by the system, and it is not necessary a long training period either for administrator, teachers and students. Besides usability, the possibility to embed multimedia content (videos, images, etc), the possibility for online tests, multilingual web forums and comprehensive documentation must be considered. Based on these functions, project e-platform system developed a more attractive and effective learning process (Natoli, 2013).

These features mentioned above could be better summarized as presence of:

• Conformity to standard: the e-platform is compatible with SCORM, technically a virtual model (reference model), a collection of technical features that allow firstly the exchange of digital content independently from the platform;

• Collaborative functions;

• Usability of the systems.

Additionally, the collaborative functions and the high usability of systems, the e-learning platform built within the project mentioned was identified as the most suitable online environment to cope with the medical learning needs and achieve project goals. Generally, it was effectively ensured a global management of didactic content and, particularly, the characteristics of usability allowed the exploitatation of a great potential impact for the users who did not have the experience with ICT issues and used for the first time an e-learning environment.

Finally, the most important criteria used for the assessment of the project e-platform quality that defined a final very good result were represented by solidity and stability; data security and accesses control; architecture flexibility; adherence to standard; possibility of didactic material re-use; meta tagging; export and printing; graphics personalization; support and localization community; virtual environments.

5. Conclusions

The e-platform and its components were the most important result of the project. It supported implementing the e-learning methods in the education process focused on project target group, enhancing training attractiveness, providing target group with new ways of gaining knowledge (interactive multimedia presentations, virtual classes, access to the up-to-date project education areas achievements). It also offered flexibility in time and location, cooperation, experience sharing, common European dimension, accessible learning to all target group members, self-directed learning and peer support encouragement, lower training costs (travel/accommodation in academic institutions), language proficiency improvement.

Therefore, the quality assurance assessment criteria were important and focused on the main components of the e-platform. When testing the quality assurance of e-platform and its component modules there were used criteria focused on fitness for purpose, suitability of provided knowledge, user interface, language level, graphic approach and interaction level. Criteria used for assessing software characteristics quality were focused on functionality, reliability, usability, efficiency, maintainability, and portability.

Based on the information gathered from target group regarding module assessment, the following conclusions were provided: the respondents answered questions regarding overall content, ease of navigation and overall look, links, visuals, style as well as content of information provided. The quality of the overall was seen as high to very high by 82 % members of project target group. The quality of the various features of the modules (content and topics of modules, courses, virtual classes etc.) was seen as high to very high by more than 70% of respondents.
References