

A Framework for the Quality Assurance of Blended E-Learning Communities

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Abstract. E-learning enables learners to decide what to learn, when, how and how fast. In the blended e-learning paradigm, knowledge is delivered using a combination of online and traditional distant education practices. The purpose of this paper is to propose a set of criteria for the evaluation of the educational process in blended e-learning communities. The systematic surveying and evaluation of the various parameters that affect the educational outcome is the primary aim of the quality assurance process. Existing evaluation methods provide general guidelines, which fail to cover the traditional distant education procedures (e.g. educational material, sporadic face-to-face meetings) that accompany e-learning activities. The key reason for the success of a blended e-learning approach is the balance between computer based and face-to-face interactions and the harmonic merge of the two. First, we review the current quality evaluation models for education and focus on the criteria that apply to blended e-learning approaches. Then, we discuss the issues arising from the combination of the two alternatives and propose solutions for improving the quality of the whole process.

Keywords: blended learning, e-learning communities, quality assurance and evaluation.

1 Introduction

A fundamental and recurring action in Quality assurance is to evaluate the system, project or service in order to ensure that it meets the quality standards and achieves the expected outcomes. In this work, we apply the principles of quality assurance and continuous assessment to the educational process inside a blended e-learning community.

Members of e-learning communities, help each other and jointly confront emerging problems. Following the Web 2.0 evolution, a growing number of online-only colleges began to offer several academic degree and certificate programs via the Internet at a wide range of levels and in a wide range of disciplines. Their main aim is to create Virtual Learning Environments (VLEs) for the management of the educational program of the whole institution, through a consistent and standard user interface.

However, they could not avoid offering some campus classes and face-to-face student support services [4], such as registration, advising and counseling. On the other side all other universities begun to offer e-learning services and online support to their students. This new paradigm of “blended e-learning” [5] combines several methods for delivering knowledge and supporting education, such as: traditional learning inside the classroom, distance learning and virtual teaching (e-learning). The selective use of traditional educational tools enforces blended learning strategies and overcomes several obstacles such as: coordination of learners’ activities, absence of the educator, students’ evaluation. It also enforces collaboration of educational institutes and leads to more open, richer and flexible curriculums, thus making the blended model a promising solution for learning communities.

From the quality assurance view, as referred by Mayes [17], quality evaluation must move from atomic to collaborative level. Among the frameworks that have been proposed in the past for evaluating blended learning approaches [10], e-learning solutions [13] or learning communities [19] no one managed to cover all three aspects of learning: pedagogical, technical and social. To the best of our knowledge, this is the first assessment framework which covers pedagogical, technical and social aspects of blended e-learning communities and evaluates the organizational and financial viability of the educational program. The evaluation plan defined in this work can be used as a guideline for evaluating learning programs in different levels and ages and can fit to the specific needs of the educational institute being evaluated.

The following section provides a survey of existing blended learning approaches and introduces the need for an evaluation framework. Section 3 presents the aspects of the educational community that we assess. Section 4 summarizes the criteria of the suggested evaluation plan and section 5 presents our conclusions.

2 Related Work

The first step in defining a framework for the quality assessment of blended e-learning communities is to position these communities precisely among all other learning approaches. Over the years, researchers and educators have introduced and tested a wide range of different teaching and learning methods [15]. Figure 1 presents a classification of these methods.

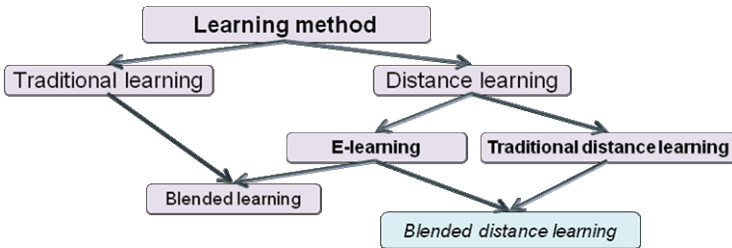


Fig. 1. Taxonomy of Learning approaches

The physical interaction between students and the tutor, through lectures, tutorials, seminars, laboratory and practical classes, is important in traditional learning and thus preferable in primary and secondary education. In the distant approach, both participants work from their own places and follow a more flexible time-schedule. The educational material is recorded, printed or other-ways reproduced and distributed to students who are able to attend courses at their own tempo. Distant learning is preferable for students who have time and space restrictions (e.g. in lifelong learning programs). We further distinguish distant approaches into traditional distant and e-learning ones. In e-learning and computer based learning, the educator is physically absent but always in assistance of the student. The educational material is properly designed to minimize teacher intervention and allow immediate response with the use of ICT technologies.

Although e-learning approaches are gaining the hype, since they provide synchronous means of interaction between students and teachers, blended solutions are preferred when e-learning educational tools are not sufficient to support the learning process. Advances in ICT replace traditional classroom meetings with online sessions and lead to a hybrid approach, which we call *blended distant learning*. For assuring the quality of the learning process, we should consider all possible aspects that affect *learning* as the principal outcome. We must examine: a) what students think and feel about the educational process, b) the resulting increase in students' knowledge and skills, c) the improvement of students' behavior and d) the effects on the students' performance [14].

The methodologies for e-learning activities' evaluation (e.g. Embedding Learning Technologies Institutionally (ELTI) [8], MIT90 [18], Pick&Mix [3] etc) do not apply to blended e-learning communities. Besides, they contain general guidelines for improving the quality of the learning process but do not provide specific evaluation criteria. For example, The E-Learning Maturity Model (eMM) [16] proposes a detailed set of criteria for assessing the learning, development, co-ordination and organization tasks performed by an educational institution, and employs a five-level scale for grading. However, eMM fails to evaluate several distant learning parameters.

As far as it concerns virtual learning communities, the proposed models focus on asynchronous tools (e.g. forums [1, 9]) or on usability issues [7]. In [2], authors propose a detailed set of criteria for virtual learning communities' evaluation and offer a detailed evaluation template, with focus on the knowledge, social and pedagogical aspects of the community. The model does not capitalize on blended e-learning communities and, as a result, neglects the traditional alternatives of "e-" processes.

A first conclusion, from the review of related work, is that some models cover traditional learning and others e-learning or e-learning communities, but none covers both aspects and all possible alternatives. Another conclusion is that all models agree on evaluating: (a) the pedagogical-psychological aspect [6], (b) the technical-functional aspect, (c) the social-cultural aspect, and (d) the organizational-economic aspect [11]. We present in details each of the four aspects, in the following section.

3 Evaluation Aspects

In order to create a concrete framework for the quality assurance of blended e-learning which can apply in a wide range of educational communities, we must

examine all the dimensions of the learning environment. The proposed framework capitalizes on the classification scheme of evaluation criteria introduced by Holst [11] and provides extensions that cover the traditional alternatives of online learning tools and the methodologies that apply in blended environments. According to the metaphor, depicted in Figure 2, a blended e-learning community is like a multilayered sphere, which spins around the organizational axis, and the learning process is a movement towards the sphere's core.

The sphere's core is the pedagogical target of the community: *learning*. The layer covering the core refers to the usability of the community structure, from a technical point of view. The arrows toward the core mean that usability aids learners and educators to achieve their target. The outside layer marks the interest of the members to the community itself. If members are interested and motivated to participate to the community activities, then it is more possible to achieve the community target. The aim of these criteria, which assess the social aspect of the community, is to evaluate whether the community is able to keep members' interest high, to build trust and avoid out-flows (arrows that bounce on the community shell). Finally, evaluation should examine the organization and operation of the learning community, which is important for its long-term existence.

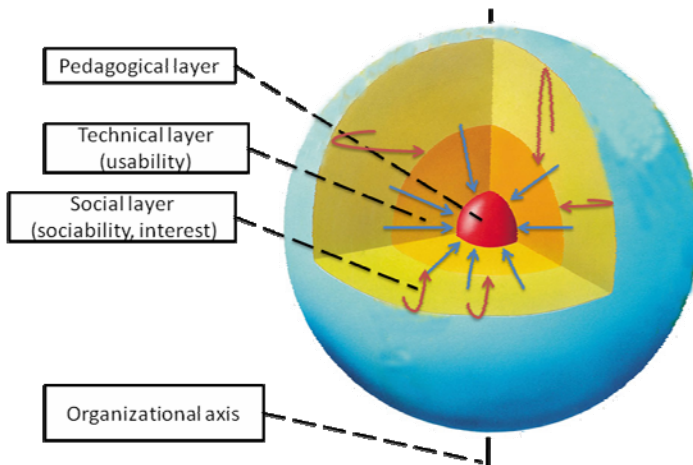


Fig. 2. A metaphor of the learning community

3.1 Pedagogical Aspect

The quality of the learning process, strongly relates to whether it reaches its pedagogical targets, which should be clear for all participants. When the pedagogical targets are clear, members are able to choose the knowledge domain of their interest and make their own schedule. So, fewer members leave the community and members' participation increases due to common interests and common goal.

Tutors are responsible for disseminating the community targets and reminding members about their educational tasks. If visitors know the chosen pedagogical

approach without having to register, it is easier for the tutors to modify it or apply an alternative approach and thus achieve a more effective learning experience. Respectively, if the members take objective comments about their progress, they could immediately try to improve themselves. By progressively increasing the difficulty of the activities, members have enough time to fill their knowledge gaps and broaden their knowledge domain. In addition, with the right scheduling, members have time to respond to their duties inside the community.

3.2 Technical Aspect

The technical infrastructure is the foundation of members' communication. As far as it concerns the virtual part of the learning community, ICT have to be of high quality and members should be familiar with it. According to Keller [12], the usability of the community platform is an intrinsic motivation to learn. Based on the web design and instructional design literature the content offered to the community members must be interactive and the general visual design should facilitate navigation.

The blended environment should be exploited to support members in getting familiar with technology and begin using the online alternatives. In-classroom courses can also complement the virtual environments, when the latter cannot substitute reality, or when it is necessary for the learners to become familiar to the real environment, for example in an anatomy course for doctors.

3.3 Social Aspect

A learning community is above all a community, which means that members reach their targets by communal effort. If the number of members is not sufficient, each member may not be able to get proper support in understanding the knowledge domain and be productive. As the complexity of knowledge domain increases, the community needs more members. Questions should be answered without delay, clarification of complex issues must be ensured and problem solving must be facilitated. Early definition of roles, privileges and responsibilities, is crucial for the operation of the blended learning community. Additionally, the existence of rules about members' behavior prevents members from having problems first in their cooperation and second in communication with others outside the community. Usually, members become more trustful as their participation increases and inspire other members to collaborate with them. Improved interaction between members supports collaborative learning, leading to more effective learning experience. Members' interaction is crucial for the successful operation of the community and it must be supported either it is on-line or on-life.

An important factor for a successful virtual learning community is to support members to evaluate the community. Involving many members in the evaluation process ensures its objectivity. When evaluators are members of the community, they better know its weaknesses and it is easier for them to report most problems. The community, of course, should not only report problems but try to solve them and improve the effectiveness of the learning experience. It should encourage members to

evaluate the community and report specific problems, but also to take into consideration the self-evaluation results and try to solve the reported problems in a legitimate time interval. The virtual activities of the community must be accompanied by scheduled face-to-face meetings that help building trust between community members.

3.4 Organizational Aspect

E-Learning is an efficient and cost-effective way of learning and as a result, it is preferable for companies that offer lifelong learning and training solutions. Although the investment for building and launching an e-learning environment is high, the resulting costs for running e-courses are significantly smaller: travel, accommodation and food expenses are minimized and virtual representations replace costly real-world experiences. Similarly the cost of learning in a virtual community can be low, thanks to simple communication equipments (i.e. a PC with internet connection and a web camera and microphone) and the volunteer contribution of experts.

A restriction for e-learning is the limited availability of Internet and associated resources in some areas of the world. Also, traditional education methods are critical in several cases (e.g. primary education) and are necessary as a complement to e-learning in others (e.g. spontaneous meetings in open-university courses). Savings from e-learning allow the educational institute to spend on traditional forms of education and *vice versa*.

The institutions behind the learning project should evaluate the organizational and financial gains and requirements of the approach and balance between electronic, distant and traditional solutions. They should balance the budget distribution for the wages of content experts, course designers, computer programmers etc, reduce the running costs and increase profits via reusability from partnerships with other e-learning institutions. In the following section we describe the focal points of the evaluation process of the blended e-learning community for all the above aspects.

4 Evaluation Criteria

We divide the evaluation criteria into four main categories matching the aforementioned aspects. Each category is further analyzed in a series of factors that should be evaluated in a continuous basis in order to assure quality. We have defined an extended set of evaluation criteria that cover all aspects and examine their factors and use a 4+1 levels scale for grading. The scale ranges from 'Fully Adequate' -when the solution completely fulfills the criterion- to 'Not Adequate' -when it does not fulfill the criterion at all- and 'Not Measured' -when it is unclear whether the community fulfills the criterion.

The criteria of the Pedagogical category, as depicted in Table 1, examine whether the pedagogical aims and the application field have been made clear for all members and visitors and tutors and learners have agreed on their roles. They check whether tutors are allowed to apply alternative pedagogical practices and the educational solution is efficient in serving the learners' needs and capable to improve their knowledge and skills.

Table 1. Criteria for the evaluation of the pedagogical aspect

Pedagogical approach related
i) Visitors are informed on the pedagogical approach, ii) The application field of the knowledge domain is presented, iii) Visitors are informed on the community goals, iv) Knowledge domain is well known by the tutors, v) Tutors are able to apply alternative pedagogical practices, vi) Instructors and learners have agreed on their roles and on the pedagogical paradigm they employ
Material and activities related
i) Topics in the content area have been divided into suitable for e-learning and suitable for face-to-face instruction, ii) There is a detailed activities' calendar including their purposes and whether they are online or offline, iii) The educational content is accurate, complete and is available in both online and offline formats, iv) Tutors discuss students' progress in person, v) Difficulty of the activities is progressively increased, vi) Activities are fairly scheduled among members, vii) Multimedia components, internet tools and external information sources used in the activities, are listed, viii) Activities are designed to support students to become independent distance learners
Student related
i) Visitors are informed on the prerequisite knowledge, ii) Learners' preferences are recorded in their profiles, iii) Knowledge and skills are available about learners, iv) Attitudinal and motivational information is available about learners, v) A survey on learners' needs is available for visitors, vi) The program goal(s) are approved by appropriate officials within the institution, vii) Student orientation services are available, viii) Students' assessment is performed both using traditional and e-learning methods

Table 2. Criteria for the evaluation of the technical aspect

Requirements
i) Hardware requirements for online or offline e-courses have been defined, ii) Special software is required for online or offline e-courses, iii) Network: technical requirements relating to data transfer (bandwidth, file size, connectivity etc). of the multimedia components, internet tools, and supplementary materials are reasonable, iv) Requirements for specialized equipment
Navigation, Orientation
i) The information is intuitively located and easily accessible, ii) It is easy to understand where I am within the information architecture, iii) Links actually lead to the content they promise to lead (no broken links)
Content & Design
i) International interoperability standards (SCORM) are employed, ii) Multimediaity: Different media are used to convey the information necessary to complete the task, iii) Quality: The quality of the audiovisual and textual content conveys effectively content and interaction capabilities, iv) Graphical interface elements and requirements (browser, plugins, etc), v) The following services are available: Multimedia Archives, Mailing lists and their archives, FAQs, e-books, Webliographies, Reading lists, Experts online.
Communication, collaboration, facilitation
i) Availability of communication tools, ii) Technical support adequacy, iii), Library support adequacy, iv) Learner's guide is available, v) Services for Students with Disabilities.
Educational
i) Flexibility and reusability of the LCMS or LMS components, ii) Teachers' familiarity with the LCMS, iii) The educational material is self-created, iv) Existence and exploitation of tutorial services.

The criteria evaluate the accuracy and completeness of the educational material and activities and if they can be equally performed online or offline. Finally, they examine if members are motivated to discuss with other members in person about their progress, receive facilitation, and participate in activities of progressively increasing difficulty.

The criteria that evaluate the Technical aspect and the quality and usability of the educational solution, as depicted in Table 2, examine: a) the completion of the technical requirements in software, hardware and equipments; b) the accessibility and usability of the online content; c) the compliance to content and design standards; d) the availability of communication, collaboration and facilitation services.

Table 3. Criteria for the evaluation of the social aspect

<i>Collaboration</i>
i) There is sufficient number of members who are encouraged to collaborate, ii) Members assist each other to use ICT, iii) Faculty and staff directories are available and up-to-date.
<i>Feedback</i>
i) Members' feedback concerning activities and their difficulties is directly forwarded to tutors, ii) Members are encouraged to evaluate the community and report specific problems, iii) Each member is rated for its participation and this rating is public, iv) The results of the self-evaluation are taken into consideration and the community tries to solve the reported problems in a legitimate time interval, v) There is a system to accept students' complaints.
<i>Facilitation – Guidance</i>
i) Information on popular courses and course suggestions are provided to students, ii) Course recommendations are made based on collaborative filtering, iii) Instructors respond to learners' inquiries, iv) The instructional staff maintain scheduled office and online hours (synchronous), v) Profile management and career counselling services are available.
<i>Connection to real world</i>
i) Parallel communities are supported (i.e. alumni), ii) Welcome and Graduation ceremony are held online and/or offline, iii) Internship and employment services, iv) The digital divide issue is considered in the design of the e-learning content.
<i>Roles and rules</i>
i) How many of the following roles apply to the faculty members: Instructor, Teaching Assistant, Tutor, Technical Support, Librarian, Counsellor, Graduate Assistant, E-Learning Administrator, Advisor, ii) How many of the following roles apply to the community members: Moderator, Facilitator, Administrator, iii) There is a policy with specific rules about members' behaviour (etiquette and netiquette)

The quality assessment of the Social aspect of the community (Table 3) emphasizes on: a) the degree of support for collaboration; b) the amount and participation of members, c) the exploitation of user feedback; d) the operation of facilitation and guidance services; e) the connection to the real life of members; f) the definition of roles and rules for the community operation.

Finally, with regard to the organizational aspect (Table 4), the operational and economic factors are evaluated. More specifically, we evaluate: a) the strategic and business plans, the structure of the academic calendar and the flexibility of the curriculum; b) the automation of the Registrar's procedures; c) the dissemination plans; d) the sustainability of the financial investment and the viability of the whole educational program.

Table 4. Criteria for the evaluation of the organizational aspect

<i>Operational</i>
i) Mission Statement, Strategic Plan and Business Plan available, ii) Predefined Content Development, Delivery and Maintenance policies, iii) Fix academic calendar or fixed course duration, iv) Curriculum flexibility, v) Clear policies on Intellectual property rights.
<i>Registrar</i>
i) Admission requirements are clear and available, ii) Availability of application forms, iii) Accessibility of students' records, iv) Payment of fees and billing are online, v) Transcript Request Form and official transcripts are both online and offline
<i>Dissemination</i>
i) Newsletter, Community Newspaper, other printed or electronic dissemination material, ii) Organize meetings, conferences, either online or offline, iii) They are able to provide their program and course information completely on-line or in print materials or in a combination, iv) Marketing means (electronic or other)
<i>Investment</i>
i) Allocate budget for e-learning, including wages for content experts, course designers, computer programmers etc., ii) Difference in fees between e-learning and traditional solutions, iii) Reusability of content and resources, iv) Partnerships with other e-learning institutions are encouraged, v) Members can use library and other learning resources from partner institutions, vi) On-line bookstore or partnership with an on-line bookstore.

In order to provide a complete evaluation template that can be applied in a constant basis in the blended e-learning community and reassure the overall quality, we perform a quantification of the evaluation results collected using the aforementioned criteria. The individual marks can be used to calculate separate scores for each sub-category, or category or a final score for the full set of criteria. Supplementary weights can be applied in each category or sub-category depending on the priorities of the community. The resulting formula will have the following form:

$$Score = W_A * \sum_{i=1}^{asize} w_{ai} * m_{ai} + W_B * \sum_{i=1}^{bsize} w_{bi} * m_{bi} + W_C * \sum_{i=1}^{csize} w_{ci} * m_{ci} + W_D * \sum_{i=1}^{dsize} w_{di} * m_{di}$$

where W_A , W_B , W_C , W_D denote the priority of the respective aspect for the community, w_{xi} represents the interest on sub-category i of aspect x and $xsize$ is the number of subcategories that apply in aspect x . Finally, m_{xi} stands for the median of the individual criteria values in the sub-categories of category x . Also:

$$W_A + W_B + W_C + W_D = 1 \text{ and } \sum_{i=1}^{asize} W_{ai} = 1, \sum_{i=1}^{bsize} W_{bi} = 1, \sum_{i=1}^{csize} W_{ci} = 1, \sum_{i=1}^{dsize} W_{di} = 1$$

The detailed presentation of the evaluation form has been omitted due to space limitations. However, it is on our next plans to make the form available in public and use it for the evaluation of a blended e-learning community. Factor analysis and the statistical process of the factors being evaluated will give us a better view on their role in the success of the community and the continuous assessment will allow us to assure the quality of the educational process.

5 Conclusions

The evaluation of learning approaches is a difficult and multi-facet task, which usually results in huge evaluation checklists that cover traditional learning and e-learning. The definition of a strict set of criteria may lead to an inflexible evaluation schema that fails to adapt to the individualities of each approach. In this work, we presented a general evaluation framework that is focused on blended e-learning communities. The framework can easily adapt to personalized education, electronic or in-person teaching, by adjusting the interest to each evaluation factor according to the specific needs of each educational institute that offers Blended E-learning solutions.

References

1. Araújo, L.H.L., Lucena Filho, G.J., Losada, M.: Evaluating Virtual Learning Communities using a Nonlinear Model. In: Proc. of the 8th lasted CATE, Aruba (2005)
2. Athanasiou, G., Maris, N., Apostolakis, I.: Evaluation of virtual learning communities for supporting e-learning in healthcare domain. In: Proc. of 6th ICICTH, Greece (2008)
3. Bacsich, P.: Benchmarks for e-learning in UK HE - adaptation of existing good practice. In: Proc of the 12th ATLC-C 2005, UK (2005)
4. Bajcsy, J.: Basic Information about Engineering Subject for Virtual Education. In: Proceedings of the 5th International Conference on Virtual University, Bratislava (2004)
5. Bielawski, L., Metcalf, D.: Blended eLearning: Integrating Knowledge, Performance Support, and Online Learning. Enterprise-class Edition, 2nd edn. HRD Press (2005)
6. Britain, S., Liber, O.: A Framework for Pedagogical Evaluation of Virtual Learning Environments. Report 41, JISC Technology Application Programme. Wales (1999)
7. Cobb, S.V.G., Neale, H.R., Reynolds, H.: Evaluation of virtual learning environments. In: Proc. of ECDVRAT, Skovde, Sweden, pp. 17–23 (1998)
8. Deepwell, F.: Embedding Quality in e-learning Implementation through Evaluation. *Educational Technology & Society* 10(2), 34–43 (2007)
9. Díaz, L.A., Figaredo, D.: Combined evaluation of on-line learning communities. In: Proc of ICTE 2009: International Conference on Technology and Education, France (2009)
10. Garrison, D., Kanuka, H.: Blended learning: Uncovering its transformative potential in higher education. *The Internet and Higher Education* 7(2), 95–105 (2004)
11. Holst, S.: Evaluation of Collaborative Virtual Learning Environments: The State of the Art. In: Scheuermann, F. (ed.) Proceedings of GMW (2000), ISBN 3-89325-925-2
12. Keller, J.: Motivational design of instruction. In: Reigeluth, C.M. (ed.) *Instructional Design Theories and Models: An overview of their current status*. Erlbaum, Hillsdale (1983)
13. Khan, B.: *E-Learning Quick Checklist*. IGI Publishing (2005), ISBN-10: 1591408121
14. Kirkpatrick, D.L.: *Evaluating Training Programs: The Four Levels*. Berrett-Koehler, San Francisco (1994)
15. de Kock, A., Slegers, P., Voeten, M.: New Learning and the Classification of Learning Environments in Secondary Education. *Review of Educational Research* 74(2) (2004)
16. Marshall, S.J., Mitchell, G.: Benchmarking International E-learning Capability with the E-Learning Maturity Model. In: Proceedings of EDUCAUSE, Australia (2007)
17. Mayes, J.: Quality in the e-university. *Assessment & Evaluation in Higher Education* 26(5), 465–473 (2001)
18. Morton, S., Michael, S.: *The Corporation of the 1990s: Information Technology and Organizational Transformation*. Oxford University Press, New York (1991)
19. Smith, B.L.L., MacGregor, J.: Learning communities and the quest for quality. *Quality Assurance in Education* 17(2), 118–139 (2009)