Quality in Blended Learning in Higher Education.

A proposal for an evaluation model.

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Abstract - *This paper presents an analysis of different models used to assess the quality of formative actions, considering classroom learning and distance education courses. Taking as starting point one of the analyzed models, the paper sets out the necessity of developing a new model that could measure the quality of a blended formation process, by selecting the applicable indicators and proposing some new. The model is composed of seven different categories, which include a sum of thirty five indicators. They will be used to represent courses quality level in Kiviat's diagrams. This model is currently being put into practice in a real university environment.*

Keywords: e-learning; b-learning; quality evaluation model;

1 Introduction

Nowadays online education has become one of the preferred methodologies among students and enterprises, due to the flexibility and work-life balance offered to students [1]. In recent years, this kind of learning, which is no longer in an early stage, has suffered a quick development, leading to the need for developing new competences and abilities to improve its practice.

To adequate patrons and procedures from traditional face-to-face classes to the online environment is not enough. This was one of the most serious problems professors, instructors and teachers found when they began to upload the contents on-line. It is necessary to define a global strategy, both from the administrative and the methodological point of view, in order to fit the objectives of the course to the new environment offered by technology [2].

It is important to remark the different ways in which education has progressed through decades. Nowadays traditional classroom learning is quite similar to the one offered in a XIX century classroom. Although professors now use audiovisual support in class, like PowerPoint, slides or videos he (or she) still has the leading role. However, it is unthinkable that in a distance course a student still uses the same tools used decades ago: Personal computers, Internet or cell phones didn't exist then. Using this comparison we can get an idea of the evolution distance learning has suffered, motivated mainly by the technological support. This justifies that throughout the paper we mainly focus on the study of the recent contributions in the field of distance education.

Referring to formation in general, and in virtual formation in particular, there is a growing concern about how to assess the quality of the different actions taking place during the training period. After all, if learning is considered as a product or service, it must undergo some measurement mechanism to guarantee quality of service. The main point when evaluating formation quality is to be oriented to enhance educational processes and to find excellence in processes and products. Therefore, quality is not only focused on the evaluation of results, but on the evaluation of the elements that take part in the organization of the course: the processes and the resources used.

Traditional formation and classical learning methods have been developing for a long period of time, being analyzed and evaluated. However, new factors appear in online formation, like the use of technology and new styles of learning that require a special attention when evaluating. Therefore, the measurement of quality of these processes becomes an essential requirement to validate the new formative models.

For these reasons, quality assessment emerges as a problem in a blended learning environment; where face-to-face and online learning coexist. Classical models are not of use in this situation, neither are the purely online formation methods. We must think about a new model that allows us to complete the process and study the criteria that may best be applied to the quality measurement in a scenario in which online and in-site classes complement each other.

2 Theoretical background

There is a vast amount of models for measuring quality in education that have been developed through history, the oldest ones used to evaluate classroom learning methodologies, , and the modern ones evaluate the online learning. We will review the most relevant ones below.

One of the first tendencies started with the principles of total quality, following the evolution of its main consideration: in a first moment, the focus was on the "product", then the "process", later "the workers", and finally, "users' satisfaction". There are some studies that define total quality in education as: "a process which implies the following: satisfy and defy client's expectations, continued enhancement, share responsibilities with the employees and reduce waste and re-elaboration" [3]. This point of view considers formation like an industrial process, which can be measured and improved. It is a first approach to measure quality, although involves numerous limitations. After all, university environment cannot be considered as a business organization, as people involved are culturally very different [4].

On the other hand, in the area of education quality, institutions like ISO or AENOR have dedicated a great effort to publish and promote rules related to this topic, such as the norm ISO 900x,which is a series of rules in which a new definition of quality appears. According to ISO, quality refers to "the whole of properties and characteristics of a product, process or service that conveys its aptitude to satisfy an expressed or explicit need (or needs)" [5], a much more adequate definition within the educational field.

Studying in depth online education, we find recent norms that gradually form not only the quality parameters, but the methodology used to measure them. Norms *ISO/IEC 19796-1* [6] and *ISO/IEC 19796-3* [7] are remarkable, as they define the metrics and categories that must be measured, and the suitable methodology, with some remarkable examples. Interestingly, AENOR, in 2008, presented the first quality standard in virtual formation, elaborated in Spain as norm UNE 661818 [8].

These days we find ourselves in an environment in which there is a great concern for standardization and definition of rules for the growing and development of education to guarantee its quality. There are researches that make a compilation of all the standards and institutions that everyday work for a needed convergence to common and interchangeable standards. These standards support the definition of recommendations and new standards within specific fields of activity that regulate the online learning process: from norms that regulate educational contents or how to pack them, to standards that define how they must be labeled and presented. [9]

As far as online formation is referred, two large classifications of tendencies can be done, although the mechanisms of parameterization of quality vary with context and with the proper concept of quality. These classifications are related to the current practices of measuring quality in institutions and projects that use e-learning as teaching activity with proper entity. These are the global and the partial focus. The main objective centers on looking for criteria and indicators that answer the questions set out by the quality evaluation in specialized environments, with specific tools and meant to people with a profile that differs from the one of the traditional group of students [10].

2.1 Partial focus of evaluation

The partial focus describes separately each element. Concrete aspects of formation are considered, like the learning processes, the resources used, or the technological platforms on which the process is based.

Among the models of learning process evaluation we find some contributions, such as:

2.1.1 Systemic Van Slyke model

It is based on a previous-to-formative-action study, analyzing a series of factors and key characteristics that will preview the learning success [11]. It analyzes four dimensions: the institution, the target of the formation, the course characteristics and the environment in which the process is developed.

2.1.2 Marshall's and Shriever's Five-levels Evaluation Model

It focuses on the study of five leves that have influence on the formative action [12]. In this case the emphasis is focused on the teacher/professor as the main actor, as he will dinamize the virtual environment. In this model, the interest in the quality of the teacher's abilities is recovered, becoming a strategic factor, as he/she will accompany the student during the entire development of the course and the interaction with him/her will determine the success of the formative action. The evaluated dimensions are: the teacher/professor, the course materials, the curricula, the modules of the courses and the learning transference.

2.1.3 Kirkpatrick's Four-levels Model

Commonly used in traditional learning, it is recommended by various authors to put into practice in e-learning. It analyses four dimensions: users' reaction to different elements that conform the formative action, the contents and abilities acquired by the students during the course, the transference generated by the development of competences, and the impact produced by the improved

formation, measured economically or in the level of innovation [13].

As far as resources and educational materials are concerned, their quality is essential. They are the main tool students will encounter to face the formation. The evaluation of these resources is one of the main areas of research, because of their diversity and the special attention they require in order to develop the course correctly. There is a large amount of researches and recommendations associated with the principles of quality, standing out some projects that analyze with detail the diversity of resources using a double focus: on the one hand, the pedagogic resource criteria and on the other hand, the criteria related with the aspect [14].

The evaluation of technological platforms has the objective of estimating the quality of the virtual environment or virtual campus where the e-learning is being developed. The great number of existing platforms, created differently: open source software, private-own-developed, licence-adquired… reveals the need for standardization. In the same way platforms are different from each other, there are different ways of assessing their quality. Some European initiatives are remarkable [15], based on the revision of different solutions, trying to result in a global vision of the quality measurement.

2.2 Global focus of evaluation

There is a global focus that considers the global group of elements that take part in an e-learning solution at the moment of establishing criteria to evaluate quality. Specifically in this focus, it is notable a model developed by the Institute for Higher Education Policy (IHEP), sited in Washington, DC [16], formed according to different organizations' researches, which identified seven categories with which all the aspects related to on-line learning are analyzed. Indicators are distinguished within each category, in order to assess the quality. It is called "evaluation based on benchmarking", and the categories are: the process of teaching/learning, the evaluation and assessment, the support for the teacher, the course structure, the development of the course, the support for the student, and the institutional support.

3 Proposed model

The quality model based on benchmarking is an excellent starting point when evaluating quality in a formative process. The study was initially applied and contrasted in some organizations and universities like [16]:

- Brevard Community College. Sited in Florida, this college began offering distance education courses in 1974.

- Regents College. This institution began in 1971 with distance programs as the External Degree Program of the University of the State of New York.

- University of Illinois at Urbana-Champaign. It is one of three participants in the University of Illinois. Offers more than 20 degree over the Internet.

- University of Maryland University College. Virtual institution founded with the mission of providing continuing education to Maryland's professional workforce. Over 25 years experience in distance education.

- Utah State University. This institution has been involved in various forms of distance education since 1911.

- Weber State University (WSU). This institution launched its first completely online course in 1997 and currently offers two-thirds of the online learning courses in Utah.

All these institutions were visited, conducting personal interviews and surveys. In all, 27 faculties, 62 administrators, 16 individuals who were both a faculty member and an administrator, and 42 students were interviewed and/or completed a survey, for a total of 147 respondents.

At the beginning, the model was composed by 45 indicators classified in seven different categories. These indicators were contrasted by the sample described above, as the people interviewed used a Likert scale to value the indicators relevance. This study revealed that several indicators were duplicated, and they were reduced to 24.

The benchmarking model measures the quality through the analysis of the seven categories; therefore, the larger the levels of the different indicators are, the larger the level of quality is.

We present below a new version of the model, based on the benchmarking model of IHEP [16], which has been adapted to assess the quality of blended learning. For that reason, a series of indicators has been included to complement the on-site part of the course, which was not considered in the initial approach. From the 24 original indicators, 11 have been added, based on the review of other analyzed models, resulting in 35.

This model has been chosen because it has been contrasted and used by numerous institutions. It takes into consideration the whole process with generic categories that may be adapted to the on-site part including more indicators. The new ISO/IEC and AENOR norms also present some categories that can be related to the selected model, but they do not describe in detail the indicators needed to assess their quality. Furthermore, the benchmarking model is better oriented to university formation.

The proposed model is composed by the following categories and indicators:

3.1 Category: Process of Teaching/Learning (A).

These indicators measure the quality of aspects related to the pedagogical activities: interactivity among students and teachers, students' collaboration, tools that make the process easier, etc.

- A1. Forum participation: students and teachers.
- A2. Participation in class: students and teachers.
- A3. Communication tools for participants.
- A4. Available documentation quality.
- A5. Quality of the teachers' contributions when correcting.

3.2 Category: Evaluation and Assessment (B).

This category measures the educative effectiveness of the program, the processes of evaluation used, the level of success of the participants, etc.

- B1. Number of registered students.
- B2. Number of students that have passed.
- B3. Number of students that have attended the evaluation process.
- B4. Level of objectives accomplishment.
- B5. Tools for evaluation.

3.3 Category: Support for the Teachers.(C).

In this category, the indicators show the level of quality in activities oriented to help teachers in their adaptation to the online teaching, and available help during the process.

- C1. Administrators' availability.
- C2.User's guides available for the teachers.
- C3. Usability of the system tools destined for the teachers.
- C4. Availability of the technical means for the classes.
- C5. Tools for the teachers' organization.

3.4 Category; Course Structure.(D).

This category analyzes the quality related to students' and teachers' expectations about the course. It includes the procedures to transmit the objectives of the courses to the students, as well as the availability of the libraries' resources, the kind of materials delivered or the response time.

- D1. Students' satisfaction with the course.
- D2. Teachers' satisfaction with the course.
- D3. Students' perception with the methodology used.

- D4. Level of adaptation of the spent time and the complexity of the course.
- D5. Complete documentation during the course.

3.5 Category:Development of the Course. (E).

Within this category, the quality is measured with indicators related to the development of the course, elaborated by the teachers (or university departments), experts in the topic of the organization or commercial enterprises. It includes the revision of materials in order to fit them with the design of the course.

- E1. Enough available resources to get a complete development of the course.
- E2. Enough available resources to get a complete development of the course according to the student's perception.
- E3. Ease perceived by the teachers about the tracking of the course.
- E4. Tools that support the students' management.
- E5. Administration of the course.

3.6 Category; Support for the students. (F).

This indicators measure the quality including indicators referring to the services offered to students, both in the formative level and the technical support in the use of technologies.

- F1. Administrators' availability.
- F2. User's guides available for students.
- F3. Usability of the system tools destined for the students.
- F4. Utility of the tools destined for the course tracking.
- F5. Possibility of adaptation to the needs of the student.

3.7 Category: Institutional Support. (G).

This category shows the level of quality with indicators that include the electronic security measurements that guarantee the performance of the quality, integrity and validity norms of information. It also includes the reliability and centralization of the system as support for the creation and maintenance of the infrastructure of distance education.

- G1.Security and privacy of the services.
- G2. Accessibility of the system tools.
- G3. System reliability.
- G4.Information validity.
- G5. Added-value services for the students.

The categories of the model are interrelated among them covering all the educational process. Therefore, if we assess the quality of every category, we will be able to observe some conclusions. To measure the levels within each category we will use the five-point Likert scale, commonly used in questionnaires and surveys with research purposes.

In order to complete the model with a graphical interface, we depict theses indicators on a Kiviatt diagram. Radial axes represent the seven different categories, while the intersections of radios and circumferences represent their respective values.

This representation will consider the value of each category aggregating the measurements of its different indicators. Besides this, by using other Kiviatt diagram, it will be possible to illustrate the indicators within each category, to determine which measures should be implemented to enhance the global quality of the formative process.

The figure 1 shows some examples of possible case studies according to the quality levels in the different categories.

These examples are extreme cases, useful to make a classification and explain the characteristics of the diagram. Three items must be considered:

- Covered area: the larger the covered area in the diagram, the greater the final quality of the global educational process. In the same way, the smaller the covered area, the lower the quality.

- Symmetry: Without taking into account the area, the measurements of different items can be very different, shaping the result towards different points of the diagram. This will demonstrate a process oriented to specific categories in terms of quality.

- Regularity: if we find an uniform shape, we can say the process is compensated; meanwhile, if the shape is not well-balanced, it means a part of the process has a lower quality than the others.

In the example, the 1st case is the perfect one, with the highest level of quality, and the 2nd case has a very low quality in every aspect. We have represented other situations, like case 3 or 4, with a high unbalance. In the 3rd case, the quality is more oriented to the student, while in the 4th case it is oriented to the teacher, leaving the student on a secondary role. Furthermore, cases 1 and 2 are regular through all the process, but the 3rd and the 4th are quite irregular.
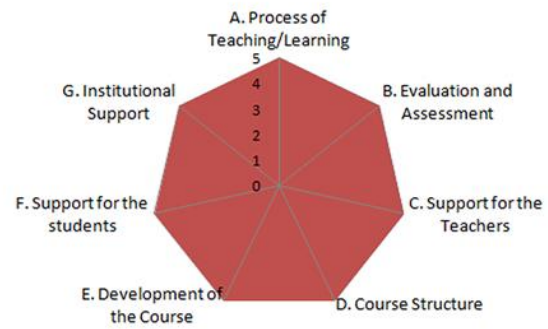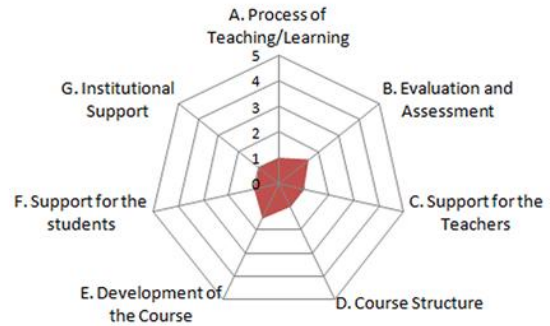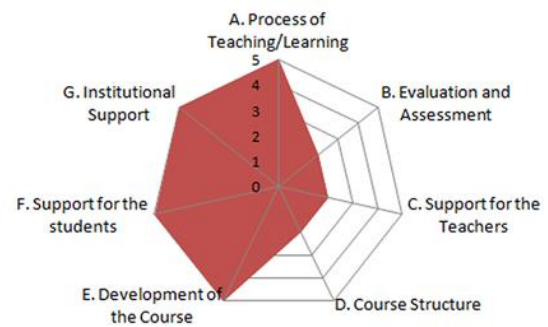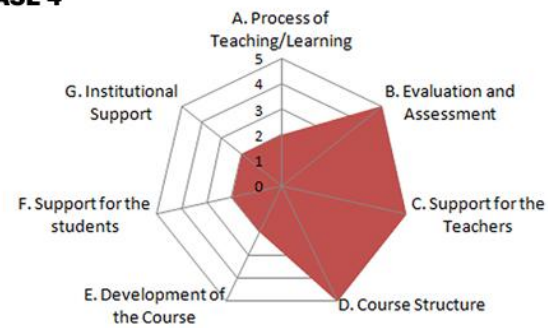

Fig. 1. Case study examples. Extreme cases to show the meaning of the Kiviat diagram that represents the proposed model.

4   Conclusions

We have designed a model based on other one, which was contrasted and consolidated in different organizations and institutions, mainly in universities. The presented model is being applied in a real Spanish university case, at the EUI - UPM (*Escuela Universitaria de Informática - Universidad Politécnica de Madrid*, Informatics Engineering Faculty - Technical University of Madrid). The data will be analyzed and reviewed in order to define a more refined model. As it happened with the original model, it is expected that some of the indicators may be cut out, as correlations with other/s may be found.

Data collected in the study will be analyzed in depth, not only valuing the categories but also the indicators levels independently. The final expected result will be a diagram like the represented above, in which we can consider the area, symmetry and regularity of the formed shape, to make a diagnosis of the quality offered by the formative process of blended learning.

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