WEB-BASED SYSTEM FOR QUALITY ASSESSMENT OF E-LEARNING IN HIGHER EDUCATION

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Abstract: A brief overview of contemporary approaches and strategies to deal with the problem of quality assurance of e-learning in higher education in Europe and in Bulgaria is given. An innovative benchmarking approach, based on more than 200 indicators grouped in 9 areas, is used to design a system for automated quality assessment of e-learning.

Key words: quality standards and guidelines, quality assurance of higher education, quality assessment of e-learning, benchmarks for assessing the quality

1. INTRODUCTION

The e-learning as a whole is a very complex process comprising of components as: learning enterprise management; content planning, management and development; content delivery, assessment and tracking (including building, maintenance and using of e-learning repositories); learner records and learner performance management; etc. The matters of quality assurance (QA) affect all these components of the e-learning process and there are a lot of researches, approaches and experiments aiming at e-learning QA that take into consideration one, a part or all of these components.

The great diversity of existing approaches and strategies to ensure the quality of e-learning can be grouped into four basic types: the approach of large open and distance universities; the quality standards and guidelines developed by various organisations; the accreditation systems provided by regional, national or international agencies; and benchmarking tools [7]. The essential of the approach of large open and distance universities is provision of very well structured and precisely defined set of rules, procedures and requirements that have to be applied in relation to the different components of the e-learning process – from courses and programs approval to the selection of the appropriate staff for tutoring, course development, etc. A world-wide acknowledged approach for QA of e-learning is development of quality standards and guidelines. There is a large number of organizations working in the field of standardization of e-learning, as for example IMS, ADL, CEN/ISSS, IEEE, PROMETEUS, ALIC, etc. The accreditation systems provided by regional, national or international agencies is another well-established quality assurance mechanism applied all over the Europe in relation to HE (EDEN - European Distance and E-learning Network, EFQUEL - European Foundation for Quality in eLearning, ENQA - European Association for Quality Assurance in HE, etc.). Most of the European countries have their national accreditation agencies and organizations, as for example the Quality Assurance Agency for Higher Education (United Kingdom),
Hungarian Accreditation Committee, Evaluation Agency for Research and Higher Education and Commission des Titres d'Ingénieur (France); Bulgarian National Evaluation and Accreditation Agency (NEAA), etc. The Bulgarian NEAA was established in 1995. Its activities are related to evaluation, accreditation and monitoring of the quality in higher education institutions and scientific organizations aiming at the enhancement of their teaching and research. Till the end of the year 2008 more than 950 evaluation and accreditation procedures in the HE sector are finalized.

A very positive example of the benchmarking approach is the development of European benchmarks for assessing the quality of e-learning in HE in the frame of the European project E-xcellence+ [3]. The benchmarks are for self-assessment and are based on 33 indicators grouped in 7 areas: Strategic management; Curriculum design; Course design; Course delivery; Staff support; Resources; Student support.

The issues regarded here, are of present interest in Bulgaria also. In 2004 the Ordinance on state requirements for the organization of distance education in HE schools is developed. The Ordinance contains a methodology for assessment (and accreditation) of distance education where its quality is evaluated by 5 groups of indicators: means ensuring proper delivery; planning, organization and provision; programmes and courses documentation; the level of conformation with the specifics of the distance education; technology provisions.

2. AUTOMATED ASSESSMENT OF E-LEARNING QUALITY

An interesting direction in attempts of QA and assessment of e-learning are related to automation of these processes.

For example, the Automated Feedback Generator is an automated feedback software system, designed with the aim of providing superior quality assurance and efficiency in both assessing student assignments and providing feedback [2]. The testing demonstrates that it offers quality control, efficiency and effectiveness benefits whilst generating consistent feedback from a student perspective.

Some results in the same direction are achieved by three research projects developed by the Lucian Blaga University of Sibiu that had as main objective to achieve a better quality management of all university's aspects, including e-learning, through an advanced web-based, multiagent, knowledge management system [11].

In the frame of the iQTool project (Leonardo Da Vinci programme) is developed an open source software tool for e-learning QA. It is suitable to assess the teaching quality management of e-learning training programs and training materials [6].

Open ECBCheck [9] forms a participative quality environment which allows its members to benefit in a variety of ways by having access to e-learning quality tools and guidelines for their own practice on the one hand, and being able to obtain a community based label on the other hand.

The automated evaluation of e-learning quality requires the establishment of:

- **Methodology for evaluation** by determining quantifiable indicators, providing objective idea of the conducted e-learning;
- **Respective (Web-based) system**, providing appropriate software tools for users with different roles – administrators, methodologists, experts, academic supervisors, etc.) and guaranteeing objectivity, straightforwardness and publicity of the procedures.

When creating the methodology for automated evaluation of e-learning quality, the accumulated positive experience, good practices and results from scientific projects may be used (e.g. E-xcellence [3]; E-Learning Quality - Aspects and criteria for evaluation of e-learning in higher education на HSV [4]; E-Learning Guidelines [12], Theory of Benchmarking for e-Learning [1], etc.).
At present there is not a system developed for automated evaluation of HE quality in the Republic of Bulgaria which is in conformity with the regulatory requirements and procedures [8]. The development of such a system would not only facilitate the universities and NEAA, but it would also contribute to the transparency and publicity of the process of evaluation and accreditation. On the other hand, the system would facilitate and objectify the self-evaluation and self-control of the quality of the education provided in the universities.

The minimum set of requirements to such a system is as follows:

- Availability of instruments for modelling different evaluation methodologies (including by adding new groups of indicators);
- Providing transparent procedures for nominating and approving experts;
- Generating documents, related to the evaluation and accreditation procedures (reports, tables, expert cards, etc.);
- Supporting internet-presentation of the procedures for different users, etc.

We should note later, that it is advisable the system design to be open with respect not only to adding/changing particular indicators, but also to creating/testing different methodologies for evaluation of education quality. As a consequence it would make it possible for NEAA and the universities to evaluate the quality of the training within the frameworks of different standards, offered or used by other evaluation institutions.

3. EXPERIMENTAL SYSTEM FOR QUALITY ASSESSMENT

In the practice of NEAA the methodologies evaluate different aspects of the objects under review and they are arranged in several levels: evaluation areas, evaluation criteria, characteristics of the criteria, indicators. Each area is relatively independent from the others and is to be evaluated according to a number of criteria. The characteristics specify in detail the criteria contents and can be quantified by means of a number of indicators.

Some important additional requirements to the methodology under development are:

- to allow automation of the evaluation procedures;
- to guarantee objectivity, straightforwardness and publicity of the conducted procedures;
- to be in conformity with the practice of the NEAA [8];
- to be coordinated with the regulatory base of the distance education, carried out at the universities [10];
- to raise the efficiency of the procedures on training quality evaluation (with respect to time, material consumption, organization, etc.).

The experimental system presented (in the part related to the e-learning quality indicators) is mainly based on the E-xcellence project. There are nine separate areas in the proposed model of e-learning quality evaluation (two more compared to those developed under the E-xcellence project): Student assessment and Self-assessment of the quality of e-Learning. The process of student assessment carried out by means of electronic methods (electronic tests, tasks, projects, etc.) involves a number of specific activities, guaranteeing procedures transparency, evaluation impartiality, identification of trainees, etc. That is the reason for separating the process of inspection and control in an independent area, thus enabling the individual analysis and evaluation. The formation of separate area for internal quality evaluation is in conformity with the requirements of Regulations of the Higher Education Act [5] concerning the provision of education of high quality.

A precise quantitative mark should be given to the object (university, professional field, speciality etc.) evaluated under any particular method. The indicators employed in e-learning methodology measures different values – time, relative shares, number, availability of plans, rules, methodologies, etc. They should use a common evaluation system in order to en-
sure the automated processing. According to the practice of NEAA a four-grade system (between 2 and 5) for evaluation of the indicators is applied. The evaluation of characteristics, criteria, areas and the overall mark are calculated using a formula which utilizes the evaluations at lower level (Fig. 2.).

The main limitations imposed to the implemented indicators are as follows:
- to be quantifiable;
- to provide for objective evaluation;
- not to be too complex and not to employ too many tools for collecting information.

More than 200 indicators have been proposed observing these requirements, among which are the following:
- indicators, essentially used in the E-xcellence project, but modified in a way that allows for their quantitative evaluation in accordance with the methodology under development;
- indicators, accounting for the current ordinance for carrying out distance education in the universities [10];
- new indicators, arising from the logic of the conducted research.

The prototype of the system for automated quality evaluation has three main characteristics: A. Roles and users management; B. Presentation and management of evaluation methodologies, and C. Evaluation process management.

**A. Roles and users management**

Each user is assigned a role which determines his/her rights of access to the system functionalities. The registered user may create a group of users in order to ensure the simultaneous start of the tasks for all members of the group. The main roles are: Super-Administrator, Administrators, Expert, Contents Administrator, Registered and Unregistered User.

**B. Modelling and management of evaluation methodologies**

Most systems for evaluation and self-evaluation use methodologies which ultimately may be expressed by means of a model, presented by a tree-structure, where the root is the object under evaluation, the interim nodes determine parameters for grouping the indicators and the leaves are the quantifiable indicators. For example, the criteria of NEAA [8] and E-xcelence [3] also have several levels – object under evaluation, areas, criteria, characteristics, indicators.

Sometimes it is appropriate to evaluate other aspects of the e-learning – for example, the participants in the educational process or the related activities. Fig. 1 illustrates the embedded option to apply benchmarking approach for the evaluation of the e-learning quality. The model is in the form of ‘e-learning cube’, similar to ‘e-guidelines cube’ [12], developed in Massey University (New Zealand). Along one of the cube axis are arranged the nine areas of evaluation, defined in the methodology (Strategic management, Curriculum design, Course design, Student assessment, Course delivery, Resources, Staff support, Student support, Self-
assessment of the quality of e-Learning). Along the other two axes are marked the participants in the educational process (Students, Teachers, Administrative staff, Other staff) and the activities (Education, Research, Management). This enables the evaluation of specific objects or activities – for example, the research activities conducted by the students, or the staff’s support regarding the research activities.

The implementation of an evaluation methodology includes: modelling and configuring the methodology, developing types of evaluation objects and defining associations.

The modelling involves the creation of a tree-structure (Fig.2) and an evaluation system, valid for all indicators (e.g. ‘2 to 5’, ‘1 to 10’, etc.).

The nodes, representing criteria, characteristics, indicators, etc. are described and the fields for each of them are assigned – name; description; equation, assigning specific evaluation to the parameter subject to measuring. The field values should be completed in the process of creation of a particular methodology. The quantitative mark for each node is calculated by default as the weighted average value of the lower level nodes marks. Text boxes containing recommendation for improvement may be envisaged for each discrete value of the indicators, as well as a text which may be used for automatic report generating.

The process of configuration of a particular methodology uses the already created model of methodology and requires the entering of particular data.

Different objects for evaluation may be defined in the prototype, such as university, specialty, center of distance education, etc.

Using the associations, different methodologies could be linked to a type of evaluation object.

C. Evaluation process management

The evaluation of a particular object is carried out in two different ways – through self-evaluation and evaluation.

In case of self-evaluation, each registered user may independently start an evaluation procedure using a particular methodology and after entering the required information he/she receives an automatically generated evaluation report and recommendations for quality improvement.

In case of evaluation, a registered user or a system administrator initiates the procedure for evaluation of a particular object. The required information is entered by an authorized official of the institution subject to evaluation (as in the case of self-evaluation). Then the administrator starts the procedure for making up an expert group (incl. on-line nomination and selection of the experts in QA). The group performs evaluation using data entered during the self-evaluation and additional data collected during the expert visit in place. The final evaluation report and the accompanying evaluation sheets (presenting the marks of each of the experts) can be automatically generated by the system.

4. CONCLUSIONS AND FUTURE WORK

The presented system may be improved by adding: a module for defining the relations between different methodologies (aiming at facilitating the comparative analyses); tools for comparative statistical analysis of objects evaluated using the same methodology; desktop application for entering data; etc.

The development of such systems for evaluation of learning quality will provide assistance for the universities when performing self-evaluation and preparation for accreditation. It
will facilitate the work of the evaluation and accreditation institutions also. The educational institutions could be easily evaluated with respect to different educational standards owing to the powerful feature for modelling of various methodologies for quality evaluation. The option of generating reports with recommendations for further improvements of the educational process will positively reflect on the quality of the education. The proposed more than 200 indicators for quality assessment in the universities could serve as a good basis for discussion (by the e-learning community, accreditation and HE institutions, etc.), improvement of QA methodology and creation of sophisticated software systems.

The development of a system for quality evaluation of different levels of the National Educational System is another interesting perspective.

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