E-learning and Quality: The Quality Evaluation Model for E-learning Courses

Ján Skalka, Peter Švec, Martin Drlik
Department of Computer Science, Faculty of Natural Sciences,
Constantine the Philosopher University in Nitra, Slovakia
jskalka@ukf.sk, psvec@ukf.sk, mdrlik@ukf.sk

Abstract

The paper introduces the quality evaluation model for e-learning courses that could be used in the e-learning implementation project. Authors shortly describe general issues of the e-learning quality. Subsequently, they pay more attention to the evaluation of the e-learning course quality itself. They analyse known virtual university development strategies and models and take them as a starting point in identification of important factors that are evitable for successful implementation of simplified quality rules to the e-learning course development and deployment process. Authors classify the identified factors to technological, developmental and educational ones. They perceive difference between general quality of e-learning issues and issues of quality of the particular e-learning course which represents the basic structural and content unit. They try to lay down e-learning course quality criteria for specific e-learning implementation project realized at their university. Finally authors propose some e-learning course quality evaluation criteria. Criteria are analysed from qualitative/quantitative and subjective/objective point of view. Authors define three milestones of the e-learning course evaluation as well as they introduce factors that reflect the effectives and fruitfulness of the e-learning course in term of the e-learning content, structure, learning effectiveness, students’ activity, students’ and teachers’ satisfaction.

Keywords


Introduction

A virtual university has been described and defined in a variety of ways, which reflects the wide disagreement between specialists in establishing a unified definition. The virtual university can be defined as an institution of higher learning that has no confines, using technology to connect learners, instructors and administrators. Other authors have added that the virtual university provides education at time and distance that is convenient for the learner (Al-Shehiri, 2008).

The role of the virtual university is the same as the role of a classical one; however delivery methods of knowledge and transfer information are different from traditional delivery methods. A significant work in virtual universities development has been presented in many books and conference papers. Their results have flowed into the improvement of various virtual university development strategies and models (Guri-Rosenblit, 2001; Kahiigi, Ekenberg, Hansson, Tusubira, & Danielson, 2008; Moore et al., 2007; Yengin, Karahoca, Karahoca, & Uzunboylu, 2010). Al-Shehiri
states that from models can be observed that the concept of the virtual university implies following common characteristics (Al-Shehri, 2008):

- The use of a sophisticated ICT will have the major impact on the concept of the virtual university.
- The virtual university is not a traditional institution and it does not need to have an existing campus, offices, instructors and locus libraries. Instead, it has an electronic network which is capable of performing the same functions as a conventional university but in more democratic and flexible way.
- The emergence of the virtual university is derived from the urgent need to acquire knowledge and skills.
- Co-operation, collaboration and communication are significant elements of the virtual university.
- The mission of a virtual university is to increase educational opportunities, reaching widely dispersed learners who were barred from taking traditional university classes.
- The organizational structures of a virtual university can be represented in various models.

A headstone of the virtual university is an e-learning course. The e-learning course represents an elementary unit which attributes influence the quality of a whole. It is hard to say that one course is good or bad or if it rises or degrades the quality of the whole. This is why we have to form evaluation criteria for e-learning courses thus to define criteria for a quality evaluation.

The evaluation is the last phase in an e-course development process. This phase consist of a content rating by reviewers and a course assessment by students. Results of this evaluation phase where results are gathered by enquiring can be compared according to system logs from the learning management system.

**Top-down implementation approach combined EES model**

Many universities adopted a ‘bottom-up’ rather than a ‘top-down’ implementation approach. They tend to foreground the potential of the e-learning to enhance teaching and learning; and to foster a wide variety of learning outcomes. In addition, staff training is seen as essential to a successful e-learning but flexible support structures and mechanisms are seen as even more important. (MacKeogh & Fox, 2009).

Event though, we adopted a four-tier electronic educational system (EES) model in the above mentioned project (Cloete, 2001). The basic idea of this approach lies in initializing the implementation of e-learning solutions by the university or faculty management. This implementation should be in line with the *Long Term Vision of the Faculty Development*. A successful e-learning implementation strategy using top-down approach relies on five main elements: people, tools, training, processes and support (Moore et al., 2007).

One of the biggest advantages of implementation by top-down approach is the possibility to identify the whole process in advance and defining exact rules, procedures and responsibilities. The success of whole integration process depends on consistency of these rules and on clear delegation of responsibilities as well as definition of evaluation criteria. Based on (Drlík & Skalka, 2011) there are following starting points:

- The primary factor for an e-learning course evaluation is the result of reviewing of the scholastic correctness of the e-learning course. The comprehensive course must be appreciated better than the incomplete e-learning course.
- E-learning courses are different in content. It is necessary to evaluate the textual and multimedia extent of each e-learning course according to its purpose and aim.
- The number of active teachers in the course – The content of the course may be often created by several teachers. It is important to recognize the overall contribution of each of them.
- Teachers’ activity and visibility in e-learning course environment represent important aspect of evaluation process. Creating of the e-learning course is only the first evaluative criterion. If a teacher is regularly visible in the course, moderates discussions and coordinates students’ activities, he/she should be adequately motivated.
- The number of assigned students and their activities are closely associated with teachers’ activities.
- The innovation of the e-learning course rests in the appropriate usage of new, traditional and unconventional methods that increase the overall quality of the educational process. The emphasis should be put on developing students’ competitiveness and on the ability of the course designer and the instructor to exploit the technology efficiently, effectively, and at the right moment (Hvorecký, 2008).

E-learning and quality

A debate on quality is the debate about how the learning and the education should looks like in the future, about values and cultures, and it takes place on the basis of diverse experiences and convictions (Ehlers & Hilera, 2012). The survey of Ehlers (Ehlers, Pawlowski, & Wirth, 2006) which was realised on almost 250 European universities shows that 53% of them use some quality model for the e-learning. If we take a closer look at used quality models we can see that these models don’t meet more exacting criteria, e.g. 24 universities do not make difference between the classical education and the e-learning one.

The evaluation of an e-learning quality process often begins by the definition of its structure and then by the implementation in the organization. This process is tightly interconnected to management model. Typical example is the five dimensions German view for a sustainable implementation (technical, didactic, economic, socio cultural and organisation) (Seufert & Euler, 2003).

Similar view can be found in work of Schönwald (Schönwald, 2003) who pay attention to Strategy and Management (Fig. 1).

![Fig. 1 Dimension for a sustainable implementation of e-learning (Schönwald, 2003)](image)

Masoumi and Lindström (Masoumi & Lindström, 2012) states that any framework or model for assuring and enhancing quality of education explicitly or implicitly should build on a set of theoretical premises, which however isn’t met by many of current models. Based on comprehensive review of
the practical knowledge (i.e. models, guidelines, benchmarks, etc.) they define that e-quality framework offers a structured set of factors and benchmarks as a tool for practical quality work with the e-learning in virtual institutions.

![Diagram of E-quality framework](image)

**Fig. 2 E-quality framework (Masoumi & Lindström, 2012)**

We think that the framework in the Figure 2 is generally applicable to evaluate all factors it describes but its real application or use carries significant personnel and time demands. If there is a variable ICT environment and the institution use lot of different technologies, learning management systems or even e-learning concepts it makes sense to watch all factors. If there is a homogenous environment we are able to eliminate some of these elements.

We can use a simplified model at the institution level which will provide a worth feedback for the institution management. Based on the current state at our university we can define the simplified model as follows:

- Technological factor has no importance nowadays. We are able to assure the 24/7 availability and usability for almost all systems.
- Institutional factor is like the technological one. Research and reputation are significant just in the case of recruiting new students, so these factors do not reflect the quality of the e-learning unit.
- Institutional design factor is the first important one which is related to usability and efficiency of a user interface. Institutions with an e-learning tradition deal with this problem by definition of principles which form the content-design template. This is the way how not to give a course creator space to “destroy” the course. Individual factor is the selection of proper learning scenarios and currency and accuracy of learning resources.
- Faculty support is partially related to the technological factor and it partially covers the field of a course creation. This group of factors plays main role if we want to measure the quality of the e-learning as whole and also in the e-university developing process. If we want to measure the quality of one particular unit then this factor is meaningless.
- Student support is in this case separated from the social aspect, which is part of the pedagogical factor, and is centrally assured. This central assurance means that it does not imply the quality of the e-learning unit.
- Evaluation factor can be divided into a subjective and an objective group. Subjective group consists of the students’ satisfaction and teacher’s satisfaction. The level of
satisfaction can be measured by questionnaires. Objective group is formed by learning effectiveness measurable tests or alternatively by the results classification. Cost-effectiveness is the combination of the financial burden at the teacher side and the financial benefit at the student side.

- Pedagogical factor is largely oriented to content, communication and used resources. It is the most important factor in our case.

![Fig. 3 Reduced e-quality framework](image)

Similar groups can be found in work of Oztekin et al. (Oztekin, Kong, & Uysal, 2010) who however use feedback from questionnaires as the primary source. Basic aspects are defined as error prevention, visibility, flexibility, course management, interactivity, feedback and help, accessibility, consistency and functionality, assessment strategy, memorability, completeness, aesthetics and reducing redundancy.

Following above mentioned sources we can split watched factors into three groups:

- Technological factor monitors technological elements like hardware, software and administration.
- Development factor is oriented to the measurement of efficiency of tools which are used in the process of creation, development and update of e-learning content. It consists from the administration, the support of course creators, the system administration and the assistance for other system interconnections.
- Educational factor represents the content itself, various criteria for its evaluation including students and teacher satisfaction. This factor is the subject of our next study.

**Measurement of the educational quality of an e-learning course**

Each e-learning course has its content well-structured and thus we can imagine it as a database. Therefore it is not technically intensive to acquire huge amount of metadata from its parts. This is also the reason why modern learning management systems (LMS) contain some logging subsystem which collects all information about users’ activity. Some LMS also offer tools for statistical processing of collected data.

Metadata and data acquired from logs offer the unlimited source of information for the investigation of user behaviour and a potential optimization of the content structure (Kapusta, Munk, & Turčáni, 2010). At the same time it can be used as the source for obtaining quantitative
information about users and their behaviour (Munk & Drlík, 2011). According to (Hvorecký & Drlík, 2008) the common mistake of evaluation models is the mixing of qualitative and quantitative criteria without clear definition of differences. We think without be in contrary to Hvorecký’s claim that we can obtain qualitative data based on the analysis of quantitative ones.

Conclusion

The evaluation process has two levels – the objective one, which is represented by measurable facts and the subjective one represented by questionnaires and feedback. One part of the subjective evaluation can be verified by objective sources. We have to mention that each course undergoes different phases of the development process, and not all evaluation criteria can be used during the whole lifecycle. We separate the evaluation process into three points that are represented by the specific stage of course development and usage:

- The completion of course creation - after the development process was finished but before its use in education.
- The end of the first educational cycle – after the education or the term ends.
- The end of other educational cycles.

Completion of course creation

The standard procedure after the completion of course creation is its evaluation as well as verification of the fulfilment of quantitative and qualitative (form and design) requirements. The evaluation phase guarantees that there will be no unsuitable e-learning courses in education process. Each course has to meet rules for the text range and the course structure defined by the template. Some parts of the course can be controlled automatically like the syllabus or literature other like the content have to be reviewed by the professional. The successful review is the necessary condition to run the course.

End of the first educational cycle

This step of evaluation is represented by factors reflecting the behaviour of teacher and students related to the content. These factors are as follows:

- Permanence – continuous education represents the continuity of information received by a student.
- Complexity – a student goes through all parts of the course content or more precisely through all mandatory parts.
- Activity – assignment submission, the level of participation in discussions, and participation in other collective activities.
- Successfulness – A student successfully completes the course if she/he passes all tests and assignments. It is recommended to use the final grading if it is missing in the course.
- Activity of teacher – means the teacher’s response time for answering questions, solving problems or grading course activities.

All the mentioned factors can be quantified or expressed as the ratio of completed elements and all elements of the same type. This quantification may be fully automated.

After the end of educational cycle it is necessary to realise a final survey so we can obtain subjective information (Tab. 1). This survey has to focus on information that is not discoverable by
tracking the student and teacher activity. We can assign them the relevance depending for example on the teacher results or on student’s activity in the course.

Tab. 1 E-learning course evaluating criteria after the completion of course and after the end of the first educational cycle

<table>
<thead>
<tr>
<th>Completion of course creation</th>
<th>Qualitative</th>
<th>Subjective</th>
<th>Objective / Objectivity support</th>
</tr>
</thead>
<tbody>
<tr>
<td>Qualitative</td>
<td>Content</td>
<td>Review</td>
<td>Range</td>
</tr>
<tr>
<td>Quantitative</td>
<td>Can be verified with a survey, but when there will be no future use of results than it is not needed.</td>
<td>Permanence, Complexity, Activeness</td>
<td></td>
</tr>
<tr>
<td>End of the first educational cycle</td>
<td>Qualitative</td>
<td>The assessment in the mean of learning effectiveness.</td>
<td>Successfulness</td>
</tr>
<tr>
<td>Teacher’s activity assessment</td>
<td>The assessment in the mean of students’ satisfaction, teacher satisfaction, a pod.</td>
<td>How students with better grading rate the content? How students who study continuously rate the content? How all students rate the content?</td>
<td></td>
</tr>
<tr>
<td>Quantitative</td>
<td>Teacher’s activity assessment with regard to the understandable answers</td>
<td>How students with better grading rate the teacher?</td>
<td></td>
</tr>
</tbody>
</table>

**End of other educational cycles**

This phase is similar to the end of the first educational cycle whereby two others elements raise:

- An appraisal of the realized changes in course content in case when the course creator is also the teacher of the course. This situation means that the content is often changed and we have to know the amount of this teacher’s activity.

- The identification of changes in the list of resources, which have to assure that these resources are up-to-date. This information is just informative.
It is useful to store and compare the results of each cycle and identify proper and inappropriate changes based on this comparison.

**Observed variables**

The definition of observed variables in the e-learning course is just the beginning of the evaluation process. Even if sources of information are clear, it is necessary to define the form of final evaluation. We will use elements in Table 1 where each element will take the value from 1 to 100. This value will represent the successfulness in the given area:

- **Range and Structure** – represents the amount of the used content compared to the expected content. For the 13 weeks of term it can be hundred pages of text, five activities and five discussions for example.
- **Learning effectiveness** – final tests or final grading success rate compared to the best possible outcome.
- **Student activity (permanence, complexity, activeness)** – evaluation of the student behaviour. While these criteria are the combination of many factors, it is necessary to optimize their weights.
- **Satisfaction of student and teacher** – it is subjective aspect. It expresses the satisfaction with the content, learning management and with the teacher and it is often acquired by a survey.
- **Teacher activity** – it is easy to measure the teacher’s activity but just in the case when there is also the activity from students. We can define processes in the way that the teacher will be responsible for students’ motivation.
- **Course creator activity** – it is easy to define creator intervention based on the activities that are typical for content updating and editing. The problem can be the significance of these tasks (typo correcting vs. content updating). In case of major content changes it is possible to require another review.

Ideas presented in this paper are implemented into the institution education quality strategy software nowadays.

**Acknowledgement**

This paper is published with the financial support of the project of The European Structural Fund “Virtual faculty – Distance Learning at FSVaZ UKF in Nitra”, project number ITMS 26110230012.

**References**


