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## The Quality of Electronic Educational Resources Evaluation for the Postgraduate Education System

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### Abstract

The article is devoted to the methodology of evaluation of the quality of electronic educational resources. The model of integral assessment of their qualities which provides the assessment of each individual training module is developed. Important elements of the integral assessment of the qualities of the e-learning module on every procedural stage are the order and evaluation criteria. Such system of evaluation contains parameters which characterize the innovative, technological and semantic qualities of the educational module. Such system allows: to evaluate and control both the separate educational modules and all educational system in general, to move right along from the assessment of separate processes and elements of the module, to module-structurally having a special purpose oriented to personality of specialist who studies in the system of postgraduate education, introduce the system of integrated assessment of the quality of educational resources and the efficiency of consumer of education services. The convenience of integral estimates is that they provide the unique numerical criterion quality.

**Keywords:** electronic educational resources, integral estimation model, postgraduate education

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### Wstęp

One of the components of the educational process in modern pedagogics is the open educational resources that are used to provide educational process in the classroom, individual and distance studying forms. Currently, the problem of efficient use of open electronic educational resources for designing and organizing the interaction among all subjects of education in the system of postgraduate education is been solving.

In order to organize the educational process with the use of open electronic educational resources the teacher must be able to search and select educational resources in accordance with the conditions, to determine the practicability of their use at different stages of studying and evaluate the results of students using the electronic educational resources. However, appearance of new types of

electronic educational resources causes the need to improve their quality and determine the criteria for assessing the effectiveness of the use of electronic educational resources.

Increasing workload of the student's independent study and the transition to individual forms of education, the implementation of a distance education system and the quality assurance of all forms of the educational process requires the implementation of a modern learning content that includes advanced scientific developments and innovative global solutions based on the concept of open education.

The complexity of the quality assessment problem of modern open e-learning resources increases due to the fact that interactive multimedia content represents the latest achievements in the field of information systems and computer technology on the content of the discipline, forming the innovative qualities of electronic educational resources.

Up to now, the task of assessing the quality of electronic educational resources was based on peer review. Integrated expertise (Bykov, Lapinskyi, 2012; Vember, 2007) provided a three-tiered assessment of electronic educational resources, which was based on a technological, content and ergonomic design expertise. However, expert evaluations have certain problems: unclear criteria, poor qualimetry, uncertain technology, subjective opinion of the expert. At the same time peer review is currently the only possible one. Therefore, the obvious way of increasing the objectivity of evaluating electronic educational resources is development of criteria system, improvement of qualimetry, unification of technologies and procedures.

Creating the newest electronic educational resources gave new impetus to the development of qualimetry and evaluating criteria of the various qualities of electronic educational content. A considerable circumstance in this process is that the resources of the new generation are unified in most aspects: unique functional environment, the defined architecture of the e-learning module.

The solution of the problem of quality evaluation of electronic educational resources in Ukraine began with the approval of the Regulation on electronic educational resources. Order of the Ministry of Education and Science of Ukraine dated October 1, 2012 No. 1060 (On Approval, 2012), which summarized the definition of electronic educational resources, the classification of electronic educational resources, the procedure for their development and implementation.

Aspects of the research of the quality evaluation of electronic educational resources are conducted by scientists in various directions. The content-methodological indicators, ergonomic design and technology were considered in their works (Vostroknutov, 2005; Robert, 2008). Problems of implementation of electronic educational resources into the educational process are reflected in the

works (Bykov, Lapinskyi, 2012; Vember, 2007). The criteria for the quality of electronic educational resources for distance learning platforms are defined in (Morse, Hlazunova, 2009) Evaluation criteria for electronic studying information resources are described in (Vostroknutov, 2005; Kravtsov, 2010). Pedagogical designing of personally oriented electronic educational resources is researched in (Gur, 2007).

The analysis of the research results shows that the problem of determining the evaluation criteria for electronic educational resources is not sufficiently studied.

Criteria are important in determination of the quality of electronic educational resources. According to (Kravtsov, 2010), the criteria for evaluating an electronic resource should include: the authorship of the material, the plenitude of presentation of educational material, the consistency of the materials with world standards (IMS, SCORM, IEEE, etc.) (IEEE Learning...; Sharable Content Object Reference Model (SCORM) – Advanced...; Sharable Content Object Reference Model (SCORM) 2004, 2005), compliance with the content of the work program, completeness the methodological provision of discipline, the degree of the resource, the structuring of the material, (content, lectures, chapters, paragraphs), ergonomics of the text (efficiency, understanding, perception), the use of hypertext references, visual material (text formatting, graphics, illustrations, photos), the use of multimedia modules, interactive systems, test tasks, standard file formats, response of material according to the level of the student, free access to the material. Each criterion is rated 0, 3 or 5 points. The average value of all criteria is determined by the quality of electronic educational resources.

Another approach is offered in (Morse, Hlazunova, 2009). The criteria frame for evaluation of the electronic educational resource based on the multimedia platform for distance learning developed by them includes the following components: work program, training schedule, scale of assessment, printed and Internet sources, terminology dictionary, announcements, theoretical material, practical (laboratory works), tasks for independent study, modular control, final certification. The specification of the criteria is carried out in the context of structural-functional, scientific-content and methodological expertise.

They distinguish six main characteristics of the quality of the electronic educational resource: functionality, reliability, convenience, efficiency, support and the ability to transfer the educational material (mobility). Evaluating the quality of an electronic educational resource should take into account individualization, differentiation and independent study, the ability to apply different types of lessons receiving new knowledge, acquisition of skills and knowledge, generalization and systematization of knowledge, control, knowledge correction, combined lesson, visualization of teaching material, etc.

The most significant innovations in the use of electronic educational resources towards ensuring independent educational work are: multiplying educational opportunities homework – besides the traditional receiving information e-learning modules make it possible to realize beyond the classroom workshops, laboratories and control that were previously possible only in the classroom.

The openness of electronic training modules for the user to add and modify up to the complete modernization of the module also provides innovative development of the sector of independent study work, taking into account its personality-oriented nature.

Also, the cross-platform of electronic training is efficient for implementation in studying process in different operational systems.

The modular content structure of the new generation of electronic educational resources allows constructing a closed cycle of the learning process. Due to the introduction of the instrumental complex of open modular systems of the accounting module of educational achievements and unification of the data about the results of consumer education work in the electronic module in accordance with the international specification SCORM RTE (Sharable Content Object Reference Model (SCORM) – Advanced...; Sharable Content Object Reference Model ((SCORM) 2004, 2005), the functionality of the open educational modular multimedia system reaches the level of necessary completeness.

Another group of important qualities of an e-learning module is its technological component, which is closely linked to the first content. What is shown in the integral evaluation of the qualities of the module of the electronic educational resource (Sirotkin, 2015).

An important parameter of an e-learning module is its volume, which indirectly characterizes multimedia content. It is the volume of the module that gives reason to assume the development of other innovative qualities of the module. On the other hand, the exceeding of the maximum specified in the unified requirements will cause problems of delivery of the module in modern network technologies.

The capabilities of structured storage, retrieval and pre-evaluation of the e-learning module of the required type and content provide the metadata of the module, developed in accordance with unified requirements. The control of filling all necessary fields, checking the metadata and the manifest of the e-learning module of the given architecture is one of the tasks of assessing the technological qualities of the e-learning module.

In this way, the technological qualities of an electronic resource module are determined by:

- conformity of unified requirements of module volume, its structure, software solutions and formats of multimedia components;

- completeness and infallibility of the metadata and the manifest corresponding to the profile of the repository, consistent with the standardized requirements;

- the quality of multimedia content components and software solutions.

For variation al electronic training modules an integral evaluation includes an additional specialized component – a comparative analysis that determines the novelty of submitting the training material in this module in relation to the previously created.

In addition to the innovative and technological qualities in the system evaluation module a major roleplays the traditional examination of educational content. Compliance with the following criteria is the minimum necessary:

- accordance to assignments;

- accordance of the educational content to the educational standard (training program);

- comprehensive representation of the relevant thematic element of the subject area;

- methodical efficiency based on the expense of expedient use of innovative qualities;

- accordance to the modern scientific representations of the subject area;

- accordance to the basic values of society;

- the adequacy of the resulting data.

It should be noted that the integrated assessment of the qualities of the created electronic training modules is preceded by the examination of the concept of the electronic educational resource in the subject area, the coordination of scenario plans and other organizational and legal documents, which are the basis for the development of an open modular multimedia educational platform. Accordingly, the parameters and characteristics of the module, established in the process of examination as determining its innovativeness, technological and content quality, should be no worse than stated in the source documentation.

The procedure for the integral evaluation of the qualities of the e-learning module begins with the registration of the e-learning resource.

As it follows from the concept of monitoring of the quality of the electronic educational resource, the integral assessment of the qualities of the training module is through a fairly large list of parameters that characterize its innovative, technological and content al qualities.

Certain qualities of the e-learning module can only be established through the examination of the functioning module. That is why, determination of the level of interactivity, the quality of multimedia components, as well as the assessment of content qualities is solely within the competence of the experts.

In accordance with Fig. 1, the integral evaluation of the qualities of the e-learning module is divided into three stages. In the first stage an automatic

computer analysis of the structural components of the electronic learning module is carried out, which allows obtaining a preliminary or final assessment of the majority of technological and a number of innovative qualities.

At the second stage, an expert specialist in the field of information technology conducts a functional examination of the module. In the process of reproduction of the e-learning module its functional capabilities are established and errors of software solutions are detected. In addition, the dynamic regime provides additional innovative technological expertise to refine the data of structural analysis, and also provides an opportunity to evaluate innovative and technological qualities that are determined only in the process of functioning of the training module.

In the third stage, an expert specialist in the subject field evaluates the content quality of the module.

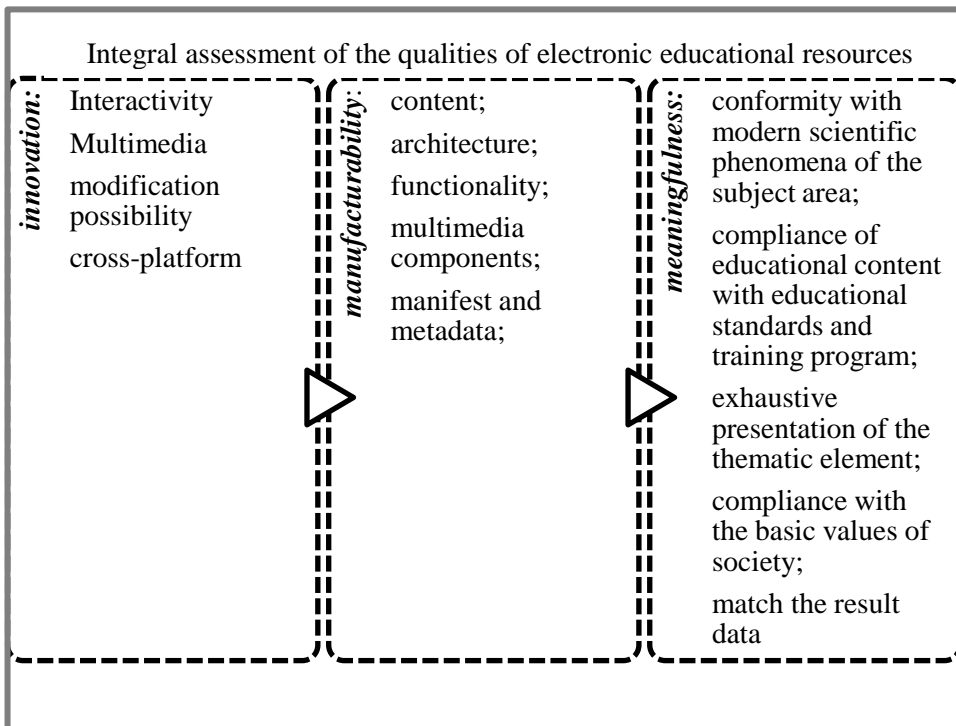


Fig. 1 Integral assessment of the qualities of electronic educational resources

Important elements of the integral assessment of the qualities of the e-learning module at each procedural stage are the order and evaluation criteria. It should be noted that the negative assessment of any of the qualities of the module at any stage is not the reason for the termination of the evaluation proce-

ture, which is intended to give maximum information for the finalization of the module. An exception is only to the violation of the functionality of the module, which is caused by critical errors in its architecture or software solutions, which makes it impossible to follow the evaluation procedure.

The main purpose of the functional expertise is to analyze the efficiency of the e-learning module, checking the clear implementation of all the declared functions. In addition, during the reproduction of the module, the examination of its innovative and technological qualities is completed: the preliminary assessments of the structural analysis are specified and assessments are made on the IT qualities that are determined only in the course of functioning of the module.

The functional environment of the e-learning module includes a cross-platform player and organizer, as well as compatibility with the software of the environment of other manufacturers.

During the functional examination, each multimedia scene in the electronic learning module is considered, the disability (or false work) is detected, multimedia compositions, educational objects or processes, media elements, media combinations, navigation elements, manipulators and other elements is revealed. The defects of interactive organization are identified which are the absence or incorrect reaction of the object or process, inappropriate proposals-messages, errors in the location of objects.

In the full-function module, the expert way also installs level of interactivity, the level of multimedia of each scene, the quality of the multimedia components.

The assessment of innovative qualities is carried out according to the criteria and qualification of the unified requirements. The quality of the multimedia components is determined subjectively.

It should be noted that after determining the level of multimedia of each learning stage, the evaluation of the multimedia level of the module, obtained at the structural analysis stage, may change. In addition, the assessment may change to a negative if a scene with a multimedia level equal to one unit is detected. Another assignment of functional expertise is the refinement of some evaluations of computer structural analysis.

In addition to the multimedia level, functional expertise actually gives a final assessment of the multimedia module platform. The faultless functioning of the module, reproduced by the cross-platform player, makes it possible to verify the absence of portable oriented software solutions hidden from structural analysis. However, paying attention to the significant differences in qualifications and technological culture of developers, this may not be enough. To make a final decision, you must directly verify the functionality of the e-learning module, reproduced in the environment of an alternative operating system.

The control of the original records in the metadata (description of the e-learning module, its characteristics, copyright, keywords, etc.)also relies on the

expert. The results of expert control together with the data of the automatic analysis allow to give a final assessment of the quality of the metadata of the electronic training module.

Special attention must be paid to importance of the examination of the content qualities of the training module, that is the educational effectiveness of the multimedia product. The current state of development of electronic educational content is characterized by significant progress in the formalization of evaluation criteria, qualimetry of the innovative and technological qualities of the electronic educational resource. The understanding of the part of these qualities in the educational value of the product is determined.

However, modern examination passed from reading character descriptions to direct study of objects and processes of the subject area is still not enough appreciated by the majority of practicing teachers.

In these conditions, the examination of the content of the e-learning module should use a system of transparent criteria with minimal possibilities of interpretation. However, one must remember about pedagogy, which is an art and like any art it is inseparable from the creator, in other words, subjective. The way out in such a situation can only be a deliberate abandonment of the apparently controversial wording of the evaluation criteria.

As part of the examination of the content of the e-learning module, the specialist of the subject area must evaluate the content of the e-learning module, based on such criteria as compliance with current scientific concepts of the subject area; conformity of educational contents to the educational standard (training program); Comprehensive presentation of the thematic element; methodical efficiency at the expense of expedient use of innovative qualities; compliance with the basic values of society; the adequacy of the resulting data.

The unified requirements of the concept of evaluation of the e-learning module identified possible solutions to the tasks of personality-oriented learning in an open educational modular multimedia system. Based on unified requirements, it is necessary to distinguish between variation modules located in the central repository of the system, prepared by professional developers, and modules modified by users for their own inquiries.

It is impossible to assess the quality of the educational e-learning resource without taking into account the opinion of consumers of educational services. Most of the key criteria used to evaluate e-learning resources do not always clearly indicate the educational effectiveness of the evaluated software package. To obtain reliable information about the work of the e-learning resource is the result of involving students in the process of evaluation.

To evaluate the e-learning resource the Reiser and Dick model (Kelly, 2010) is used, which focuses on the extent to which students acquire new skills that are endowed with the software package of the e-learning module. Using this approach teachers will be able to identify e-learning modules better.



A further study is in gradual expand of the evaluation criteria in all areas of the open e-learning resource as the new indicators of the educational pedagogical system are introduced.

## References

- Bykov, V., Lapinskyi, V. (2012). Methodological and Methodical Bases for the Creation and Use of Electronic Teaching Aids. *Computer at School and Family*, 2(98), 3–6.
- DSTU 7157: 2010 (2010). Information and documentation. Electronic edition. Basic Types and Output Details. Kyiv: Derzhspozhyv standart of Ukraine.
- DSTU 4861: 2007 (2009). Information and documentation. Edition. Output information. Kyiv: Derzhspozhyv standart of Ukraine.
- DSTU 3017-95 (1995). Edition. Themain types. Terms and definitions. Kyiv: Gosstandart of Ukraine.
- Gur, V. (2007). *Theoretical Foundations of Pedagogical Designing of Personally Oriented Electronic Educational Resources and Mediums*. Rostov on Don: SFU Publishing House.
- IEEE Learning Technology Standards Committee. WG 12: Learning Object Metadata. Retrieved from: <http://ltsc.ieee.org/wg12> (6.09.2018).
- ISO/IEC 19796-1:2005. Information technology – Learning, education and training – Quality management, assurance and metrics. Part 1: General approach (2005). Retrieved from: [http://www.iso.org/iso/catalogue\\_detail?csnumber=33934](http://www.iso.org/iso/catalogue_detail?csnumber=33934) (5.09.2018).
- Kelly, B. (2010). Reflectionson CETIS's "Future of Interoperability" Meeting. Retrieved from: <http://ukwebfocus.wordpress.com/2010/01/14/reflections-on-future-of-interoperability-standards-meeting> (1.09.2018).
- Kravtsov, G. (2010). *On the Criteria for Assessing the Quality of Electronic Learning Resources*. Retrieved from: <http://dls.ksu.kherson.ua/dls/Library/LibdocView.aspx?id=618bef1a-da5c-4497-a82f-1fec09fea98a> (6.09.2018).
- Morse, N., Hlazunova, O. (2009). Criteria for Quality of Electronic Training Courses, Developed on the Basis of Distance Learning Platforms. *Information Technologies in Education*, 4, 63–75.
- On Approval of the Provisionon Electronic Educational Resources (2012). Order of the Ministry of EducationandScience, Youthand Sports of Ukraine dated 10/01/2012 No. 1060. Retrieved from: <http://zakon5.rada.gov.ua/laws/show/z1695-12> (6.09.2018).
- Robert, I.V. (2008). *Theory and Method of Informatization of Education (Psychological and Pedagogical and Technological Aspects)*. Moscow: IAORAO.
- Sharable Content Object Reference Model (SCORM) – Advanced Distributed Learning Initiative. Retrieved from: [https://link.springer.com/referenceworkentry/10.1007%2F0-387-30038-4\\_225#howtocite](https://link.springer.com/referenceworkentry/10.1007%2F0-387-30038-4_225#howtocite) (5.09.2018).
- Sharable Content Object Reference Model (SCORM) 2004 (2005). Moscow: FGUGNIIAITT „Informika”. Retrieved from: <http://www.edu.ru/db/portal/e-library/00000053/SCORM-2004.pdf> (6.09.2018).
- Sirotkin, G.V. (2015). *Model of the System of Integral Evaluation of the Quality of Education and the Effectiveness of the Activities of Universities. Innovations in Science*. Novosibirsk: SibAK, 6(43). Retrieved from: <https://sibac.info/conf/innovation/xlvi/42526>.
- Vember, V. (2007). Informatization of Education and the Problems of Introducing Pedagogical Software Tools into the Educational Process. *Information Technologies and Teaching Aids*, 2(3). Retrieved from: <http://elibrary.kubg.edu.ua/859/> (5.09.2018).
- Vostroknutov, I. (2005). *Theory and Technology of Estimation of Quality of Software of Educational Purposes*. Moscow: State Centerof Information Technologies.