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Facultad Experimental de Ciencias
Departamento de Ciencias Humanas
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Internet and higher education: Prospects, challenges, problems

Larisa G. Orchakova[1]
[1]Moscow City University, Moscow, Russian Federation
OrchakovaLG@mgpu.ru

Yulia V. Smirnova[2]
[2]Moscow City University, Moscow, Russian Federation
SmirnovaYUV@mgpu.ru

Abstract

The purpose of this article is to develop a model for optimizing the modern concept of higher education information based on the key vulnerabilities determining its current state, problems and development prospects. The research method consists of analyzing, inductive and deductive reasoning; a systematic approach, comparative analysis, generalization of pedagogical experience related to knowledge assessment and also the educational process organization. Results demonstrate that the analysis of the current state, problems and prospects of the application of the Internet technologies in higher education was conducted within the research framework.

Keywords: E-learning, Higher education, Key vulnerabilities, Education information.

Internet y educación superior: perspectivas, desafíos, problemas

Resumen

El propósito de este artículo es desarrollar un modelo para optimizar el concepto moderno de información de educación superior basado en las vulnerabilidades clave que determinan su estado actual, problemas y perspectivas de desarrollo. El método de investigación consiste en análisis, razonamiento inductivo y deductivo; un enfoque sistemático, análisis comparativo, generalización de la experiencia pedagógica relacionada con la evaluación del conocimiento y también la organización del proceso educativo. Los resultados demuestran que el análisis del estado actual, los problemas y las perspectivas de la

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aplicación de las tecnologías de Internet en la educación superior se realizó dentro del marco de investigación.

Palabras clave: E-learning, Educación superior, Vulnerabilidades clave, Información educativa.

1. INTRODUCTION

Modern education is characterized by the integration of information technology in teaching and learning activities: from monitoring students' knowledge to creating an electronic learning environment (TOKAREVA ET AL., 2019a). In most countries, educational institutions shift from traditional pedagogical methods, decrease the role of the teacher and replace educational laboratories with the virtual ones, etc. Today, the boundaries in the provision of educational services have almost blurred – anyone and anywhere in the world can get access to online courses at leading universities, including Oxford and Harvard. Accessibility of information due to Internet technologies is becoming a buffer for the modern higher education system largely determining its current state, trends and development prospects (TOKAREVA ET AL., 2019b).

Information prospects for underdeveloped countries are due to the need to adapt their education systems to international standards; to minimize the subjectivity of teachers, as well as the resources and time needed to assess students' knowledge in a written and verbal form; to expand modeling opportunities in the educational process without the

use of expensive equipment; to conduct research and share knowledge with foreign educational institutions.

In highly industrialized countries, education information is urgent due to the need to search for the vulnerabilities of electronic learning management systems; to optimize e-learning technologies; to develop distance learning strategies and compare their effectiveness with traditional pedagogical approaches as the concept of education information is still quite a controversial issue. Undoubtedly, e-learning technologies meet modern needs, save the resources to print educational material, as well as expand the possibilities of demonstrating information; however, at the same time, they contradict traditional didactic concepts, including the sensualistic philosophy of J. A. Comenius, the studies of Jean-Jacques Rousseau and many others.

The practical relevance of the study is due to an attempt to identify vulnerabilities in education information at the present stage; reach a consensus between the opponents and supporters of the use of Internet technologies in education, relying on the identified key vulnerabilities of e-learning systems and the proposed recommendations for mitigating or neutralizing them. The research materials and results can be used in educational institutions to optimize the educational process and knowledge assessment through the use of information technologies (SADEGHI ET AL., 2017).

The analysis of recent publications demonstrates the urgency of the problem of education information (BULMAN & FAIRLIE, 2016; STAUB & HODEL, 2016; MIRONOV & LATYPO, 2017; AKHMETSHIN ET AL., 2019). Modern applied research is aimed at integrating the educational environment in LMS, including its implementation at the level of mobile applications (ZHU & CHEN, 2016). Remote laboratories are becoming popular; they allow illustrating scientific phenomena without expensive and complex equipment (TORRE ET AL., 2016). The transition of LMS to social networks may also be promising. According to (PETROVIC ET AL., 2013), the advantages of Facebook in the educational process are due to faster access and exchange of information, feedback from colleagues in an informal setting and confidence in the security of personal data.

The use of Internet technologies in the educational process contributes to new research opportunities (KANYANINA, KRUPODEROVA & STEPANOVA, 2016). In particular, the use of social networks reduces the time spent on conducting opinion polls and interpreting their results due to built-in tools for graphical processing of static data, expanding the geography of the sample and increasing the number of respondents. It was in the era of the development of information and communication technologies that it became possible to conduct full-scale sociological research covering almost all regions of the world.

In a number of studies, education information is considered from a critical point of view. The disadvantages of e-learning include: a negative impact on communication skills and the socialization process, the limited role of the teacher, the lack of a practical component for medical and exact sciences (ARKORFUL & ABAIDOO, 2015), the need for additional technical training of teachers and students (CHANG, 2016). In contrast to the critical points regarding the effectiveness of e-learning, the possibilities of using a biomedical virtual laboratory in the educational process should be noted (ABRAMOV ET AL., 2017). The authors provided the instruction for the work of such laboratories with the development of the requirements for the visual, mechanical and technological aspects of their functioning, which would correspond to the objectives of the educational process.

Gamification of the educational process is one of the main contradictions in the use of Internet technologies in education (SOBOLEVA & SOKOLOVA, 2017; BOGOMOLOV & NEVEZHIN, 2019). The article (DICHEVA ET AL., 2015) considers the possibility of using online games in educational institutions provided there is an appropriate training facility and technological structure. Currently, most teachers do not have the necessary skills and resources to create and maintain the gamification of courses. At the same time, the use of gaming technologies opens up a wide range of opportunities for modeling learning situations, increasing the motivation and interest of students.

Along with gamification, the critical aspects of education informatization include the impact of Internet technologies on the physiological and psychological health of students. The study (SOBOLEVA, 2016) presents the following negative factors: visual deterioration and poor skeletal muscle performance, sleep disturbance, the probability of being involved in sects or terrorist organizations due to the availability of various information, etc.

In modern studies, particular attention is given to the reliability and security of students' knowledge assessment when using e-learning technologies (BOGOMOLOV & NEVEZHIN, 2019). The article (BOGOMOLOV & NEVEZHIN, 2019) discusses the vulnerabilities of the Moodle system: changing student grades and the possibility of credential theft. Defective test tasks, including their reduced complexity or invalidity, as well as academic dishonesty due to the ability to find tasks and answers in advance on the Internet are significant problems (GEFAN & KUZMIN, 2015). It should be noted that such problems also occur in the traditional knowledge assessment system.

The results of comparative pedagogical experiments using online courses and traditional approaches are important for understanding the effectiveness of e-learning. The studies (STEVEN, 2015) showed that the performance of students has not changed when the same methods of presenting educational material were used within the framework of one course in the format of e-learning and the

traditional class. The authors noted the incorrectness of research with opposite results due to the lack of protection during the online exam and the independent choice of the course by the students. These factors can influence productivity and success distorting the results.

Today, e-learning is becoming a separate area of the educational services market. According to (DEMING ET AL., 2015), educational institutions focused on e-learning technologies are characterized by lower contract prices and the e-learning system can significantly change the pricing policy in this sector. The study (LITERAT, 2015) presents the criticism of online courses as a poor-quality substitute for traditional classes and threats to existing higher education models.

Thus, modern scientific research on education information is characterized by inconsistency related to the quality of distance learning and knowledge assessment, as well as the risks of reducing communication skills and socialization of students. Despite the abundance of critical reviews of e-learning models, the issues related to the consensus between the opponents and supporters of education information, as well as the optimization of the existing shortcomings of e-learning and knowledge assessment have not been properly addressed.

So, there is a need to develop a model for optimizing the modern concept of higher education information based on the vulnerabilities determining its current state, problems and development

prospects. The purpose of the study is to develop a model for optimizing the modern concept of higher education information. This involves the following tasks: the analysis of the current state, problems and prospects of using Internet technologies in higher education; the identification of key vulnerabilities in the modern concept of education information and the development of the model for its optimization.

2. METHODOLOGY

The research methods used in the study include analysis, inductive and deductive reasoning; a systematic approach, comparative analysis, generalization of pedagogical experience related to knowledge assessment and the educational process organization using Internet technologies. The e-learning systems and technologies of higher education institutions of Europe, the USA, Canada, Russia and other CIS countries were analyzed. MOODLE is considered as the main LMS universal for most regions of the world. The object of the study is Internet technologies in higher education. The subject of the study is the challenges, problems and prospects of the use of Internet technologies in higher education.

3. RESULTS AND DISCUSSION

The model for the optimization of the modern concept of higher education information was developed based on the key vulnerabilities,

which determine its current state, problems and development prospects (Table 1). Let us consider in more detail the vulnerabilities of each component of the "state – problems – prospects" pattern.

Describing the current state of education information, we should note the problems of introducing e-learning in underdeveloped countries, including the post-Soviet countries (Russia, Ukraine, Belarus and others) where the main obstacle to the use of Internet technologies in education is the relatively expensive price of the installation and operation of LMS, as well as its complexity.

Table 1: Model for optimizing the concept of education information

STATE AND CHALLENGES	
• partial implementation of e-learning in underdeveloped countries, including the CIS countries; • criticism and contradiction in the use of Internet technologies in education; • vulnerabilities of e-learning systems related to the security and reliability of knowledge assessment methods	
PROBLEMS	
Security: Knowledge Assessment • credential theft (administrator and teacher data); • theft of the tasks and answers; • grade changing through scripts; • search for answers on the Internet during the online test; • reliability and validity of tests	Learning: Theory • inaccuracy of information on the Internet; • poorer memorization of the educational material; • a tendency to seek answers on the Internet instead of working independently; • a tendency to receive "ready-made knowledge".

Security: Health • impaired vision and musculoskeletal system; • circadian rhythm disorders; • neuralgia problems, including tension headaches	Learning: practice • focus on theory rather than practical skills; • reduction of the applied aspect in the educational process; • unsuitability of Internet technologies for medical and exact sciences

Implementation of e-learning: material and technical aspect
• the high cost and inaccessibility of technology for many educational institutions in underdeveloped countries;
• the need for teacher training;
• LMS interface complexity for students and teachers

PROSPECTS

Security: Knowledge Assessment • identification of vulnerabilities and source code fixing; • creation of a single test database with thousands of tasks; • use of SEBs	Learning: Theory • teaching students, the principles of multi-resource verification and analysis of information; • focus on understanding the concepts and phenomena rather than their memorization; • introduction of extra practical and research assignments
Security: Health • limited time of an online lesson and increased interval of breaks, the introduction of warm-up at breaks; • limited test time and the limited number of questions in one test	Learning: practice • shift from the tasks focused on search skills to the research and analytical ones; • teaching data processing, modeling and forecasting methods; • widespread use of network laboratories in biosciences

Implementation of e-learning: material and technical aspect
• use of free LMS versions with a simplified interface;
• support for the development, release and distribution of teacher resource books to work with the e-learning system

The best option is the use of the Moodle system due to the availability of its free version and application in more than 100 countries; the system supports dozens of languages, has a relatively simple interface, as well as a chat and forum for communication with the teacher or colleagues. The system can be stored in the cloud, which minimizes the cost of its functioning.

However, the main factors for the criticism of the introduction of Internet technologies include the problem of security and reliability of knowledge assessment described above. To ensure the safety of knowledge assessment in e-learning systems, a safe exam browser (SEB) is used. It does not allow using the Internet, activating other programs, taking screenshots or closing the test. There is also no address bar, which makes it impossible to use scripts for the technical correction of assessments.

Another aspect of the reliability problem is the imperfection of the test tasks used in e-learning systems. When developing questions, the teacher must take into account the following factors: 1) case sensitivity - the same answer can be counted as correct and incorrect when using uppercase letters; 2) avoidance of open questions with similar answer options; for example, “time of year” and “season”, “5%” and “five percent”; 3) development of several types and levels of tests, including open questions, graphic tasks, alternative and multiple choice tasks. This will ensure the development of a comprehensive knowledge assessment test and help to identify the problems related to

the understanding of individual topics or definitions compared to the traditional approach with the use of examination cards.

Contradictions related to the quality of education using Internet technologies can be resolved by adapting the education system to the e-learning environment. For example, practical tasks can include working with databases; information processing and systematizing, modeling and forecasting of phenomena; organization of experiments in virtual laboratories.

In addition, the possibility of intensifying students' research activity should be noted. Information technologies allow students to find a lot of data for further research: meteorological, geological, medical, economic, etc. At the same time, there are available resources for data processing: programs for creating maps, modeling or forecasting, clustering, and other static tools.

The concern for the use of information technologies in education is often associated with the inaccuracy of data on the Internet; however, this may be one of the positive aspects of e-learning. In the past, students had to memorize information from academic publications the reliability of which could not be questioned. Now students have a new task: they have to independently search for the information, compare data from different sources, as well as analyze them to assess the reliability of certain information. This approach will contribute to the development of students' thinking and

logic skills, understanding of the educational material rather than memorizing it.

Thus, the creation of the model made it possible to clearly demonstrate the key vulnerabilities in the higher education information and develop recommendations for mitigating or neutralizing them. It should be noted that the current level of technology development allows creation of a high-quality electronic environment to provide a complete educational process remotely, including knowledge assessment, practical exercises, the development of theoretical material and other components.

The results of the study demonstrate the real prospects for the gradual replacement of traditional approaches with e-learning systems and extensive use of the Internet. The presented model for the optimization of the modern concept of education information shows that most vulnerabilities can be mitigated or neutralized by adapting the educational process to e-learning systems. This will prevent the education quality loss in the transition to the e-learning practice.

The results presented in the study are consistent with the research data (STEVEN, 2015) showing almost identical student performance in online and traditional classes, as well as with the data of pedagogical experiments (LEONENKO, 2010), which demonstrate that computer testing is as effective as the traditional assessment methods.

The lack of reliability and suitability of the online testing system for knowledge assessment should also be noted. The article (NOHRINA, 2002) demonstrates the restrictions on students' answers and the inability to trace their reasoning. These disadvantages are mainly caused by the imperfection of the development of individual tasks, the presence of technical vulnerabilities in the software and other similar factors. LMS functionality allows creating a wide range of tasks, including the following types: open questions, essays, multiple choice tasks, etc. Thus, modern knowledge assessment when using e-learning technologies can be considered as an alternative to the traditional verbal and written methods.

It should be noted that the presented optimization model covers only some basic aspects of the use of information technologies in the educational process. The prospects for further research may be associated with an increased number of the model criteria, the creation of new detailed models as part of the optimization of each individual criterion of the education information and many other areas.

4. CONCLUSION

Today, information technologies are an integral part of the higher education system. Thus, the educational process should be adapted to modern requirements: the transition from traditional classes to e-learning is inevitable.

The model for optimizing the modern concept of higher education information was developed in the study. It considers the use of Internet technologies in higher education in the context of the "state and challenges - problems - prospects" pattern. The model consists of the following units: theoretical and practical components; e-learning for student health; technological security, including the reliability of knowledge assessment; material and technical aspects of the introduction of e-learning in underdeveloped countries.

The practical and scientific relevance of the research results is due to the identification of vulnerabilities in the information of education; development of the model for optimizing the process of information, which may allow reaching consensus between opponents and supporters of the use of Internet technologies in higher education.

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