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**DEVELOPMENT OF REMOTE EDUCATIONAL COURSE BASED
ON MOODLE**

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Abstract

This article discusses the development and use of e-learning courses in higher educational institutions. The study includes a description of the electronic educational environment of the Reshetnev Siberian State University of Science and Technology, which forms a system-organized set of information, technical, educational and methodological support, inextricably linked with a person as a participant in the educational process. The purpose of the work is to develop software and methodological support for the discipline «Econometrics», and its implementation in the electronic educational environment of a higher educational institution. The approbation of the e-learning course was carried out on the basis of the assessments of the university experts, exposed according to 19 different criteria. To assess the consistency of expert opinions, the concordance coefficient and Pearson's criterion were calculated. The results of the expert assessment showed that the developed electronic distance course meets all the necessary criteria and can be used by students.

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Keywords: Introduction, approbation, electronic educational environment, electronic educational and methodological course, distance learning system



1. Introduction

The issues of improving the quality of vocational education have acquired new solutions with the development of information and communication computer technologies and e-education, with the creation and implementation of e-learning courses in educational practice. The creation of electronic educational and methodological courses opens up new opportunities for improving the processes of education, training and development of students. An electronic educational-methodical course is understood as an electronic educational resource of the discipline, which includes all the necessary educational, auxiliary and control-measuring materials, as well as guidelines for organizing work with a distance course using information technologies and the means of the global network Internet (Vaganova et al., 2019). The main goal of creating this course in higher professional education is to increase the efficiency of students' educational activities through the use of didactic means of information and communication computer technologies and improve the quality of training specialists through the organization of a management system for learning and self-education of students (Loginova, 2015).

2. Problem Statement

The current system of teaching at universities is based on the study of a wide range of disciplines with their own specific characteristics. The content of academic disciplines has its own, characteristic for a particular educational institution, direction and specificity. This specificity is determined by the traditions and teaching methods prevailing in the university. Thus, the implementation of the information and educational environment of the university is largely determined by electronic educational resources, their qualitative characteristics, the provision of the educational process with this type of teaching aids (Instructions for working with the MOODLE distance learning system, 2018).

The creation of electronic courses, which are one of the components of the information and educational environment of the university, will increase the efficiency of studying the entire range of disciplines taught in an educational institution. Increasing the effectiveness of training and improving the quality of education is possible due to the organization of students' operational access to the information resources of the university, including, among other things, curricula, work programs of the studied disciplines, theoretical and practical materials, constantly updated publications in electronic library systems, methodological recommendations and regulatory documentation (Rebrina & Leontyeva, 2014).

3. Research Questions

In the course of the research, we solved the following tasks:

- Development of software and methodological support for the discipline «Econometrics» in the electronic educational environment of the Reshetnev Siberian State University of Science and Technology.
- Conducting approbation and evaluation of the developed resource.

4. Purpose of the Study

E-learning as a modern form of education involves the widespread use of distance learning technologies in the educational process. One of the options for the implementation of such technologies in universities is the free software package Moodle, which is a learning management system specially designed for creating distance learning courses, as well as for organizing interaction between teacher and students (Eshnazarova, 2015). The Moodle distance learning system gives the teacher an extensive toolkit for presenting educational and methodological materials of the course, conducting theoretical, practical and laboratory classes, organizing student learning activities both in individual and group forms (Akhmetova, 2016). Thus, the purpose of this work is to develop an electronic educational and methodological course for the discipline «Econometrics» and its implementation in the electronic information environment of a higher educational institution.

5. Research Methods

5.1. Electronic educational environment of the university

Before proceeding to the description of the creation of an electronic distance course of the discipline, it is necessary to consider the features of the environment in which this course will be developed and operated.

An electronic educational environment is understood as a systemically organized set of information, technical, educational and methodological support, inextricably linked with both a person and a participant in the educational process (Vasilina et al., 2017).

The electronic educational environment of the university includes (Voitovich, 2017):

- access to curricula, work programs of disciplines (modules), practices;
- access to publications of electronic library systems and electronic educational resources specified in the work programs;
- fixing the course of the educational process;
- the results of intermediate certification and the results of mastering educational programs;
- the student's electronic portfolio, including the student's saved works, reviews and evaluations of these works by any participants in the educational process;
- interaction between participants in the educational process, including synchronous and (or) asynchronous interaction through the Internet (Belim et al., 2016).

One of the main components of the electronic educational environment of the university is the automated management system of the university «Pallada», which includes such subsystems as:

1. Subsystem «Document flow» - automation of electronic document flow processes;
2. Subsystem «Stream» - automation of educational process control;

3. Subsystem of automation of management processes for educational and methodological support;
4. Subsystem for automating the processes of managing financial and economic activities and investment development;
5. Subsystem «Science» - automation of scientific management processes;
6. Subsystem «Monitoring» - automation of the processes of the management and quality system;
7. Subsystem «Applicant» - automation of the admission campaign;
8. Subsystem «Analyst» - automation of strategic management processes;
9. Subsystem of automation of management processes for additional education and international cooperation;
10. Subsystem «Electronic library» - automation of library processes (providing the possibility of full-text viewing of books, methodological material).

Another important component of the information and educational environment of the university is the «Portal of electronic distance learning», it includes the following elements:

- Educational resources;
- User support;
- Infocomt;
- Contacts.

The Educational Resources module includes:

- Electronic distance learning;
- Distance learning for secondary vocational education;
- Distance pre-university training;
- Massive open online courses;
- Online Olympiads;
- Server of distance practice and state final certification.

The «User Support» module contains reference information for students and teachers on working with the e-learning server, university regulations on electronic educational resources, instructions for logging into the system and creating e-courses. Infocomt (management of information and communication educational technologies) includes such elements as:

- Additional IT education;
- Services (list of services provided by Infocomt);
- Video materials (examples of video clips developed at Infocomt studio);
- Documentation (normative documents Infocomt);
- Research and development (scientific and research activities of the unit).

The element «Contacts» contains information for communication with the management of Infocomt, departments of software and hardware and additional IT education of the university. On the server of e-distance learning of the university there is a database of e-courses by structural divisions of the university.

The e-distance learning of the university is based on the Moodle learning management system. Formation of an e-learning course is a rather complicated and time-consuming process; its development includes the following stages:

1. Designing the course, determining the content of the course.
2. Preparation and organization of training materials.
3. Creation of a course model and placement of training materials in the Moodle distance learning system.
4. Approbation and implementation of the electronic course in the educational process.

Designing a distance learning course is one of the main stages in preparation for the practical formation of a course in the Moodle distance learning system, on the results of which the effectiveness and efficiency of the educational process largely depends (Eshnazarova, 2015).

At the design stage it is necessary to: determine the educational goals and objectives of the course; analyze and select teaching materials, designate course modules, topics of the main sections of the course; to determine the forms of classes, the means of organizing the educational process, ways of interaction with students, consolidation and methods of control of knowledge and skills, communication and feedback (Smirnova & Afanasyeva, 2017).

5.2. Development of an electronic educational and methodological course for the discipline «Econometrics»

An electronic training course is a multifunctional didactic system, the work of which supports the educational process with the help of educational information technologies.

Acting as an automated educational information system, an electronic training course should perform the following tasks: to carry out effective management of the student's educational and cognitive activity in relation to the studied academic disciplines; use methods to stimulate the educational activities of participants in the electronic information environment; to provide an optimal combination of various types of educational and scientific activities, taking into account their didactic characteristics; rationally combine various technologies for presenting educational and reference information (text data, graphic materials, audio and video lectures, presentations, etc.); when placed in the electronic information environment of a university, ensure the organization of interactive classes based on information and communication technologies.

We will take as a basis the models of electronic training courses previously considered by the authors and proceed to the development of software and methodological support. The Moodle distance learning system has a wide variety of modules (course elements) that can be used to create courses of any type (Rakhmangulova, 2021).

We have included the following elements in the «General» section:

- file «Work program of the discipline»;
- file «Questions for test»;
- file «Links to electronic resources posted in the scientific library of the University»;
- file «Links to library systems used by the University»;
- element «News Forum»;
- element «Feedback»;
- element «Electronic Journal»;
- element «Final test» (Yuferova, 2020).

The work program of the discipline will allow students to familiarize themselves with the volume, content, procedure for studying the academic discipline (module), as well as ways to control the results of its study.

The rating plan for the study of the discipline contains information on the types and topics of classes for academic weeks, types of control and points awarded to students for completing assignments.

Test questions will provide an opportunity to study the main topics of the final test during the intermediate certification of students.

The document «Links to electronic resources placed in the University Scientific Library» contains a list of literature for independent work of students in the discipline, with appropriate links to bibliographic resources of the University Scientific Library.

The file «Links to electronic library systems used by the University» includes the names and addresses on the Internet of electronic library systems cooperating with the university.

The news forum can be used as:

- a space for students to communicate so that they get to know each other;
- course announcements (news forum with mandatory subscription);
- discussion of course content or reading materials;
- continuation of the discussion started earlier during a personal meeting;
- space for teachers to communicate;
- a help center where teachers and students can give advice;
- individual student support (via forum with separate groups and with one student per group);
- for additional activities, such as «puzzles» for students or «brainstorming» to think about and suggest solutions.

The «Feedback» element can be used:

- to assess the usability of the course, helping to improve the content for subsequent participants;
- to enable potential listeners to sign up for training courses, events, etc.;
- for anonymous messages.

The electronic journal will allow the teacher to keep a record of student attendance, and students to see information about their own attendance. The teacher will be able to create several classes and mark the attendance of students by assigning them the statuses «Attended», «Not been», «Late», «Good reason» or change these statuses at their discretion. The module provides reports for groups of students or for each student separately.

With the help of the element «Final test» tests were created, consisting of questions of different types: «Multiple choice», «True/False», «Compliance», «Short answer», «Numeric».

The theoretical block of the course is organized using the elements «Lecture», «Glossary» and «Test». The «Glossary» module is a glossary of terms and definitions used in the e-course.

The practical block of the e-course is organized using the elements «Assignment». The assignment assumes a creative response from the student.

The current control of the study of the theoretical material of a specific topic of the electronic course is carried out using the «Test» element. Testing is a means of control that allows the teacher to objectively assess the knowledge of a large number of students with a minimum amount of teacher's time. Any test in Moodle is created on the basis of a Bank of Questions (a special database).

For more effective independent mastering of theoretical material by students, a presentation has been added to the structure of each topic.

An interactive element «Forum» has been created to answer the questions that students have in the process of studying educational materials.

The program of studying the discipline «Econometrics» provides for the writing of an essay by students on the chosen topic. For this work, 16 academic hours of study time are allocated. The implementation of this item of the curriculum in the electronic course was carried out by adding the element «Seminar».

For virtual consultations on the study of educational materials, an element «BigBlueButton videoconference» was added to the structure of the e-course «Econometrics». The BigBlueButton Video Conferencing module allows you to create links in Moodle to virtual online meetings in BigBlueButton, an open source web conferencing system for distance learning.

5.3. Examination of the e-learning course «Econometrics» and analysis of its results

Examination of the quality of the created e-learning course «Econometrics» for students in the direction 38.03.01 Economics was carried out using the method of expert assessments.

Expertise is the research activity carried out by a competent person or group of persons to answer questions clearly posed by another person. It is carried out at a certain time and ends with the preparation of a document in the prescribed form. Expert judgment is a method of analyzing judgments and assumptions with the participation of experts. The term «expert» comes from the Latin word (experienced), (Korobov, 2019).

When implementing the method of expert assessments, the following sequence of operations is assumed: selection of experts; establishment of a point scale of assessments; direct assessment by experts of compared research objects; processing of the results of expert activities.

When selecting experts, we took into account: the level of the expert's general erudition; possession of special knowledge in the analyzed subject area; the experts have a certain practical and research experience on the issue under study; lack of bias, interest in specific assessment results.

To assess the electronic distance course, a questionnaire was drawn up, summarizing the requirements for electronic educational resources, prescribed in the university documentation.

The questionnaire contains 19 criteria by which the experts evaluated the e-course (Table 1). In the grading scale, the expert must indicate the number with the corresponding number of points. The questionnaires provide for the possibility of experts writing comments with wishes addressed to the creators of the electronic course.

The grading scale provides the following answer options:

- the implementation of the criterion deserves an «excellent» mark (5 points);
- the implementation of the criterion deserves the mark «good» (4 points);
- the implementation of the criterion deserves an assessment of «satisfactory» (3 points);
- the criterion is practically not met (2 points);
- the criterion is not met (1 point).

Five experts took part in the examination of the electronic distance course. The experts were the teachers of the Engineering and Economic Institute of the Reshetnev Siberian State University of Science and Technology, who read the disciplines «Statistics», «Econometrics» and «Information Technologies in Economics» for students of economic specialties.

Table 1. Content of the questionnaire for assessment by experts

№	Criteria	Points
1	Availability of a working program of the course indicating the goal, tasks, competencies to be implemented and the planned results of studying the discipline	
2	Does the content of the work program correspond to the stated goals and objectives?	
3	Variety of educational activities	
4	Providing the course with communication opportunities for its participants	
5	Availability of guidelines for the study of modules	
6	The logical sequence of studying the discipline modules	
7	Clearly defined deadlines for completing tasks and submitting reports to the distance learning server	
8	Saturation and content of educational material	
9	The lecture material has a clear structure, is easy to understand, includes visual means of perceiving information	
10	Reliability of teaching materials	
11	Accessibility (selection of material in accordance with the psychological and age characteristics of students)	
12	Providing the opportunity to study modules of the course externally	
13	Availability of various forms of control of current, intermediate and final control	
14	Convenient course navigation	
15	Interactivity of the course (availability of feedback)	
16	Fullness of the course	
17	Availability of a list of references for independent work of students	
18	Presence of a glossary on the topics of the course	
19	Availability of a rating plan for the study of the discipline	

The procedure for identifying the generalized assessment of the expert group was carried out on the basis of statistical methods. For each criterion, we have determined the average score.

6. Findings

The analysis of the results showed that the experts rated the developed electronic distance course quite high by almost all criteria. Criterion 7 - «Clearly marked terms for completing assignments and submitting reports to the distance learning server» have a relatively low average score, criterion 11 - «Accessibility (selection of material in accordance with the psychological and age characteristics of students) ». Authors should pay attention to the fulfillment of these requirements when finalizing the electronic-distance course and launching it into the educational process.

To assess the consistency of expert opinions, the dispersion coefficient of concordance was calculated (Ayvazyan, 2020):

$$W = \frac{5209}{\frac{1}{12} \cdot 5^2(19^3 - 19) - 5 \cdot 1431.5} = 0.73$$

The value of the coefficient $W = 0.73 > 0.6$ indicates a high degree of agreement of expert opinions. This conclusion is clearly confirmed by the graph in Figure 1.

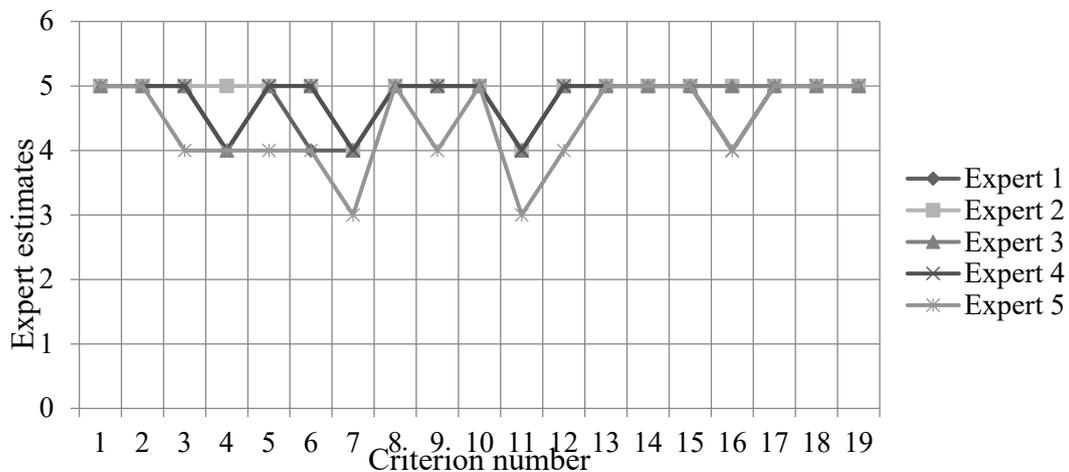


Figure 1. Assessing the consistency of expert opinions

To assess the significance of the coefficient of concordance, the Pearson criterion was calculated:

$$\chi^2 = \frac{5209}{\frac{1}{12} \cdot 5 \cdot 19(19-1) + \frac{1}{19-1} \cdot 1431.5} = 66.1$$

The calculated χ^2 is compared with the table value calculated for the number of degrees of freedom $K = n-1 = 19 - 1 = 18$ and at a given significance level $\alpha = 0.05$. Since χ^2 calculated = 66.1 \geq χ^2 tabular = 28.8693, then $W = 0.73$ is not a random value, and therefore the results obtained make sense and can be used in further research.

Thus, according to the results of these assessments, it can be concluded that the developed electronic distance course meets all the necessary criteria and can be used in the study of the discipline «Econometrics» by students of economic specialties.

7. Conclusion

The developed course meets the basic requirements for electronic educational resources prescribed in the university documentation, as evidenced by the high assessment of experts assessing the electronic distance course according to a variety of criteria.

The electronic training course «Econometrics» for students in the direction 38.03.01 Economics will provide: effective management of the student's educational and cognitive activity in relation to the studied academic discipline; the use of methods to stimulate the educational activities of participants in the electronic information environment; the optimal combination of various types of educational and scientific activities, taking into account their didactic characteristics; a rational combination of various technologies for presenting educational and reference information (text data, graphic materials, audio and video lectures, presentations, etc.); organization of interactive classes based on information and communication technologies.

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