ORGANIZATION OF E-LEARNING MATHEMATICS AT THE UNIVERSITY

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Abstract

E-learning is a part of modern educational environment of the university. E-learning represents the transfer of knowledge and educational process management by means of new information and telecommunication technologies, for example interactive electronic delivery systems of information, mainly the Internet and local network technologies. With e-learning mathematics two groups of problems are supposed to be solved: methodical and technical ones. One of options of e-learning mathematics are educational web-quests on the basis of cloud computing. Modern web technologies are rather flexible and variable therefore they allow to consider specifics of group structure, presence of various groups of students. It allows to use the differentiated or individual approach to students. It also allows to use group and individual forms of education at classes of advanced mathematics. The most effective way of independent work of students is the use of e-learning. E-learning mathematics are possible to organize by means of educational web-quests according to various sections of mathematics. The educational web-quests on mathematics developed by the author are applied in mathematics for students of humanities. The experimental work showed that the use of e-learning mathematics improves the quality of mathematical education and promotes students’ personal development. There is an improvement in mathematical training level, information literacy, as well as the raise of interest in mathematics study.

Keywords: E-learning, the university, training in mathematics, educational web-quest.

1 INTRODUCTION

E-learning is a key element of the information educational environment. E-learning is not an alternative to traditional training and cannot replace work of students with the teacher or the textbook. E-learning has to keep all advantages of traditional process of training and supplement it with modern information technologies. E-learning promotes formation of positive motivation of students, development of scientific outlook and significantly expands possibilities of independent practical activities of students. Means of ensuring of e-learning are computer educational and business games, web-quests, virtual and dynamic environments of training, etc., constructed on the principles of problematical character, prospects of self-development, computer visualization of abstractions, interactivities of educational dialogue.

2 METHODOLOGY

At the organization of e-learning in mathematics two groups of problems are supposed to be solved: methodical and technical character. One of a possibility of e-learning organisation in mathematics are educational web-quests on the basis of a cloud computing. Web-quests in methodical sense are not something absolutely new. But they are a way of integration of a number of methodical strategy, substantially using resources the Internet.

Developers of web quest as an educational task Bernie Dodge [1], [2] and Tom March [3], [4] from the State San Diego State University consider two types of web quests: short-term and long-term. The purpose of short-term projects is acquisition of knowledge and implementation of their integration into the system of knowledge. Work on short-term web quest can borrow from one prior to three sessions. Long-term web quests are directed to expansion and specification of concepts. Upon completion of work on long-term web quest, a student has to be able to keep the deep analysis of the gained knowledge, to be able to transform them, to know material so that to manage to create tasks for work on a subject. Work on long-term web quest can last from one week to a month (at most two). Today
twelve types of web quests are distinguished. The classification is based on the following types of tasks (Compilation tasks, Judgement tasks, Retelling tasks, Persuasion tasks, Mystery tasks, Creative tasks, Journalistic tasks, Design tasks, Analytical tasks, Self-knowledge tasks, Consensus tasks, Scientific tasks).

The web quest as educational technology is based on constructive approach to training [5]. According to this approach, a teacher constructivist, first of all, is not a lesson giver, but a consultant, organizer and coordinator of problematic, research educational, cognitive activity of students, these characteristics correspond to function of a teacher-facilitator. Educational process assumes realization of modern ways of subjects’ interaction of educational process, their new roles: a teacher, as a consultant, and a student, as an active researcher, independently and creatively working on the solution of an educational task, widely using educational opportunities computer and Internet technologies for obtaining necessary information. They create conditions for independent cerebration of students and in every possible way support their initiative. Students become full-fledged "accomplices" of process of training, dividing responsibility for process and results of training with a teacher.

Active introduction in educational process of Web quests promotes achievement of the educational purposes connected with formation and development of abilities of students to independent search, collecting, the analysis and submission of information. At the same time any Web quest technology is guided by realization of the developing training function, acquaints students with creative activity. Arming trainees with methods of scientific search, quests develop critical thinking and also abilities: to compare, analyze, classify, think abstractly; students become more active and independent when studying mathematics [6], [7].

3 RESULTS

The educational cross-disciplinary Internet portal "Interactive Educational Environment" was developed by authors to support e-learning (http://a90519uv.bget.ru/). By means of web technologies independent cognitive activity of students in the process of e-learning when using educational web-quests is organized [8], [9], [10].

Let's imagine working with web-quests on the example of teaching students math.

In the process of students’ work on web-quests for mathematics the following purposes of training are implemented:

1. The educational purpose of training in mathematics – involvement of each student in active informative process of training in mathematics. Organization of individual and group activity of students. Identification of skills and abilities to work independently.

2. The developing purpose of training in mathematics – development of interest in mathematics, development of students’ creative abilities; skills of research activity and public statements formation, abilities to develop independent work with literature and the Internet – resources; outlook and students’ erudition enlargement.

3. The educational purpose of training in mathematics – education of tolerance, education of personal responsibility for performance of the chosen activity, formation of esthetic perception.

The educational web-quest includes the following required components:

- introduction (subject and substantiation of project’s value). This stage provides main information, key concept introduction, it also contains a question on which students are required to think over;
- task (purpose, conditions, problem and ways of its decision). It is the most important part of web-quest. A task directs students to make specific actions for problem solutions;
- process (stage-by-stage description of the process, distribution of function and duties of each participant, reference to Internet resources, final product). This section contains instructions how exactly students will perform a task (an order of performance and sorting of information);
- assessment (a scale for a self-assessment and criteria for teacher’s assessment). The section contains criteria for assessment of a performed task according to certain standards;
Conclusion (generalization of results, summing up (what skills a student has acquired; rhetorical questions or questions motivating further research of a subject are possible). Here results are summed up and reflection and further researches on a problem are encouraged;

Pages for a teacher (in addition): contain information to help other teachers for web-quest usage.

According to results of a research conclusions and offers are made. A competition of the performed works is held. Understanding of a task, reliability of the used information, relation of students to a specific subject, critical analysis, logicality, structure of information, definiteness of positions, approaches to a solution, identity, professionalism of presentation are evaluated. A teacher and students take part in assessment of results by means of discussion or interactive vote, for example through cloud computing.

The key section of any web-quest is the specified scale of evaluation criteria. Based on assessment scale participants of a project estimate themselves, participants of team and other students. A teacher uses the same criteria. As a web-quest is a complex task, assessment has to be based on several criteria focused on type of a problem task and a form of result presentation. Web-quests result on mathematics turns to be an individual or a group project. A project publication is carried out by means of cloud computing, it is displayed either in a teacher’s cloud or in a specially prepared cloud of educational group. Subsequently discussion and assessment of a project is implemented by all participants of educational process at classes or online and offline mode (in clouds or forums). An informative part, independent activity of all group and each participant separately, project defense are estimated.

The structure of thematic educational web-quests on mathematics for students of humanities is presented by the following elements:

Introduction (main task): the final result of independent work of students is defined. A way of work performance as well as availability to start web-quest performance is offered.

Performance order: algorithm of thematic educational web-quest is defined. Algorithm of educational quests on mathematics has the following structure:

1. Choose a role on behalf of which a web-quest will be performed.
2. Get acquainted with the main task of a web-quest.
3. Study Internet resources according to the role.
4. Answer questions.
5. Make a report on the performed task (message, presentation, booklet, etc.). At first get acquainted with criteria of web-quest assessment.
6. Provide a defense of your work.
7. Make general conclusions.

Selection of a role for web quest performance is presented on the “Fig. 1”.

![Selection of a role for web quest performance](image-url)
Educational web-quests on mathematics have practical features. The purpose of educational web-quests on mathematics is theoretical knowledge acquisition, practical application of mathematical theory, experimental study.

Final stage. A team works in cooperation, under the leadership of a teacher, have the responsibility for the received results of a research. According to results of a research conclusions and offers are made. Defense and team-work estimation of prepared projects are carried out.

Project defense is followed by multimedia presentation. Project presentation is in an open access (in educational group cloud) for all students who estimate and comment on it.

Working on web-quests students:
- to work with information (to analyze, generalize and establish associations with earlier studied and draw conclusions);
- to create creative works of different genres according to a communicative plan;
- to create information resources;
- to generate the ideas and find multiple solutions;
- to enter communication both to listen to the partner and to argue the point of view and to reach compromise with the interlocutor, etc.;
- to cooperate and bear responsibility for results of the work.

For the e-learning training in mathematics at university the authors developed educational web-quests on probability theory, on combination theory, on history of mathematics, on statistics.

4 CONCLUSIONS

Use of thematic educational web-quests on mathematics promote generalization and systematization of a training material of a subject, allow to capture all components of its contents: information, methodological, semantic and valuable. Educational web-quests on mathematics promote the correct formation at students ideas of a mathematics subject, about mathematical modeling and also to development of informative independence of students. In the course of search and cognitive activity with use of resources of the Internet students can find a lot of additional material of historical and biographic character. It promotes realization of the principle of historicism and the principle of personification of training in mathematics and also provides development of informative activity and independence of students.

REFERENCES


