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E-learning Environment as a Means for a Modern Engineer Training

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Abstract— **The educational process is the main parameter in the help of the students' knowledge acquisition at the university. Therefore, the adoption, implementation and harnessing the promise that are available in the everyday world require the training of an engineer capable of applying modern technological developments in production. A modern engineer training requires the creation of a new learning environment. In this article, the authors consider the possibility of creating e-learning environment. Along with the educational institution internal resources, the usage of open web services and learning resources created by the intellectual and pedagogical community becomes effective. In particular, we review and analyze several programs, present their development, describe and determine their applicability for formal study. Using this learning environment, the teacher gets the opportunity for a creative approach to organize the educational process and to transform students' learning activities from reproductive into productive, personalised form. The organization of such kind of learning activity contributes to the development of modern specialists' technical expertise. This article examines some organization approaches of the educational process in a single e-learning environment of undergraduate students 21.03.01 " Petroleum Engineering " in Ufa State Petroleum Technological University.**

Keywords— information educational environment; educational process; web services; learning resources; technical expertise; hard skills; LMS Moodle; facilitator.

1. INTRODUCTION

The contemporary world is rapidly developing and it is necessary to have skills of self-education to fit into a dynamically developing world. This requires the organization of a new educational process oriented to the development of intellectual, critical, analytical thinking, aiming at self-development. New educational standards of higher education in Russian Federation expand the university's capacity to create e-learning information environment.

Along with the internal resources of the educational organization, web services are an effective mechanism for e-learning. In particular, Wikipedia plays an important role in various information gathering by the students. A social network service for educational objective was also widely spread.

2. TIMELINESS

Based on the analysis of the data presented [1], e-learning is worldwide spread, today there is a community of CSCL (Computer Support for Collaborative Learning), covering all countries of the world, established for the e-learning development. The importance of cooperative interactive learning is mentioned in the article [2].

The potential application as an auxiliary tool for the process analysis, facilitators' support in the online mode and the development of more adaptive learning support for computer-based cooperation are discussed[3].

Also the works [4] are devoted to the creation of the educational environment. In the works [5, 6], the creation of e-learning environment as a medium of instruction in the future is considered. The author's conclusions [7] are based not only on the analysis of data from national and international statistical accounts and the secondary analysis of other scientists' economic and sociological researches, but also on his own large scale research. In the end, he formulated a holistic theory that allows us to assess the fundamental consequences of the revolution impact in information technology, covering all branches of human activities, on the contemporary world. Whereas, he notes that such strategies of positive changes as technological and education policies take on great importance. In works [8,9,10,11,12,13,14,15] great attention is paid to the potential of MOOCs (massive open online courses), which can become a part of students' educational environment.

The analysis of theoretical literature route and the author's own experience [16,17,18] show that the solution of education modernization problem is currently one of the most important and urgent tasks.

3. GOAL SETTING

At the department of Information Technologies, Mathematics and Natural Sciences of Ufa State Petroleum Technological University, Branch in the City of Oktyabrsky, an educational environment has been created and it includes an educational subject teaching with the usage of Moodle and open educational Internet resources, among which MOOCs has a great success. The usage of various resources, according to the authors [19,20,21,22], allows us to train a future engineer capable of integrating into the rapidly changing modern world. With the graduation of theUniversity the learning does not stop, it just begins.

Practicals on "Mathematics" and "Computer studies" for undergraduate students 21.03.01 "Petroleum Engineering" in

Ufa State Petroleum Technological University were organized in the following way:

1. For the Internet educational resources usage, laboratory operations manual were prepared, providing brief theoretical information on the topic, and drills.

2. Students could freely choose an integrated environment or Internet resources for solving the problems. The students were faced with a specific problem, according to which the students chose the tools for doing it themselves.

3. The control over the accuracy of the completed drills was conducted in the form of oral discussions. This form of practicals' organization made it possible to individualize the students' educational activity within the framework of the traditional educational process.

In the latest poll of the students (72 students), they made active use of web resources for preparing their homework (Fig. 1).

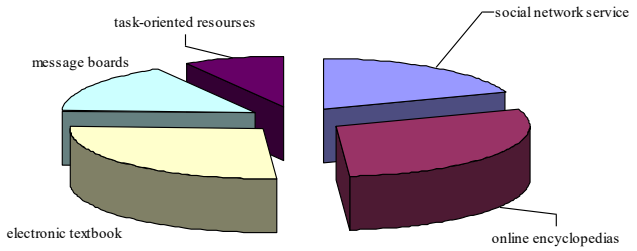

Fig. 1. Survey findings on the use of web resources.

Also, the students made active use of mobile Internet for preparing their homework (Fig. 2).

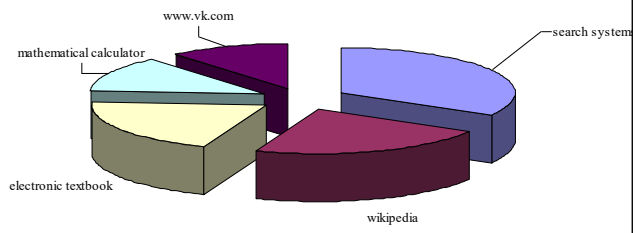

Fig. 2. Survey findings on the use of mobile Internet.

While assessing the lessons, 10% of students noted th they would prefer traditional forms of the lessons without t use of electronic resources. But the majority spoke in support of the lessons organized with the use of computer technology.

The students prefer online courses created by the subject teachers (64%), email (58%), and cloud resources (16%) for learning material and tasks' distribution and for self-use of web resources (16%).

During the practicals the following types of training activity were organized:

• information search to find ways and means for problem solving;

• usage of existing web resources for solving educational problems;

• the development of problem solving programme with the help of the integrated environment, chosen independently;

• analysis and explanation of decisions;

• generalization of learning activity results;

Organized training activities contribute to the development of the following undergraduate students' performance skills:

• an ability to apply the principal laws of natural science disciplines and modern information and communication technologies in their career;

• an ability to develop applications and software prototyping for handling of applied problems;

• an ability to apply a comprehensive approach and mathematical methods in formalizing the solutions of applied problems;

• an ability to develop scientific literature reviews and electronic information education resources for their professional activities.

3. Results

The creation of a unified educational environment at the university, with the use of open Internet resources, MOOCs resources in particular, contributes to improving the quality of engineering education. The effectiveness of information technology usage in students' task performance is built in such a way that a student can accomplish educational objectives in any convenient place with an access to the Internet. The usage of this technology makes it possible to motivate students in such a way that they are engaged in the subject area not only during class time, but also during out-of-class time.

Figures 3 show the results of students' inclusion in various

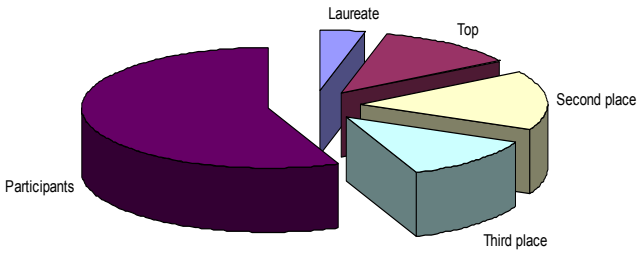

Fig. 3. The results of the first year students' participation in various competitions in 2016-17 academic year.

Thus, the created information educational environment in the organization of students' educational and research activities contribute to increasing the learning motivation and attracting more participants for joint research activities, which is the main factor in a modern engineer training.

4. Conclusion

1. A new generation of educational standards in the Russian Federation requires the formation of the information educational environment of the institution. Social web services

and educational resources created by the intellectual work of the pedagogical community can be used as an effective mechanism in the development of the e-learning environment.

2. Modern information technologies allow the teacher to use a variety of educational resources, created by the intellectual activity of the pedagogical community.

3. The teachers develop new methods of teaching, corresponding to the level of modern educational technologies' development. They receive additional opportunities for cooperation with the students, for involving the students in a unified e-learning environment.

4. Web resources are becoming an important tool for students' learning activities. Their implementation contributes to the development of core competencies at the professional level in accordance with the educational standards of the new generation.

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