Educational process in electronic information-educational environment

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Abstract

New educational standards of higher education in Russian Federation expand the frames of educational institution towards the formation of electronic information-educational environment (EIEE). Along with internal resources of educational institution, public web-services and educational resources, created by intellectual work of pedagogical community, becomes an effective mechanism in the development of e-learning environment. Teacher obtains additional opportunities for creative approach to organization of educational process, for organization of educational collaboration, for involving students in the process of EIEE development. Teacher can transform students' learning activities from reproductive form into productive, personalized form. Organization of this kind of educational activities helps to develop professional competences of modern professionals. The paper discusses some of the approaches to educational process in EIEE of students of bachelor program 09.03.03 Applied Informatics in Kazan (Volga) Federal University.

Keywords: Electronic information-educational environment, educational process, web-services, educational resources, professional competences

1. Introduction

New educational standards of higher education in Russian Federation expanding university scope towards creation of electronic information-educational environment (EIEE). Thus, educational standard of bachelor program 09.03.03

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Applied Informatics states: «Electronic information-educational environment of organization must provide: interaction between participants of educational process, including synchronous and (or) asynchronous communication via Internet» (Prikaz, 2015).

Formation of EIEE educational institutions requires teachers’ activity on the creation of electronic educational resources, using different approaches, including:

- Elaboration and frequent reedition of textbooks.
- Development of electronic educational resources through specialized systems and web-resources (Golitsyna, 2013, 2015a, Kochisov et. al., 2015).
- Use of professional software available in Internet (Shustova & Shustova, 2013).
- Development of own software frameworks for teaching, including mobile technologies (Gosudarev, 2014).

Along with educational organization internal resources, web-services are the effective mechanism for e-learning environment development (Golitsyna, 2015b). Particularly, “Wikipedia mainly plays an introductory and / or clarificatory role in students information gathering and research” (Selwyn & Gorard, 2016). Social media are widely used by students in educational process, expanding learning experience beyond limited class time (Lee, Bonk, 2016), shifting educational paradigm (Golubev & Testov, 2015). Takes place positive correlations between the intensity of using social networks and students’ perceptions of using social networks for educational purposes (Lim, Richardson, 2016). Social software widely used in academic activities, teaching and learning (Manca & Ranieri, 2016, Seaman & Tinti-Kane, 2013).

Meanwhile, Internet contains enough open educational resources in order to organize productive learning activities of students during traditional classroom teaching. And that is a subject of current paper.

2. Goals and methodology of research

This paper discuss of approaches to organization of students’ productive educational activity in traditional educational process using EIEE opportunities. It reflects our experience of organization of learning activity of students of bachelor program 09.03.03 Applied Informatics.

Under teaching the course "Operations research and optimization methods", we used Internet educational resources for individualizing of the learning activity of students in traditional educational process.

Under teaching the course "Information Systems in Education" we used Internet educational resources for organization of students’ collaboration during development of electronic educational resource "Information Systems in Education" in LMS Moodle. Organized learning activities contribute to development of professional competencies of students according to educational standard of bachelor program 09.03.03 Applied Informatics (Prikaz, 2015).

3. Discussion

3.1 Experience of teaching through Internet educational resources

Practical lessons under the course "Operations research and optimization methods" for 3th year students of bachelor program 09.03.03 Applied Informatics at Kazan Federal University was organized as follows:

1. By using of Internet educational resources have been prepared guidelines, giving brief theoretical information on topic and hands-on assignments, for each practice session (13 lessons).

2. Students were free to choose software environment or online resources for problem solving. As the result, independent practical activity of students was personified. Students themselves chosen tools for problem solving including mobile tools.

3. Control in a classroom was in form of verbal personal discussion with students about practical lessons topics.
For guidelines development were used open educational resources developed either by educational institutions of Russian Federation or by individual teachers. Each student had to choose method and means of problem solving, to solve the problem, to explain and justify obtained solution during verbal conversation with the teacher. These forms of practical training organization allowed to individualize the learning activity of students in a framework of traditional educational process.

According to students’ poll (62 students), they actively used Internet resources for their homework preparation, including social networks to discuss subject with each other (51%). Most students used electronic encyclopedias (77%), 70% read electronic textbooks, 42% used specialized forums for educational problems solution, 29% used IDE for programs development for problems solving, 22% worked with specialized resources for mathematical tasks solving.

Also, students actively used mobile Internet for homework preparation: 90% used search engines, 61% - Wikipedia, 55% - electronic textbooks, 35% - resources for mathematical tasks solving. For ordinary communications under learning 30% students used mobile application of popular in Russian Federation social network VKontakte (https://vk.com). In addition, students used:


In assessment of conducted lessons, 10% of students said that they would prefer traditional forms of lessons without use of electronic resources. But the majority supported form of lessons organization with implementation of information technologies. Students encouraged teachers to create e-learning resources on a subject (64%), use e-mail (58%) and cloud resources (16%) for distribution of educational material and providing assignments for self-dependent use of web-resources (16%).

During the practical lessons, next types of learning activities were organized:

- informational search on finding ways and means of problems solving;
- use of the existing online resources for educational problems solving;
- development of problem solving programs by means of programming environment chosen on their own;
- analysis and explanation of solutions;
- generalization of learning activity results.

Organized learning activities contribute to development of following professional skills of bachelor students (Prikaz, 2015):

- ability to apply basic laws of natural sciences and modern information and communication technologies in their professional activities (common professional competence CPC-3)
- ability for applications development and software prototypes creation for applied tasks solutions (professional competence PC-8);
- ability to apply systematic approach and mathematical methods to formalize solutions of applied tasks (professional competence PC -23);
- ability to elaborate academic literature reviews and electronic information-educational resources for professional

activities (professional competence PC-24).

### 3.2 Experience of students collaboration under development of e-learning resource

Formation of EIEE of educational institution requires teachers’ activity on creation of electronic educational resources, but modern technologies let to involve students in productive learning activities on creation of educational resources.

In collaboration with 4th year students of bachelor program 09.03.03 Applied Informatics, during classes under the course "Information systems development in education" was organized development of e-learning resource "Information Systems in Education" on LMS Moodle platform.

Designed resource has following structure: it is divided into 24 sections, number of sections corresponds to the number of students in the academic group. Each section contains theoretical information on particular topic and tests with different kinds of questions: a clear choice, multi-choice, for compliance, free response.

Activity was organized as following: each of the students of academic group was asked to:

- choose the theme for development from a list;
- find educational content on a chosen theme on their own;
- make a report in class with presentation on his/her theme;
- prepare content for uploading to LMS Moodle;
- upload content to LMS Moodle, supply it with necessary illustrations and hyperlinks;
- develop tests on the theme;
- upload tests in LMS Moodle.

As a result during the classes was arranged group project activity, in a framework of which each student was involved in following learning activities:

- data retrieval for educational content on chosen theme, what students have implemented using Internet resources;
- analysis and information structuring to fill up relevant section and develop tests;
- representation of obtained information in a form of presentation and report;
- content editing according to general pattern;
- content uploading to LMS Moodle;
- development of test questions to respective section of the course;
- test uploading to LMS Moodle.


Expert evaluation of developed resource was held by 5th year students of "Applied Informatics (in education)" of extramural department under the class of "Electronic educational resources."

For this purpose students were asked to complete following tasks:

1. Evaluate quality of educational content of each of course sections on a scale from 1 to 10 by following criteria:
   - Compliance of the content to sections’ theme.
   - Quality of educational content presentation (clarity of language, how topic is explicated, presence of necessary hyperlinks).
   - Appearance of educational content (division of text into fragments, illustrations, screenshots, etc.)
2. Evaluate quality of tests in each of course sections on a scale from 1 to 10 by following criteria:
   - Clarity of questions.
   - Comprehensiveness of sections’ content in questions.
   - Presence of different types of questions in tests.
3. Select three best and three worst sections of "Information Systems in Education" resource.

Expert evaluation results were uploaded to Google Drive and were available to all course developers and experts. Course developers were able to improve corresponding sections of the course in accordance with expert evaluation.
Students, whose work was recognized as the best by the expert evaluation, received additional points to their academic ranking, in addition to moral encouragement.

Introduced learning activities aimed for development of electronic educational resources, contributes to development of following professional competencies of bachelor students of 09.03.03 Applied Informatics (Prikaz, 2015):

- ability to solve common tasks of professional activities on a basis of informational and bibliographic culture using information and communication technologies, and in accordance with basic information security requirements (common professional competence CPC-4);
- ability to conduct description of applied processes and information support solutions of applied tasks (professional competence PC-7);
- ability to implement presentation of information system and basic training of users (professional competence PC-16);
- ability to participate in implementation of professional communication in a framework of project groups, to train users of information systems (professional competence PC-19);
- ability to prepare reviews of academic literature and electronic information educational resources for professional activity (professional competence PC-24).

4. Conclusion

New generation of educational standards in Russian Federation requires formation of EIEE of educational institution. Public web-services and educational resources, created by intellectual work of pedagogical community, can be used as an effective mechanism in the development of e-learning environment.

Use of web-services by students and teachers in the learning process leads to:

1. EIEE expands beyond the frames of educational institution.
2. Modern information technologies allow teacher to use diverse educational resources created by intellectual activity of pedagogical community. Teachers were given the chances to develop new techniques and methods of teaching, corresponding to a level of modern education technologies development. They receive additional opportunities for collaboration with students, for involve students to development of EIEE of educational institution. Use of these resources allows choosing creative approach to organization of educational process, to transform learning activities of students from reproductive form to productive, personalized, providing students with an opportunity of independent choice of methods of solution of common tasks. Organization of such kind of learning activities forms professional competencies of modern specialists.
3. Web-resources become an important tool of students’ learning activities. Their use contributes to development of key-competencies on professional level in accordance with educational standards of new generation.
4. Students actively form mobile personal-oriented education environment, thus becoming active participants of the EIEE formation, which corresponds to modern education development trends in direction of Education 3.0 (Golitsyna, 2015a).

Table 1 shows Internet resources that can be used to expand EIEE of educational institution under organization of different kinds of learning activities. The table lists professional competencies of students according to educational standard of bachelor program 09.03.03 Applied Informatics (competencies clarification stated in the text of the paper).

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<th>Learning activities</th>
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Prikaz (2015). Prikaz ot 12 marta 2015 g. N 207 ob utverzhdenii federal'nogo gosudarstvennogo obrazovatel'nogo standarta vysshego obrazovaniya po napravleniyu podgotovki 09.03.03 Prikladnaya informatika (uroven' bakalavrata) [Order of 12 March 2015 N 207 on the approval of the Federal State Educational Standard of higher education in the field of training 09.03.03 Applied Informatics (Bachelor level)]- http://fgosvo.ru/uploadfiles/fgosvob/090303.pdf


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