

Implementation of Training Using Electronic Learning Materials Based on Web 2.0 Online Services*

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Abstract. The development of global economics and a present job market impose new requirements on the pedagogical staff. In general, these requirements concern the professional sphere which is connected with the development of competencies in information and communication technologies meeting the demand of our time. That means the innovative activity of the educator is to be connected not only with the use of stationary computer applications in educational practice, but also integrate the full scope of the global Network. The space of the Internet has a broad spectrum of educational portals, websites, blogs, the methodical communities, which provide access to different electronic educational resources. The organization of network interaction of participants of the educational process is the cornerstone of electronic training with applying of remote technologies. The great popularity is gained by using social network services in the educational process which can serve as web designers for the creation of training materials by the educator and student result representation of participation in projects, individual works, and other types of activity. This article is devoted to the applying of network technologies, in particular, online services based on Web 2.0, in master degree student training who get the pedagogical education in biology. The model of online services application is developed for the creation of electronic training materials in work with students of a magistracy as future educators

Keywords: Network technologies, Web 2.0 online services, electronic training materials, ICT competence, Master students, Learners, Modern information educational medium, Online services application model, SWOT analysis.

1 Introduction

Modern aspects in the society and economy development, modernization of the system of Russian education, new values, and reference points increase the level of requirements to the professional qualities and abilities demanded in the 21st century both for the acting pedagogical staff, and for future experts in this field. One of the impulses of the existing changes is that information and communication technologies are constantly

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improved, they are an integral part of the educational medium of any educational organization. Hence, the Professional Standard "An educator of Professional Training, Professional Education and Additional Professional Education" approved by the order of the Ministry of Labour and Social Protection of the Russian Federation of September 8, 2015, urges the teacher "to use modern technical means of training and educational technologies, including if necessary to carry out electronic training, to use remote educational technologies, information and communication technologies, electronic educational and information resources" [1].

The modern information educational medium does not do without us network technologies which continue actively intrude into the educational process of institutions of all orientations. Employing network technologies the arrangement of management and control of educational activity, information and methodical ensuring disciplines, electronic training, network interaction of participants of educational process successfully are implemented. The current Internet has a big resource base of training materials, ready to apply. It can be materials on the websites and portals of the organizations which are especially engaged in their drawing up and development and also handiworks of teachers most of which often can be met in network methodical communities, personal websites, or blogs. Besides, the Internet space is filled with various social network services (online services based on Web 2.0) – available in using and understanding by the web applications allowing the user to carry out various tasks: storage and editing data, communication, presentation, ordering, etc. Today it is difficult to imagine our everyday life without online services. Many network services during their existence were considerably improved, functional new services have appeared, having forced out the irrelevant at present. However, a matter of network services Web 2.0 applying in the educational activity will remain interesting to study, the activity which is not related directly to technical specialties, having other subject orientation. An educator's innovative activity can be seen partly in this field.

2 Materials and methods

According to the increasing rate of development of the information and communication technologies (ICT) the perspective directions of the transformation of the educational process open, the conditions meeting modern educational priorities, and the purposes of the 21st century are created [2]. The attention is focused less on ICT educator qualification, than on his ICT competence, i.e. his/her ability to apply information technologies in the solution of pedagogical tasks [3].

The responsible role in the educator's formation with a set of the professional qualities demanded in the 21st century is allocated for higher educational institutions. In particular, implementation of programs of a magistracy "Pedagogical education" allows gaining knowledge and abilities in the sphere of innovative technologies necessary for working in an education system with the ability to apply modern ICT technologies in the organization of educational activity, to apply diagnostics and estimation of the quality of educational process according to various educational programs, to use modern educational and pedagogical technologies for information broadcasting in interaction

with participants of the educational process [4]. The objects of the professional activity of magistracy program graduates mostly become learners of general secondary schools. In this regard, there is a chain of important successive interactions.

It is important to be mentioned that the system and activity approach in training is the methodological cornerstone of federal state educational standards of general education. This approach describes the structure of student educational activity, necessary conditions, and mechanisms of the assimilation process. Modern information educational medium is the important instrument for the formation of different types of educational activity, types which promote the achievement of educational results by learners [5]. At the same time, the feature of the existing stage of education development consists in the applying of advanced system delivery of information, an interactive operating mode, different complementary technologies of training [6]; therefore, the active development by educational institutions of Internet technologies and network services Web 2.0 has great importance.

Social network services, or Web 2.0 services, represent program online applications for any solution of tasks [7]. In essence network services Web 2.0 essentially differ from the static websites, portals, and servers of a wide area network [8].

Web 2.0 is an era of such development of Internet technologies when users are authors and coauthors of the content of the Network [9]. In the Internet space it is possible to meet office, photo, video editors; services for the creation of infographics, mental maps, polls, tapes of time, interactive flash-resources, etc.

The implementation of online services application in education is very large-scale. In the network access, there is a large number of electronic resources and materials of users that can be used for educational purposes. Employing network services it is possible to organize the students' group work and provide communication in scientific and methodical communities. As network services Web 2.0 are free software, there is a possibility of independent creation of training materials and their publication even for the users who do not have special knowledge in the IT-sphere [10]. Depending on the approach to the online services applying in a pedagogical activity it is possible to achieve the solution of many tasks which are implemented in the information and education environment: the organization of network interaction and control of educational activity, ensuring the design and creative activity of participants of the educational process and also the formation of a complex of network electronic educational resources, including electronic training materials which are environment ICT-saturated integral component [11]. Therefore, when choosing tools for the creation of training materials based on online services it is necessary to take the following advantages of services into account: availability, multimedia, and usability.

This work represents an opportunity to consider features of network technologies applying in the training of masters, taking into account specifics of training materials development based on network services to design studies by both the educational specialist and the students of a magistracy. The pedagogical experiment proceeded within the implementation of the magistracy program "Pedagogical education (Biological education)" on discipline "Interactive forms and training methods in biology". This discipline is included in a professional cycle of obligatory disciplines and studied by students of a magistracy in the second semester. It is provided that a considerable volume

of studies is given for self-instruction. The course was presented in a learning management system of Moodle of higher education institution, network services Web 2.0 were applied at the developing of some author's training materials [12].

Moodle is a platform that allows the creation of educational modules with turning on text blocks, multimedia of components, wiki pages, forums, questionnaires, glossaries, polls, and tasks of various types. Google Sites can become the alternative tool environment that allows forming the interactive guide to a course. The indisputable advantage of Google Sites against the LMS Moodle system that the teacher independently, without any help of the technical specialists who support and adjust the platform in higher education institution can make corrections in training materials, provide the student access to certain resources, being the author and the moderator during a course implementation.

Google Sites – an easy to use designer of the website. Without any special knowledge in the field of IT technologies, the teacher can create personal websites with the representation of the acquired methodical materials and also the websites, in other words, guides, to disciplines or the specific studied subjects. Google Sites allows to create the full-fledged websites with a hierarchical insert of web pages, to configure their interface, to place necessary content: text, images, video, audio resources, internal hyperlinks or links to materials of a wide area network, additional gadgets [13]. An interactive guide, ready to use, is kept in the opened or closed access mode. In the second case of the mode only the author or the restricted invited audience of users, which roles of coauthors can be also appointed, has access to the website. Several advantages supplement convenient navigation between the created pages, ready subjects, and templates of registration, preview of the website on the smartphone, the tablet, the computer. A website application is certainly an important moment in the realization of distance learning and also in the organization of students' self-instruction at all steps of education.

Irrespective of the platform of training course allocation, a network interaction of its participants is represented with the following interactions:

- an educational specialist – network platform resources – a student;
- a student – network platform resources – a student.

In the first case, the part of the tutor and coordinator is assigned to the educational specialist, who keeps feedback with students and providing them timely consultation with the arising questions.

The second interaction arises during student group work in network actions, a design activity. The educational specialist in this situation is a moderator: he forms problematic issues and tasks, directs to the obtaining of provided results, regulates the rate of work. The presented interactions are applicable in educational institutions of any level and specialization.

Resources of the network platform are a complex of electronic educational and methodical materials, where the training materials created in the environment of Web 2.0 services can be as a part. The choice of online services for the training material development is undoubtedly diverse. In this article, we will observe the capacities of network services Mindomo and LearningApps.org.

Mindomo (<https://www.mindomo.com/ru/>) is an online service for the creation of the mental map. The beta version of the service can create three free cards. Mental maps are applied for the acquaintance with the ideas, tasks, plans, business strategies, design, the IT-sphere. However, this network service has gained special popularity in education [14].

The card which is created employing Mindomo Service contains schematically located multimedia blocks united with each other hierarchical or equal connections. Inserted elements of blocks are images, text, a network video, hyperlinks, information pop-up windows. The scheme contains the main block and affiliated blocks departing from it. For consecutive submission of information, a part of the scheme can be hidden.

For educational purposes, the Mindomo service can serve as the online designer for the development of a network electronic training material in the form of the interactive schemes, which allow disclosing interrelation of complex structural components to complete perception of training material, to focus attention on important blocks of the scheme, to build a route (concept) of a subject studying [15]. The reference to the published scheme is built-in on the page of the interactive guide of a training course.

Students of a magistracy when modeling studies for school students also developed interactive schemes employing network service Mindomo. Translated from Russian into English the scheme by a student is submitted in Fig. 1.

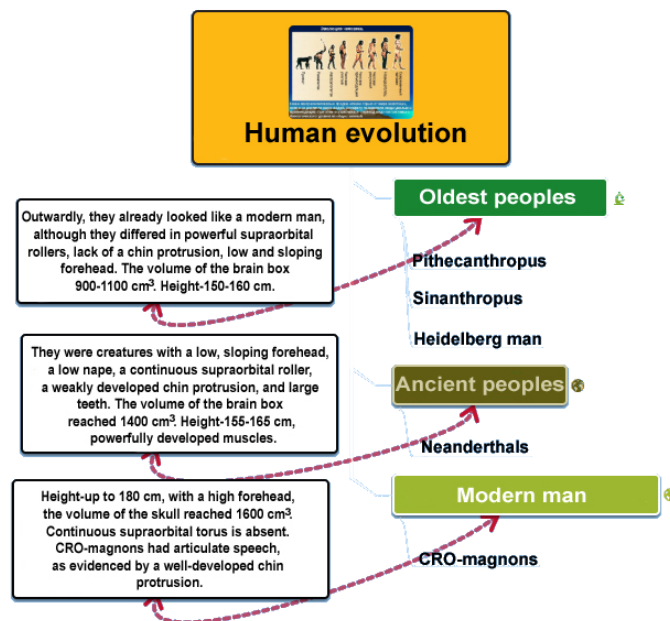


Fig. 1. A master degree student's screenshot of the interactive scheme

One more online service which deserves educational specialists and master students' attention is LearningApps.org (<https://learningapps.org>). It is the Russified network service Web 2.0 for the creation of interactive exercises – a complex of the versatile tasks directed to working off of knowledge and abilities gained during the training. Types of the developed exercises are the following:

- conformity,
- classification,
- a chronological range,
- a simple order,
- text input,
- pictures sorting,
- a quiz with the choice of the correct answer,
- a filling in gaps.

Moreover, there is an opportunity to create audio and video content, a grid from various applications, and also exercises in a play form: "Who wants to become a millionaire?", "Guess" the Puzzle", "Crossword puzzle", "Words from letters", "Where is it?", etc. Auxiliary web tools allow organizing the voting, chats, marking events in the calendar, creating notes in a notebook, to leave announcements on the built-in online board. In Fig. 2 there is a screenshot of the author's interactive exercise about the conformity of elements on the subject "Organelles" which is shown to students of a magistracy as an example.



Fig. 2. The author's interactive exercise about the conformity performed in the medium of the LearningApps.org online service

Fig. 3 shows a screenshot of the author's interactive exercise in the form of a crossword puzzle on the topic "Living Cell" also performed with the help of the LearningApps.org online service which is shown to master's students as an example.

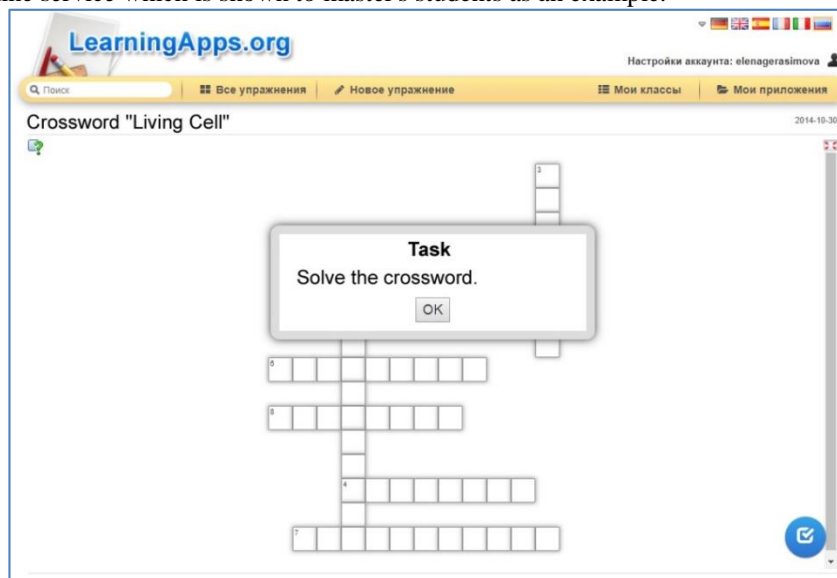


Fig. 3. The author's interactive exercise in the form of a crossword puzzle performed in the medium of the LearningApps.org online service

Thus, interactive schemes are indispensable in the cognitive and design, and creative activity arrangement for students, when the problem tasks and questions are shown, an educational experiment is arranged. Interactive exercises are the source of ensuring for the regulatory activity of students directed to of a self-preparation level assessment, introduction of the corresponding amendments. Similar network schemes and exercises play an important role in the formation of interactive and communicative activity which content comes down to the ability to organize a joint activity, to formulate, reason, and defend the opinion, allows to form and develop the competence of the scope of information and communication technologies.

The conducted survey in the form of SWOT analysis with students of a magistracy about their attitude to online services of Web 2.0 applying in their study and pedagogical activity, allowed to reveal strong and weak points, opportunities, and possible threats while operating with the services.

According to students of a magistracy, the application of online services in training is a level indicator of modern education. Students noted the advantages of the services, which consist in the interactivity and usability, thus, they create conditions for the realization of individual educational pathways.

Master students realize opportunities of network services in the distance learning arrangement, the development of electronic training materials, and their demonstration with using of an interactive board and mobile devices that have current importance in their study and professional activity.

However, there are also some weak points of this matter. First of all, these points concern unexpected online service blackout leading to the loss of information and emergence of errors in hypertexts or references that happen at access closing to resources of the websites, to single images, video or audio. The unpleasant factors menacing to the application of electronic training materials based on network services Web 2.0 are technical failures in work of services, lack of access to the Internet at the required zone: in a lecture room, a computer class, at home, etc. The late teacher's feedback can lead to the assumption of inaccuracies and mistakes in students' activities. But after all, there are much more advantages in the application of online services. A qualified educator, designing the lesson, always assumes the replacing techniques and technologies in case of unforeseen situations with the functioning of the training materials taken in the medium of network services. Especially as various technical failures most often are temporary.

3 Results

One of the important requirements to the professional skills of the modern teacher is the development and application of electronic tutorials according to requirements of the federal state educational standards, which are imposed on students for their achievement of new educational results. The level of professional skills of the graduates of pedagogical specialties in many respects depends on a high school level of training, in particular, in the field of successful implementation of information and communication technologies in their further educational activity. Therefore it is important to show to the master student possible methods and design technologies of training materials that stir up the educational activity directed to the achievement of modern educational results by learners.

As useful tools for the development of electronic training materials, the educator can apply online services of Web 2.0. Without any assistance from technical sphere experts, the educator, considering his/her methodical positions, will be able to create interactive training materials independently. The advantages of online services applying in the study and pedagogical activity were noted by students of a magistracy of the "Pedagogical education (Biological education)" course. The application specifics of online services in educational activity directly depends on the creative approach and innovative activity of the educational specialist.

In this regard network technologies as an integral part of the modern information educational medium, are perspective means on the way of realization of a chain of important successive interactions between a higher education institution and a secondary school in the 21st-century youth formation.

Thus, proceeding from specifics of the discipline implementing the program of a magistracy, the model of application of network services in the work with master students can have the following form (Fig. 4).

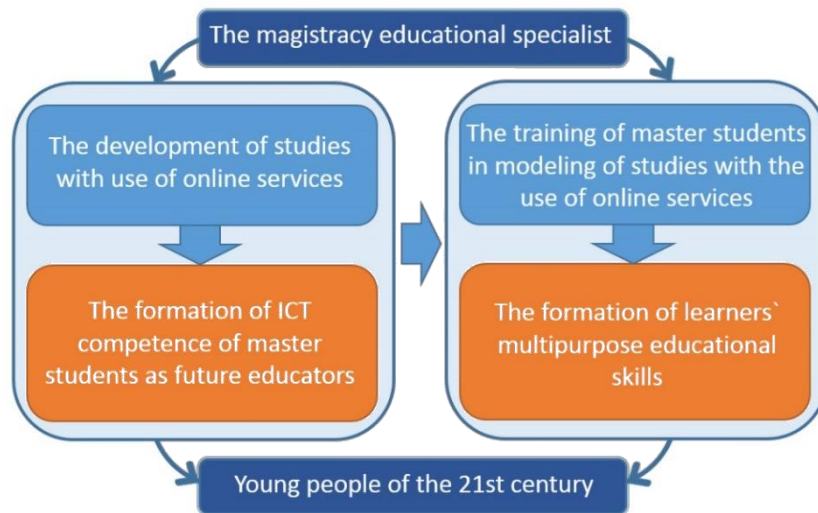


Fig. 4. The model of the online services application in work with future educators

During the final class students of a magistracy were offered to make a SWOT analysis of the application of network services in the study and pedagogical activity. The essence of the analysis came down to the reasonings including the following positions: strong and weak points of the case, opportunity, and potential threats. Popular answers of students are provided in the cumulative diagram in Fig. 5.

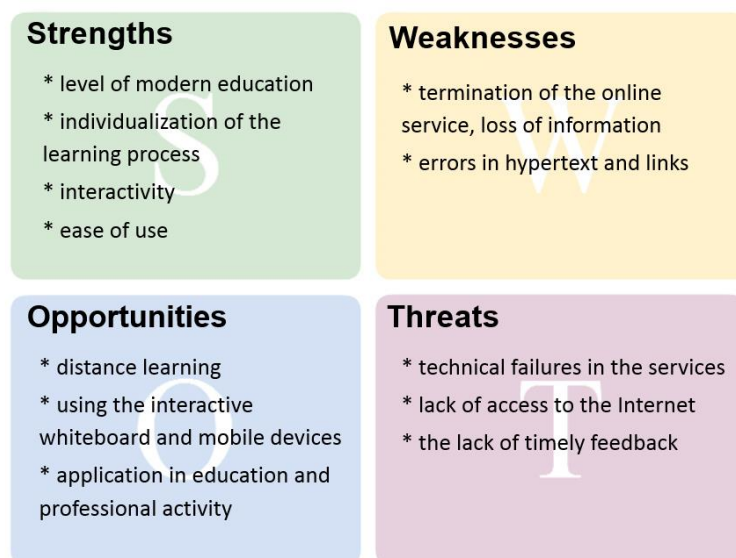


Fig. 5. SWOT analysis of the application of network services in the study and pedagogical activity

4 Conclusion

Let us note the main advantages of the online services of Web 2.0 in designing studies and materials. Firstly, it is the availability that assumes easy access to resources of the service. It is only required to execute an entrance employing the available account on service or to use the account of the resolved social networks, and as the need arises - to pass the registration. Secondly, multimedia allows working with different formats of information at the same time: text, images, audio, video. Thirdly, it is their usability. Most network services Web 2.0 have intuitively clear interface therefore not only IT professional can be their users.

During the implementation of the course "Interactive Forms and Methods of Training to Biology" (the author's electronic training materials based on online services of Web 2.0 were applied). The program graduates of the magistracy "Pedagogical education (Biological education)" are future teachers whose objects of professional activity are, in particular, students of the secondary general educational organizations of basic and profile levels. Therefore, at the studied course master students learn to develop their training materials, being guided by requirements of the existing federal state educational standards. Master students were asked to model training materials using online services.

Apparently from the chart, students of a magistracy consider that using online services is necessary for the innovative activity of the educator, it is one of the indicators of the level of modern education. Besides, employing network services individualization and interactivity of the training process is implemented.

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