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ORGANIZATION OF LESSONS BY MEANS OF WEB SERVICES IN TERMS OF PROFESSIONAL TRAINING

The paper aims to examine effective web services and substantiate their efficiency in the organization of the educational process. The study is based on Kirkpatrick’s Four-Level Training Evaluation Model. Students of the National University “Chernihiv Collegium” named after T. Shevchenko took part in the experiment (n=35). According to the results of the organization of classes by means of web services in the process of training future professionals there have been selected effective web services that have shown a positive impact on students and the educational process in general. Using the method of D. Kirkpatrick to verify the effectiveness of web services in the organization of the learning process, the reaction, knowledge of the material, behavior, and the result (learning effect) of the students were determined. The research outcomes have shown that web services improve the interaction between students and a teacher, promote the optimization of the educational process, self-development, increase interest, creative activity.

Keywords: *e-learning, web services, electronic tools, students of the computer profile, organization of classes.*

Introduction

Today, all branches of industry are closely connected with the use of information and communication technologies (ICT), which are no longer a new, unknown concept, but rather an indispensable tool of work. Their benefit is their flexibility, economy, convenience, dynamism, geographical “unlimitedness” in the fulfillment of professional duties (it concerns every field of work, without any exceptions).

A teacher occupies the central position in the process of professional training of future specialists, who delivers the information in an accessible and interesting form. His/her main task is to organize an effective, innovative environment, creates a favorable atmosphere. ICT products may come into play here (Iverson, 2004; Leuf, 2001; Matviichuk, 2016). The use of gaming technologies to solve educational tasks is equally important in the educational process. Such technologies make it possible to get closer to the essence of the problem and solve it in the game environment. It is important that such gaming technologies greatly increase the motivation of students to study. They help to use the full potential of the ‘player’. Besides, they simulate real situations, which every specialist can face in professional self-realization. Many

web-services help organize such a gaming environment (Luthfi, Kom, 2009).

Consequently, the issue of web services is being discussed more and more often, especially their capabilities and ways of implementation. The demand in such means every year is only increasing. But often web services remain unnoticed and become popular only in some fields. In addition, the issue of web services is considered to be understudied in the educational environment.

However, insufficient attention is paid to the problem of organizing classes with the help of web services. At the time, the issue of the selection of web services for the organization of the learning process is relevant, so we consider it necessary to organize the educational process and verify its effectiveness on the basis of certain web services.

Problems of various aspects of the introduction of ICTs into professional training have been examined in the works of domestic and foreign scholars, in particular: V. Artemenko describes the importance of web tools in organizing webinars and in recording videos in the LMS (Artemenko, 2015). V. Bykov explains the essence of informatization of education, which needs not only to be discussed but which requires fruitful work of scientists and educators (Bykov, 2010). The experience of using

electronic tools in the educational process confirms their effectiveness and positive impact on all subjects of the educational process (Matviichuk, Ostapchuk, Kraychuk, 2017). O’Leary’s works, which present the application of Web services in the learning process, through which one can develop interactive content (O’Leary, Humphrys, Walshe, 2005), are also worth attention. In his writings, he tries to show the prospects of using web services. In the organization of e-learning, the use of web services cannot be ignored (Westerkamp, 2004). Chen confirms the importance of web services in the e-learning system. In his article, he describes the way to make the educational web service mutually compatible for a teacher and a student (Chen, 2002). The work of the group of authors has resulted in the confirmation of the effectiveness of the integration of tools with the e-learning system, which have a positive effect on the acquisition of users’ knowledge (Pattnayak, 2016). Another research (Bianca Andreica, Covaci, Stuparu, 2010) was based on the platform architecture, which provides many web services for knowledge management. The developed architecture was implemented and enabled users to evaluate it. The results obtained confirmed their performance and the ability to use in different cases for different users. The learning process requires significant changes not only in the content of the training, but also in the modernization of laboratories, and its improvement can be achieved by the start of the operation of the architecture of web services for mobile learning (Sharma, Kitchens, 2004).

Many scholars are now discussing the benefits of ICTs for the learning process, though their positive effect is undeniable. But it should be noted that the issues of organizing the learning process with the help of web services are still understudied and remain relevant.

Aim and Tasks

The paper aims to select web services and substantiate their productivity in organizing the learning process in order to increase the motivation of students to study.

The tasks set are as follows: to clarify the definition of “web services” phenomenon; to select productive web-services for organization of classes; check the effectiveness of web services in the organization of the learning process.

Research Methods

The study is based on Kirkpatrick’s Four-Level Training Evaluation Model. A number of tools were used at each level: the response form (containing open questions and scale-questions); test for evaluation of learning material mastering, qualification map; a questionnaire, a checklist of projects, testing; a control test. Also, for the solution of the tasks assigned we used a method of critical analysis of scientific sources and experience. Students of National University “Chernihiv Collegium” named after T. Shevchenko majoring in “Secondary Education (Computer Science)”, “Computer Science and Information Technologies”, “Mathematics (Information Technologies)” were involved in the experimental group (16 students); and the students majoring in “Biology”, “Ecology”

composed the control group (19 students). Training in the control group (CG) was carried out without any changes according to traditional methods, and in the experimental group (EG), training was conducted with the help of selected web services and electronic resources developed on their basis: LearningApps, WordArt (Tagul), Online Test Pad, Майстер-Тест, ProProfs Quiz Maker, Bubbls, Mindomo, Glogster EDU, Google Apps for Work, Animoto, Diigo, Blogger, Eliademy, Wixsite.

Research Results

The emergence of web services (online applications) in education is recent. At the beginning, they were used for industrial goals, which eventually went into mass development of online applications of all services to meet human needs, including education. They have no restrictions on the use of devices, operating system, interface language, access mode, etc. Web services are available on the basis of short-term free use periods and have completely free access.

Often, a web service is understood as an application that can work if Internet access is available. But this is not always the case. Today, many web services are designed to allow users to use them both online and offline. Now this element is integrated into a more complex system (Alharthi, Aziz, Abdullah, 2016).

Web services today play an important role in the society life. When it comes to teachers, they are perhaps the best tool for organizing a learning process (Bry, Eisinger, Schneemeyer, 2003). They help to solve a lot of problematic issues, and this is, first of all, the ability for temporarily software replacement, which is often so needed in our educational institutions. The lack arises because of the high cost of licensed software, for which schools do not always have enough money to purchase. Web services provide protection of the computer (gadget) from unverified and often dangerous software.

Web services are paid for or free apps developed by programmers. Their potential is great and, at the same time, simple, everyone can work with them. They help in solving educational issues, form important competencies, demonstrate the creativity of the one who uses them. Web services are good, irreplaceable tools that a modern teacher should possess.

After analyzing the views of various authors, we suggest our own interpretation of the term. In our opinion, “web service” is a convenient, specific tool (application) that operates under the standard SOAP, REST, XML-RPC protocols, by which the user solves different kinds of tasks, runs on any device, and can embed it in his or her own website or blog.

Eastern wisdom says: “True innovations consist of interweaving three areas of creativity – plans for creating new products, creating new technologies and new approaches to marketing” (Akio Morita). Therefore, our study deals with the implementation of the results of teacher’s creativity for the organization of a productive learning environment of future professionals in the computer major.

According to the results of the survey, we have selected the most significant web services for the organization of the educational process. Our list includes web services different according to features, interface language, and type of work (online / offline), that we have applied for a specific purpose, namely: LearningApps, Online Test Pad – interactive exercises for verification and consolidation of knowledge; WordArt (Tagul) – for reviewing educational material; Online Test Pad, Master Test, ProProfs Quiz Maker – Testing; Bubbls, Mindomo – for creating mental maps, systematization of ideas, graphic summary, presentation of projects; Glogster EDU – for creating interactive projects, presentations and tasks; Google Apps for Work is a collaborative team work with tabular data, creating questionnaires, a place for storing works; Animoto – creation of videos, presentations; Diigo – active reading, storage of important sources; Blogger,

Eliademy, Wixsite – creating and hosting content (e-courses). All these applications are positively evaluated by both students and teachers.

Using Kirkpatrick’s Four-Level Training Evaluation Model, at the first, “reaction” level, we determine the attitude of the EG participants to the organization of training through web services. To assess it, we used the response forms that gave us an opportunity to evaluate the positive or negative attitudes of the students to organizing such a learning process. The questionnaire contained 8 open questions, among which there were issues with scales, where one should express one’s grade (“satisfactory”, “good”, “excellent”).

Having processed the results of the survey, a diagram was constructed (Fig. 1), where the approval of students is clearly observed.

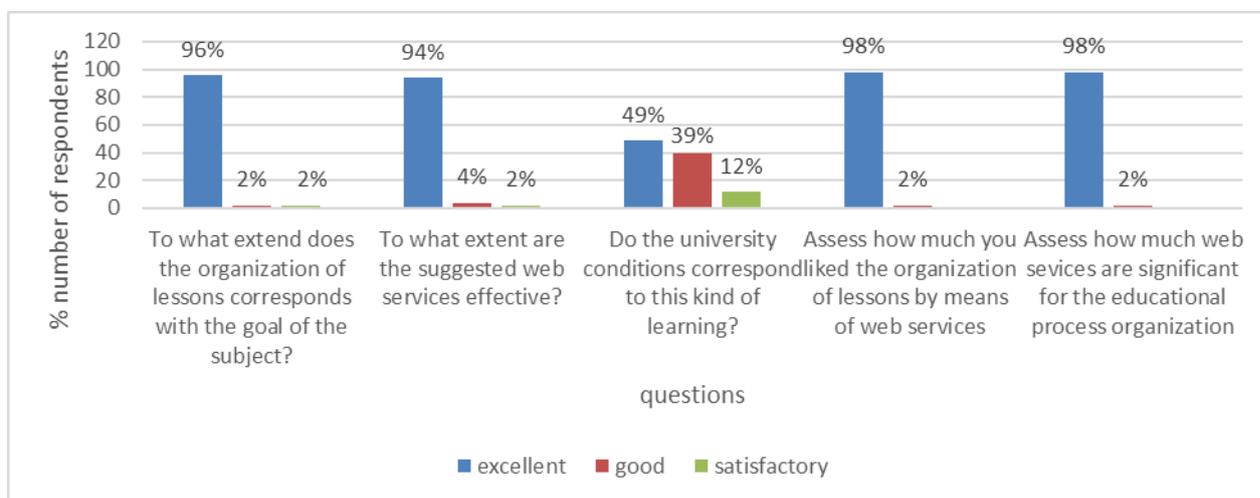


Fig. 1. Diagram of the EG Students’ Assessment of Indices of Response to the Educational Process Organization Using Web Services

Guided by the results, we can confirm the commitment and support of students to organize the educational process by means of web services. Such classes engage students, motivating them to study. The results of the students’ positive assessment gave us the opportunity to decide on the continuation of classes with the help of web services.

At the second level, called “learning”, the main task was to determine the level the students’ knowledge and

skills acquired through the proposed methodology (simultaneously with the help of web services, students learned to create their own electronic resources that were regarded as projects) in the educational process. To do this, we used testing forms and qualification maps. Qualification maps used a scale of assessments (3 - excellent use of skills, 2 - sufficient use, 1 - inability to use skills).

The results obtained are presented in the form of a diagram (Fig. 2).

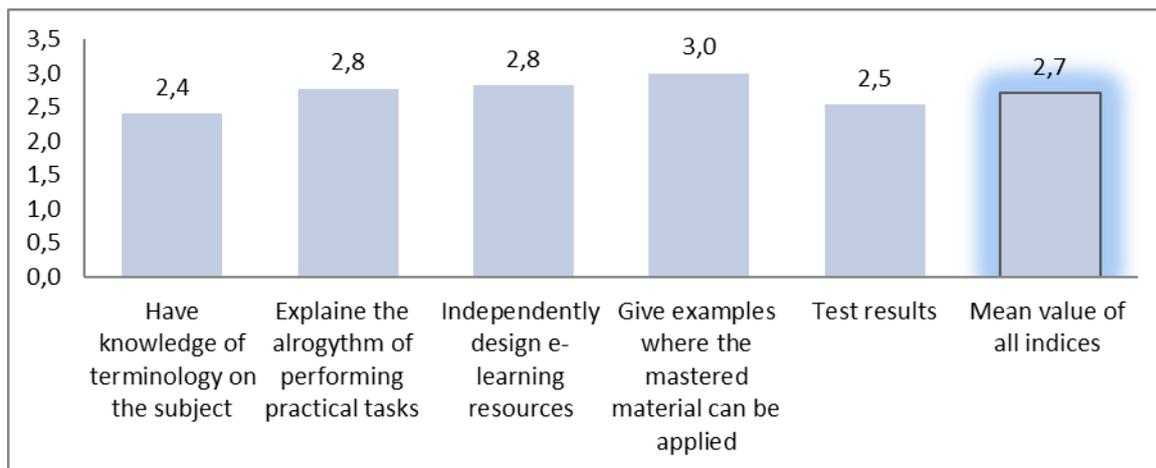


Fig. 2. Dynamics of Mean Values of Qualification Map (EG)

Consequently, at this level, good results of learning and improving the skills of students who have completed the course are observed. The obtained marks for the test – 2.5 (according to a three-point scale) – and other results of the processed qualification maps confirm the high significance of web services. They not only helped to improve the learning process, but also provided the opportunity to create a relaxed atmosphere for learning the material through the gaming environment.

The third level, called “behavior”, according to Kirkpatrick, is the most important and complex. At this level, an assessment of changes in the behavior of respondents after completing the study, is performed. Also,

it provides an opportunity to see the level of motivation of respondents and the relevance of the proposed methodology for organizing training using the proposed methodology. To find out the behavior of the respondents the following tools were applied: a survey of conduct, a checklist of practical projects, tasks, testing. The survey consisted of ten questions with a scale of assessment (I completely disagree, undecided, I fully agree). In order to compare the results, the test was conducted in two groups (control and experimental). The test took place after a slight pause, which gave an opportunity to adequately assess the behavior of the students. The obtained results are shown in Fig. 3.

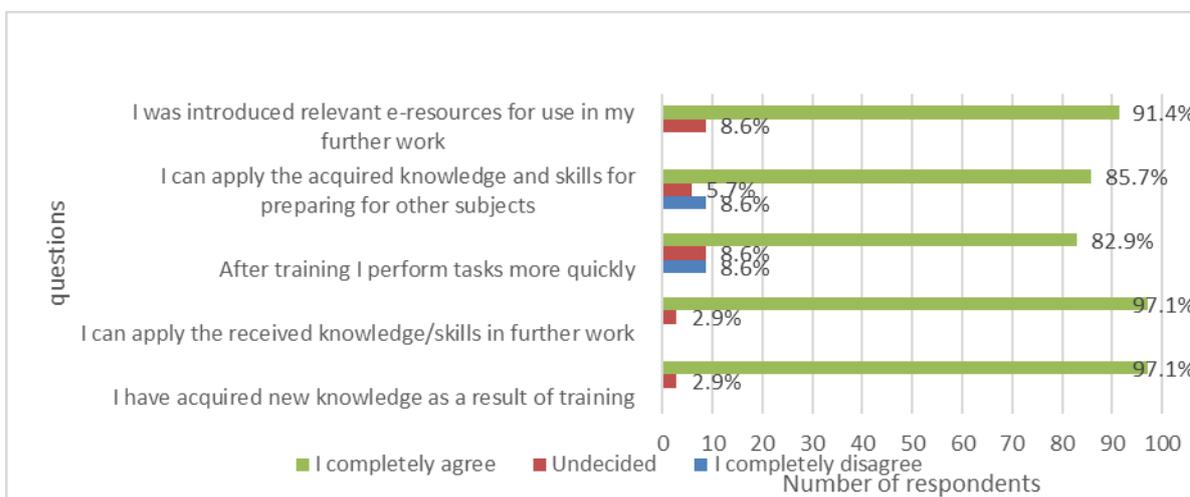


Fig 3. Diagram of the Assessment of Behavior Changes (EG)

It should be noted that only half of the survey questions is shown due to the limitedness of the paper, but this does not reduce the quality of the analysis of the data received. Therefore, we can make a conclusion about positive changes in the behavior of the participants after the training, which confirms the high percentage of the respondents (mean – 90.8%), who fully agree with the proposed teaching methodology. Also, analyzing students’ responses, we can say that the proposed method

can be easily adapted to other disciplines. The students used electronic resources development skills when having internship at secondary schools, where they applied them when conducting their first lessons.

In our opinion, the answers of the students to the question being assessed according to the three-point scale as well, are interesting for the general analysis. The results are presented by the mean values of the estimates. The statement “This kind of training has a significant

impact on” was assessed as follows: quality – 2; performance – 2; reduction of time expenditures for the preparation of printed teaching material – 2,5; increases motivation of students to study disciplines – 3.

In addition, a test was conducted in both groups. The average score according to the 100-point ECTS grading scale was decisive. Therefore, analyzing the obtained data after the conducted testing, it was found that in the CG the average score was 71, and in the EG – 84 points. Moreover, the high result obtained in the experimental group suggests the effectiveness of the proposed web services in the learning process, which motivates students to study.

The fourth level called “results” shows “to what degree, based on the results of the training, the intended results have been achieved” (Kirkpatrick, 2008). At this level, the effect of learning and its further development and use were estimated. Kirkpatrick states that in order to measure learning outcomes it is important that such systems of indicators are implemented in the organization. Therefore, the results can include only changes (improving the quality of education, high level of motivation to study the discipline) that arose after the study. Our task is to realize the expectations of interested students in the value of using web services in the organization of training.

As Kirkpatrick’s experience shows, for validation purposes, the evaluation should involve a control group, the reevaluation should be conducted in a certain period, before and after the introduction of certain components (web services) into the learning process, to conduct the assessment several times during the training. At this level, we used a final test that helped us to evaluate the results in both groups (CG and EG).

Having processed the results of the tests of the control and experimental groups, the individual assessments of every student were determined, after which the mean value of the assessments of all students was calculated. The average score in the control group was 74 points, and in the experimental group it was 86 points. The points were assigned according to a 100-point ECTS grading scale.

In general, the presented results are indicative of the effectiveness of the proposed methodology for organizing training with the help of web services. The students ap-

preciated the organization of classes by means of web services. They motivate, facilitate easier assimilation of the educational material, help to perform exercises in the gaming environment. In the course of the study, there was a competition among the students to create the best web resource.

At the end of the experiment, an explicit survey in the control group was conducted. Among the responds to the question “What is your attitude to organizing classes with web services?”, 97% were positive, and only 3% were doubtful about the effectiveness of the use of web services in education.

Conclusions

Based on the theoretical and empirical research, “web service” has been considered as a convenient, specific tool (application), which functions according to the standard SOAP, REST, XML-RPC protocols, with the help of which the user solves various tasks.

According to the results of the organization of studies by means of web services in the process of training future professionals we have selected effective ones that have had a good impact on students, increased their interest in studying, improved their performance, creativity, and logical thinking. Upgrading the organization of different classes will be effective if the teacher correctly selects applications that will be approved by the students.

Using the method of D. Kirkpatrick to verify the effectiveness of web services in the organization of the learning process, the reaction, knowledge of the material, behavior, and the result (learning effect) of the students were determined. The survey has shown the appreciation and support of web services by the students. The results have confirmed their productivity in the organization of classes, which increases the need to develop new web services for solving educational tasks.

Proceeding from this, we can note the achievement of the goal and the proof of the perspective of using the selected web services. They help to organize classes at a new level and provide an opportunity not only to study, but also to teach, solve various tasks.

Prospects for further research involve the creation of a web database to ensure the effectiveness of the educational process in the field of humanities.

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ОРГАНІЗАЦІЯ ЗАНЯТЬ ЗАВДЯКИ ВЕБ-СЕРВІСАМ В ПРОЦЕСІ ПРОФЕСІЙНОЇ ПІДГОТОВКИ МАЙБУТНІХ ФАХІВЦІВ

Метою дослідження є підбір ефективних веб-сервісів та обґрунтування їх продуктивності в організації навчального процесу. В дослідженні використано чотирьохрівневу модель оцінки ефективності навчання Дональда Кіркпатріка. Базою дослідження стали студенти Національного університету «Чернігівський колегіум» імені Т. Г. Шевченка. Загальна кількість учасників, які взяли участь в експерименті – 35 студентів. Головними інструментами дослідження є: анкета реагування, тест для оцінки засвоєння навчального матеріалу, лист перевірок вмінь, оглядова анкета поведінки, оглядовий лист проєктів, тест, контрольний тест. На основі аналізу літературних джерел уточнено сутність та зміст поняття «веб-сервіси», з якими користувач стикається щоденно. «Веб-сервіс» розглядається як зручний, специфічний інструмент (програма, додаток), що функціонує за стандартними протоколами SOAP, REST, XML-RPC, за сприяння якого користувач розв'язує різного роду завдання, запускає на будь-якому пристрої і може вбудовувати на свій власний сайт, блог. Здійснено підбір веб-сервісів, які дозволили модернізувати організацію заняття та стали у пригоді студентам (при проходженні практики). Описано організацію, реалізацію та аналіз результатів проведення навчальних занять за допомогою веб-сервісів, що позитивно вплинуло на професійну підготовку майбутніх фахівців комп'ютерного профілю. Модернізація організації різних занять буде ефективною, якщо викладач правильно зуміє підібрати додатки, які будуть схвалені студентами. Користуючись методикою Д. Кіркпатріка для перевірки ефективності веб-сервісів в організації навчального процесу, з'ясовано реакцію, знання матеріалу, поведінку та результат (ефект навчання) студентів. Проведене дослідження показало прихильність та підтримку студентами веб-сервісів, які мотивують їх та сприяють засвоєнню нової інформації. Отримані результати показали, що веб-сервіси покращують взаємодію між студентами та викладачем, сприяють оптимізації навчального процесу, саморозвитку, підвищують інтерес, творчу активність, цим самим надихаючи викладача розробляти нові інструменти та розширювати діапазони їх застосування.

Ключові слова: е-навчання, веб-сервіси, електронні інструменти, студенти комп'ютерного профілю, організація занять.

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