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The Importance of E-Learning for Homework Assignments in Islamic Religious Instruction in Primary Schools

Fadil Novalić[1], Mevljuda Novalić[2], Muzafer Saračević[1] and Emruš Azizović[1]
[1]*Department of Computer Science, University of Novi Pazar*
[2]*Jovan Jovanović Zmaj Primary School in Novi Pazar*

Abstract

Since the teaching content of Islamic religious instruction contains elements of a foreign language and description of rituals, in the learning process a counselor is essential. The question arises regarding the possibilities of learning this content with the use of information technology during students' homework assignments. The study was conducted with primary school pupils in "Jovan Jovanović Zmaj" Primary School in Novi Pazar. The possibilities of using electronic materials by students were examined and it has been concluded that electronic materials would be best used when creating the form of static Web pages with text and graphics, as well as audio and video recordings. The influence of e-learning was examined with two groups of students who have equal school success. One group was taught the lessons and did their homework using the traditional methods of learning, while the other group used electronic learning. All students were graded in several aspects of the homework they had done and the scores were compared. It was revealed that better success was achieved by students who had used electronic material. The conclusion is that e-learning has a positive impact on the development of homework tasks in Islamic religious instruction in primary schools.

Key words: *education; e-lessons; e-learning; evaluation; website.*

Introduction

Throughout the history of education, innovations have been continuously introduced as well as the use of new technologies. In today's era of information technology they are increasingly gaining in importance in the learning process and

are used in all branches of science. Islamic religious education is also an important area of science in society, which proves the existence of educational institutions of all levels of religious denomination. The significance of Islamic religious education is also increased by the fact that in Serbia, as well as in some other European countries, it was introduced as a subject in public elementary and secondary schools. Therefore, there is no doubt that research on the possibilities of improving the learning of Islamic religious education by using information technology is significant.

The term "electronic learning" is now one of the most frequently used phrase in the process of modernization of education in the world. Different definitions of electronic learning have been used. By the definition of the ASTD (*American Society for Trainers and Development*), e-learning is a methodology used to deliver or enable the instructional content or learning experience by the use of electronic technology (Glušac, 2012, p. 5).

E-learning can be defined as application of information and communication technologies (ICT) in education. E-learning or distance education implies that the main carrier of communication between the teacher and the student is separation (at different times and in different places-the physical distance between the instructor/tutor and the student). It must include a two-way communication between teachers and students that aims to facilitate and support the process of education. Technology is used as an intermediary in the necessary two-way communication (Saračević, Mašović, Međedović, & Hadžiahmetović, 2011).

A distinction has to be made between e-learning and distance learning. Distance learning is one aspect of e-learning. The curricula to be implemented remotely by using educational technology are defined as classes or distance learning. In the most general sense, it is the process of creating and providing opportunities for access to the process of teaching of those students who do not have time or spatial access to the sources of educational information (LINKgroup, 2012, p. 87). Electronic learning covers some other forms of learning, such as learning by using discs with multimedia content, learning by reading electronic lessons, taking tests to check knowledge on the computer, etc.

For our topic the body of research on e-learning in teaching foreign languages is interesting, given that religious instruction contains many elements of the Arabic language. According to the existing literature, three most important areas in which e-learning has an impact on the teaching of foreign languages are: developing basic skills, motivation and the opportunity to learn a foreign language outside the educational institution.

Information and communication technologies (ICT) on which e-learning is based support and develop listening skills, comprehension, discussion and writing in a foreign language. The digital video is an effective way to support the teaching of a foreign language. Video conferencing is particularly important for developing listening skills and conversation. Particularly significant is the use of multimedia applications, such as interactive educational software, CD dictionaries etc. (Ristić, 2006, p. 108).

The development of ICT has caused the emergence of new technologies for the distribution of e-learning materials, as well as support and evaluation of learning based on Computer Assisted Learning (CAL).

Riahi (2015) concludes in his paper that the Internet is a place which makes education available to its users, as well as the application of educational software. With the rapid growth of the Cloud computing architecture usage, the focus has shifted from investment in platform and system development to learning techniques.

Masud and Huang (2012) point out in their paper that e-learning systems usually require many hardware and software resources, and conclude that Cloud computing technologies have changed the way applications are developed and accessed. Therefore, an E-learning system based on Cloud computing architecture is feasible and it can greatly improve the efficiency of investment and the power of management, which can make E-learning system development a virtuous circle and achieve a win-win situation for suppliers and customers.

Computer Assisted Learning is an educational method which uses computers as an environment in which learning occurs, which enhances the learning period and pupils' motivation, and can be useful for pupils because of their different learning speed. This educational method has been formed by combining computer technology and one's own learning principles (Hancer & Tüzeman, 2008).

Pedagogical Aspects of E-Learning

From the point of view of pedagogy, the question is: What kind of changes can the concept of learning that is based on the latest technology bring? Answers to this question are complex and can be systematized as follows:

- Flexibility, observed through temporal and spatial dimension of attending the lectures;
- FChanges in the level of interaction (student-student and student-teacher). To make the learning process based on modern technologies effective, it is necessary to provide some basic forms of communication, such as communication through discussion forums, e-mail and audio communication, as well as a wide range of other technologies that encourage interaction;
- FAn individual approach to students. It can be said that modern technologies in the educational process enable a higher degree of individualization of the learning process (LINKgroup, 2012, p. 86).

In the case of e-learning in Islamic religious studies, applied for the purposes of this study, the learning material representing e-lessons is in the form of static Web page content distributed via CDs or materials on Cloud Storage Service. The students are enabled individual learning at home, which is flexible in terms of time.

The issue of the teachers' competence in the process of e-learning can also be raised. The basic structure of the teachers' competence for e-learning, given the complexity of the teaching profession and the requirement to be independent in the creation of the

teaching process, requires from him/her to be competent to apply e-learning content in the framework of e-teaching system (teacher as an instructor and tutor) and to create appropriate e-learning content. The use of content requires the following teacher's activities: managing the process of learning, supporting the process of learning and reflection, communication with students, the integration of e-learning content and ICT support. Creating e-learning content requires the following teacher activities: preparation for the design and content of the course (task analysis, etc.), modeling lessons and teaching strategies, preparing information and technological basics of e-learning, preparing appropriate documentation and integrating elements of online teaching procedures in e-classes (Bjekić, Krneta, & Milošević, 2008, p. 14).

Specifically in our example of e-learning, the teacher of religious education can perform all the activities required by the application and can be included in the activities that require creation of e-materials, while for web design activities the involvement of an expert will be necessary. Once created, the material can be used permanently, as it is a static Web page and does not need to be updated through the duration of the course.

The emergence of information technology requires new forms of interaction between students and teachers. The teacher is the main carrier of the innovation application in the teaching area and (s)he presents this innovation to students. A new era requires a new strategy in the organization of the teaching process, and management of this process should be considered interdisciplinary, taking into consideration cybernetics, communication theory, new theories of learning, didactic doctrine of students' individual and research work, etc. (Selimović & Tomić, 2011, pp. 335-337).

The Peculiarity of Islamic Religious Education

The subject Religious Education was restored in primary and secondary schools in Serbia in 2001, after more than five decades of its abolition (RTS, 2011). The Islamic Community of Sandžak, as a religious institution of the Muslims in Serbia and Montenegro, has created a curriculum for Islamic religious instruction for one lesson per week, or 36 lessons per school year. Most classes are formed as lectures and the revision is performed by students through homework assignments. The elements of Islamic Religious Education lessons are theory, instructive stories and poems, prayers and reciting parts of the Quran by heart in Arabic, learning to perform rituals and performance of devotional songs.

Here we will explain some terms that are common in the field of Islamic studies and we will use them in the further text. A prayer in Islam is called *da'wa*. Sentences or parts of sentences, which are numbered in the Quran, are *verses*. Reciting or melodic singing of da'wa and verses is referred to as *reciting prayers and verses*. The term *learning* is used for singing devotional songs, called *ilahije* and *kaside*. Ilahije are dedicated to the glorification of God, and kaside speak about the virtues of Prophet Muhammad, may God's blessings and peace be upon him.

Parts of lessons such as learning da'wa and Quranic verses, performing rituals and learning Islamic spiritual songs, require professional assistance. In order to acquire lesson content fully, it is necessary that, in addition to the material covered in school, students study further at home, i.e. to do their homework. In cases where they cannot count on the help of the elderly who have the knowledge of the religious practices, they are forced to learn from printed books. This may cause erroneously learned prayers, verses and rituals. And when learning Islamic spiritual songs one should know the correct melody. In all this, video and audio materials could be helpful.

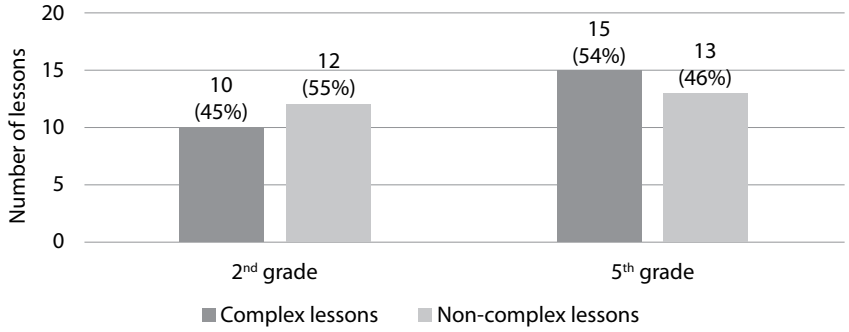
Lesson Analysis

There is a question of the number of Islamic religious education elements that cannot be independently learned in the entire curricula of Islamic religion. For the purposes of this study two curricula were selected for the second and the fifth grade of primary school. Having reviewed the lessons, it was found how many lessons contain the aforementioned elements and the manner in which the lessons contain each of these elements. These lessons are called complex, in order to facilitate tabular and graphical presentation. The results can be presented in a table and a graph:

Table 1

Number of lessons with elements that cannot be learned without tutors

	Number of lessons to be conducted	Number of lessons that contain complex elements				Number of complex lessons	Number of non-complex lessons
		Prayers	Verses	Rites	Islamic spiritual songs		
2nd grade	22	7	5	2	2	10	12
5th grade	28	9	10	8	0	15	13



Graph 1. The ratio of complex lessons and those that are not complex

The analysis of the lessons revealed a great number of lessons in which the material being covered requires the presence of religious education teacher. In the second grade the number of such lessons is 10 (or 45%) of the total number of lessons, while the number of lessons that can be learned by independent use of textbooks is 12 (or 55%).

In the fifth grade, the number of complex lessons is 15 (or 54%), and the number of lessons that are not complex is 13 (or 46%). This implies that one can expect a positive effect of the use of electronic learning materials which would replace the person helping the students learn at home, i.e. doing Islamic religion homework.

For the purposes of this study two complex lessons were selected – one for second - and one for fifth-graders. The lesson for the second grade includes prayer, explanation of the rituals of religious purification (ablution) and spiritual songs, while the lesson for the fifth grade contains prayers, verses and explanation of the ritual – *namaz (Prayer, ar. Salah)*.

Creating Materials for E-Learning

The material for e-learning can be graphic and multimedia resources, Web page, CD, DVD, material on Cloud Storage Service etc., and is referred to as the object of learning.

The objects of learning should exhibit the following characteristics:

– Possibility of reuse – teaching content that represents a module composed of smaller teaching units should be suitable for breaking down into smaller units and inclusion into other courses;

– Interoperability – objects of learning can be exchanged regardless of the system of learning which is being used and regardless of who their author is;

– Durability – objects of learning remain useful regardless of the future ways of sharing and presenting;

– Accessibility – objects of learning are available anywhere, at any time and can be easily found online (Brković & Milošević, 2005, p. 84).

The material for e-learning can be shared with students via all types of electronic media, including computers, the Internet, satellite broadcasting, audio and video tapes, interactive television, CD -ROMs or DVDs, etc. (Stankov, Grubišic, Žitko, & Krpan, 2005).

Given the increasing popularity of the Internet, electronic lessons are written in the form of Web pages. The research requires a comparison of the grades given for homework assignments to students using textbooks and to those using e-materials. Web pages with lessons have content which can be found in the textbooks, supplemented by audio and video recordings and tests with the possibility of checking the accuracy of answers.

Information Technology Used to Create E-Materials

Audio recordings used in the lessons are in *mp3 format*, while the video recordings are in *mp4 format*. Some have been downloaded from the Internet, where they were made public. For the creation of other e-materials *Camtasia Studio* program is used, which allows easy creation of video recordings even for those who are not professionals, enabling video import from digital cameras, recording of the actions

on the computer in the form of a video and voice recording with a microphone (TechSmith, 2014). Camtasia allows export of audio and video materials in different formats, including MP3 and MP4, as well as CD, DVD, HD and many other media.

The web pages are made in HTML and CSS technologies.

HTML indicates an abbreviation of the English words Hyper Text Markup Language and it is the official language of web pages, known as "hypertext marker language". HTML is not a computer programming language. It is a marker language, which sets guidelines or codes (tags) about the text so that the Internet search machine knows how to display specific text on the screen (Hill & Brannan, 2011, p. 1). In this way, the Web page defines headings, paragraphs, tables, images, audio and video recordings, links and other elements.

The content of the e-material used in this study consists of text, images, audio and video recordings and knowledge assessment tests. The web browsers display all the elements that are clear to the users through interpreting the HTML side code.

Preparation for prayer (Ablution)

Say Bismillah and wash hands from behind the palm

Wash mouth

Figure 1 Display of images on web page

Figure 2 Display of video elements

Figure 3 Display of text and audio elements

What can be a problem when reviewing materials are the tags that define the audio and video files. The problems mainly relate to what file format is supported by the web browser.

There are some rules we should be aware of related to displaying audio files on the Internet sites in order to be broadcast in all browsers (Internet Explorer, Chrome, Firefox, Safari, Opera) and on various devices (PC, Mac, iPad, iPhone). The sound is an external, non-html element in HTML pages. If the sound file format is not supported by the web browser, then it is necessary to install a plug-in that will broadcast the sound. The *plug-in* is a small computer program which extends the functionality of a web browser. The tags in the HTML page for audio files of the mp3 format are <embed> and <object>. Here is what the codes for these tags look like:

```
<embed height=”50” width=”100” src=”sound.mp3”>
<object height=”50” width=”100” data=”sound.mp3”></object>.
```

When using these tags the sound will not be reproduced if the browser does not support *mp3* file format. In this case, the sound can be reproduced by using plug-ins. If the necessary plug-in has not been installed on the computer, the audio file will not be broadcast.

In the HTML5 version there is <audio> tag which defines the sound files. It works in all modern browsers. The following code example shows the use of tags to display *mp3* files in Internet Explorer, Chrome, Firefox 21+, and Safari browsers, and the *ogg* file in earlier versions of Firefox and Opera. If an error occurs, a text message will appear:

```
<audio controls>
        <source src=”sound.mp3” type=”audio/mpeg”>
        <source src=”sound.ogg” type=”audio/ogg”>
        Your browser does not support this audio format.
</audio>
```

When using <audio> tag, a problem can be that it does not work in older browsers and it is necessary to convert the files to *ogg* format (w3schools, HTML Sounds, 2014).

When creating our materials for e-learning, the audio elements are defined in a way which W3School (www.w3schools.com, HTML Sounds, 2014) presents as the best option. It combines <embed> and <audio> tags. The conversion of audio files in the *ogg* format was performed using an online audio converter on media.io. Sound files are in the *audio* folder and they are of *mp3* and *ogg* type. The following is a display of an audio file within HTML side that is a part of our e-material:

```
<audio controls height=”100” width=”100”>
        <source src=”audio/dove.mp3” type=”audio/mpeg”>
        <source src=”audio/dove.ogg” type=”audio/ogg”>
        <embed height=”50” width=”100” src=”audio/dove.mp3”>
</audio>
```

This way of defining sound within the HTML side has a disadvantage - <embed> tag cannot return an error message. The code gives display of the audio player on the web page, which allows for the control of the sound playback (Figure 3).

In a similar way, the video files are placed into the HTML side. The most commonly used formats of video files are: *mp4*, *flv* and *swf*. And for them the tags <embed> and <object>are used:

```
<embed src=”movie.mp4” height=”200” width=”200”>
<object data=”movie.mp4” height=”200” width=”200”></object>
```

Problem that can cause inability of viewing videos embedded in the HTML side by using these two tags is that there is no support for the video formats by some web browsers and iPad and iPhone devices (w3schools, HTML Videos, 2014).

In the HTML5 technology there is <video> tag. It works in all modern web browsers and supports the *ogg* video files format for earlier versions of the browser.

```
<video width=”320” height=”240” controls>
        <source src=”movie.mp4” type=”video/mp4”>
        <source src=”movie.ogg” type=”video/ogg”>
        Your browser does not support this video element.
</video>
```

This code will return a message if the video format is not supported by the browser. Its disadvantages are that it does not work in earlier versions of the browser, and the need for converting video files into *ogg* format.

W3School and video files suggests the best solution that combines <video>, <object> and <embed> tags (w3schools, HTML Videos, 2014). Here is an example of inserting a single video in an HTML page in our electronic material that shows the manner of a prayer (namaz):

```
<video width=”750” height=”439” controls>
        <source src=”videos/namaz.mp4” type=”video/mp4”>
        <source src=”videos/namaz.mp4” type=”video/mp4”>
        <source src=”videos/namaz.ogg” type=”video/ogg”>
        <object data=”videos/namaz.mp4” width=”750” height=”439”>
        <embed src=” videos/namaz.swf” width=”750” height=”439”>
        </object>
</video>
```

The drawback of this solution is the need to convert a large number of files into *ogg* and *swf* video formats.

CSS is a Cascading Style Sheets. The main purpose of CSS is to allow the designer to define the style declaration (the details of the formation such as font, size and color elements), and to apply these styles to specific parts of the HTML page using selectors - references to an element or group of elements for whom the style is designed (Andrew, 2007, p. 1).

In creating our e-materials, CSS has commonly been used to define the layout of the text, i.e. the font. Here is an example:

```
<style type=”text/css”>
p {font-family:Arial, Helvetica, sans-serif; font-size:14px}
</style>
```

This code sets the font style for all paragraphs (<p> tag) in the HTML page.

Question Writer HTML5 is a software tool for creating tests for the purpose of checking the knowledge acquired through the use of e-lessons. It can be downloaded from the Web site www.questionwriter.com, at a great price, and there is a trial period of 30 days for the free use of the program.

The test is a diagnostic method for verifying the knowledge and skills of students which can be employed in order to provide feedback to the student or his mentor regarding the achieved level of competences (LINKgroup, 2012, p. 170).

Tests created within the framework of our e-lessons are intended for self-testing of students, to help them make learning more interesting. The possibility of self-tests where you do not need others to present the results of the test can be repeated many times, which increases the motivation to learn. In Question Writer HTML5 different types of questions can be set: Multiple Choice & Multiple Response, True/False, Matching, Sequencing, Fill The Blank and essays. The program also provides feedback on accurate and inaccurate responses. Resolving the test can be repeated without limit. Tests created in this program can be in the form of an exported web page. Their merger to the parties that represent e-lessons can be done by linking the initial test or by inserting the source code in the HTML test page of the e-lessons.

Technologies that are used to make an autorun file are also necessary when creating e-materials, since CDs, as portable media, are used for distribution. An autorun file automatically opens the web site home page when the computer reads the disc inserted in the CD. To make this happen, it is necessary to have on the CD an *autorun.inf* file that contains the command to run an executive file, with the extension *exe*, i.e. the applications:

```
[autorun]
OPEN=”autorun.exe”
ICON=book.ico
```

Launching an application is achieved by using OPEN. ICON command determines which frames will be taken for the icon when viewing the CD in My Computer. Using the *autorun.inf* file HTML page cannot be opened, but only the executive file. Therefore, it is necessary to make an executable file that will automatically open the HTML side and close itself. This can be done using any programming language. We have chosen *Delphi 7*. It can build applications that run under Windows operating system, and are displayed in the form of a window. The code that allows web pages' automatic start and closing of the exe file is executed when the window of Delphi application appears, i.e. on the *FormShow event*:

```
procedure TForm1.FormShow(Sender: TObject);
begin
    ShellExecute(handle,'open',PChar('index.html'), '','',SW_SHOWNORMAL);
    Close;
end;
```

Hardware and Software Requirements for the Use of E-Materials

Distribution of materials for e-learning in modern times in most cases takes place on the Internet. In our case, the e-material is created as a web page using technologies that do not require services of a server. Web pages should replace printed textbook and will contain text and images. In addition, they can be supplemented by audio and video recordings allowing students to be able to see the rituals and demonstrate the correct pronunciation of the elements of the Arabic language. All these elements of the web page are executed on the client side, i.e. in the web browser. This reduces the need for complex hardware and software resources in the use of e-materials. All requests boil down to the fact that the device used for viewing e-lessons has a web browser installed. Devices such as PC, Mac, iPad and iPhone are most widely used for viewing web pages today.

During the research, electronic material was distributed to students via CD or Material on Cloud Storage. All students who have been selected for the research have a PC at home with Windows operating system and at least one web browser. The oldest version of the operating system the authors have come across working on computers at the time of the research was Windows XP, and it contained Internet Explorer web browser. To install Windows XP, according to the official technical specification prescribed by experts from Microsoft, the PC must have the following minimal performances:

Memory: 64 MB (preferably 128 MB or more)
Processor: Pentium 233 MHz or compatible processor;
Hard disk: Disk capacity of 2 GB or more with at least 650 MB of available disk space
VGA monitor, keyboard, mouse, CD or DVD (Alan & Brian, 2014).

Hence, the *minimum hardware requirement* for the use of e-materials on a personal computer is that the student has a computer on which it is possible to install Windows XP. The *minimum software requirement* for the computer is to have an installed operating system and a web browser. These are the requirements met by almost all students in Serbia, which can be concluded from the interviews with students and parents.

Methodology

Aims of the Research

The primary aim of the research was to compare (by grade) the success of homework done by both groups of students. Besides that, the aim of the research was to determine

how many students are successful in reviewing electronic materials and whether they need help from the elders. By analyzing the scores, information on improving success in homework assignments using e-learning materials will be obtained.

Methods

The survey was conducted with students of the second and fifth grade from the "Jovan Jovanović Zmaj» Primary School in Novi Pazar, Serbia. For each class two groups of 25 students were formed, representing a total of 100 students. These groups had the same number of students with the same level of knowledge, i.e. with the same grades in the subject Islamic Religious Education. In each class one group used e-learning materials and for the purposes of this article we will name it a *group for e-learning*, and the second group learned using textbooks, and we will name it *traditional group*. All students in both groups had the necessary conditions for using computers for studying at home. There was one lesson selected for both classes and conducted with the aid of textbook. Everyone was given the same homework assignment. One group of second-graders and one group of fifth-graders were shown a way of reviewing lessons using CDs or Material on Cloud Storage, and they all got discs with electronic materials. They were instructed to do their homework using a computer. Students who were not given the electronic learning material did their homework using printed textbooks.

The success of students in Islamic religious instruction was evaluated across three levels of knowledge, i.e., with the following descriptors, from the lowest to the highest: outstanding, good and satisfactory. In order to conduct more detailed analysis of success in homework, the completed homework, which is the subject of research, was evaluated using grades from 1 to 5. Five is the highest and 1 the lowest grade. Islamic religious education teacher of these students had an extra lesson with each group during which homework was graded. Descriptive and numerical evaluations have their advantages and disadvantages. Numerous tests, carried out in the world and in our country, have shown that multistage scale encourages and motivates students towards greater success, greater dedication to work and learning. For the numerical evaluation we can say that it is global, because it is trying to cover all the values acquired by the pupil. At the same time, this is the weakness of this assessment method, as the numerical symbol (success) serves as a generalized indicator of the value of students' knowledge. Descriptive assessment evaluates individual components of the student's personality. This means that besides the amount of acquired knowledge it is evaluating the quality of the acquired knowledge, comprehension of the acquired facts and generalizations and the ability to apply this knowledge in new situations and practices in general (Kačapor, Vilotijević, & Kundačina, 2005, pp. 51-52). We have made a combination of descriptive and numerical evaluation, by which we have created the possibility to rate several elements of the acquired knowledge individually on a five-level scale.

Aspects of the Research

The first aspect: Analysis of the performance of finding lessons in the book, reviewing e-lessons from the CD or Material on Cloud Storage and the need for aid in learning by adults.

The second aspect: Comparative analysis of students' homework done by using the traditional way and using e-learning.

Sample: 50 students from grade 2 and 50 students from grade 5, from "J. J. Zmaj" Primary School in Novi Pazar.

Methods: Survey, Comparative and analytical methods.

Period of the survey implementation: February 2014.

The layout of the survey list:

For students who used the textbook:

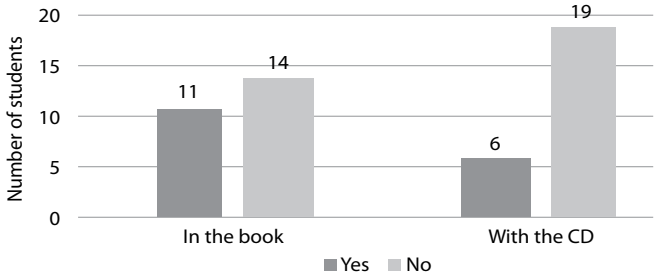
1. Did you manage to find the lesson in the book?
2. Did you need help from some of the elders while learning?

For students who used CD or Material on Cloud Storage:

1. Were you able to open the lesson in the e-materials?
2. Did you need help from some of the elders while learning?

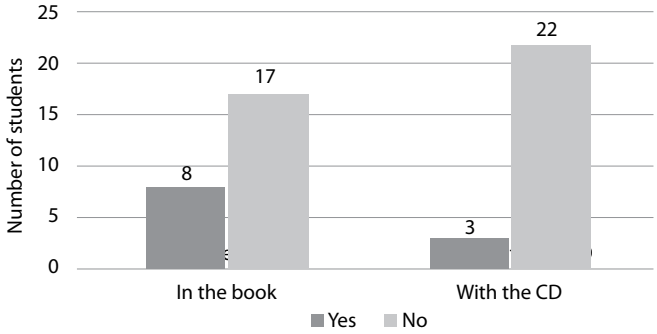
Results

The first aspect: All students managed to find the lesson in the book or to open e-lessons. Some of them needed aid from the elders. Of great importance is the data on the number of students who needed aid from the elders while learning and comparison by groups. This research is presented in the following two graphs, for grade 2 and grade 5 of primary school, respectively.



Graph 2. Aid of elders during learning; second-graders

Analysis of the survey results shows that there is larger number of students who need aid while learning from textbooks than the number of those who need aid while learning from e-materials. This number is lower with older students. The number of students who need aid while learning from textbooks is 11 in grade 2, which is 44%, and 8 in grade 5, which is 32%. The number of those who need aid while learning from e-materials is 6 in grade 2 (24%), and only 3 in grade 5 (12%).



Graph 3. Aid of elders during learning; fifth-graders

The second aspect: The analysis of the students' success was carried out by comparing the grades given to students for their homework (all students have similar level of knowledge, but one group used traditional method with textbooks, while the other group used e-materials).

The elements which were assessed were:

A) correct pronunciation of prayers and verses in Arabic learned by heart;

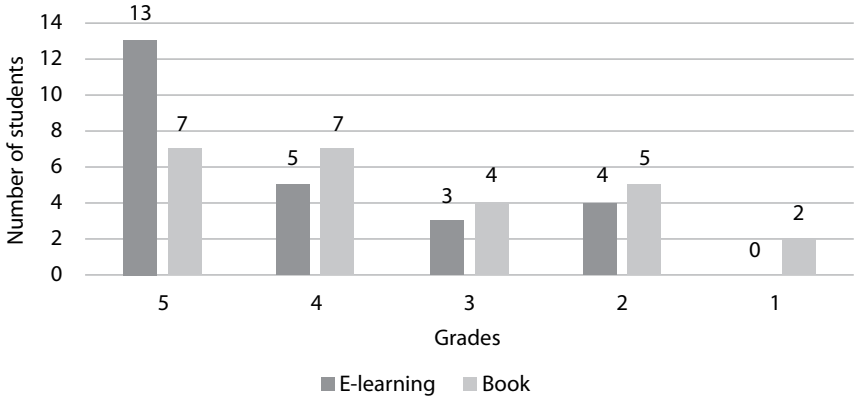
B) correct performance of rituals;

C) melodic performance of Islamic spiritual songs;

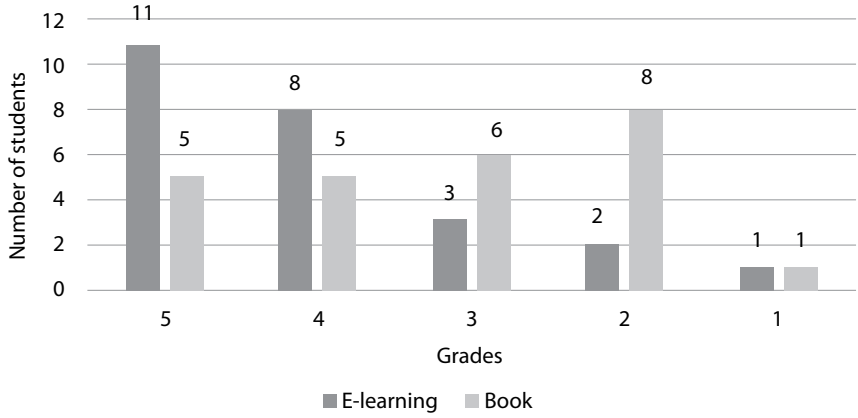
D) the average score for the first three elements was calculated.

The segments were chosen in such a way that they can present the effect of e-learning on homework assignments. The lesson for grade 2 contains all of the above mentioned elements, while the lesson for grade 5 does not contain any spiritual songs.

A) Analysis of the success achieved in the correct pronunciation of prayers and verses in Arabic



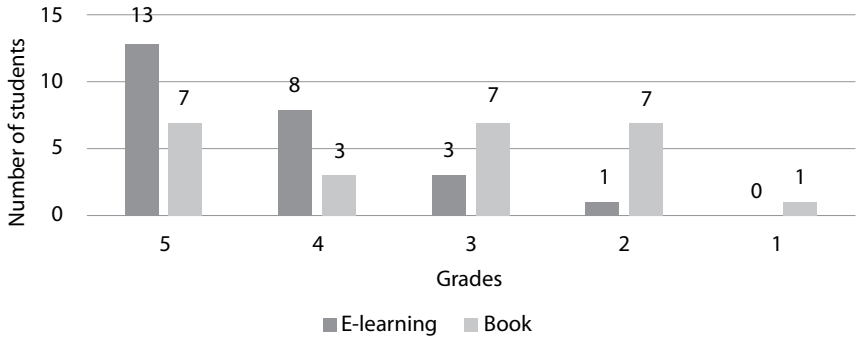
Graph 4. The actual success of grade 2 students in learning prayers and verses



Graph 5. The actual success of grade 5 students in learning prayers and verses

By analyzing the scores in the accuracy of learning prayers and verses in Arabic we obtained information on the relationship between the number of students of all grades who have used e-materials and those who have learned from textbooks. The number of students with the same scores in both groups is approximate. In both grades there are more students with grade 5 in the group which was using e-learning. Also, the average score on the accuracy of learning prayers and verses in Arabic is greater in the second and fifth grade in the group that used e-learning. In grade 2, the average score was 4.08 in the e-learning group, and 3.48 in the traditional group. In grade 5 the e-learning group had an average grade 4.04, and the traditional group 3.20.

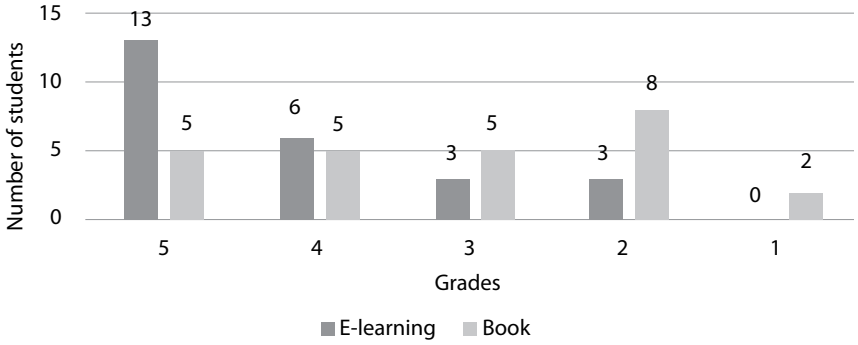
B) Analysis of the success achieved in the correct performance of rituals



Graph 6. The actual success of grade 2 students in performing rituals

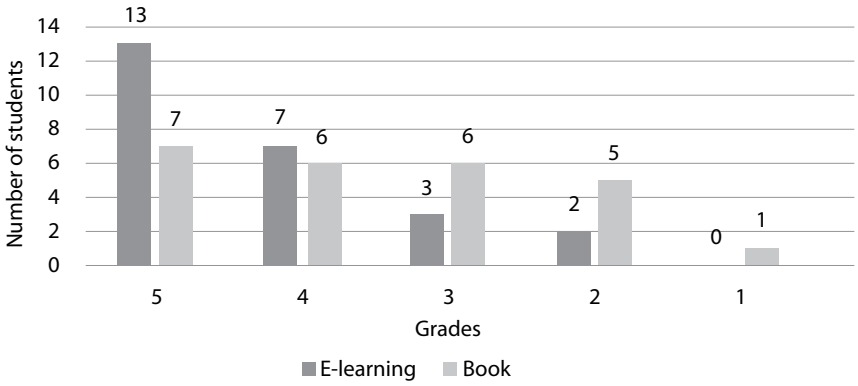
Analysis of the score obtained for the accurate performance of rituals shows that there are more excellent students in the e-learning group than in the traditional group. The number of negative grades is low in the traditional group, and in the e-learning group there are no negative grades, which is interesting. The average scores were

higher for both grades in the e-learning group - 4.32 in grade 2 and 4.16 in grade 5. In the traditional group the average score in grade 2 was 3.32, and in grade 5 it was 3.12.



Graph 7. The actual success of grade 5students in performing rituals

C) Analysis of the achieved success in learning Islamic spiritual songs

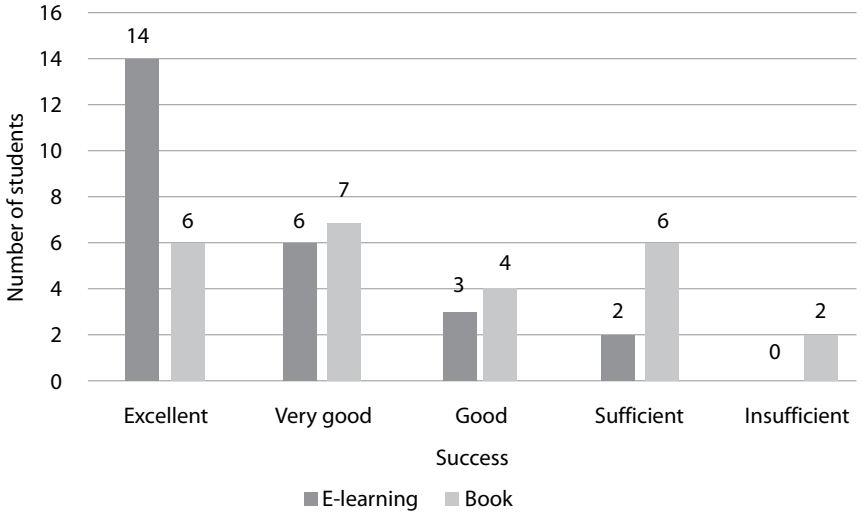


Graph 8. The actual success of grade 2 students in learning Islamic spiritual songs

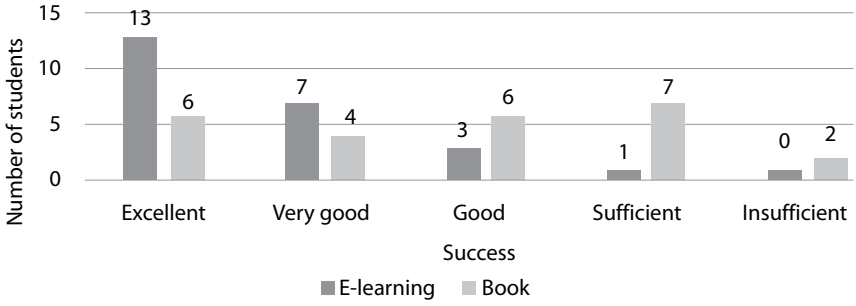
Analysis of the ratings given to learning Islamic spiritual songs shows that the e-learning group has more excellent grades and no negative grades. The average score in the e-learning group is very high, 4.24 and in the traditional group it is 3.52, which is also a high score.

D) Analysis of the average score of students per grade and groups

If we calculate the average score for each student, as the arithmetic mean score obtained for the individual elements of the lesson, we will have information on the number of students with excellent, very good, good, sufficient and insufficient grades, by classes and groups. Low success is achieved by a student who has at least one negative grade on some of the elements assessed, regardless of the average score.



Graph 9. The performance of grade 2 students by groups



Graph 10. The performance of grade 5 students by groups

Analyzing the students' performance on the basis of the average score of each student in the group, we can see that in the e-learning group there are several excellent and very good students and fewer of those with insufficient success, in both grades. Based on the average students' score, rounded up to whole values, we can calculate the *average score for each group individually*. In the e-learning group in grade 2, the average score was 4.28, while in the traditional group it was 3.36. In grade 5, the average score in the e-learning group was 4.20, while in the traditional group it was 3.20. The average score per group was higher in the e-learning group, in both grades.

Discussion

All surveys conducted and described in this paper have a purpose. The analysis of research results related to the need for aid in learning by elders shows that there is a significant number of those who need aid in learning in the traditional way, especially at a younger age, and that this number is reduced with the use of e-learning materials

to a large extent (see Graphs 2 and 3), although it cannot be completely disregarded.

By analyzing the ratings given to certain lesson elements it can be concluded that there has been better success in homework with students from the e-learning group. The success depends on the complexity of the material regardless of the group. Progress has been made in learning the elements that are in Arabic (see Graphs 4 and 5), it was slightly better in learning the proper performance of rituals (see Graphs 6 and 7), and it was best in learning Islamic spiritual songs (Graph 8). By using e-materials for homework, the students were able to achieve a greater score, and to reduce the number of negative ones. When learning the proper performance of rituals and learning Islamic spiritual songs in e-learning groups of 25 students from grades 2 and 5 there were no negative ratings at all.

By using e-materials there is an increase in the number of students with excellent and very good average scores in the subject Islamic Religious Education, as well as a reduced number of students with negative ratings, in comparison with the group of students who did their homework using printed textbooks. There have also been improvements of the average score of e-learning group over the traditional groups in both grades (see Graph 8 and 9). A higher average was achieved by the e-learning group from grade 2 than the group from grade 5. But in grade 2 even the traditional group had a better average rating than the traditional group from grade 5. It can be concluded that the use of e-materials will improve success in the group regardless of its previous way of learning (traditional or e-learning).

Test of Statistical Significance of the Obtained Differences

The statistical significance of the obtained differences will be tested using the t-test. The statistical data are presented in Table 2, where N is the number of students per group, M is the arithmetic mean and σ is standard deviation.

Table 2
Statistical data

Group	N	M	σ
	grade 2		
E-learning (Group 1)	25	4.28	0.94
Traditional (Group 2)	25	3.36	1.19
	grade 5		
E-learning (Group 1)	25	4.20	1.05
Traditional (Group 2)	25	3.20	1.22

The zero hypothesis H_0: There is no difference between the success in homework assignments achieved by the students from the group taught in the traditional way and those who have used e-learning; i.e., the difference between some of the same statistical indicators is equal to zero. This means that the difference between the same types of statistical indicators determined on the sample occurred by chance and that it cannot be generalized to the basic set.

T-test calculation for grade 2 groups of students will be presented. Standard deviations of the arithmetic mean $SE_M=\frac{\sigma}{\sqrt{N-1}}$ for both groups are SE_{M_1}=0.19 and SE_{M_2}=0.24. The standard error of the difference between two arithmetic means $SE_{D_M}=\sqrt{SE_{M_1}^2+SE_{M_2}^2}$ is 0.31. The difference between two arithmetic means of the absolute value $D_M=|M_1-M_2|$ is 0.92. Finally, the value of t-test is $t=\frac{D_M}{SE_{D_M}}=2.97$.

In the same way as it has been shown above for grade 2, t-test for grade 5 was calculated. In this case t is 3.03.

On the basis of statistical tables with limit t-values, it can be calculated that for the number of degrees of freedom $df=N_1+N_2-2=48$ the value is *2.02* on the level of significance of *.05* and *2.71* on the level of significance of *.01* (Kundačina & Banđur, 2007).

The obtained t-value in both grades which participated in the study was higher than the table values, and hence the null hypothesis is rejected. So, the given differences are not random, but statistically significant. This proves that progress made in doing homework assignments in Islamic Religious Education using e-learning is statistically significant.

Conclusion

Electronic learning has its advantages, so it should be used in all areas of education. A lot has been written on the application of e-learning in teaching computer science, mathematics, technical education and foreign languages. This paper considers the needs for and possibilities of e-learning in teaching Islamic Religious Education in elementary school. Electronic lessons, identical to the lessons from textbooks, have been created for the purpose of this research. In discussions with students of "Jovan Jovanović Zmaj" Primary School in Novi Pazar we came to the conclusion that they mostly use the computer for surfing the Internet. That is why e-lessons were created in the form of web pages whose content includes text and multimedia elements. For their viewing the requirement is for a computer to have an operating system and a web browser and there is no need for Internet connection, which are the requirements fulfilled by all of the students in the school where the research was conducted. The survey was conducted with students of grades 2 and 5 in order to determine the impact of e-learning success in acquiring the knowledge assigned for homework. The individual elements of the lesson were evaluated. By analyzing the score it was concluded that e-learning has a positive effect on doing homework, because there is a larger number of high grades in the groups of students who participated in e-learning than in the groups that were taught in the traditional way. The number of negative grades by using e-learning was also reduced. The conclusion is that e-learning is more interesting than learning from printed textbooks. The results showed that the success is better at learning the simple elements of lessons, in both groups (Brković & Milošević, 2005).

The question arises regarding a more intense use of e-learning in Islamic religious studies. One way is to create an electronic textbook that would be recorded on a CD sold with the book. Research on the possibility of reviewing the e-lessons by students should be extended to rural areas. It should also investigate the existence of cases of students who are religious minorities in schools and there is no realistic possibility of engaging a religious education teacher. In such cases, the possibility of implementing distance learning through the Internet should be considered.

The positive effect of e-learning in Islamic religious instruction could increase if the Ministry of Education launched a similar project.

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Fadil Novalić
Department of Computer Science, University of Novi Pazar
Dimitrija Tucovića bb
36300 Novi Pazar, Serbia
fadilnovalic@uninp.edu.rs

Mevljuda Novalić
Primary School "Jovan Jovanović Zmaj" Novi Pazar
Vuka Karadžića bb
36300 Novi Pazar, Serbia
mevljudanovalic@uninp.edu.rs

Muzafer Saračević
Department of Computer Science, University of Novi Pazar
Dimitrija Tucovića bb
36300 Novi Pazar, Serbia
muzafers@uninp.edu.rs

Emruš Azizović
Department of Computer Science, University of Novi Pazar
Dimitrija Tucovića bb
36300 Novi Pazar, Serbia
azizovic.emrus@gmail.com

Važnost e-učenja za izradu domaćih zadataka u nastavi islamskog vjeronauka u osnovnim školama

Sažetak

S obzirom na to da nastavni sadržaji predmeta islamski vjeronauk sadrže elemente stranog jezika i opis obrednih radnji, u učenju je neophodna pomoć stručne osobe. Postavlja se pitanje mogućnosti učeničkog svladavanja takvih dijelova gradiva uporabom informatičkih tehnologija prilikom izrade domaćih zadataka. Istraživanje provedeno među učenicima O. Š. „Jovan Jovanović Zmaj" u Novom Pazaru. Ispitane su mogućnosti učeničke upotrebe elektroničkog materijala i zaključeno da bi elektronički materijal imao najbolju uporabu ako se izradi u formi statičnih internetskih stranica s tekstualnim i grafičkim sadržajem, kao i poprati audiosnimkama i videosnimkama. Istraživanje utjecaja elektroničkog učenja izvršeno je nad dvjema skupinama učenika čiji je uspjeh bio jednak. Jedna je skupina učila gradivo i izrađivala domaću zadaću koristeći se tradicionalnim načinom učenja, a druga se koristila elektroničkim učenjem. Kod svih je učenika ocijenjeno više aspekata ispunjenog domaćeg zadatka i uspoređene ocjene. Pokazalo se da su bolji uspjeh postigli učenici koji su se koristili elektroničkim materijalom. Zaključak je da elektroničko učenje ima pozitivan utjecaj na izradu domaćih zadataka u nastavi islamskog vjeronauka u osnovnim školama.

Ključne riječi: *edukacija; e-gradivo; e-učenje; internetska stranica; ocjenjivanje.*

Uvod

U cijeloj povijesti obrazovanja uvodile su se inovacije i uporaba novih tehnologija. U današnjem vremenu informatičke tehnologije sve više dobivaju na važnosti u procesu učenja i koriste se u svim granama znanosti. Islamski je vjeronauk također važno znanstveno područje u društvu, što dokazuje postojanje obrazovnih institucija svih razina religijskog opredjeljenja. Važnost islamskog vjeronauka povećava i činjenica da je u Srbiji, kao i u nekim drugim europskim zemljama, ona uvedena kao predmet u državnim osnovnim i srednjim školama. Stoga nema sumnje da istraživanje o mogućnostima unaprjeđenja učenja islamskog vjeronauka uporabom informatičkih tehnologija ima važnost.

Pojam „elektroničko učenje" jedna je od danas najkorištenijih sintagmi u procesu modernizacije obrazovanja u svijetu. Koriste se razne definicije elektroničkog učenja. Po definiciji Američke asocijacije ASTD (*American Society for Trainers and Development*) e-učenje je metodologija kojom se „nastavni sadržaj ili aktivnost u učenju isporučuju uz pomoć elektroničkih tehnologija" (engl. *instructional content or learning experiences delivered or enabled by electronic technology*) (Glušac, 2012, str. 5).

E-obrazovanje se može definirati kao primjena informacijsko-komunikacijskih tehnologija (ICT) u obrazovanju. E-obrazovanje ili obrazovanje na daljinu podrazumijeva da je glavni nositelj komunikacije između predavača i studenta razdvojenost (u različito vrijeme i na različitom mjestu – razdvojenost instruktora – tutora od studenta). Ono mora obuhvatiti dvosmjernu komunikaciju između predavača i studenta koja ima za cilj olakšati i podržati proces edukacije. Kao posrednik u neophodnoj dvosmjernoj komunikaciji koristi se tehnologija (Saračević, Mašović, Međedović, i Hadžiahmetović, 2011).

Treba napraviti razliku između e-učenja i učenja na daljinu (*Distance Learning*). Učenje na daljinu predstavlja jedan vid elektroničkog učenja. Nastavni programi koji se realiziraju na daljinu korištenjem obrazovne tehnologije definiraju se kao nastava, odnosno učenje na daljinu. U najopćenitijem smislu to je proces kreiranja i pružanja mogućnosti pristupa nastavnom procesu učenicima koji su vremenski ili prostorno distancirani od izvora obrazovnih informacija (LINKgroup, 2012, str. 87). Elektroničko učenje obuhvaća i neke druge vidove učenja, kao npr. učenje svpomoću diskova s multimedijalnim sadržajem, učenje čitanjem elektroničkih lekcija, rješavanje testova za provjeru znanja na računalu i sl.

Za našu su temu zanimljiva istraživanja primjene e-učenja u nastavi stranih jezika, s obzirom na to da vjeronauk sadrži dosta elemenata arapskog jezika. U literaturi se kao tri najvažnija područja u kojima e-učenje ima utjecaj na nastavu stranih jezika spominju: razvijanje osnovnih vještina, motivacija i mogućnost učenja stranog jezika i izvan institucije.

Informacijsko-komunikacijske tehnologije na kojima je utemeljeno e-učenje podržavaju i razvijaju vještinu slušanja, razumijevanja, razgovora i pisanja stranog jezika. Digitalni video predstavlja djelotvoran način potpore nastavi stranog jezika. Video konferencija je posebno važna za razvijanje vještine slušanja i razgovora. Posebno je važna uporaba multimedijskih aplikacija, kao što su interaktivni obrazovni softver, CD rječnici i sl. (Ristić, 2006, str. 108).

Razvoj ICT je izazvao pojavu novih tehnologija za distribuciju materijala za e-učenje, kao i podršku i procjenu u obrazovanju utemeljenom na tehnologiji računalno podržanog učenja (CAL).

Riahi (2015) u svom radu zaključuje da je internet mjesto koje korisnicima omogućuje dostupunije obrazovanje i jednostavnije implementacije edukacijskih softverskih aplikacija. S povećanom uporabom Cloud Computing tehnologije, fokus je sada više na tehnikama učenja, a ne na ulaganju u razvoj platforme i sustava.

Masud i Huang (2012) ukazuju na to da sustavi za e-učenje obično zahtijevaju mnoge hardverske i softverske resurse, i zaključuju da su Cloud Computing tehnologije promijenile način na koji se aplikacijama pristupa. Prema tome, sustav za e-učenje utemeljen na Cloud Computing infrastrukturi je izvodljiv i to u velikoj mjeri može poboljšati djelotvornost učenja.

Računalno podržano učenje (CAL) je edukacijska metoda koja se koristi računalima kao okruženjem u kojem se odvija učenje, što povećava vrijeme posvećeno učenju i motivaciju u učenju, a može biti korisno za učenike zbog njihovih različitih stilova i brzine savladavanja gradiva. Ta je obrazovna metoda oblikovana kombiniranjem računalne tehnologije i vlastitih principa učenja (Hancer i Tüzeman, 2008).

Pedagoški aspekti e-učenja

Promatrano u pedagoškom smislu, postavlja se pitanje kakve promjene donosi koncept učenja koji se temelji na suvremenoj tehnologiji. Odgovori na to pitanje su kompleksni i mogu se ustanoviti na sljedeći način:

- Fleksibilnost promatrana u vremenskoj i prostornoj dimenziji pohađanja nastave;
- Promjene u stupnju interaktivnosti u odnosu učenik – učenik i učenik – učitelj. Kako bi proces učenja utemeljen na suvremenim tehnologijama bio učinkovit, neophodno je osigurati nekoliko osnovnih vidova komunikacije, poput komunikacije posredstvom interesnih foruma, e-mail i audio-komunikacije i širokog spektra drugih tehnologija koje potiču interaktivnost;
- Individualni pristup učenicima. Može se reći da suvremene tehnologije u obrazovnom procesu omogućuju viši stupanj individualizacije procesa učenja (LINKgroup, 2012, str. 86).

U primjeru e-učenja u nastavi islamskog vjeronauka, koji je primijenjen za potrebe ovog istraživanja, materijal za učenje predstavljaju e-lekcije u obliku internetskih stranica statičkog sadržaja distribuirane preko CD-a ili *Cloud Storage* servisa. Učenicima je omogućeno individualno učenje kod kuće, fleksibilno u pogledu vremena.

Također se može postaviti i pitanje kompetencija nastavnika u procesu e-učenja. Osnovna struktura kompetentnosti nastavnika za e-nastavu, s obzirom na složenost nastavničke profesije i zahtjev da bude samostalan u kreiranju nastavnog procesa, zahtijeva da bude kompetentan u primjeni e-nastavnih sadržaje u okviru aktivnosti e-nastavnog sustava (učitelj kao instruktor i tutor) i kreiranju odgovarajućih e-nastavnih sadržaja. Primjena sadržaja zahtijeva sljedeće nastavnikove aktivnosti: upravljanje procesom učenja, pružanje podrške procesu učenja i refleksiju, komunikaciju s učenicima, integraciju e-nastavnih sadržaja i ICT podrške. Stvaranje e-nastavnih sadržaja zahtijeva sljedeće nastavnikove aktivnosti: pripremu za oblikovanje sadržaja i tečaja (analiza zadataka i sl.), modeliranje nastave i nastavne strategije, pripremanje e-nastave, pripremanje odgovarajuće dokumentacije, integriranje elemenata *on-line* nastavnih postupaka u e-nastavu (Bjekić, Krneta, i Milošević, 2008, str. 14).

Konkretno u našem primjeru e-učenja učitelj vjeronauka može obavljati sve aktivnosti koje zahtijeva primjena sadržaja, a aktivnosti koje zahtijevaju stvaranje e-materijala može uključiti. Neophodan je angažman stručne osobe koja poznaje internetski dizajn. Jedanput kreirani materijal može se koristiti trajno, s obzirom na to da se radi o statičkim internetskim stranicama i nije potrebno njihovo ažuriranje za vrijeme trajanje nastavnog tečaja.

Pojava informacijske tehnologije zahtijeva nove oblike interakcije između učenika i nastavnika. Nastavnik je glavni nositelj primjene inovacije u nastavnom području koji izlaže i u odjelu s učenicima s kojima radi. Novo doba traži novu strategiju u organizaciji nastavnog procesa, pa upravljanje tim procesom treba promatrati interdisciplinarno, imajući u vidu kibernetiku, teoriju komunikacije, nove teorije učenja, didaktičku doktrinu o samostalnom i istraživačkom radu učenika i sl. (Selimović i Tomić, 2011, str. 335-337).

Specifičnosti predmeta islamski vjeronauk

Predmet vjeronauka vraćen je u osnovne i srednje škole u Srbiji 2001. godine, nakon više od pet desetljeća nakon njegova ukidanja (RTS, 2011). Tadašnja Islamska zajednica Sandžaka, kao vjerska institucija muslimana u Srbiji i Crnoj Gori, kreirala je nastavni plan i program predmeta islamski vjeronauk, u skladu s fondom sati od jednog sata tjedno, odnosno 36 sati u jednoj školskoj godini. Većinu nastavnih sati čine nastavni sati obrade nastavnih jedinica, a obnavljanje se obavlja pregledavanjem domaćih zadataka. Elementi gradiva islamskog vjeronauka su teorija, poučne priče i pjesme, učenje molitvi i dijelova Kur'ana na arapskom jeziku napamet, učenje obavljanja obrednih radnji i izvođenje pobožnih pjesama.

Ovdje ćemo pojasniti neke pojmove koji se susreću u području islamske znanosti, a kojima ćemo se koristiti u daljnjem tekstu rada. Molitva se u islamu naziva dova. Rečenice ili djelovi rečenica koji su u Kur'anu označeni brojevima su ajeti. Izgovaranje ili melodično pjevanje dova i ajeta jest učenje dova i ajeta. Termin učenje se koristi i za pjevanje pobožnih pjesama, ilahija i kasida. Ilahije su posvećene veličanju Boga, a kaside govore o vrlinama Božjeg poslanika Muhammeda, neka je na njemu Božji mir i spas.

Učenje dova i kur›anskih ajeta, obavljanje obrednih radnji i učenje ilahija i kasida, zahtijevaju pomoć stručne osobe. Da bi se lekcije savladale u potpunosti, potrebno je da, osim obrade na satu s vjeroučiteljem, učenici uče dodatno kod kuće, tj. da ispune domaći zadatak. U slučajevima kada ne mogu računati na pomoć starijih, koji imaju znanje o vjeri, prisiljeni su učiti iz knjige. To može uzrokovati pogrešno naučene dove, ajete i obredne radnje. I pri učenju ilahija i kasida treba znati pravilnu melodiju. U svemu tome mogli bi pomoći video i audiomaterijali.

Analiza lekcija

Postavlja se pitanje opsega zastupljenosti elemenata koji se ne mogu samostalno učiti u cjelokupnom programu predmeta islamski vjeronauk. Za potrebe ovog rada odabrana

su dva nastavna programa, za drugi i peti razred osnovne škole. Provjerom lekcija došlo se do informacija o tome koliko lekcija sadrži spomenute elemente i koliko lekcija sadrži svaki od tih elemenata. Takve su lekcije nazvane složenima, radi lakšeg tabličnog i grafičkog prikaza. Dobiveni se rezultati mogu predstaviti u tablici i na grafikonu:

Tablica 1

Grafikon 1

Analizom nastavnih jedinica dolazi se do podataka da je broj lekcija u kojima se obrađuju elementi za čije je učenje neophodna pomoć osobe koja poznaje predmetno gradivo velik. U drugom je razredu takvih lekcija 10, odnosno 45% ukupnog broja lekcija za obradu, a broj je lekcija koje se mogu samostalno naučiti uz pomoć udžbenika 12, odnosno 55%. U petom razredu je broj složenih lekcija 15, odnosno 54%, a lekcija koje nisu složene ima 13, odnosno 46%. Na temelju toga se zaključuje da se može očekivati pozitivan učinak upotrebe elektroničkog materijala za učenje, koji bi donekle zamijenio osobu koja bi pomagala učenicima pri učenju gradiva kod kuće kući, tj. u izradi domaćih zadataka iz predmeta islamski vjeronauk.

Za potrebe ovog istraživanja odabrane su po jedna lekcija za drugi i peti razreda osnovne škole, obje složene. Lekcija za drugi razred sadrži dovu, objašnjenje obredne radnje vjerskog čišćenja (abdest) i ilahiju, a lekcija za peti razred sadrži dove, ajete i objašnjenje obredne radnje klanjanja namaza.

Kreiranje materijala za e-učenje

Materijal za e-učenje može biti grafički i multimedijalni resurs, internetska stranica, CD, DVD i materijal smješten na *Cloud Storage* servisu sl., i naziva se objekt učenja.

Objekt učenja treba posjedovati ova obilježja:

– Mogućnost ponovne uporabe – nastavni sadržaj koji predstavlja modul sastavljen od manjih nastavnih jedinica treba biti pogodan za odvajanje na manje sadržaje i ponovno spajanje u druge tečajeve,

– Međuoperativnost – objekti učenja mogu se razmjenjivati neovisno o sustavu za učenje koji se koristi i o tome tko im je autor,

– Trajnost – objekti učenja ostaju uporabljivi bez obzira na buduće načine razmjene i prezentiranja,

– Pristupačnost – objekt učenja je dostupan svuda, u svakom trenutku i može se lako pronaći na mreži (Brković i Milošević, 2005, str. 84).

Materijal za e-učenje se učenicima može dostavljati preko svih vrsta elektroničkih medija, uključujući računala, internet, satelitsko emitiranje, audio i videovrpce, interaktivnu televiziju, CD-ROM-ove ili DVD-ove i sl. (Stankov, Grubišic, Žitko, i Krpan, 2005).

S obzirom na sve veću popularnost interneta, elektroničke lekcije oblikovane su kao internetska stranica. Istraživanje zahtijeva usporedbu ocjena domaćeg zadatka kod

učenika koji su domaći zadatak izrađivali s pomoću knjige i onih koji su se služili e-materijalom. Internetse stranice s lekcijama imaju sadržaj jednak onom koji se nalazi u udžbenicima, ali dopunjen audio i videosnimkama i testovima s mogućnošću provjere točnosti danih odgovora.

Informatičke tehnologije koje su se koristile za izradu e-materijala

Snimke koje su se koristile u lekcijama su formata mp3, a videoisječci su formata *mp4*. Neki su preuzeti s interneta, gdje su javno objavljeni. Za oblikovanje ostalih koristio se program *Camtasia Studio*, koji omogućuje lako kreiranje videosnimaka i onima koji nisu profesionalci, uvoz videa s digitalne kamere, snimanje radnje na računalu u obliku videa i snimanje glasa unesenog s pomoću mikrofona (TechSmith, 2014). Camtasia omogućuje izvoz audio i videomaterijala u različitim formatima, među kojima su i mp3 i mp4, kao i za CD, DVD, HD i mnoge druge medije.

Internetske stranice rađene su u HTML i CSS tehnologijama.

HTML označava skraćenicu od engleskih riječi Hyper Text Markup Language koji je službeni jezik internetskih stranica, poznat kao "hipertekstualni markup jezik". HTML nije računalni programski jezik. To je markup jezik, koji postavlja upute ili oznake (tagove) oko teksta tako da bi internetski pretraživač znao kako prikazati određeni tekst (Hill i Brannan, 2011, str. 1). Na taj se način na internetskoj stranici definiraju naslovi, ulomci, tablice, slike, audio i videosnimke, poveznice i drugi elementi.

Sadržaj e-materijala koji se koristio u ovom istraživanju čine tekst, slike audio i videosnimke i testovi provjere znanja. Internetski *browseri* prilikom tumačenja HTML koda stranica prikazuju sve elemente stranice tako da su korisnicima jasni.

Slika 1, 2, i 3

Ono što može predstavljati problem kod pregledavanja materijala jesu tagovi koji definiraju audio i videofajlove. Problemi se uglavnom odnose na to koji je format datoteke podržan od internetskog browsera.

Treba poznavati nekoliko pravila prikazivanja audiodatoteke na internetskim stranicama kako bi se mogao pustiti u svim browserima (Internet Explorer, Chrome, Firefox, Safari, Opera) i na raznim uređajima (PC, Mac, iPad, iPhone). Zvuk predstavlja eksterni, ne html element u HTML stranicama. Ako format zvučne datoteke nije podržan od internetskog browsera, onda je na računalu neophodno imati instaliran dodatak (*plug-in*) koji će pustiti zvuk. *Plug-in* je mali računalni program koij proširuje funkcionalnost internetskog browsera. Tagovi u HTML strani za audiodatoteke formata *mp3* jesu <embed> i <object>. Evo kako izgledaju kodovi za te tagove:

```
<embed height="50" width="100" src="sound.mp3">
<object height="50" width="100" data="sound.mp3"></object>.
```

Prilikom korištenja tih tagova, zvuk se neće moći reproducirati ako browser ne podržava *mp3* format datoteke. U tom se slučaju zvuk može reproducirati s pomoću plug-ina. Ako neophodni plug-in nije instaliran na računalu, neće biti moguće pustiti audiofajl.

U HTML5 verziji postoji tag <audio> koji definira zvučne datoteke. Radi u svim modernim browserima. Sljedeći primjer prikazuje uporabu tog taga za prikazivanje *mp3* datoteke u browserima Internet Explorer, Chrome, Firefox 21+ i Safari, kao i ogg datoteke u starijim verzijama Firefoxa i Operi. Ako dođe do pogreške, prikazat će se tekstualna poruka:

```
<audio controls>
        <source src=”sound.mp3” type=”audio/mpeg”>
        <source src=”sound.ogg” type=”audio/ogg”>
        Vaš browser ne podržava ovaj audio format.
</audio>
```

Kod uporabe <audio> taga, problem može predstavljati to što ne radi u starijim browserima i što je neophodno konvertirati datoteke u *ogg* format (w3schools, HTML Sounds, 2014).

Prilikom kreiranja našeg materijala za e-učenje, audio elementi su definirani na način koji W3School (www.w3schools.com) predstavlja kao najbolji. On objedinjuje <embed> i <audio> tagove. Konverzija audiofajlova u *ogg* format izvršena je s pomoću online audiokonvertera na lokaciji media.io. Zvučni fajlovi nalaze se u mapi *audio* i tipa su *mp3* i *ogg*. Slijedi prikaz jedne audiodatoteke unutar HTML strane koja je dio našeg e-materijala:

```
<audio controls height=”100” width=”100”>
        <source src=”audio/dove.mp3” type=”audio/mpeg”>
        <source src=”audio/dove.ogg” type=”audio/ogg”>
        <embed height=”50” width=”100” src=”audio/dove.mp3”>
</audio>
```

Taj način definiranja zvuka unutar HTML stranice ima nedostatak u tome što <embed> tag ne može javiti povratnu poruku o pogrešci. Kod daje prikaz audio playera na internetskoj stranici koji omogućuje kontrolu reprodukcije zvuka (Slika 3).

Na sličan se način i videofajlovi postavljaju unutar HTML stranice. Najčešće korišteni formati videofajlova su: *mp4*, *flv* i *swf*. I za njih se koriste tagovi <embed> i <object>:

```
<embed src=”movie.mp4” height=”200” width=”200”>
<object data=”movie.mp4” height=”200” width=”200”></object>
```

Problemi koji mogu uzrokovati nemogućnost pregledavanja videosnimaka umetnutih u HTML stranicu s pomoću ta dva taga nastaju zbog toga što ne postoji podrška za pojedine videoformate od nekih internetskih browsera i iPad i iPhone uređaja(w3schools, HTML Videos, 2014).

U HTML5 tehnologiji postoji tag <video>. Radi u svim modernim internetskim browserima i podržava *ogg* format videodatoteka za starije verzije browsera.

```
<video width=”320” height=”240” controls>
        <source src=”movie.mp4” type=”video/mp4”>
```

```
    <source src=”movie.ogg” type=”video/ogg”>
    Vaš broweser ne podržava ovaj video element.
</video>
```

Ovaj kod će vratiti poruku u slučaju da videoformat nije podržan od browsera. Njegovi su nedostaci u tome što ne radi u starijim verzijama browsera i potreba je za konverzijom videofajlova u *ogg* format.

W3School i za videofajlove predlaže najbolje rješenje koje objedinjuje <video>, <object> i <embed> tagove(w3schools, HTML Videos, 2014). Evo primjera umetanja jednog videa u HTML stranicu u našem elektroničkom materijalu koji prikazuje način obavljanja namaza:

```
<video width=”750” height=”439” controls>
    <source src=”videos/namaz.mp4” type=”video/mp4”>
    <source src=”videos/namaz.mp4” type=”video/mp4”>
    <source src=”videos/namaz.ogg” type=”video/ogg”>
    <object data=”videos/namaz.mp4” width=”750” height=”439”>
    <embed src=” videos/namaz.swf” width=”750” height=”439”>
    </object>
</video>
```

Ono što kod takvog rješenja predstavlja nedostatak, jest potreba velikog broja konvertiranja fajlova u *ogg* i *swf* videoformate.

CSS predstavlja kaskadne opise stilova (engl. *Cascading Style Sheets*). Osnovna namjena CSS-a je omogućiti dizajneru da definira deklaracije stila, engl. *style declarations* (detalje o oblikovanju – poput fontova, veličine elemenata i boja), i da primijeni te stilove na određene djelove HTML stranica s pomoću selektora (engl. *selectors*) – referenci na element ili na skupinu elemenata za koje je stil predviđen (Andrew, 2007, str. 1).

U kreiranju našeg e-materijala CSS se najčešće koristio za definiranje izgleda teksta, tj. fonta. Evo jednog primjera:

```
<style type=”text/css”>
    p {font-family:Arial, Helvetica, sans-serif; font-size:14px}
</style>
```

Tim kodom određuje se stil fonta za sve odlomke (tag <p>) u HTML stranici.

Question Writer HTML5 je programski alat za stvaranje testova s ciljem provjere znanja stečenog uporabom e-lekcija. Može se preuzeti na adresi www.questionwriter.com, po povoljnoj cijeni, a postoji i probno razdoblje od 30 dana za besplatnu uporabu programa.

Test je dijagnostička metoda provjere znanja i vještina učenika koja se poduzima s ciljem omogućavanja prosljeđivanja povratne informacije učeniku ili njegovu mentoru o dostignutoj razini kompetencija (LINKgroup, 2012, str. 170).

Testovi kreirani unutar naših e-lekcija služe za samotestiranje studenata, kako bi im učenje postalo zanimljivije. Mogućnost samotestiranja u kojem ne moraju drugima pokazati rezultate i test mogu ponoviti neograničen broj puta, povećavaju motivaciju za učenjem. U Question Writeru HTML5 mogu se zadati pitanja različitog tipa: s više ponuđenih odgovora (*Multiple Choice* & *Multiple Response*), s izborom točno ili netočno (*True/False*), s povezivanjem pojmova (*Matching*), s uređivanjem redoslijeda ponuđenih odgovora (*Sequencing*), s dopunjavanjem odgovora (*Fill The Blank*) i eseji. Program također daje povratnu informaciju o točnim i netočnim odgovorima. Rješavanje testa može se ponavljati bez ograničenja. Testovi kreirani u tom programu mogu se exportirati u obliku internetskih stranica. Njihovo pripajanje stranama koje predstavljaju e-lekcije može se obaviti poveznicom na početnu stranicu testa ili umetanjem izvornog koda stranica testova u HTML stranice e-lekcija.

Tehnologije koje se koriste za izradu *autorun* datoteke također su neophodne u kreiranju e-materijala, s obzirom na to da se za distibuciju kao prijenosni medij koristi CD. Napravljen je *autorun fajl* koji će automatski otvoriti početnu internetsku stranicu kada računalo pročita disk umetnut u CD pogon računala. Da bi se to dogodilo, neophodno je na CD-u imati fajl *autorun.inf* koji sadrži zapovijed za pokretanje neke izvršne datoteke, s ekstenzijom *.exe*, tj. aplikacije:

```
[autorun]
OPEN=”autorun.exe”
ICON=book.ico
```

Aplikacija se pokreće s pomoću OPEN. ICON određuje koja će se sličica uzeti za ikonu prilikom prikazivanja CD-a u *My Computeru*. S pomoću datoteke *autorun.inf* se ne može otvoriti HTML stranica, već samo izvršni fajl. Zato je potrebno napraviti izvršni fajl koji će automatski otvoriti HTML stranicu i zatvoriti sam sebe. To se može učiniti s pomoću bilo kojeg programskog jezika. Mi smo izabrali *Delphi 7*. U njemu se izrađuju aplikacije koje rade pod operativnim sustavom Windows, odnosno prikazuju se u obliku prozora. Kod koji omogućuje automatsko pokretanje internetske stranice i zatvaranje *exe* datoteke izvršava se kada se pojavi prozor Delphi aplikacije, tj. na događaj *FormShow*:

```
procedure TForm1.FormShow(Sender: TObject);
begin
        ShellExecute(handle,'open',PChar('index.html'),'','',SW_SHOWNORMAL);
        Close;
end;
```

Hardverski i softverski zahtjevi za uporabu e-materijala

Distribucija materijala za e-učenje danas se u većini slučajeva odvija preko interneta. U našem je slučaju e-materijal kreiran kao internetska stranica, uporabom tehnologija koje ne zahtijevaju usluge poslužiteljske stranice. Internetske stranice trebaju zamijeniti tiskani udžbenik, pa će sadržavati tekst i slike. Dodatno se mogu

dopuniti audio i videosnimkama, koji bi učenicima mogli vizualno prikazati način obavljanja obrednih radnji i pravilan izgovor elemenata na arapskom jeziku. Svi spomenuti elementi internetskih stranica se izvršavaju na klijentskoj strani, tj. u internetskom browseru. To umanjuje potrebu za složenim hardverskim i softverskim resursima prilikom uporabe e-materijala. Svi zahtjevi svode se na to da uređaj koji se koristi za pregledavanje e-lekcija ima instaliran internetski browser. Najveću uporabu u pregledavanju internetskih stranica danas imaju sljedeći uređaji: PC, Mac, iPad i iPhone.

Tijekom istraživanja elektronički je materijal učenicima distribuiran preko CD-a. Svi učenici koji su uzeti kao uzorak istraživanja kod kuće imaju PC sa sustavom Windows i bar jednim internetskim browserom. Najstarija verzija sustava koju su autori rada sreli na računalima u okruženju u vrijeme istraživanja jest Windows XP, i on u sebi sadrži internetski browser Internet Explorer. Za instalaciju Windowsa XP, prema službenoj tehničkoj specifikaciji koju su propisali stručnjaci Microsofta, PC mora imati sljedeće minimalne performanse:

> Memorija: Najmanje 64 MB (poželjno 128 MB ili više),
> Procesor: Pentium na 233 MHz ili kompatibilni procesor,
> Čvrsti disk: Disk kapaciteta 2 GB ili više s najmanje 650 MB raspoloživog slobodnog prostora,
> VGA monitor, tipkovnica, miš i CD ili DVD uređaj(Alan & Brian, Windows XP Biblija, 2014).

Dakle, *minimum hardverskih zahtjeva* za uporabu e-materijala na osobnom računalu jest da učenik posjeduje računalo na kojem je moguće instalirati Windows XP. *Minimalni softverski zahtjevi* jesu da na računalu bude instaliran operacijski sustav i internetski browser. To su zahtjevi koje danas ispunjaju gotovo svi učenici u Srbiji, što se zaključuje iz razgovora s učenicima i roditeljima.

Metodologija istraživanja

Ciljevi istraživanja

Primarni je cilj istraživanja usporediti uspjeh u izradi domaćih zadataka koji su postigli učenici obje skupine, po razredima. Cilj je, osim toga, bio i utvrditi koliko su učenici uspješni u pregledavanju elektroničkog materijala i koliko im u tome treba pomoć starijih. Analizom ocjena dobit će se informacije o poboljšanju uspjeha u izradi domaćih zadataka uporabom e-materijala za učenje.

Metode istraživanja

Istraživanje je provedeno nad učenicima drugog i petog razreda osnovne škole „Jovan Jovanović Zmaj" u Novom Pazaru, Republika Srbija. Za svaki razred oblikovane su po dvije grupe od po 25 učenika, što predstavlja ukupno 100 učenika. Grupe imaju jednak broj učenika s istom razinom znanja, tj. s istim ocjenama iz predmeta islamski vjeronauk. U svakom će se razredu jedna grupa za učenje koristiti e-materijalom, i

za potrebe ovog rada nazvat ćemo je skupinom za e-učenje, a druga će se skupina u učenju koristiti udžbenikom, i nazvat ćemo je tradicionalnom skupinom. Svi učenici u skupinama koje će se koristiti računalom prilikom učenja kod kuće imaju ispunjene uvjete koji im to omogućuju. Izabrana je po jedna lekcija za oba razreda i obrađena uz pomoć udžbenika. Svima je zadan isti domaći zadatak. Jednoj skupini drugog i jednoj petog razreda prikazan je način pregledavanja e-lekcije i svi su dobili diskove s elektroničkim materijalom. Njima je naloženo da domaći zadatak ispune učeći s pomoću računala. Učenici kojima nije dan elektronički materijal za učenje, ispunit će svoj domaći zadatak s pomoću tiskanog udžbenika.

Uspjeh učenika iz predmeta islamski vjeronauk ocjenjuje se s tri razine znanja, tj. sljedećim opisnim ocjenama, od najviše do najniže: ističe se, dobar i zadovoljava. S ciljem detaljnije analize uspjeha u izradi domaćih zadataka, domaći zadatak koji je predmet istraživanja ocijenilo je ocjenama od 1 do 5. Pet je najviša, a 1 najniža ocjena. Vjeroučiteljica koja predaje predmet islamski vjeronauk održala je sa svakom skupinom učenika koji su uključeni u istraživanje dodatni sat na kojem je ocijenila domaće zadatke. Opisno i numeričko ocjenjivanje imaju svoje prednosti i nedostatke. Brojna ispitivanja, u svijetu i u nas, pokazala su da višestupanjska skala potiče i motivira učenike na veći uspjeh, veće zalaganje u radu i učenju. Za brojčano ocjenjivanje može se reći da je ono globalno, jer se njime nastoje obuhvatiti sve vrijednosti koje je učenik postigao. Istodobno, to je i slabost tog načina ocjenjivanja, jer jedan brojčani simbol (uspjeh) služi kao općenit pokazatelj vrijednosti znanja učenika. Opisnim se ocjenjivanjem vrednuju pojedinačne komponente učenikove osobnosti. To znači da se osim količine stečenih znanja vrednuje kvaliteta stečenih znanja, razumijevanje usvojenih činjenica, generalizacija i mogućnost primjene stečenih znanja u novim životnim situacijama i praksi uopće (Kačapor, Vilotijević, i Kundačina, 2005, str. 51-52). Mi smo napravili kombinaciju opisnog i brojčanog ocjenjivanja, čime smo postigli da više elemenata naučenog gradiva bude ocijenjeno pojedinačno skalom s pet elemenata.

Aspekti istraživanja

Prvi aspekt: Analiza uspješnosti pronalaska lekcije u knjizi, pregledavanja e-lekcije i potrebe pomoći u učenju od starijih.

Drugi aspekt: Usporedna analiza uspjeha učenika u izradi domaćih zadataka na tradicionalan način i s pomoću e-učenja.

Uzorak: 50 učenika II. i 50 učenika V. razreda OŠ „J. J. Zmaj" - Novi Pazar

Metode: Anketno ispitivanje i komparativno-analitička metoda

Vrijeme provedbe anketnog ispitivanja: veljača 2014.

Izgled anketnog lista:

Za učenike koji se koriste knjigom:
1. Jeste li uspjeli pronaći lekciju u knjizi?
2. Je li Vam u učenju pomagao netko od starijih?

Za učenike koji se koriste CD-om ili materijalom s *Cloud Storage* servisa:
1. Jeste li uspjeli otvoriti e-lekciju?
2. Je li Vam u učenju pomagao netko od starijih?

Rezultati

Prvi aspekt: Svi učenici su uspjeli pronaći lekciju u knjizi ili otvoriti e-lekciju. Nekima od njih je u tome trebala pomoć starijih. Od velike je važnosti podatak o broju učenika kojima je u učenju bila neophodna pomoć starijih i usporedba po skupinama. To je istraživanje predstavljeno na sljedeća dva grafikona, odvojeno po razredima.

Grafikon 2 i 3

Analiza rezultata ankete pokazuje da je veći broj učenika kojima je potrebna pomoć u učenju iz knjige nego broj onih koji trebaju pomoć starijih za učenje e-lekcije. Taj se broj smanjuje kod starijih učenika. Učenika kojima je potrebna pomoć u učenju iz knjige je 11 u drugom razredu, što je 44%, a 8 u petom razredu, odnosno 32%. Onih kojima treba pomoć u učenju e-lekcija je 6 u drugom razredu (24%), a samo 3 u petom (12%).

Drugi aspekt: *Analiza uspjeha učenika* izvršena je usporedbom ocjena kojima se ocijenilo domaći zadatak studenata iste razine znanja koji su domaći zadatak radili na tradicionalan način, uporabom udžbenika, i onih koji su se u izradi domaćih zadataka koristili e-lekcijom. Elementi lekcije koji su se ocjenjivani jesu:

A) pravilan izgovor napamet naučenih dova i ajeta na arapskom jeziku,
B) pravilno izvršavanje obrednih radnji,
C) melodično učenje ilahija i kasida.
D) Na kraju je izračunata prosječna ocjena za ta tri elementa.

Elementi su izabrani tako da se može vidjeti učinak primjene e-učenja u izradi domaćih zadataka. Lekcija iz drugog razreda sadrži sva tri spomenuta elementa, a lekcija iz petog razreda ne sadrži ilahiju ili kasidu.

A) Analiza ostvarenog uspjeha u pravilnom izgovoru dova i ajeta na arapskom jeziku

Grafikon 4 i 5

Analizom ocjena kojima je ocijenjena pravilnost učenja dova i ajeta na arapskom jeziku dolazi se do informacija o odnosu broja svih ocjena učenika koji su se koristili e-materijalom i onih koji su učili iz knjige. Broj učenika s istim ocjenama u obje je skupine približan. U oba razreda više je učenika s ocjenom 5 u skupini koja se koristila e-učenjem. Također i prosječna ocjena u pravilnosti učenja dova i ajeta na arapskom jeziku je veća i u drugom i u petom razredu kod grupe koja je uključena u e-učenje. U drugom razredu je prosječna ocjena 4,08 u skupini za e-učenje, a 3,48 u tradicionalnoj skupini. Kod petog razreda skupina za e-učenje ima prosječnu ocjenu 4,04, a tradicionalna skupina 3,20.

B) Analiza ostvarenog uspjeha u pravilnom obavljanju obrednih radnji

Grafikon 6 i 7

Analiza ocjena dobivenih za pravilno obavljanje obrednih radnji pokazuje da ima više odličnih učenika u skupini za e-učenje nego u tradicionalnoj skupini. Broj negativnih ocjena je malen u tradicionalnoj skupini, a u skupini za e-učenje ih uopće nema, što predstavlja zanimljiv podatak. Prosječne su ocjene veće za oba razreda u skupini za e-učenje, 4,32 u II, razredu i 4,16 u V. razredu. Kod tradicionalnih skupina prosječna je ocjena u II. razredu 3,32, a u V. razredu 3,12.

C) Analiza ostvarenog uspjeha u učenju ilahija i kasida

Grafikon 8

Analiza ocjena dobivenih za učenje ilahije pokazuje da u skupini za e-učenje ima više petica i da nema negativnih ocjena. Prosječna ocjena u skupini za e-učenje je vrlo visoka, 4,24, a u tradicionalnoj je grupi 3,52, što je također visoka ocjena.

D) Analiza prosječnih ocjena učenika po razredima i skupinama

Ako se izračuna prosječna ocjena za svakog učenika, kao aritmetička sredina ocjena dobivenih za pojedine elemente lekcije, imat ćemo informaciju o broju učenika s odličnim, vrlo dobrim, dobrim, dovoljnim i nedovoljnim uspjehom, po razredima i skupinama. Nedovoljan uspjeh postiže učenik koji ima bar jednu negativnu ocjenu za neki od ocjenjivanih elemenata, bez obzira na prosječnu ocjenu.

Grafikon 9 i 10

Analizom uspjeha učenika na temelju prosječne ocjene svakog učenika vidimo da u skupini za e-učenje ima više odličnih i vrlo dobrih učenika, a manje onih s nedovoljnim uspjehom, u oba razreda. Na temelju prosječnih ocjena učenika, zaokruženih na cijele vrijednosti, može se izračunati prosječna ocjena za svaku grupu pojedinačno. U skupini za e-učenje kod drugog razreda prosječna ocjena je 4,28, a u tradicionalnoj skupini 3,36. Kod petog razreda prosječna ocjena u skupini za e-učenje je 4,20, a u tradicionalnoj skupini 3,20. Prosječna ocjena po skupinama je veća kod skupine za e-učenje, u oba razreda.

Rasprava

Analiza rezultata istraživanja u vezi s potrebom pomoći u učenju od starijih pokazuje da je značajan broj onih kojima je pomoć potrebna u učenju na tradicionalan način, posebno kod manjeg uzrasta, i da se ta potreba smanjuje pri uporabi e-materijala za učenje u dobroj mjeri (Grafikoni 2 i 3), iako se ne može u potpunosti isključiti.

Analizom ocjena danih za pojedine elemente lekcije, zaključuje se da je postignut bolji uspjeh u izradi domaćih zadataka kod učenika iz skupine za e-učenje. Uspjeh

ovisi i o složenosti gradiva, bez obzira na to o kojoj skupini se učenika radi. Postignut je napredak kod učenja elemenata koji su na arapskom jeziku (Grafikoni 4 i 5), nešto veći je kod učenja pravilnog obavljanja obrednih radnji (Grafikoni 6 i 7), a najveći kod učenja ilahija i kasida (Grafikon 8). Uporabom e-materijala pri izradi domaćih zadataka učenici su uspjeli dobiti više odličnih ocjena, a smanjiti broj negativnih. Pri učenju pravilnog obavljanja obrednih radnji i učenju ilahija i kasida u grupama za e-učenje od po 25 učenika drugog i petog razreda negativnih ocjena uopće nije bilo.

Uporabom e-materijala dolazi se do povećanja broja učenika sa odličnim i vrlo dobrim prosječnim ocjenama iz predmeta islamski vjeronauk, kao i smanjenja broja učenika s negativnom ocjenom, u odnosu na skupinu koja se u izradi domaće zadaće koristila tiskanim udžbenikom. Ostvarena su i poboljšanja prosječne ocjene skupina za e-učenje u odnosu na tradicionalne grupe u oba razreda (Grafikoni 8 i 9). Veći je prosjek ostvarila skupina za e-učenje u drugom razredu nego grupa u petom razredu. Ali u drugom razredu i tradicionalna skupina ima bolju prosječnu ocjenu od tradicionalne grupe u petom razredu. Zaključuje se da će uporaba e-materijala popraviti uspjeh u skupini, bez obzira na njezin prethodni uspjeh ostvaren tradicionalnim načinom učenja.

Test statističke značajnosti dobivenih razlika

Statističku značajnost dobivenih razlika testirat ćemo upotrebom t-testa. Statistički obrađeni podaci mogu se predstaviti tabelarno.

Tablica 2

Nulta hipoteza H_0: Nema razlike između ostvarenog uspjeha u izradi domaćih zadataka kod učenika iz grupe koja je učila na tradicionalan način i onih koji su se koristili e-učenjem, tj. razlika između određenih istovrsnih statističkih pokazatelja je jednaka nuli. To znači da je na uzorku do utvrđene razlike između istovrsnih statističkih pokazatelja došlo slučajno, te da se ona zato ne može generalizirati na osnovni skup.

Slijedi t-test za grupe učenika II. razreda. Standardne greške aritmetičkih sredina $SE_M=\frac{\sigma}{\sqrt{N\text{-}1}}$ za obje grupe iznose SE_{M_1}=0,19 i SE_{M_2}=0,24. Standardna greška razlike između dvije aritmetičke sredine $SE_{DM}=\sqrt{SE_{M_1}{}^2+SE_{M_2}{}^2}$ iznosi 0,39. Razlika između dvije aritmetičke sredine po apsolutnoj vrijednosti $D_M=|M_1\text{-}M_2|$ iznosi 0,92. Na kraju, t vrijednost $t=\frac{D_M}{SE_{D_M}}$ iznosi 2,97.

Na isti način kako je to učinjeno za grupe učenika II. razreda, dobivamo vrijednost .

Na osnovi statističke tabele s graničnim t vrijednostima slijedi da je za broj stupnjeva slobode $df=N_1+N_2\text{-}2=48$ ta vrijednost 2,02 na nivou značajnosti ,05 i 2,71 na nivou značajnosti ,01. (Kundačina i Banđur, 2007).

Dobivena t vrijednost kod oba razreda koja su sudjelovala u istraživanju veća je od tabelarnih vrijednosti, pa se odbacuje nulta hipoteza. Dakle, dobivene razlike nisu slučajne, već su statistički značajne. Time se dokazuje da je napredak u izradi domaćih zadataka u nastavi islamskog vjeronauka upotrebom e-učenja statistički značajan.

Zaključak

Elektroničko učenje ima prednosti koje treba iskoristiti u svim područjima obrazovanja. Najviše se piše o primjeni e-učenja u nastavi informatike, matematike, tehničkog obrazovanja i stranih jezika. U ovom radu razmatrane su potrebe i mogućnosti primjene e-učenja u nastavi islamskog vjeronauka u osnovnoj školi. Kreirane su elektroničke lekcije koje su identične lekcijama iz udžbenika. U razgovoru s učenicima osnovne škole «Jovan Jovanović Zmaj» u Novom Pazaru došlo se do zaključka da se oni najviše koriste računalom za surfanje internetom. Zato su e-lekcije urađene u obliku internetskih stranica čiji je sadržaj tekst i multimedija. Za njihovo je pregledavanje potrebno računalo s operativnim sustavom i internetskim browserom i ne mora postojati veza s internetom, što su zahtjevi koje ispunjaju svi učenici škole u kojoj je izvršeno istraživanje. Istraživanje je provedeno nad učenicima drugog i petog razreda, u cilju utvrđivanja utjecaja e-učenja na uspješnost svladavanja lekcija zadanih za domaći zadatak. Ocjenjivani su pojedini elementi lekcija. Analizom ocjena došlo se do zaključka da e-učenje ima pozitivan utjecaj na izradu domaćih zadataka, jer je veći broj odličnih ocjena u skupinama učenika koje su sudjelovale u e-učenju nego u skupinama učenika koje su učile na tradicionalan način. Također je primjenom e-učenja smanjen broj negativnih ocjena. Zaključuje se da je e-učenje zanimljivije od učenja iz tiskane knjige. Rezultati istraživanja pokazuju da je uspjeh bolji kod učenja jednostavnijih elemenata lekcije, u obje skupine.

Otvara se pitanje intenziviranja e-učenja u nastavi islamskog vjeronauka. Jedan od načina jest kreiranje elektroničkog udžbenika koji bi se na CD-u prodavao uz knjigu. Istraživanje o mogućnosti pregledavanja e-lekcija od učenika treba proširiti na seoska područja. Također bi trebalo istražiti postojanje slučajeva učenika koji su vjerska manjina u školama i ne postoji realna mogućnost angažiranja vjeroučitelja. Za takve slučajeve treba razmatrati mogućnost realizacije učenja na daljinu putem interneta.

Pozitivan efekt e-učenja u nastavi islamskog vjeronauka mogao bi se povećati ako bi se u tom pravcu pokrenuo projekt na razini ministarstva.