BARRIERS TO USING COMPUTERS IN TEACHING

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Abstract. This paper discusses the barriers that prevent the use of computers in teaching, as well as the possibilities of their elimination in order to achieve precise acquisition of knowledge in various fields. The survey considered five research questions and answers using mean and standard deviation. Two hypotheses were formulated and tested using the z-test statistical tool. The results show that students believe that using computers in teaching limited, and that the most important barrier is technical equipment on the educational institution. All barriers can be overcome by organizing a large number of useful and practical courses and seminars about computers. The results have confirmed that there are no significant differences between male and female students in thinking about the barriers of using computers in teaching.

Keywords: barriers, computer, students, teachers, teaching

Introduction

Information communication technologies (ICT) are influencing all aspects of life including education (Ratheeswari, 2018). Characteristics of traditional teaching activity are insufficient individuality of students, lack of obviousness and feedback, and thus acquired knowledge are less permanent. The new requirements for education can be fulfilled using computers in the class-

room. The use of computers enables a completely new organization of education, which provides fast and efficient display, transfer and absorption of knowledge.

Computers in teaching and learning are a very useful tool. They are not a substitute for teachers. With the use of computers, both the teacher and the student have a new role and position in education. The basic tasks of teachers are to prepare educational work, motivate students, enable students to acquire knowledge and control the implementation of educational work. With the help of computers, students actively participate in communication, which keeps them in a mobile state, ie keeps their attention on dynamic illustrations of teaching content (Geladze, 2015). In this way, a high level of quality in teaching and learning is achieved, as well as a great durability of students' knowledge.

Using computers and educational software has many advantages over conventional methods (Iskrenovic-Momcilovic, 2018). With the help of computers, teachers collect data, analyze information and prepare teaching materials, and with the help of new educational software, they create applications for learning and testing knowledge. Students, on the other hand, use computers for easier acquisition of knowledge, more active participation in teaching, analysis and application of information, shortening learning time and self-motivation to acquire new knowledge. Computers simplify and provide objective testing of students' acquired knowledge.

The use of computers in teaching implies the creation of special applications for specific thematic areas. If, in addition to standard computer equipment, additional tools are used, which provide multimedia presentation of knowledge, the effects of such learning are much greater than with the traditional learning (Cvetković, 2010). Also, one should keep in mind the possibility of global communication via the world's largest computer network - the Internet.

From basic correspondence through postal service to the wide variety of tools available through the Internet, society has embraced new forms of communication through the years (Moore et al., 2011, Aladwan et al., 2019). Today, it is possible to create courses for students to acquire knowledge, using additional tools, which are a standard part of computer software and additional media or are obtained via the Internet. It can be said that the main advantages of the courses are the following: (a) the place and time of the course are at the choice of the course participants; (b) there is the simultaneous work of a large number of students at potentially lower costs; (c) a simple, user-oriented work environment with the ability to adapt to each of the course participants.

Statement of problem

The use of computers in teaching is largely limited by barriers. Several studies have divided the barriers unto two categories: external and internal barriers (Hamutoglu & Basarmak, 2020). Ertmer (1999) described external barriers such as first access, time, support, resources and training and internal barriers such as second access, beliefs, practice and resistance. Hendren (2000) pointed out that external barriers pertain to work organization not individuals and internal barriers pertain to teachers, administrators and individuals.

Pelgrum (2001) identified barriers as materiel and non-materiel barriers. The material barriers include lack of computers or lack of copies of software. The non-materiel barriers include lack of teachers' ICT knowledge and skills, the difficulty of integrating ICT in institution and insufficient teacher time. Herzig (2004) dated that major barriers to ICT integration are lack of experts and need of teacher training.

Hew and Brush (2007), who analyzed experimental studies from 1995 to 2006, reported that barriers include students 'knowledge and skills, teachers' attitudes and beliefs and institution culture and principles. In recent years, barriers have been considered to contain various variables under primary barriers, such as lack of equipment, unreliability of equipment, lack of technical

support, and issues related to other resources, and the secondary barriers as school-level factors, such as institution's culture, and teacher-level barriers, such as beliefs and attitudes about teaching and technology and openness to change (Belland, 2009; Kopcha, 2012; Bingimals, 2018).

Since the purpose of this paper is to determine the present and further barriers to using computers in teaching, the analysis focuses on: (a) internal barriers: (no) knowledge of English; advantage of the skills of students in the use of computers; fear of hardware and software problems; lack of skills for making educational contents; lack of time for preparation of the contents of education; lack of methodological skills for the use of computers; (b) external barriers: lack of hardware; lack of software.

The basic prerequisite for the use of computers is knowledge of the English language (Glušac et al., 2012). Today, many software applications contain a multi-language interface, but there are some that does not have this option (Stojanovic et al., 2017). Some browsers have a built-in translation module. For example, Google Chrome has a translate module, which allows efficient translation from and into any selected language. There are a large number of online dictionaries on the Internet (Tarp, 2014), into which even sentences can be copied. Regardless of all this, searching on the Internet with the help of keywords is far more efficient in English.

Learning to work on a computer with no knowledge of English is based on memorizing basic functions or groups of functions (insert, open, save, etc.) within various software applications (Maurer, 2017). However, accepting the wider capabilities of computers is far more efficient with knowledge of English. Good knowledge of English eliminates many problems about understanding how computers work (Maurer, 2017). Future teachers should keep in mind that ignorance of the English language often makes it impossible to use computers in education, but also in everyday life.

The advantage of students in the application of modern technology in relation to teachers is obvious (Raja & Nagasubramani, 2018). Computers al-

low interactive applications versus one-dimensional exercise books and tests. This new way of teaching the students accepted with enthusiasm. It is faster, easier and more interesting way to adopt new concepts and skills.

In contrast, teachers are reluctant to accept computers, with many problems and difficulties (Mikre, 2011). They are in a fear of the advantages of students in the skills to use computers. Feelings of uncertainty, hostility and fear naturally lead to many teachers' reluctance or resistance to technological innovation. They will continue to adhere to their traditional practices with which they feel more confident and comfortable (Mikre, 2011; Sabzian & Gilakjani, 2013).

Various hardware and software problems occur during using of computers. Hardware problems originate from a faulty or weak hardware component and are usually solved by replacing the problematic part. Diagnosis of hardware problems is sometimes difficult because the symptoms of the failure can indicate different components (Mandal et al., 2013). On the other hand, software problems originate from driver corruption, the presence of malware, damage to the operating system, or some application not working well (Lee & Iyer, 2000).

If all this happens during the teaching process and there is no teacher's knowledge to solve these problems or it is simply not possible in the short term, a bad experience can turn into a barrier. In environments where computers and other technical tools are used, problems of this nature inevitably arise. This problem can be solved most effectively if the teacher prepares alternative teaching content in case of hardware and software problems (for example, in case of power outage or Internet connection). One of the other factors that affect the use of computers is the inadequate computer technology support in hardware/software faulty (Gilakjani, 2013).

On the market there are a large number of software applications for creating teaching content such as PowerPoint, Prezi, smart Notebook, mimio Notebook, ... Although the use of these applications is simple (user friendly),

you need the appropriate knowledge and skills. In addition, creating, studying, analyzing opportunities and testing teaching content requires a certain amount of time and effort. That time is one of the main barriers to the realization of good and interesting teaching content (Francom, 2019). Due to lack of time teaching content is often based on tools for displaying and presenting course content and not on the development of the learning environment with interactive and multimedia.

Teachers do not have time to design, develop and incorporate technology into the teaching content (Kafyulilo et al., 2016; Afshari, 2009; Ihmeideh, 2009). These studies reported lack of time as one of the biggest constraints to the integration of ICT into the teaching content. Teachers need time to learn how to use the hardware and software, time to plan, and time to collaborate with other teachers. Teachers also need time to develop and incorporate technology into their teaching content.

Today, the lack of hardware and software is still one of the major barriers to the application of new media in education. There are educational institutions that still do not have (in the appropriate number) computers, laptops, projectors and interactive whiteboards (Stojanovic et al., 2017). External barriers are in most of the cases are eliminated with the help of material resources. In addition to hardware, the wide availability of web tools has made lack of software less of an issue to any teacher with Internet access. Given this, teachers no longer need to purchase expensive software or hardware to provide access to digital content. Teachers have already begun to adjust their classrooms to integrate these tools (Ruggiero & Mong, 2015).

Methodology

The aim of the research is to analyze using computers in teaching, with emphasis on the barriers and their elimination. Detection and analysis of barriers to the application of computers in teaching will create a more effective educational environment.

Research questions are: (1) for what purpose teachers use computers in teaching; (2) what are the disadvantages of using of computers in teaching; (3) what are the advantages of using computers in teaching; (4) what are the barriers in using computers in teaching; (5) how to improve the use of computers in teaching.

Hypotheses are: (1) there is no significant difference between male and female students in the opinion of the barriers in using computers in teaching; (2) there is no significant difference in the opinion on how to improve the using computers in teaching.

The population consists of all the students from all four years of undergraduate studies at the Faculty of Education in Sombor. The survey was conducted on 165 students of the fourth year, because they have a complete picture on using computers in teaching. Students of other years are not involved in the research, because there are not clear picture of what is supposed to be teaching. The sample is representative and given the size of the sample, some generalizations are possible within the population, which has been studied.

The research involves the collection of data to answer the research questions and test hypotheses on the present situations of problems. Five research questions were raised during the research and two hypotheses were formulated which was tested at 0.05 level of significance. The instrument used was a questionnaire comprised of five items which was designed using the five point Likert scale. The format of a typical five level Likert items is as follow: *1-strongly disagree, 2-disagree, 3-undecided, 4-agree, 5-strongly agree.*

The data collected were analyzed using mean and standard deviation for research questions, and the decision rule of acceptance level is anything from 2.50 and above, while the rejection level is anything below 2.50. The z-test statistics was used to test the hypotheses at 0.05 level of significance.

Results

Research question 1: for what purpose teachers use computers in teaching

Table 1 showed that out of four items on the use of computers in teaching, students agreed on three items 1, 2, 3 and 4 which had their decision mean above 2.50 but disagreed on one item (5) From Table 1 it can be concluded that computers are used in teaching in many ways, but mostly for displaying PowerPoint presentations and educational software. This Table 1 also shows that the cumulative average mean of students' responses is 3.29.

Table 1. Using computers in teaching

	Items	Students Response		
		$\bar{X}$	SD	Decision
1.	displaying of PowerPoint presentations	4.78	1.76	agreed
2.	displaying and using of educational software	3.10	1.17	agreed
3.	displaying content from the Internet	4.25	1.51	agreed
4.	displaying of films and video clips	2.75	1.30	agreed
5	listen to music and audio tracks	1.57	1.20	disagreed

Research question 2: what are the disadvantages of using computers in teaching

Table 2 showed that out of five items on disadvantages of using computers in teaching, students agreed on all five items which had their decision mean above 2.50. From Table 2 it can be concluded that using of computers in teaching has many bad features. This table also shows that the cumulative average mean of students' responses is 3.17.

Table 2. Disadvantages of using computers in teaching

	Items	Students Response		
		$\bar{X}$	SD	Decision
1.	it more difficult to control the teaching	3.20	1.71	agreed
2.	preparing the lesson is more difficult	3.50	1.21	agreed
3.	restricts the content of the lessons	2.90	1.35	agreed
4.	hardware and software problems often disrupt lesson	3.60	1.15	agreed
5.	using computers in teaching is expensive	2.65	1.16	agreed

Research question 3: what are the advantages of using of computers in teaching

Table 3 showed that out of five items on benefits of using computers in teaching, students agreed on all five items which had their decision mean above 2.50. From Table 3 it can be concluded that using of computers in teaching has many good features. This table also shows that the cumulative average mean of students' responses is 3.74.

Table 3. Advantages of using computers in teaching

	Items	Students Response		
		$\bar{X}$	SD	Decision
1.	lessons are not boring, students can be very active	4.85	1.71	agreed
2.	develops motivation and independence in students	3.50	1.21	agreed
3.	lessons are more easy for learning	4.50	1.35	agreed
4.	computer perform routine activities and spends more time for meaningful activities	3.20	1.15	agreed
5.	simulation experiments that are inaccessible for economic or health reasons, are possible	2.65	1.16	agreed

Research question 4: what are the barriers in using computers in teaching

Table 4 showed that out of four items on barriers in using of computers in teaching, students agreed on three items 2, 3, 4 and 5 which had their decision mean above 2.50 but disagreed on one item (1) which had its decision mean below 2.50. From Table 4 it can be concluded that English language is not a barrier to the use of computers in teaching. The biggest problem in teaching using computers is the lack of hardware (computers, printers, monitors, scanners, …) and software (programs for processing word, image or sound and other user programs). This table shows that the cumulative average mean of students' responses is 3.12.

Table 4. Barriers in using of computers in teaching

	Items	Students Response		
		$\bar{X}$	SD	Decision
1.	English is too present	2.35	1.10	disagreed
2.	lack of hardware (computers, printers, monitors, …)	4.15	1.65	agreed
3.	lack of software (programs for processing word, image or sound and other user programs)	3.25	1.40	agreed
4.	lack of skills for teaching content	2.85	1.30	agreed
5.	lack of time for teaching content	3.00	1.27	agreed

Research question 5: how to improve the use of computers in teaching

Table 5 showed that out of four items on options to improve using computers in teaching, students agreed on all four items which had their decision mean above 2.50. From Table 5 it can be concluded that barriers of using computers in teaching can be overcome with less effort. This table shows that the cumulative average mean of students' responses is 3.10.

Table 5. Options to improve using computers in education

	Items	Students Response		
		$\bar{X}$	SD	Decision
1.	better knowledge of English	2.70	1.20	agreed
2.	increasing number of hardware elements	3.15	1.46	agreed
3	increasing number of software packages	3.05	1.52	agreed
3.	increasing number of connections Internet	2.90	1.30	agreed
4.	increasing number of useful and practical courses and seminars on computer	3.70	1.54	agreed

Hypothesis 1: there is no significant difference between male and female students in the opinion of the barriers in using computers in teaching

As shown in Table 6, the z-calculated was less than the z-critical therefore the null hypothesis which states that there is no significant difference between male and female students in the opinion of the barriers in using computer in teaching was retained. This shows that both male and female students consider that there are the same barriers in using computer in teaching

Table 6. Z-test analysis of male and female students in the opinion of the barriers in using computers in teaching

	N	$\bar{X}$	SD	Df	Z_cal	Z_critical	Decision
Male	35	3.76	2.10				
Female	91	3.72	1.83	23	1.18	1.96	Retained

Hypothesis 2: there is no significant difference in the opinion on how to improve the use of computers in teaching

Table 7 showed that the z-calculated value of 1.06 was less than the z-critical value of 1.96 at 0.05 level of significance, hence the null hypothesis was retained. This shows a non-significant difference in the opinion on how to improve the use of computers in teaching with regards to gender.

Table 7. Z-test analysis of male and female students in the opinion on how to improve the use of computers in teaching

	N	$\bar{X}$	SD	Df	Z_cal	Z_critical	Decision
Male	35	2.04	1.09				
Female	91	2.17	1.89	27	1.06	1.96	Retained

Discussion

Students answered five research questions and tested two hypotheses about the use of computers in teaching. Results on Research question 1 demonstrate that teachers mostly use PowerPoint presentations. PowerPoint program allows to create interactive presentations that include text, images, animations, audio and video elements. The reasons for its popularity are numerous, but the most important are: (a) it is accessible to everyone who uses a computer; (b) it is easy to use; (c) it keeps students' attention; (d) it allows students to get involved in creating a presentation and thus show what they have learned (Brock & Joglekar, 2019).

The road to creating a good presentation implies a good knowledge of PowerPoint program, but also a degree of visual creativity. Although Power-Point program offers an extensive range of options (eg. visual and audio effects) during the preparation of the presentation, it should be noted that the appearance of the presentation should not distract from the content (Iskrenovic-Momcilovic, 2016).

A large number of teachers uses the computer and display information from the Internet. Internet has become an inexhaustible source of information to both teachers and students. All need accurate, timely information, but if they are faced with information that is inaccurate or misleading, and they lack the ability to distinguish this information from more credible sources, their using is compromised (Metzgera et al., 2003). Students have noted that teachers

use fewer computers to run educational software, movies, video clips and audio tracks.

The disadvantages of using computers in teaching are varied (Tarman et al., 2019). It is more difficult to control the class. Also preparing the lesson is more difficult, because teacher first need to figure the lesson, and then collect the information necessary for the implementation of lesson. Using computer in teaching sometimes restricts the content of the lessons. Hardware and software problems often disrupt lesson, and then go on to be a traditional form of lesson. Students think that using computers in teaching is expensive.

The advantages of using computers in teaching are also varied (Tarman et al., 2019). What is most important lessons are boring, so students are active in the course of its realization. Computer increase autonomy and motivation in students (Ayari et al., 2012). He performs routine activities, but students have more time for meaningful activities. The application of computers in the classroom to simulate experiments that are now inaccessible for economic or health reasons.

In the summarized results can be seen that the present barriers to using computers in teaching. The most important of them are the lack of hardware (computers, printers, monitors, scanners, …) and a lack of skills and time to develop instructional content (Iskrenovic-Momcilovic, 2018). There is also a lack of software, as well as English language, which is too present during the application of computers. Knowledge of English is probably a problem in older teachers, because it had not learned English only during training, but also Russian and German.

Finally, the question arises - how to improve the use of computers in teaching. Students feel that the best way for the elimination of all barriers to the existence of a large number of useful and practical courses and seminars about computers. Teachers need constant training, which would primarily work on breaking prejudices and fear of computer use, and in particular the

implementation of educational software in teaching, and afterwards explained the purpose of the use of computers and the effects that may be achieved. If teachers were aware of the benefits of computers to the efficiency of learning and cognitive activity of students probably would have tried to supplement the teaching of these funds.

To improve the use of computers in teaching should increase the number of hardware elements (computers, printers, monitors, scanners, …) and software packages, as well as Internet connections. Access to the Internet in the Faculty of Education is possible only in computer classrooms. Increasing the number of Internet connections could be realized by placing the terminal in the corridors, which would allow easy and quick access to all the petty needs and quickly check email. One solution is the introduction of wireless connections for teachers and students, which makes sense considering the arrival of tablet, smart phone and other portable devices through which one can access the Internet. Be sure to work on improving English language skills due to the Internet and computers.

Conclusion

The great availability of computers, the rapid flow of information and the advancement of ICT have led to qualitative changes in many segments of modern society. All this has led to innovations in the field of education as well. E-books, educational software, online courses, distance learning and video conferencing are just some of the features that characterize modern education.

Students and teachers reacted largely positively to using computers in teaching. As an aggravating circumstance for the use of computers, they have different excuses, starting from a lack of hardware and software to the recognition of their own ignorance of computers and English language. The general conclusion is that everyone likes teaching as it is and that they very rarely dare to change anything, because they feel most comfortable in familiar forms and

methods of work. Teachers need constant training and seminars, in which it primarily worked on breaking prejudices and fear of using a computer, and only then explained the purpose of their use and effects, that may be achieved.

If teachers were aware of the benefits of learning efficiency and students' thinking activity, they would probably try to make teaching look different. With the presence of a computer, it is easier for the professor to encourage students and encourage their activity, because the multimedia of these means enables him to do so. Students are in a positive attitude towards computers, because their application refreshes everyday teaching, which is becoming more and more boring for students. Today, digital information is a familiar form of communication for students, because it makes up their everyday living environment.

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