SETSCI Conference Proceedings,
4 (1): 416-420, 2019

ISAS 2019
3rd International Symposium on Innovative Approaches in Scientific Studies
Section: Engineering and Natural Sciences
April 19 – 21, 2019, Ankara, Turkey

The Effects of BİLZÖS Intelligent Tutoring System on The Student's Success

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Presentation/Paper Type: Oral / Full Paper

Abstract: Artificial intelligence is used at the many fields of our lives in a successful way. The education is the one of these fields. Intelligent Tutoring System is the one of the Artificial intelligence using methods at the education fields. Intelligent Tutoring Systems are thought as future education systems. Various studies are made at this field. Intelligent Tutoring Systems are used at many fields successfully. The increasing of using technology at education and teaching activities at the schools increases the interests into the Web Based Intelligent Tutoring Systems. The aim of this study is to investigate the effects of the Web Based Intelligent Tutoring System, that is developed by ourselves, to the success of the students. With this aim, we have defined as a working group the students who study at The Computer And Teaching Technologies Department at The university of Amasya during 2018-2019 education therm. Shell Operations unit, including in the operating system lesson that is studied Michaelmas term at the same department, has been uploaded to the Intelligent Tutoring System. This study is an experimental study. It has been studied on the effect of independent variable to the dependent variable. The students, including the Web Based Intelligent Tutoring System, have answered pre-test and final test questions. We have compared the success situations by considering the test points. At the end of this comparing study, it has been seen that Web Based Intelligent Tutoring System which is developed by ourselves has increased the academic success. Furthermore , we have applied to the students The Teacher Candidates' Scale Of Technology Accept And Using and we have investigated their attitudes to this subject.

Keywords – Intelligent Teaching System, Student Achievement, Artificial Intelligence, Web Based Education

I. INTRODUCTION

The concept of "inovasyon", which we frequently encounter recently, is defined as innovation according to the Turkish Language Association [1] (TDK). It is thought that everything that is new should provide a quality contribution to its field. In this way, societies and individuals keep up with technological developments, produce high value-added products, reduce labor and cost, use time effectively, succeed and live life easier [2].

Although many technological products have been called new in the past, they have lost their properties today. In the past, the emergence of an innovation was both difficult and took a very long time. Today, there is a new technological change almost every day and every hour. Thanks to the developments in new technological tools such as mobile phones, tablets and computers and new software, we have come up with different concepts in recent years. Some of these concepts are internet of objects, cloud technology (data processing), augmented reality, humanoid robots and industry 4.0 [3].

The Internet of Things concept was first used by Kevin Ashton. Ashton has designed Radio Frequency Identification technology for Procter & Gamble [4]. The Internet of Things is defined as the interconnection of almost all kinds of objects, from cars to airplanes, from iron to electrical appliances, from shoes to intelligent systems [5]. Thanks to the improved internet infrastructure and ease of access, it is thought that many more devices and objects will be included in the internet of objects concept.

Cloud technology or cloud computing was first introduced by Amazon in 2006 [6]. Armutlu and Akçay [7] describe cloud technology as information and communication services that can be adjusted according to needs, ready for use at any time, easy to manage and source search through common resources. In short, it is a service that stores data on the internet through web services and provides common information sharing [8].

Augmented reality is based on the work of Ivan Sutherland, who was a professor at the Massachusetts Institute of Technology (MIT) in the 1960s. Sutherland presented head-mounted display [9]. Augmented reality is the visualization of the object or shape being displayed by means of technological devices, and transferring the obtained image to the user as a real image via a screen [10]. Shelton [11] briefly explains the augmented reality as follows; it is a system that allows images of real-world objects to be viewed as real, in three dimensions.

Humanoid robots first appeared in the 12th and 15th centuries. Systems of human action (such as sitting and arm movements) designed by Al Jazeera and Leonardo da Vinci are encountered.[12 and 13]. Today, the end point of the humanoid robots is amazing and robots have been produced

which are almost identical to human beings [14, 15 and 16]. With the developing technologies, robot technology is expected to enter our lives more in the following years.

The Concept of Industry 4.0 was first used in the world's largest industrial fair, Hannover Fair in 2011 [17, 18 and 19]. Industry 4.0 refers to the machine power that uses computer and internet technologies to manage the production process by replacing manpower [20]. When it is looked at the components carefully, it is seen that Industry 4.0, which is referred to as the new industrial revolution, is a great transformation which includes the information technologies and industrial activities used today.

It is a well-known fact that the Internet is included in the infrastructure of these concepts and the number of devices connected to the Internet in the world increases rapidly. This is also shown with 2018 social media statistics prepared by We are social and Hootsuit [21]. According to the survey 53% of the world population, while 67% of Turkey's population are internet users. According to the same report, mobile devices are used for internet at the rate of 52% worldwide, while mobile phone devices are used for internet at the rate of of 98% in Turkey. Considering other devices such as computers and tablets it can be said that there is widespread use of the Internet in the world and in Turkey. According to the researches internet usage rate in Turkey it is higher than in younger individuals. [22 and 23].When these groups are examined, it is seen that they are mostly composed of age groups in the education period. It is said that the use of internet and technological tools in education for these age groups is now compulsory [24].

It is an undeniable fact that there is a rapid transformation in the world. It cannot be thought that with the change especially in the field of industry and other areas, including education, these are not affected by this change.

Education was previously only in the classroom and face to face. In this type of education, the teacher was the only source of information and the educational environment was only class. Thanks to the new environments that have emerged recently, the teacher has come to a position to guide the students from being the only source of information [25]. Internet and web based systems are the basis of this. In this way, the teacher was no longer the only source of information and became a guide. Learning environments have not only been class but the whole world. In addition, education has become student-centered rather than teacher-centered. The student-centered approach is the main element of individual learning environments that arise in line with technological developments, it is also designed to facilitate student learning and improve performance [26]. Many devices have been designed and used for this purpose. Especially the use of computers in education has led to the emergence of new tools and software.

Computer software, which was introduced in 1970s, has been replaced by individual software since 2000s [27]. The computer and internet based learning systems that emerged with the latest developments in science and technology can be used in order to increase the performance of the individual while learning, to meet his / her needs (learning speed, motivation, interest, entertainment, etc.) and to learn his / her own [28].

Göçer [29] stresses that for a qualified education, individual differences such as knowledge and skills, speed, interests and motivations of individuals should be considered. In this direction, the new teaching methods has emerged because of the situations like, increasing number of students, the teacher cannot devote enough time to the student, different methods and techniques cannot be applied to each student easily, the content of the students cannot be satisfied with the student and the student's interest in the course. Individual learning, which initially gained a different dimension with Computer Assisted Teaching (CAT), continued with Web Based Learning (WBL) with the inclusion of internet and web technologies in this system. Today, Intelligent Teaching Systems (ITS) are used to incorporate artificial intelligence technologies and algorithms into the WBL system.

The concept of Intelligent Teaching was first used in 1982 by Sleeman and Brown's book "Intelligent Tutoring Systems" [30]. The Intelligent Teaching System is a computer system designed using techniques involved in the formation of artificial intelligence, which knows what to teach, who to teach and how to teach [31]. In intelligent teaching systems, the aim is to plan, design, implement and evaluate learning completely according to the student. According to another definition, artificial intelligence is; to guide the progress of the learner in a manner similar to the behaviors of a teacher and provide support for the learning process with instant feedback with using cognitive science, informatics, and web technologies [32]. The aim of the intelligent teaching system is to control the student level and make decisions and to organize the content according to the student.

It is of great importance to accept and use technology as much as the development of a system and technology. In particular, with FATİH (Fırsatları Artırma ve Teknolojiyi İyileştirme Hareketi-Opportunities and Technology Improvement Movement) project, information technology tools such as interactive board, tablet, etc. have entered the classroom and in this environment where educators use these technologies is inevitable in terms of education. Research shows that the use of technology is not at the desired level [33, 34 and 35]. The acceptance and adoption of technology by teachers who play a key role in education is effective in achieving targeted changes [36]. In the last few years, in addition to the pedagogical content knowledge, one of the key competences that teachers should have is using technology knowledge [37].

There are many studies about the acceptance and use of technology by students, teacher candidates and teachers [38, 39, 40 and 41]. As seen in these studies, the importance of technology in education as well as its use and acceptance are important.

The aim of this study was to investigate the effect of the BİLZÖS intelligent teaching system [42] developed by us and its effect on student achievement. In addition, the attitudes of teacher candidates towards technology acceptance and use were examined. For this purpose, our problem sentences are formed as follows.

Problems:

1- Is there any effect of the use of the intelligent teaching system of BİLZÖS in the teaching of the subjects in the shell processing unit of the Operating System Course?

2- What are the attitudes of students who use BİLZÖS to acceptance and using technology?

II. METHOD

Research Design

Our study was conducted as a quasi-experimental study of quantitative research methods. This method was preferred because it was difficult to obtain the desired number of experimental group in the teacher candidates who took the operating system course. For this purpose, a randomly selected group was formed in a classroom where the same teacher was trainer. The education of the group was given through BİLZÖS under the guidance of a teacher.

Working Group

The study group of this study consists of 3rd year students who are studying Computer Education and Instructional Technologies at Amasya University in the academic year of 2018-2019. The experimental group consists of 21 students.

Data Collection Tools

The achievement test was developed to determine the students' level of achievement. In order to check the validity of the achievement test, the opinion of four field experts (two IT instructors working in the National Education and two teaching staff working in the University) were taken and as a result of the regulations, a success test consisting of 19 questions was created. The test was applied to the students who had previously taken over the course of operating systems face to face in the 2018-2019 fall semester. In the achievement test, the lowest grade is evaluated as 0 and the highest grade is evaluated as 19.

Another data collection tool used in the research is the "Technology Acceptance and Use Scale of Teacher Candidates"developed by the Işıl Kabakçı Yurdakul, Ömer Faruk Ursavaş and Gökçe Becit İşçitürk in order to determine the technology acceptance and usage levels of teacher candidates. [43]. The scale is the first scale to be used in the national literature by using "Technology Acceptance and Use Unified Model" to determine the acceptance and use of technology of prospective teachers. The scale consists of 23 items and seven factors. The items of the scale are 5-point Likert-type, "Strongly Agree", "Agree", "Undecided", "Disagree" and "Strongly Disagree`. The internal consistency coefficient of the scale (Cronbach's alpha coefficient) was .95.

III. RESULTS

The data obtained by using the success test and the technology acceptance and use scale were analyzed by using SPSS program. The test group data were tested to be suitable for normal distribution and the values in Table 1 were obtained.

Table 1: Normal distribution table

	Statistic	sd	p
Pre-test achievement score	0,15	21	0,20
Post test achievement score	0,17	21	0,12
Pre-test technology acceptance	0,17	21	0,13
Post test technology acceptance	0,13	21	0,20

In order for a sample to be considered as normal distribution, $p > 0.05$ or skewness values should be between (-1) and (+1) [44]. When Table 1 is examined in this direction, the whole of the experimental group is $p > 0.05$ and all of the sample shows normal distribution. Since the parametric tests will be applied in the normally distributed data [44], the following findings were obtained in our study in accordance with the research problems.

1- Is there any effect on the academic achievement of the use of the intelligent teaching system of BİLZÖS in the teaching of the subjects in the shell processing unit of the Operating System Course?

Table 2: Achievement points

	N	X	S.S.	sd	t	p
Pre-Test	21	11,43	2,27	20	-4,38	0,00
Post Test	21	13,57	2,20			

The dependent sample t test was applied to determine the difference between the pre-test and post-test achievement scores. The results are given in Table 2. According to this table, the average of the post-test success score of the students (X) is 13.57, and the average of the pre-test success score (X) is 11.43. Although the difference in favor of the last test appears, this difference is expressed as a significant difference ($p < 0.05$) ($t(20) = -4.38$; $p < 0.05$). According to these results, the experimental group students were more successful than the pretest in the last test.

2) What are the attitudes of students who use BİLZÖS to acceptance and using technology?

Table 3: Attitude towards technology acceptance and use

	N	X	S.S.	sd	t	p
Pre- test	21	4,21	0,57	20	-0,58	0,57
Post Test	21	4,24	0,51			

When the results in Table 3 are examined, it is seen that students' level of technology acceptance and use is high. Although the difference between the post-test average ($X = 4.24$) and the pre-test average ($X = 4.21$), this difference was not statistically significant ($t(20) = 0.58$; $p > 0.05$). According to these results, it is thought that students will accept technology and will not have any problems in use.

IV. DISCUSSION AND CONCLUSION

The aim of this study was to investigate the effect of the intelligent teaching system prepared by us on academic achievement. Also, it is aimed to examine the technology acceptance and usage levels of the teacher candidates who are our sample group.

In our study, the experimental group was trained through intelligent teaching system.

When our sample was examined, it was determined that it showed normal distribution ($p > 0.05$). In this respect,

parametric tests were used to analyze the statistical data. When the results of the analysis were examined, it was determined that the students' academic achievement level (X = 11.43) was above the average in the pre-test. In the last test of the same group, the mean (X = 13.57) was increased. This increase in the experimental group was statistically significant (p <0.05). With this result, it is seen that the experimental group students were successful at the end of the education.

In the light of the results obtained in the study, the sample group (teacher-guided education via BİLZÖS) received academic success when the students were educated via BİLZÖS. In the light of this study, the BİLZÖS positively affected the success of students took Operation System Course shell processing unit.

To provide a more comfortable environment in the crowded classroom environment, to provide learning in a person's own interest, desire and individual learning speed in education, to attract attention of the learner with web tools (such as video, graphics), to be dependent on time and space. show that it is important. In this respect, it is considered useful to use intelligent teaching systems in teaching other courses.

Another result of the study is to examine the acceptance and usage levels of the students using technology. According to the results, the final test average of students (X = 4.24) was higher than the pre-test average (X = 4.21). However, this difference was not statistically significant (p> 0.05). This result shows that students accept technology and do not have any difficulties in use.

While living in a technological era, if people stay away from technology or do not adopt it, is expected that many technological processes will not progress at the desired level. Especially teachers who are considering to teach in schools equipped with FATIH project need to develop and adopt themselves in technology. This study shows that the high level of technology acceptance and use by teacher candidates will contribute to achieving the desired goals in the use of technology in education.

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