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The Effect of Adaptive Online Web Based Material on Student Academic Success[1]

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Abstract

Accelerating the use of computer and internet technologies in education has necessitated the formation of different teaching environments. The necessity of different environments to be presented to different users as the opportunities offered by today's technology creates a working environment for researchers on new concepts. Adaptive Online Environments bring innovation to the field in this sense. The purpose of this research is to show the effectiveness of the web-based teaching portal designed as an adaptable online environment to the users' academic success. Results based on pre-test and post-test findings of academic achievement test and suggestions for these results were included in the research. According to the ANOVA result, it was determined that the group x pre-test common effect was not significant on post-test average scores of the students. [F (1–50) = 1.178, p>.05]. In addition, descriptive statistics and ANCOVA results of the post-test arithmetic averages corrected in the study are given according to the groups. Participants measured the level of academic achievement test, recall, and implementation in the search for the success effect of using the web-based adaptive online environment. As a result of the research, some suggestions are given.

Keywords: *Adaptive online environments, Web based learning, Educational technology*

[1] *This article is derived from Fatih Çağatay Baz's Ph.D. thesis on "Designing of adaptable web based online learning context in confirmity with the collated teaching model and its effect on student's success".*

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Web Tabanlı Uyarlanabilir Çevrimiçi Öğrenme Ortamlarının Öğrenci Başarısına Etkisi

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Öz

Bilgisayar ve internet teknolojilerinin eğitimde kullanımının hız kazanması farklı öğretim ortamlarının oluşmasını gerekli kılmıştır. Günümüz teknolojisinin sunduğu imkânlar ölçüsünde farklı kullanıcılara sunulacak ortamların farklı özellikler de olması gerekliliği, yeni kavramlar üzerinde araştırmacılara çalışma ortamı yaratmaktadır. Uyarlanabilir Çevrimiçi Ortamlar bu anlamda alana yenilikler getirmektedir. Bu araştırma ile uyarlanabilir çevrimiçi ortam olarak tasarlanan web tabanlı öğretim portalının kullanıcıların akademik başarısına olan etkisini ortaya koymak amaçlanmıştır. Akademik başarı testine ait öntest ve sontest bulgularına dayalı olarak ulaşılan sonuçlar ve bu sonuçlara yönelik önerilere araştırmada yer verilmiştir. Araştırmada uygulanan ANOVA sonucuna göre, öğrencilerin sontest ortalama puanları üzerinde grup x öntest ortak etkisinin anlamlı olmadığı belirlenmiştir. [F (1–50) = 1.178, p>.05]. Ayrıca çalışmada düzeltilmiş sontest aritmetik ortalamaların gruplara göre betimsel istatistikleri ve ANCOVA sonuçları da verilmektedir. Katılımcıların hazırlanan web tabanlı uyarlanabilir çevrimiçi ortam kullanımlarının başarıya etkisinin araştırılmasında hazırlanan akademik başarı testi, hatırlama kavrama ve uygulama düzeylerini ölçmüştür. Araştırma sonucunda birtakım önerilere yer verilmiştir.

Anahtar Kelimeler *Uyarlanabilir çevrimiçi ortam, Web tabanlı öğrenme, Eğitim teknolojisi*

Introduction

Societies are evolving to the extent of educational quality that they offer to individuals. Individuals who have a free thought, who produce solutions to problems will have a productive and productive personality. In order to achieve this, it is necessary to use the possibilities of technology in the field of education. According to Alesso and Smith (2009), traditional information systems leave their place to wealthy practitioners. The next generation information systems have begun to use open global standards, contain productive components and provide easy interaction. In this sense, the use of technology with specific standards in education will increase the quality of education (Lee and Owens, 2000; Seferoğlu, 2006; Çelen and Çelik, 2011).

Today, web based environments in education (Nam and Smith-Jackson, 2007; Yu, 2007; Hadjerrouit, 2010; Ludewig and Ludewig-Rohwer, 2013; Perlman, 2016), distance learning environments (Birkök and Vuranok, 2010; Eygü and Karaman, 2013; Durak, 2017), semantic web (Lin, 2008, Mathews and Rao, 2011; Shamsi and Khan, 2012; Czerkawski, 2014) and similar environments are being studied. In addition to these, adaptive learning environments, a new field of study, take place in the field of education (Roya and Brusilovsky, 2016; Agudo, Rico and Sanchez, 2016; Battou, 2017).

Adaptable environments are enabling improvements in e-learning technologies that take into account differences among users and vary according to their individual needs. In addition, the development of these environments will be contributed by Web 3.0 and semantic web technologies. Adaptable web-based systems have been interesting and reported since the years of development (Brusilovsky and Peylo, 2003; Somyürek, 2009; Şahin and Kışla, 2013). In these settings, learning adapts automatically or continuously according to changing characteristics. In adaptive environments, learning-learning processes become personalized by taking into account learners' learning styles, cognitive styles, personality types and various other individual characteristics and preferences and the changes in these preferences (Çardak, 2010).

The adaptive online systems outline user information, such as the learner's preferences, prior knowledge, skills and attitudes; selects the adaptive method using the data for creating a user model, extracting results and placing each person according to the developed user model; The implementation of adaptive methods in the system is based on the collected and finalized data. Different characteristics of each individual are important clues for the teacher to decide on teaching strategies (İnan et al., 2016; Ercan and Yıldırım Orhan, 2016). In the literature, adaptive learning system, adaptive educational hypermedia system, personalized learning system and intelligent teaching system are used in similar sense in the literature. All these concepts emphasize that learning can be personalized and more effective learning can be realized by taking individual differences into consideration (Güyer and Çebi, 2015).

The necessity of different environments to be presented to different users in accordance with the possibilities offered by today's technology creates a working environment for researchers on new concepts. Adaptive online learning environments also bring innovations to the field. In the study, online learning environments were dealt with in order to respond to the needs of this topic. This research is designed with a web-based teaching portaiton as an adaptable learning environment. It is aimed to show the effect of this designed web-based teaching portal on the academic success of the students. Within this aim, students were asked whether there is a meaningful difference between their academic achievement scores of students who use web based instruction software designed as adaptive online learning environment and those who are working with traditional method. A small number of studies have been found on adaptive learning environments. In this sense, the contribution that the researcher can provide to the field is important.

The Study

The research consists of experimental and control groups. Experimental and Control Groups constitute senior students studying at the Department of Computer and Instructional Technology Education at the University. The number of students in the experimental group is 26 and the num-

ber of students in the control group is 28. For the experiment group, teaching software was used as material, taking into account researchers' adaptive online learning principles. The software is prepared in accordance with the "Content Alignment" method. By the method of adaptation of contents; setting content and amount of content is different for students with low level of preliminary knowledge and different content for students with high level of preliminary knowledge (İnan et al., 2016). In line with this principle, the software is basically developed using PHP, a script language. For the control group, PowerPoint presentations and in-class materials prepared by subject experts were used as teaching materials. The prepared materials and applications were continued in the computer laboratory for 14 weeks. In an effort to investigate student academic achievements in adaptive learning environments, an academic achievement test was developed. While the test was being developed, attention was paid primarily to the fact that the test consisted of questions about each topic, in other words the coverage. The opinion of five experts on the validity of the test coverage was obtained. These specialists consist of professors active in the university and active in the field. After the opinions of the experts, some items were regulated and added to the final test.

The symbols used in the research and the symbolic appearance of the research pattern are given in Table 1.

Table 1. Semi-Experimental Pattern Symbolic Appearance Used in Research

Group	Pretest	Method	Posttest
A	O1.1	X1	O1.2
B	O2.1	X2	O2.2

A: According to the adaptive online learning environment principles, the experimental group using the research software prepared by the researcher

B: The control group in which classroom presentations and lecture notes (traditional) are used by subject area specialist

X1: Instructional software supported instruction based on adaptive online learning principles

X2: Teaching with computer presentation and lecture notes

O1.1, O2.1: Pretest
O1.2, O2.2: Posttest

The working group of the study was the students of the Department of Computer and Instructional Technology Education. The most important reason for working with these students is that they are better computer readers than the other departments. Because the research was carried out using a computer for both experiment and control groups.

Analyses and Results

In this section, the academic achievement of students using software designed as an adaptable online environment has been measured. Pretest and posttest of the students' academic achievement test are given.

Table 2 shows the arithmetic mean and standard deviation of the scores obtained by the experimental and control groups in pretest and posttest of the web design course.

Table 2. Descriptive Statistics of Pretest and Posttest Scores of Experimental and Control Groups

Tests	**Experimental**		**Control**	
	X	ss	X	ss
Pretest	12,9231	13,03510	16,50	10,25418
Posttest	91,7308	11,94172	85,6429	16,68047

As shown in Table 2, the scores obtained by the experimental and control groups in the web design course are X = 12,9231 and X = 16,50. For the posttest performed in the study, the experimental group X = 91,7308 and the control group X = 85,6429. As understood from the pretest-posttest, the subjects in the experimental group started to work with lower scores, completing with a higher score than the 14-week study end control group.

In Figure 1, there is a graph of scores of pretest and posttest scores of the experimental and control groups in Table 2.

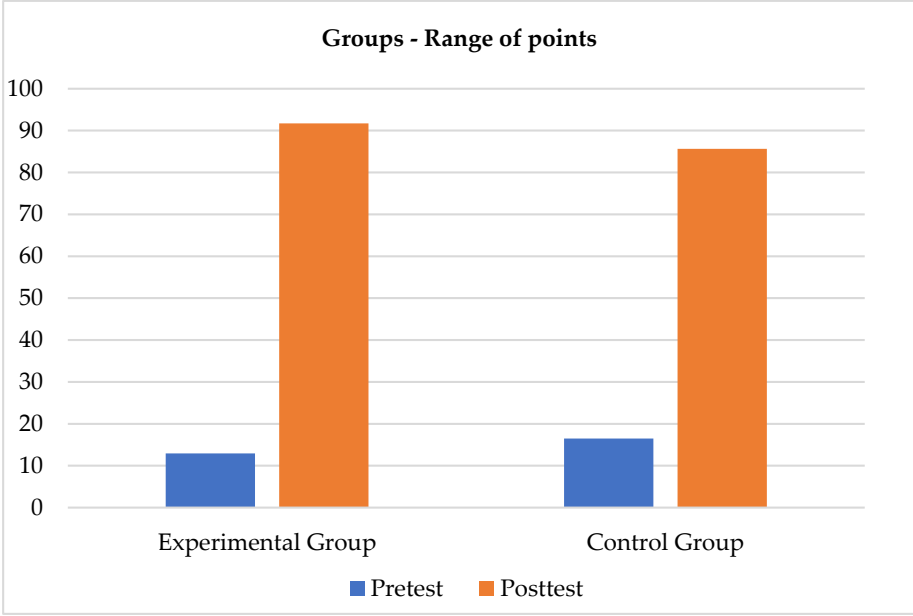

Figure 1: Pretest and posttest scores of experiment and control groups.

As shown in Figure 1, the pre-test scores of the subjects in the experimental group are lower, but post-test scores are higher than in the control group.

It was determined that the group x pretest common effect on posttest average scores of the students was not significant according to the ANOVA result applied to test the equilibrium of the slopes of the regression lines related to the estimation of posttest mean scores based on the academic achievement average scores of the experimental and control groups. [F (1-50) = 1.178, p & gt; .05]. This finding indicates that the slopes of the regression lines calculated for the estimation of mean posttest scores of the students in the experimental and control groups are equal to each other based on the average academic achievement scores.

The average posttest arithmetic averages of the students' academic success and posttest arithmetic averages according to pretest average scores are given in Table 3.

Table 3. Descriptive Statistics of Academic Achievement Posttest and Corrected Posttest Arithmetic Average By Groups

Group	N	X	Corrected X
Experimental	26	91,73	92,30
Control	28	85,64	85,11

As shown in Table 3, the average scores of the academic achievement test were 91.73 for the experimental group and 85.64 for the control group. When the groups' academic achievement pretest scores are checked, it is seen that posttest scores change. Academic success posttest corrected average scores were calculated as 92.30 for the experimental group and 85.11 for the control group. The results of the ANCOVA on whether the differences between the groups' academic achievement posttest corrected average scores are meaningful are given in Table 4.

Table 4. ANCOVA Results According to Groups of Average Posttest Average Scores Compared to Academic Achievement Pretest Average Scores

Source of Variance	Sum of Squares	sd	Squares Average	F	p
Pretest	667.805	1	667.805	3.272	.076
Group	679.609	1	679.609	3.330	.074
Fault	10409.739	51	204.113		
Total	11577.204	53			

As shown in Table 4, no significant difference was found between the academic achievement posttest mean scores corrected for the academic achievement average scores of the experimental and control groups.

Conclusion and Discussion

In this research, the impact of a web-based adaptive online learning environment on student success is examined. It can be said that there is a difference in favor of the experimental group as a result of the results obtained based on the findings of the pretest and posttest of the academic achievement test. The scores of the students who use the adaptive online learning environment, which constitute the experiment group, were found to be better than the scores of the students who did not use the adaptive online learning environment that constituted the control group.

As a result of the research, it was found that there was no significant difference in the academic achievement between the experimental group in which the training software prepared according to the adaptive online learning environment principles were used together with the blended learning environment and the computer auctions and material prepared by the subject field expert and the average of posttest total scores of the control group.

In a similar study by Eryılmaz (2012), the level of adaptability and adaptability of the learning environment looked at the effects on students' academic achievement, satisfaction and cognitive loadings. It has been seen that the success variable of the students working in the web environments has an effect on the academic achievement in the application as pretest and posttest. Kılıç (2016) has developed an application with adaptive navigation techniques, indicating that users can quickly reach their goals with adaptive navigation techniques, reduce navigational burden and increase satisfaction. Gelibolu (2015), on the other hand, investigated the computerized adaptive examinations in the field of basic computer education, taking into account individual differences such as measurement similarities and gender with other types of exam used in distance education. Looking at the literature, there are few adaptive media studies. But work is not enough.

As a result of the research, it can be said that the meaning of the adaptive online learning environment concept is still new and requires a comprehensive study in order that there is no significant difference in the academic achievement of experimental and control groups. It can also be stated that the implementation of such web-based media design is a difficult process, which requires a long process.

As a result of the research, the following suggestions can be listed:

- Adaptive learning environments are complex systems. The fact that it consists of different models and each model requires a separate design makes its design comprehensive.
- The teaching software designed for this study was developed according to the principles of adaptive online learning environment. Methods and techniques of adaptation of content can be used in developing educational software.

- In this research, adaptive learning environment principles can be developed by teaching the topics in other lessons of teaching software developed to teach topics in web design course.
- It can be the subject of research which can be done together with other current educational technology topics and adaptive environments.

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