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Effects of Using WebQuest and Animation on Academic Achievement and Retention in Social Studies Education

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Abstract

The aim of this study is to analyze the effects of animation and WebQuest teaching methods on students' academic achievement and retention of the learned knowledge. One control and two experimental groups were used in this quasi-experimental study. 94 students participated in the study, 32 of which were in the experimental group 1 taught by using WebQuest, 31 in the experimental group 2 taught by using animation, and 31 in the control group which was taught through traditional teaching. The study was carried out in the fall semester of 2017-2018 academic year in a secondary school (with middle socioeconomic level students) located in Ankara. The academic achievement test, which was prepared by the researcher, was applied to all three groups as the pre-test, post-test, and retention test. The findings revealed that the teaching method, applied in three different groups whose learning level was equivalent at the beginning of the study, affected academic achievement to different degrees. The analysis of the post-test data indicates that animation and WebQuest teaching methods have a similar effect on increasing academic success. On the other hand, the WebQuest teaching method has emerged as the most effective method for remembering the information learned.

Keywords: *WebQuest, Animation, Social studies course, Quasi-experimental design*

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Sosyal Bilgiler Eğitiminde WebQuest ve Animasyon Kullanımının Akademik Başarıya ve Kalıcılığa Etkisi

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Öz

Bu araştırmanın amacı animasyon ve WebQuest öğretim yöntemlerinin öğrencilerin akademik başarılarına ve öğrenilen bilgilerin kalıcılığına etkisini incelemektir. Yarı deneysel desene göre tasarlanan bu araştırmada iki deney ve bir kontrol grubu kullanılmıştır. WebQuest öğretiminin uygulandığı deney 1 grubuna 32, animasyon öğretiminin uygulandığı deney 2 grubuna 31 ve geleneksel öğretimin uygulandığı kontrol grubuna da 31 olmak üzere toplam 94 öğrenci araştırmaya katılmıştır. Araştırma, Ankara'da orta sosyoekonomik düzeyde bulunan bir ortaokulda, 2017-2018 eğitim öğretim yılı güz döneminde yapılmıştır. Araştırmacı tarafından hazırlanan, akademik başarı testi her üç gruba da ön-test, son-test ve kalıcılık testi şeklinde üç kez uygulanmıştır. Elde edilen bulgular araştırmanın başlangıç aşamasında öğrenme düzeyi birbirine denk olan üç farklı grupta, uygulanan öğretim yönteminin akademik başarıyı farklı düzeylerde etkilediğini ortaya koymuştur. Son-test verilerinin analizine göre akademik başarıyı arttırmada animasyon ve WebQuest öğretim yöntemlerinin benzer etkiye sahip olduğu tespit edilmiştir. Öte yandan öğrenilen bilgilerin hatırlanması konusunda ise WebQuest öğretim yönteminin en etkili yöntem olduğu belirlenmiştir.

Anahtar Kelimeler: *WebQuest, Animasyon, Sosyal bilgiler dersi, Yarı deneysel desen*

Introduction

The rapid advances in the field of Information and Communication Technology (ICT) have been transforming all areas of life (Yeşiltaş and Turan, 2015). One of the most important factors that accelerated this transformation in recent years is the use of Internet and computer technology together. Towards the end of the 20th century, computers began to be mass-produced, enabling increasing access to computers (Eady and Lockyer, 2013), and triggering the rapid rise in the use of computers by the educational institutions around the world.

With the use of computers and the Internet together, humans have begun to access educational environments independent of time and place (Acun, 2004). There is a gradual progress in the use of computers and the Internet in the classroom. For example, in the early days, called Web 1.0 technology, information was produced and shared from a single center. Students were only the recipients (readers or commentators) of the information presented to them through the Web 1.0 technology. However, with the help of the Web 2.0 technology, the students moved from the position of receiving the information to the position of structuring and sharing the information.

The learning process and individual qualities of today's youth classified as the 'digital natives' by Prensky (2001) or as 'Generation Z' (Igel and Urquhart, 2012) have also undergone a rapid transformation. These young people labeled as the Gen Z or digital natives have shorter attention spans than those of the previous generations of youth. They also see technology as an integral part of their lives. It is not realistic to expect this new generation of young people (Eşgi, 2013), whose mastery of technology and adaptation to innovations is much faster, to sit around and focus on their lessons during an entire period of a lesson (35-40 minutes). The needs and expectations of the new generation have changed. The digital natives or students representing the Gen Z do not simply receive the information they are presented; they attach great importance to producing, sharing, and questioning information. It is vital to create adequate learning environments to address the needs of the next generation of youth and prepare them for the future.

Web-based teaching materials can be updated faster than printed materials, can contribute to the development of students' high-level thinking skills, embody and concretize abstract issues, involve various sensory organs, and enable active participation in the course by increasing motivation (Eady and Lockyer, 2013; Kaya, 2008; Ulusoy and Gülüm, 2009). Consequently, the use of web-based teaching materials is becoming increasingly more common. The WebQuest and animations are among the web-based training tools that can meet the interests, needs and expectations of the new generation of youth.

WebQuest

Sharing information on the Internet has become very easy (Açıkalın and Duru, 2005). However, doubts about the accuracy of the information shared on the Internet have also increased. The ubiquity of the harmful content and piles of false information on the Internet that can be easily accessed by students are among the most worrisome problems that disturb educators and parents (Yoder, 1999). The WebQuest instructional design, developed by Dodge (1995), is one of the designs aiming to minimize students' exposure to harmful and inaccurate digital information. Allowing the student to actively take part in the learning process by emphasizing the learner's inquiry and research skills, the WebQuest is an Internet-based teaching method in which the learning process is divided into six steps as 'Introduction, Task, Process, Resources, Evaluation, and Conclusion' (Dodge, 1995, 2001; March, 2000; Yoder, 1999; Çetin and İnel, 2017).

In the WebQuest learning environment, teachers can monitor their students while quickly updating their courses with new information (Çetin and İnel, 2017). WebQuest liberates teaching from time and space limitations. It contributes to the development of students' inquiry, research and high-level thinking skills. In WebQuest courses, students continue to learn outside the school at their own pace of learning. It also provides equal educational opportunities for disadvantaged students (Gürgil, Ünal and Aksoy, 2019).

Animation

Animation is one of the computer-based instructional materials in which static objects such as pictures, photographs, graphics are combined with sound and motion effects (Aslan-Efe, 2015; Burke, Greenbowe and Windschitl, 1998; Genç, 2013; Large, 1996; Mayer and Moreno, 2002). Animations add dynamism to the learning process thanks to their motion capacities. Animations are pointed out as one of the effective computer based educational tools that attract students' attention and increase their learning motivation (Karagöz and Korkmaz, 2015). Animations also contribute to an improved understanding of complex, abstract and difficult subjects (Weiss, Knowlton and Morrison, 2002).

Ulusoy and Gülüm (2009) state that, due to their young age, students show an intense interest in animation-type computer based teaching materials. Weissa, Knowltonb and Morrison (2002) caution educators to critically reflect on the animations they will use in their classes in terms of their potential to contribute to learning. In addition, Burke, Greenbowe and Windschitl (1998) advise that teachers should be careful about copyrights regarding the use and distribution of objects to be used in animations. The educational objectives should be considered when selecting the animations to be used in the course. In addition, animations appropriate to the age and development level of the students should be selected.

The review of the literature conducted for the present study indicates that there has been extensive research examining the effect of web-based teaching activities on learning (Akdeniz, Öztürk and Bakırcı, 2017; Güven and Sülün, 2012; Kuş, 2006; Koçoğlu and Koka, 2018; MacGregor and Lou, 2005; Tay and Yıldırım, 2013; Tezci, 2003; Türker and Yaylak, 2011; Toros and Yeşiltaş, 2015; Yeşiltaş and Turan, 2015). Some of this research focused on the effectiveness of WebQuest (Aydoğdu-Yenilmez, Özpınar and Gökçe, 2017; Doğru and Şeker, 2012; Yang, 2014), while others focused on the effectiveness of animations (Aslan-Efe, 2015; Aktaş, 2015; Genç, 2013; Karaçöp, Doymuş, Doğan and Koç, 2009; Yakışan, Yel and Mutlu, 2009). The literature review has detected no previous study that compares all three of the WebQuest, animation, and traditional teaching methods in terms of learning outcomes. In addition, while the web-based research focuses especially on science courses few studies focus on social studies

courses. Therefore, by filling the current gap in the literature, this study is expected to be a pioneering study by providing researchers and educators with some research findings on the effectiveness of the web-based instruction.

Method

Focusing on the effects of WebQuest and animations on student achievement and retention of knowledge, this study was designed as a quasi-experimental study. One of the most important caveats of the experimental studies in the field of education is that the groups to be included in the research are predetermined independently from the study. Therefore, although more powerful, genuine experimental designs cannot be used in many studies in education. As such, the current study had to employ the quasi-experimental design because the classes of the students were formed before the academic year began. The academic achievement test was administered to the experimental and control groups three times as the pre-test, post-test and retention test. The study was conducted with students from three different classes, forming three groups. One of these (experimental) groups was taught with WebQuest (EG1), the other (experimental) group was taught with animations (EG2), and the third (Control) group was taught traditionally, with no extra treatment.

Study Group

The research procedure was conducted in the fall semester of 2017-2018 academic year in a secondary school in Ankara. To determine the groups to be included in the study, the academic achievement test was applied as a pre-test to all 7th grade students in the school. The classes with the closest academic achievement test results were listed and then the teachers' opinions were consulted. Thus, three classes which were decided to have a similar learning level according to the teachers' opinions and academic achievement test were included in the study. In an unbiased manner, two of these classes were determined as the experimental groups and one as the control group.

Table 1. Gender status of the students in the study group

	Gender	*f*	%
EG1	Girl	18	56
	Boy	14	44
	Total	**32**	**100**
EG2	Girl	16	52
	Boy	15	48
	Total	**31**	**100**
Control	Girl	17	55
	Boy	14	45
	Total	**31**	**100**

As can be seen in Table 1, there are 32 students in Experimental Group 1. Of these students, 18 were female (56%) and 14 were male (44%). There are 31 students in Experimental Group 2. Of these students, 16 were female (52%) and 15 were male (48%). Of the 31 students in the Control Group, 17 were female (55%) and 14 were male (45%).

Data Collection Tools

Academic Achievement Test: The study was conducted with a specific focus on the *Effective Citizenship* learning domain of the seventh grade social studies course in Turkey. Therefore, an *Academic Achievement Test* covering the outcomes and subjects under the *Effective Citizenship* learning domain was prepared. The test consisted of multiple choice questions. Based on the *Effective Citizenship* learning domain outcomes and subjects, a pool of 60 items was created. Expert opinions were obtained for the questions prepared. In accordance with the opinions of the experts, 10 questions, which were thought to measure similar characteristics and had poor distractors, were excluded from the draft test form. This test was then administered to 277 students from three different secondary schools. Next, the item discrimination and item difficulty indexes of the questions in the academic achievement test were calculated. Items 1, 17, 21, 25, 26, 27, 31, 39, 42 and 47, which were determined to have inadequate item discrimination and item difficulty values were excluded from the test. Thus, *Academic Achievement Test* was finalized to include four choices and 40 items. The

reliability value of the test was found to be .902. The test was determined to be reliable (Fraenkel and Wallen, 2008) and was used in this study.

Activities Conducted with the Experimental Groups

All of the teaching activities for the Experimental Group 1 (EG1) and Experimental Group 2 (EG2) were carried out by the teacher of the course. Thus, an attempt was made to minimize any practitioner-generated (rather than the treatment) effects on the dependent variable. The prepared materials and lesson plans were shared with the teacher. The teacher was informed about the implementation. The researcher observed the implementations in all three groups.

a) WebQuest (EG1): In the EG1, the academic achievement test was applied as a pre-test one week before the classes started. Then the courses prepared with WebQuest began. The WebQuest activity presented to the EG1 was prepared to cover a five-week period within the framework of the *Effective Citizenship* learning domain (MoNE, 2015). What students were to learn in the process was explained in the Introduction section of the WebQuest teaching activity. In addition, a short story about a child named Hakan was included. In the Task section of the WebQuest teaching activities, the child hero named Hakan was introduced and the tasks that the students should perform throughout the learning domain were explained. These tasks were structured within the framework of six intertwined stories. In these stories, the interesting events that Hakan experienced were formed around the basic principles of the concept of democracy. Hakan shared with the students the experiences and problems he had during his journey in time in an aristocratic country, in a theocratic country, and in a country governed by democracy. The importance of democracy was shaped within the framework of current and historical events and presented to students as tasks to be performed individually or as a group. The instructions and resources required for these tasks were also provided to students in the WebQuest. The assessment section of the WebQuest included information on how to evaluate students' performances. At the end of the WebQuest, what the students had just learned was summarized, with a goodbye wish to see them in another adventure.

After the completion of the courses, the academic achievement test was given to the EG1 students again as a post-test. Eight weeks after this post-test, the academic achievement test was administered for the last time as the retention test.

b) Animation (EG2): In the EG2, the academic achievement test was applied as a pre-test one week before the classes started. Subsequently, the lessons were taught with animations. The *Effective Citizenship* subjects were taught by using animations for five weeks. 21 different animations each lasting 15 minutes were prepared for the EG2. The animations included short stories and activities that would be of interest to the students. Some of these animations were presented to the students with voiceover narrations and some were presented with speech bubbles. In the pilot study conducted before the research, it was observed that the use of animation alone caused students to get distracted from the lesson after a while. For this reason, worksheet activities were also added to the animations used for the EG2. Same as the EG1, for this group, a child hero named Hakan was created. The animations presented Hakan's adventures with his close friend circle and classmates. In some of the lessons, some news about the basic principles of democracy reported in visual media were also included. After the completion of the course, the academic achievement test was administered as a post-test with the EG2. Eight weeks after the post-test application, the academic achievement test was given to the EG2 for the last time as the retention test.

Activities Conducted with the Control Group

c) Traditional Teaching: For the control group, the academic achievement test was employed as a pre-test one week before the classes started. The control group classes were taught by the social studies teacher who taught this class before. The teacher taught the course subjects for five weeks by following the same routine teaching activities as before the study. The teacher used both the lecture and question-answer methods. In addition, the teacher had the students do the activities in the textbook at the end of the classes. After the completion of the course, the control group students took the academic achievement test as a post-test. Eight weeks after the

post-test, the academic achievement test was administered to the control group for the last time as the retention test.

Data analysis

The SPSS 20 package program was used to examine the effects of WebQuest, animation, and traditional teaching methods on students' academic achievement The normality assumption and descriptive statistics of the data were analyzed and the Mixed between-within subjects ANOVA was used in the study. Mixed Intra-Group Variance Analysis was preferred because it is an analysis method that provides more comprehensive information by combining both the intergroup design allowing comparison of two or more groups and the intergroup design allowing the comparison of repeated measurements in a single study.

Limitations

The study is limited to 94 students in the seventh grade of a middle SES level secondary school in a central district of Ankara in the fall semester of 2017-2018 academic year. In addition, it is limited to the outcomes and subject content specified under the *Effective Citizenship* learning domain and the academic achievement test prepared according to this learning domain.

Findings

In this study, while the academic achievement scores of the students constitute the dependent variable, the time variable comprising three different time periods in which the achievement test was administered before (pre-test), immediately after (post-test), and eight weeks after the treatment (retention) denotes the first independent variable, and the group variable composed of the WebQuest (Experiment 1), Animation (Experiment 2), and traditional teaching (Control) groups constitutes the second independent variable. Table 2 shows the mean and standard deviation values of the achievement test scores of the experimental and control

groups in three different time periods. The within- and between-group results of the analysis of variance for the students' academic achievement test scores are presented in Table 3.

Table 2. The mean and standard deviation values of the students' effective citizenship learning domain academic achievement test scores

		Pre-Test		**Post-Test**		**Retention**	
Groups	n	M	SD	M	SD	M	SD
WebQuest (Experiment 1)	32	9.98	2.21	30.78	3.55	24.18	3.27
Animation (Experiment 2)	31	9.94	2.22	31.45	5.21	19.26	3.71
Traditional Teaching (Control)	31	10.03	1.80	25.36	4.06	14.03	3.22

Table 3. Results obtained from the mixed intra- and inter-group variance analysis for academic achievement

	Wilks' Lambda	*df*	*F*	*p*	η^2
Time-Group interaction	.150	4	71.02	.00*	.61
Time (Pre-test, Post-test, Retention)	.024	2	1814.97	.00*	.98
Method (WebQuest, animation, traditional teaching)		2	24.20	.00*	.35

** There is a statistically significant difference at p< .05.*

The results obtained from the mixed inter-intra group analysis of variance for the academic achievement test are presented in Table 3. These results show a significant interaction between time and methods, as Wilks 'Lambda = .150, F (4.91) = 71.02, p <.05, partial η^2 = .61. Further, both the main effect showing the change in academic achievement over time [Wilks' Lambda = .024, F (2.91) = 1814.97, p <.05, η^2 = .98] and the main effect of comparing groups (applied methods) [F (2.91) = 24.20, p <.05, η^2 = .35] were found to be statistically significant. These results demonstrate that different methods have varying effects on students' academic achievement. In other words, when different teaching methods were applied, the change in students' achievement was different over time. The effect size of the difference between the groups (partial η^2=*.35*) indicates

that 35% of the total variance in academic achievement is explained by the applied method.

Table 4. Comparison of academic achievement of groups in the pre-test and post-test

Time Period	Group (I)Group	(J) Group	Mean Diff. (I-J)	Standard error	*p'*	*Partial* η^2
Pre-test	WebQuest	Animation	-.60	.526	1.00	.01
	WebQuest	Traditional Teaching	-.157	.526	1.00	
	Animation	Traditional Teaching	-.097	.530	1.00	
Post-test	WebQuest	Animation	-.67	1.09	1.00	.29
	WebQuest	Traditional Teaching	5.43	1.09	.00*	
	Animation	Traditional Teaching	6.97	1.10	.00*	
Retention	WebQuest	Animation	4.929	.86	.00*	.61
	WebQuest	Traditional Teaching	10.16	.86	.00*	
	Animation	Traditional Teaching	5.23	.86	00*	

** Mean difference was statistically significant.*

' Bonferroni adjustments were made to the comparisons.

To examine the effect of group and time variables on academic achievement in more detail, the syntax codes were extended and paired comparisons were made using t-test for the dependent samples and the t-test for dependent samples. In these comparisons, Bonferroni correction was applied to reduce the possibility of Type I error due to sample division.

According to the t-test results conducted on the independent samples to compare pre-test, post-test and retention test scores between WebQuest, animation and traditional teaching groups, the initial difference between their academic achievement scores was statistically not significant (partial $\eta^2 = .01$). When the post-test scores were examined, no significant difference was observed between the mean scores of WebQuest and the animation groups, whereas the post-test mean score of the control

group was significantly lower than that of the WebQuest group and the animation group (partial η^2 = .29). The results of the retention test showed that the difference between the academic achievement scores of all three groups was statistically significant (partial η^2 = .61). In other words, these findings indicate that the academic achievement of the students in all three groups was initially the same. However, the post-tests performed immediately after the treatment show that the academic achievement of the students in the WebQuest and animation groups increased by the same degree, exceeding those of the students in the control group. In addition, eight weeks later, the retention test scores showed a decrease in the achievement scores of all the groups, with the mean score of the WebQuest group being the highest and the mean score of the control group where the traditional teaching was conducted being the lowest. The effect size differences between the groups immediately after the treatment (post-test) and eight weeks after the treatment (retention) were found to be quite large (Cohen, 1988).

Table 5. Intra-group pre-test and post-test paired comparison

Group	**Time**		**Mean Diff. (I-J)**	**Standard Error**	***P'***	***Partial* η^2**
	(I)Time	**(J)Time**				
WebQuest	Pre-Test	Post-Test	-20.91	.55	.00*	.95
	Post-Test	Retention	6.59	.50	.00*	
Animation	Pre-Test	Post-Test	-21.52	.56	.00*	.94
	Post-Test	Retention	12.19	.47	.00*	
Control	Pre-Test	Post-Test	-15.32	.56	.00*	.90
	Post-Test	Retention	11.32	.47	.00*	

** Mean difference was statistically significant.*

' Bonferroni adjustments were made to the comparisons.

Finally, the paired-samples t-test was performed to compare pre-test, post-test and retention test scores within the groups (Table 5). The results obtained from the analyses revealed that there were statistically significant differences both between the pre-test and post-test scores and between the post-test and retention test scores of all three groups. A closer look revealed that compared to the pre-test scores, the increases in the post-test scores were approximately 20 points in the WebQuest group, 21

points in the Animation group, and 15 points in the Control group. The decrease in retention test scores compared to the post-test scores was approximately 7 points in the WebQuest group, 12 points in the Animation group and 11 points in the Control group. Thus, the WebQuest and Animation methods are similar in increasing academic achievement; however, in the long run, the success of the group studying with the WebQuest method seems more permanent.

Discussion and Conclusion

In this study, the effects of animation, WebQuest and traditional teaching methods on students' academic achievement and retention of knowledge were investigated. The findings indicate no significant difference between the pre-test scores of the students. Put differently, pre-treatment levels of the students are equivalent. The post-test scores of the students Show that all three methods increase academic success but the exact increase in academic achievement level differs according to the specific teaching method. According to the post-test scores, there was no significant difference between the EG1 and EG2 in which WebQuest and animation teaching methods were applied, but a significant difference was found between the mean scores of the control group in which traditional teaching method was applied. In other words, according to the post-test scores the level of learning was lower in the control group.

WebQuest and animations are a type of web-based teaching. Previous studies on web-based teaching concluded that web-based teaching methods were more effective at increasing student achievement than the traditional teaching method (Akdeniz, Öztürk and Bakırcı, 2017; Emrahoğlu and Bülbül, 2010; Emrahoğlu and Öz, 2008; Güven and Sülün, 2012; Karagöz and Korkmaz, 2015). Therefore, the findings of the current study are supported by those reported in the literature which indicate that the teaching process performed with WebQuest and animations is more successful than traditional teaching. Previous research findings also indicate that web-based teaching methods positively affect student attitudes towards the course (Doğru and Şeker, 2012) and increase student attention (İnel and Çetin, 2017). The WebQuest and animation methods used in this study may have been more effective than traditional teaching in that such

web-based approaches employ multiple sensory organs, attract students' interest, enrich the teaching process, and concretize abstract information (Ulusoy and Gülüm, 2009).

One important finding was obtained as a result of the analysis of the retention tests. When the results of the retention test performed eight weeks after the post-test were examined, it was found that there was a decrease in the scores of all groups. When the groups were compared, the mean retention test scores of the EG1, that is, of the group where WebQuest was taught were found to be the highest. EG1 was followed by EG2 in which the teaching was performed with animations. In the control group, where traditional teaching was applied, the level of recall of the learned information remained at the lowest level. In other words, forgetting was mostly observed in the control group students. According to these findings, WebQuest and animations were equally effective in students' learning; however, WebQuest teaching was more effective on the retention of knowledge.

No study in the literature was identified that compared all three of the WebQuest, animation and traditional teaching methods together. However, some research comparing WebQuest or animations with traditional teaching is available in the literature. The previous studies comparing WebQuest and traditional teaching methods report that WebQuest teaching activities increase academic achievement more, are more effective on the permanence of learned knowledge, increase learning motivation, and make teaching processes more enjoyable (Akçay and Şahin, 2012; Chang, Chen and Hsu, 2011; Gülbahar, Madran and Kalelioğlu, 2010; Hassanien, 2006; Lipscomb, 2003; Perkins and McKnight, 2005; Doğru and Şeker, 2012; Ulu and Ulusoy, 2018; Yang, 2014). The previous research findings also conclude that WebQuest teaching activities are student-centered and encourage students to research, question, and think critically (Akçay and Şahin, 2012; Gülbahar, Madran and Kalelioğlu, 2010). The previous studies comparing animation and traditional education methods further found that the animation-based teaching led to higher student achievement and ensured higher knowledge retention than the traditional teaching (Aktaş, 2015; Aktürk, 2012; Daşdemir, 2006, Daşdemir and Doymuş, 2012; Karaçöp, Doymuş, Doğan and Koç, 2009; Köklü, 2015; Lowe, 2003; Boyacı, 2016; Yakışan, Yel and Mutlu, 2009).

Students' being more active than they are in other teaching processes, focusing on completing various tasks individually or in groups, and these tasks' strong support of these high-level thinking skills in the WebQuest teaching process, may have affected the higher retention scores because the students perform their tasks in stages. During the research process, the WebQuest was observed as the most engaging teaching method. It was observed that the students showed great interest in the lessons carried out with animations. However, both in the control group where traditional teaching was applied and in the EG2 where animation was used, students mostly remained as the passive receptors of knowledge. Therefore, the students' being active may also have affected the permanence of the learning. In WebQuest teaching activities, students have the opportunity to repeat their lesson contents as much as they want regardless of time and place (Gürgil, Ünal and Aksoy, 2019). The difference in retention test scores may also be related to students' access to the learning material.

One of the most important characteristics of WebQuest teaching activities is that the resources that students will use in the learning process are pre-selected and filtered by the teachers (Dodge, 1995). On the one hand, this characteristic supports the use of the Internet in the educational environment towards developing the professional competencies required by the modern age, and on the other hand, minimizes any parental concerns about inappropriate and harmful online content. Akçay and Şahin (2012) point out the difficulty of accessing WebQuest teaching activities and reliable sources of information, especially at the primary and secondary level. Zheng, Stucky, McAlack, Menchana and Stoddart (2005) state that WebQuest teaching activities can be used at all levels of education by making sure that they are appropriate to the specific teaching subject considering the developmental characteristics of students. It is critical to provide teachers with the necessary training so that they can prepare and use WebQuest teaching activities in their classrooms.

According to Eady and Lockyer (2013), the educational use of technology has become a modern necessity. It is emphasized that computer-aided teaching materials will not replace teachers; on the contrary, they help teachers in the teaching process (Ulusoy and Gülüm, 2009). Ünal, Özmen and Er (2013) draw attention to teacher competence in this regard, stating that although teachers have adequate technological opportunities, they

fail to make effective use of these opportunities in their classes. On the other hand, Gülbahar and Güven (2008) state that teachers are aware of the importance of computer and internet technologies and they are willing to incorporate them in their courses, but that they have some problems about accessibility. Determination of teachers' communication technology competencies and perceptions and solving any IT support problems is considered important in terms of ensuring a high quality of education.

To conclude, the present study found that the WebQuest and Animation teaching methods increase student success, while the WebQuest teaching method is more successful in ensuring the retention of knowledge. Future studies could involve other age groups taught via some other web-based teaching methods. Thus, the most appropriate web-based teaching methods for specific developmental levels and course subjects can be determined. In this study, the effect of teaching methods on students' affective status was not examined. The affective factors that may affect the learning process can also be considered in the future research.

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