



THE EFFECT OF USE OF WEBQUEST IN SCIENCE EDUCATION ON PERSISTENCY AND ATTITUDE LEVELS FOR SCIENCE AND TECHNOLOGY LESSON

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ABSTRACT

Effect of webquest method on science teaching was examined in this study as being one of the most important reflections of technology to the education and it was shown that students structured the knowledge in the coordination and enjoying with this method. The purpose of this study was to examine the effect of webquest-assisted teaching method for unit “The Structure and Properties of Matter” in the Science and Techonolgy lessons on attitude towards science lesson and retention of knowledge. Semi-experimental pattern with pre-test – post-test group was used in the study. Study group comprised of 30 students as 15-person control group, 15-person experimental group attending to a private school. “Academic Achievement Test of Science and Technology Lesson” and “Scale of Attitude Towards Science” were used in the study as a data collection tool. Data obtained were analyzed by Mann Whitney-U test and Wilcoxon test. At the end of the study, it was seen that web-assisted teaching technique did not affect attitudes of students towards science but had positive effect on level of remembering.

Keywords: *Web-assisted teaching, science and technology teaching, WebQuest, persistency, attitude towards science lesson*

INTRODUCTION

In the twenty first century when the science and technology progressed and developed continuously, also the information grew fast and this required the diversification of ways to access to information. Students are expected to be active individuals who can organize information access and internalize them during the learning process (Gülumbay, 2005).

Today the individuals acquaint with the technology in childhood before education life. Computer, internet, social study networks, mobile phones and video games surrounding them constitutes some part of this effect. Generations not benefiting from the returns of technology and science remain incapable of coping with the technology in the following stages of their lives and this inefficiency affects social even psychological development of the individual adversely (Prensky, 2001). Progress in this respect changes the world views, points of views of individuals today when technology is indispensable for the individual (Özusağlam, 2007). Reflections of this effect in our lives are seen in school and incorporation of technology in education and increasing practice activities are considered as the purposes of education

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(Chang, 2002). Technology progressing in parallel with rate of increase of number of people introduces many opportunities for education similar to every field. When information technologies are used at schools permanently and included in curriculum and integration is achieved, learning will realize faster, more permanent and more deeply (Drew and Ausband, 2009).

Proliferation of computer that is considered as the most important and concrete product of technology, allows students to use their personal computers in their education lives therefore it also allows accessing to the information easily (Federico, 2000).

Use of computer in education increases academic success of students, motivation of lesson and at the same time it encourages students to study in cooperation (Glennan and Melmed, 1996). Moreover, technology is one of the most important assistant for the students to build confidence (Özden and Şengel, 2009). Progress of technology, the desire to follow the developing and changing world in the forefront has a considerable share in the competition of countries. To achieve this, individuals should obtain qualified education. Undoubtedly that science and technology lesson is one of the important steps to prepare the individual for the technology world (Kılıçer, 2008). For this reason, societies mainly developed countries try to increase quality of science and technology education. The fact that students are science and technology literates is related to the interaction between science and technology (MEB, 2005). Computer and internet is an assistant tool for both the student and the instructor to train individuals achieving it (Finlay, 2009). Methods and techniques used to teach terms of science are important in terms of persistency of learning. Students remember 90% of activities they participate actively. This is a high rate for the persistency of learning (Silbermen, 1996). Since science and technology includes abstract subjects in terms of content, these are the lessons that students have difficulty in understanding (Wang and Reeves, 2007). Internet and technology are the most important tools to increase motivation and capability of students to overcome subjects that they have difficulty (Halat, 2008).

Internet is used in two ways in education. These are internet-assisted and internet-based education. Internet-assisted education is of the quality to enable face to face education. Internet-based education is to realize teaching on internet directly. Responsibility of achievement belongs to mostly student for internet-based education. Student is active but teacher plays the role of guide in web-assisted education (Horzum and Çakır Balta, 2008). The reflection of internet shows itself in the field of education, too. Web-assisted learning strategy that emerged depending upon the development of internet is one of the applications in the field of education (Eşgi, 2006).

Web-assisted learning activities increase academic success and motivation of the student. At the same time, web-assisted teaching method is more efficient than traditional teaching method and its effect on attitude of student towards the lesson (Arıkan, 2006; Çetin, 2010; Hayes and Billy, 2003). Web-based teaching method offers the opportunity of more pleasing and permanent teaching to the student and makes positive contribution to internet use (Beard, Harper and Riley, 2004; Tüysüz and Aydın, 2007).

Webquest technique being one of the web-assisted teaching methods was used in this study. Webquest is a method that students performing research-based activities by organizing knowledge they have obtained by internet are in interaction with each other (Dodge, 1997). Purpose of webquest is to use technology during learning-teaching process and contribute to positive development of the student (Leahy and Twomey, 2005). Webquest being one of the roots of constructivist approach allows performance of research-based activities and enables

student to practice, brings high thinking ability (Lahaie, 2008). Many studies show that Webquest is highly efficient to develop the ability of problem-solving, high level thinking and creativeness, to increase motivation, critical thinking, active learning and to correlate with the content (Abu-Elwan, 2007; Lim and Hernandez, 2007). Webquest provides more efficient high cognitive thinking than some other activities and strategies (Kanuka, Rourke, and Lafiamme, 2007).

Moreover, webquest allows using the internet in an enjoyable way and improves attitude towards the lesson positively and it is a method that students are engaged in upper cognitive activities and persistency of learning activities are achieved (Kurtuluş and Kılıç, 2009).

The purpose of this study is to examine the effect of Webquest-Assisted Teaching method on seventh grade students' attitude toward science and retention in learning "The Structure and Properties of Matter" unit in Science and Technology course. Answers of following questions were sought within this scope.

- 1- Is there a significant difference between attitude toward science of experimental group and control group before the practice?
- 2- Is there a significant difference between attitude toward science of experimental group and control group following the practice?
- 3- Is there a significant difference between post-test and persistency tests of experimental groups that Webquest-aided learning method is applied?
- 4- Is there a significant difference between post-test and persistency tests of control group?
- 5- Is there a significant difference between post- tests of experimental group and control group following the practice?
- 6- Is there a significant difference between persistency tests of experimental group and control group following the practice?

METHOD

Research Model

Present curriculum (constructivist approach) was applied to experimental group as webquest-assisted and present curriculum was applied to control group (constructivist approach) over an eight week-period during the second semester of 2010-2011. The research is semi-experimental study that is based on including experiment groups and control group. This model is a method that variables to be observe under the control of researcher to determine cause and effect relations (Karasar, 2009). One of two classes equivalent to each other was designated as the experimental and the other one was designated as the control group by objective assignment in the study. Measurements of experimental pre-procedure and experimental post-procedure were performed for both groups and efficiency of variables to be examined was searched. For this reason, pre-test-post-test control group pattern was adopted in the study (Büyüköztürk, Çakmak, Akgün, Karadeniz and Demirel, 2010).

Research Group

This study was carried out a private school in Muratpasa, Antalya. Two classes of grade seven were randomly selected for the practice in the study. 15-person control group and 15-person experimental group was designated from the grades. Relation to ensuring the equality of the experimental and control group, independent t-test was conducted based on first semester success grade of students in science and technology lesson. Results of analysis were presented in Table 1 and it was determined that groups were equivalent. One of equivalent groups was

designated as experimental group and the other one was designated as the control group randomly.

Table 1.Results of Mann Whitney U-Test for Group Equality

| Group | n | Mean Rank | Sum of Ranks | U | P |
|--------------|----|-----------|--------------|--------|------|
| Experimental | 15 | 13.63 | 204.50 | 84.500 | .245 |
| Control | 15 | 17.37 | 260.50 | | |

$p > .05$

Data Collection Tool

Academic achievement test of Science and technology lesson: Academic achievement test of science and technology lesson was prepared by the researcher to determine the level of remembering the concepts relating to “the structure and properties of matter” of students of grade 7. During the process of test preparation, questions were created to cover all acquisitions about the unit. Items were formed considering developmental characteristics of grade seven students. To ensure the validity of content, specialist opinion about the fit of items in terms of content and meaning, clear meaning, fit of grammatical rules and fit for cognitive behaviours and whether items were of the quality to measure the behaviours was employed. Corrections were made on items with the aid of specialist’s opinions. 49-question items were applied to 156 grade eight students. In the end of pre-practice of the test, analyzes were carried out by means of Microsoft excel and Statistical program. While choosing the items, moderately hard items distinctiveness of which was high were chosen (Tekin, 1993). The best of two items measuring the same behaviour was chosen and academic test having 27 items was finalized. KR20 reliability coefficient of the test was found as 0.96.

Scale of Attitude Towards Science:

In this study the “Scale of Attitude Towards Science (SATS)” developed by Oğuz (2000) was employed to find out students’ attitude towards science. It is a 5-point likert-type scale composed of 28 items. Cronbach Alpha reliability coefficient of the scale was found as 0,86.

Analysis of Data

Data collected in the end of experimental process were analyzed statistically via SPSS 16.0 program. During the analysis, non-parametric test statics were used. To determine whether there was difference between experimental and control group, Mann-Whitney U test was applied. To determine the difference of pre-test and post-test of control group and pre-test and post-test of experimental group, Wilcoxon test was applied. 05 significance level was admitted for interpreting the results.

RESULTS

Results obtained by statistical analysis of data were presented in tables to test problem status for the study and interpretations about the results were presented.

Results of “Mann Whitney U Test” analysis of scores of pre-test “Scale of Attitude towards Science” of groups for the first sub-problem are seen in Table 2. While analyzing scores of pre-test “Scale of Attitude towards Science” of experimental and control group, Mann Whitney was found as U: 87.500, $p > .05$. No statistical difference was found between SATS scale pre-test scores of the groups. Accordingly, it can be concluded that attitudes of experimental and control group towards science are equivalent.

Table 2.Results of Mann Whitney U Test of SATS by Pre-Test Scores

| Group | n | Mean Rank | Sum of Ranks | U | P |
|--------------|----|-----------|--------------|--------|------|
| Experimental | 15 | 17.17 | 257.50 | 87.500 | .299 |
| Control | 15 | 13.89 | 207.50 | | |

$p > .05$

Results of Mann-Whitney U test carried out to determine whether there was difference between SATS scale post-test of control group and experimental group getting webquest assisted teaching are seen in Table 3. Mann Whitney test abstracts for whether there was difference between SATS post-tests of experimental and control group or not can be seen in Table 3. It is seen that there is no significant difference between SATS post-test scores of control group and experimental group ($U = 102.00$, $p > .05$). Accordingly it is understood that attitudes of experimental and control group towards science are similar. In such a case, it can be concluded that webquest assisted teaching does not affect attitudes of students towards the lesson positively.

Table 3.Results of Mann Whitney U-test of SATS by Post-Test Scores

| Group | n | Mean Rank | Sum of Ranks | U | P |
|--------------|----|-----------|--------------|--------|------|
| Experimental | 15 | 16.20 | 243.00 | 102.00 | .663 |
| Control | 15 | 14.80 | 220.00 | | |

$p > .05$

Results of Wilcoxon signed rank test for whether there was a significant difference between post-test of science and technology achievement about “structure and specifications of substance” of experimental group getting webquest-assisted teaching and test of persistency applied fifteen days after the test are presented in Table 4. Results of study show that there is no significant difference between scores of science achievement post-test and persistency test, $z = 1.696$, $p > .05$. Based on this finding, it means that webquest-assisted teaching for experimental group has an effect on persistency. In other words, post-test scores of experimental group for achievement test and scores of persistency conducted 15 days later are equivalent. Students remember the knowledge they have learnt.

Table 4.Results of Wilcoxon Signed Rank Test of Scores of Test of Persistency and Post-Test of Achievement Test of Experimental Group

| Achievement test | n | Mean Rank | Sum of Ranks | z | P | |
|------------------|----------------|-----------|--------------|-------|--------|------|
| Directions | Negative Ranks | 3 | 5.83 | 17.50 | 1.696* | .090 |
| | Positive Ranks | 9 | 6.72 | 60.50 | | |
| | Ties | 3 | | | | |
| | Total | 15 | | | | |

*based on negative ranks

Results of Wilcoxon signed rank test conducted to demonstrate whether there was a difference between achievement test post-test and test of persistency conducted 15 days later during the experimental process of control group or not are presented in Table 5. Considering the analysis result, there is a significant difference between scores of post-test of achievement test and test of persistency of control group students not participating in any experimental process ($z = 2.452$, $P < .05$). It is seen that this difference is positive ranks in other words in favour of scores of persistency taking line totals of difference scores into consideration. Accordingly, it may be said that teaching with methods and techniques fit for “2005 primary school science and technology lesson program” has positive effects on level of remembering of students.

Table 5.Results of Wilcoxon Signed Rank Test of Post-Test and Persistency Test Scores of Control Group for Achievement Test

| Achievement test | n | Mean Rank | Sum of Ranks | z | P |
|------------------|----|-----------|--------------|--------|------|
| Directions | | | | | |
| Negative Ranks | 1 | 13.50 | 13.50 | 2.452* | .014 |
| Positive Ranks | 13 | 7.4 | 91.50 | | |
| Ties | 1 | | | | |
| Total | 15 | | | | |

*based on negative ranks

Findings about change of difference of achievement test pre-test scores of experimental and control group are presented in Table 6. In accordance with study findings, a significant difference is present between achievement test scale post-test scores of control group not getting Webquest-assisted teaching and experimental group getting Webquest assisted method ($U= 55.50$, $p < .05$). It can be concluded by means of ranks total in the Table that Webquest-assisted method increases achievement test of students.

Table 6.Results of “Man Whitney U-test” of Scores of Science and Technology Achievement Test Post-Test of Experimental and Control Group Students

| Group | n | Mean Rank | Sum of Ranks | U | P |
|--------------|----|-----------|--------------|-------|-------|
| Experimental | 15 | 19.30 | 289.50 | 55.50 | .017* |
| Control | 15 | 11.70 | 175.50 | | |

* $p < .05$

Test results showing the significance of persistency academic success levels and post-test of control group instructed with present curriculum and experimental group instructed as webquest-assisted and present curriculum are shown in Table 7. It was found out that there was not a significant difference between persistency academic success levels and post-test scores of experimental and control group as a result of experimental study as per Table 7. $U=110.50$, $p > .05$.

Table 7.Results of “Man Whitney U-test” of Scores of Achievement Test Persistency Test of Experimental and Control Group

| Group | n | Mean Rank | Sum of Ranks | U | P |
|--------------|----|-----------|--------------|--------|------|
| Experimental | 15 | 15.37 | 230.50 | 110.50 | .931 |
| Control | 15 | 15.63 | 234.50 | | |

$p > .05$

CONCLUSION

It is seen that analyzing the effect of webquest-assisted teaching method applied to experimental group within the scope of study towards science and technology lesson of students, this procedure does not affect attitude towards science. However, it is understood that it has positive effect on level of remembering of “science and technology academic success” of experimental group instructed by present curriculum and webquest-assisted teaching method. In addition to this, an increase is in question for persistency test applied fifteen days later to the control group that lesson was instructed in accordance with present curriculum.

DISCUSSION

It was determined based on findings of this study that webquest-assisted teaching method did not affect attitude towards science and technology lesson. When the literature is examined, it is expressed that the webquest application has a positive effect upon the attitude of students (Akçay, 2009; Çıgırık, 2009; Halat, 2008; Kılıç, 2007; Tüysüz and Aydın, 2007). According to another study attitude of internet network-based learning towards science was examined. It was seen that internet network-based learning had positive effect on attitude towards science as a result of experimental process (Özden and Şengel 2009).

On the other hand the reason of not discovering a significant difference between the points of attitudes of participants towards the lesson can be explained by teaching the lessons from the same curriculum, by being a private school and for this reason having the same social environment, by having a limited application time and by the necessity of a long time in the applications towards changing the behaviors such as attitude. In the study of Çepni, Taş and Köse (2006), it is said that computed-aided application did not change the attitude of students toward science and as a reason it is emphasized that it is hard to change the attitude toward science in a limited time. Similarly, Arıkan (2007), Şahin (2010) and Gökalp (2011) reached the conclusion that the webquest application did not change the attitude of students toward lesson.

It was determined by the findings of this study that webquest-assisted teaching method had positive effect on persistency of knowledge.

However, it is seen that it helps to the students of the control group in which constructivist approached lessons are thought, to remember the knowledge. So, it can be said that webquest application effects the level of storing the knowledge in a positive way. When the related literature is examined, it is seen that the webquest application is effective in being more successful and continuing it (Akçay, 2009; Çıgırık, 2009; Börekçi, 2010; Gökalp, 2011; Kılıç, 2007; Kurtuluş and Kılıç, 2009; Zacharia, Xenofontons and Monoli, 2011).

In addition to this, the webquest application helps the students to combine the knowledge they are going to obtain with the old knowledge. For this reason, it also effecting storing the knowledge in a positive way. In the study of Halat (2007) and Smith and Robinson (2003), it was emphasized that the webquest application contributes to storing level. According to the study of Akpınar and Ergin (2005) teaching the science and technology lessons with a constructivist approach effects the academic success of the student in a positive way.

Hancer and Yalcin (2009) with seventh grade students in primary school, 29 experimental and 29 control group students being total 58 students, it was seen that constructive approach-based computer assisted teaching had positive effect on academic success and persistency of learning compared to teacher-centered method. Sanford, Townsend-Rocchiccioli, Trimm and Jacobs (2010) suggest that webquest allows creativeness and more efficient learning and contributes to persistency.

As a result it is seen that the webquest usage did not effect the attitude of students toward science and technology lessons but it effects the storing level in a positive way. In order to increase the effectiveness of this method, while preparing the webquest, degrees of students and their science and technology lessons acquisitions and individual and group working opportunities should be considered. In addition to this, parents should be aware of technology

and technologic developments and should encourage the teachers and the students in webquest usage.

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