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Effect of the use of multimedia on students' performance: A case study of social studies class

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The rapidly changing technological developments have affected education as it does every other fields of human endeavor. The number of technology applications used in education increases every day. One of these tools is multimedia. In the studies about the use of multimedia in education, it has been reached that multimedia increases students' success, affects students' attitudes in the positive way and makes lessons more enjoyable and understandable. In this study, multimedia tools were used in social studies to contribute to the field. The study aims to outline the effect of multimedia on the academic success of social studies students. Experimental design was used in the study with two sections (both 4th grade – Section I as the control group and Section II as the experimental group) used as the control and experimental study groups of this study. The sample of the study is 67 social studies 4th grade students in Kayseri, Turkey. For data collection, an achievement test which was generated with experts' opinion and tried as pilot was used. The data from the achievement test was analyzed with SPSS program. At the end of the study, it has been concluded that multimedia technique increased the academic success of students in social studies lesson compared to the traditional classroom.

Key words: Multimedia, computer aided education, social studies, technology usage.

INTRODUCTION

Human kind has been the subject of a fast changing process he has never seen or experienced before. The most effective factor in this process is high probably technology and its influence in societies. This fast changing process has caused welfare level, prosperity, production, development and life conditions to be improved in the countries where it exists. The development and generalization of technology development has affected the function of educational institutions and a need to raise technology-user individuals for many fields with industry at the top has emerged (Akpinar, 2003). Also, it is seen that increasing the use of hardware and software in the field of education positively affected learning environment after 1980s (Akkoyunlu, 1995). In this sense, it is observed that educational environments have also changed after 1980s with the increase in computer equipment and software (Akkoyunlu, 1995). This change also affected social studies course, whose target is to raise effective citizens.

However, although it is expressed that the main aim of social studies is to raise effective citizens, it is rather difficult to make a clear definition about the field of social

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studies. The main reason of that is the presence of numerous aspects of social studies. When national and international scientists' definitions are taken into account, Özturk's definition could be accepted as a summary: "Social studies is a learning program with the aim to raise effective citizens who can solve problems by deciding on information in changing national and international circumstances almost in every aspect which uses the information and techniques from human and social sciences" (Öztürk, 2006, p24). Besides, the recommendation of the Board of Education and Discipline's under the Ministry of National Education's for Social Studies lesson is:

"According to 6th and 7th grade Social Studies program prepared by the Ministry of Education, the Board of Education and Discipline Presidency, it has been recommended that teachers use technological tools such as CD-ROMs, History and Social Studies simulation programs, multimedia, hypermedia and telecommunication services such as the Internet" (The Ministry of National Education [MNE], 2005).

It could be stated that technology use in Social Studies lesson is positive based on studies on this subject (Arslan, 2006; Kuş, 2006; Tankut, 2008; Akbaba, 2009; Yeşiltaş, 2010). In addition, technology and computer assisted learning subjects are noteworthy in the examples Dönmez and Oruç (1994, cited in Oruç and Ulusoy, 2008) give about thesis studies in the United States of America (U.S.A.), and its reflections in Turkey could be noticed in recent years (cited in Oruç and Ulusoy, 2008). Based on these, it seems possible to use technological feasibilities more to reach information and lead students to information by integrating them in technological implementations. One of the implementations where technological feasibilities meet education is multimedia.

Multimedia is defined by Turkish Language Society (TLS) as "the platform where a material is combined with text, graphs, audio and simulation" (www.tdk.gov.tr). According to Mayer (2001), multimedia is the multiple introduction of a material with picture or text. Dinç (2000), on the other hand, defines multimedia as the synthesis of digital platforms such as text, audio, graph, animation, visual and video. In another explanation, multimedia sources created by using audio, video, visual, graph, text, animation to explain a subject is expressed as the use of different data types to explain an idea, an event or a subject (Alkan et al., 2001). Also, it is introduced as a tool combining different platforms such as written, audial, numeric graphs and animation (Schwier and Misanchuk, 1993). In parallel with these, Deryakulu defines multimedia as the use of more than one platform bodily to increase the effectiveness of instruction (1998). However, it is generally used to refer to computer-based multimedia today. In the multimedia definition of Brook (1997), on the other hand, the use of platforms like movies, slides, music and light for purposes such as education or advertisement are emphasized.

In summary, it could be stated that multimedia is composed of computer platforms where written media is presented with audial, visual and animation media, and high definition and graphs are set (Maddux et al., 2001).

LITERATURE REVIEW

Multimedia is called effective in education. Multimedia provides easiness and facilities in education. Thanks to multimedia practices, students can learn brand new information. Dwyer states that students can gain the knowledge and information that would be impossible to get in traditional ways; besides they could find the opportunity to prepare their own products with multimedia technique (1993, translated by Çeliköz, 1998). As a result, it could be asserted that the use of multimedia possesses the aim of helping students with different skills and learning styles. Also, Dwyer points out that multimedia provide the opportunity for every student to work individually. In other words, a student can work on the subject(s) she/he believes she/he needs to in the way she/he desires (Dwyer, 1993; trans by Çeliköz, 1998).

Also, it can be observed that multimedia gains authenticity and variety in learning and instruction. Semerci (1999) expresses the fact that the message via multimedia reaches the receivers in various ways and thus, it provides a richer learning environment. The subjects being taught could be transmitted to the students with web-based audio, visuals, video and animations in a way that could not be taught in classrooms authentically with other techniques. This way, closeness to reality could be provided and complete learning could be achieved (Semerci, 1999). Also, multimedia eases education in terms of data used, storage, share and transportation of the visual and non-visual written material, graphs, audios and other materials (Bitter, 1989; cited in Semerci, 1999). Moreover, multimedia creates a familiar, various, economic and practical environment in education (Uşun, 2000). Another contribution multimedia makes into education is the increase in academic achievement of the students. When compared to traditional instruction, multimedia use increases the academic achievement of the students. The use of multimedia affects education positively when designed properly compared to traditional instruction, in terms of academic achievement (Akkoyunlu and Yılmaz, 2005).

From the literature, it could be asserted that multimedia use eases and objectifies learning as it presents more than one technological factor to the learner and it addresses more than one emotion of the receiver.

METHODOLOGY

In this study, experimental design with experimental and control

groups and pre and post-test of quantitative research techniques was used. Experimental design is the research model where the data to be observed is analyzed directly under the control of the researcher (Karasar, 1997:79). Besides, experimental design is regarded as the best model in comparing two groups, time limits, reliability and testing the hypothesis of cause and effect (Check and Schutt, 2012:128).

Research progress and implementation

In the first phase of the study, social studies curriculum is analyzed and 4th grade subject "My Friends Away" in the 8th unit is decided. The reason to choose this subject was that it was both suitable for multimedia to be used in and it was considered that it would reveal the achievement difference between control and experimental groups. The objectives to address and highlight through the implementation process were decided according to the Ministry of National Education's objectives defined for the unit. Then, an achievement test for "My Friends Away" unit was designed. While 15-questioned achievement test was designed, the objectives of the lesson and unit were taken into consideration. Experts' opinion from two doctors –one in the field of Curriculum and Instruction and the other in the field of Computer and Educational Sciences- was received about the achievement test and revisions were made by omitting and re-writing some questions. Also, pilot test of the achievement test was done in another primary school completed the unit.

After the achievement test was finalized, decisions about the multimedia sources –what multimedia sources to be used and how they would be utilized - were made. In this sense, power-point presentations, audio-music records, animations and videos were selected to address the students' visual and audial senses. From these materials, power-point presentations and audio-music records were designed with the researcher-experts who were academic members in Computer and Educational Technology department while animations and videoswere taken as they were. After negotiating with the course teacher about the decisions, the implementation phase of the study was started.

In the implementation part, two sections close to each other in terms of academic success and behavior were selected out of four course sections. The selection of the sections was made in parallel with course teacher's advice. For the two sections chosen, one of them was labeled as 'control group' (Section I) while the other one was labeled as 'experimental group' (Section II) randomly. After pre-tests were directed to both groups, 10-h implementation on the unit "My Friends Away" was done accordingly with the curriculum schedule. In the experimental group, "finding countries" activity in the unit was studied on computer platform, and students completed the activity with enjoyment as if they were of playing a game. Power-point presentations and were used to give information about country flags and general information about the unit. Student-level-compatible and meaningfully whole documentary cuts which were presented on television about the countries and cultures in the unit were watched by students. Documentaries were found to be effective in education (Sidekli et al., 2013). Music and audio records about the Turkish countries were listened and common points were highlighted. Children who came to Turkey for April 23rd, Children's Day were explained through animation.

In control group, on the other hand, the unit was studied via course book. After the unit was completed, the same achievement test in pre-test was directed to students as post-test and the success of the students is analyzed with SPSS program.

Sample

The target population of this study was 4th grade students in 2009-2010 educational year in Turkey. The reachable population of this study, on the other hand, was 4th grade students in all elementary schools in Kocasinan, a town of Kayseri, Turkey.

The sample (n=67) of the study was all students in two sections of 4th grades, 4-B and 4-C, at an elementary school in Kocasinan, Kayseri, Turkey. Both groups were chosen randomly, the control group as 4-B section while the experimental group was as 4-C section. Before conducting the study and starting implementation, consent from the students in both sections and their parent were received.

Data collection tools and collecting data

As a data collection tool of the study, a multiple choice achievement test was designed taking expert opinions and regarding objectives of the unit to test the use of multimedia effect on students' academic success. One of the two experts whose opinions were taken throughout the process of achievement-test-design was an academic at Curriculum and Instruction department while the other one was at Computer Sciences Education department. Pilot study of the achievement test was done at the same level in another school. Under the light of the pilot study, experts' opinion was requested again and both the question items and the choices were revised to outline 15-itemed multiple choice achievement test. This achievement test was directed to both control and experimental groups in 30 min and they were asked to answer the questions. The items in the test were designed to outline what students know about the unit and what have learnt throughout the process. Indeed, researchers state multiple choice tests could be used to measure the knowledge, understanding and application levels of students (Groundlung and Lin: 157; Ayatar, 1965:22, cited in Öncü, 2003).

Data analysis

The data of the study was analyzed with SPSS software program. The rate of the correct answers is given as percentage-frequency for each item in the achievement test. Additionally, whether there was a difference between the control and experimental groups as a result of multimedia use was defined via t-test and significance value was taken as 0.05.

FINDINGS

This part presents the explanation and findings of the data collected throughout the study.

The effect of multimedia on academic achievement – Experimental group

When the pre and post test results of the experimental group were compared, a significant difference is observed between the two tests [t(68) = -4.323, p=.000<.05]. When the mean values of experimental group were analyzed, a considerable increase is observed in the post-test results compared to pre-test result ($\overline{x}_{expretest}$=71.57<$\overline{x}_{exposttest}$=84.87). From this point, according to the implementation results, it could be asserted that the use of multimedia positively affects the academic success of the students, as statistically significant difference is observed between the pre and

Table 1. T-test results of experimental group.

Experimental group	N	$\overline{x}$	sd	*t*	sd	p
Pre-test	35	71.5714	14.92981	-4.323	68	.000
Post-test	35	84.9714	10.64531			

Table 2. T-test results of the control group.

Control group	N	$\overline{x}$	sd	*t*	sd	p
Pre-test	32	69.9688	16.29067	.055	62	.956
Post-test	32	69.7500	15.23155			

post-tests of the experimental group, where multimedia was used (Table 1).

The effect of traditional instruction on academic achievement

At the end of our study, no significant difference is observed between the means of pre and post-test results of the control group ($\overline{x}_{controlpretest}$=69.96< $\overline{x}_{controlposttest}$=69.75) and there is no significant difference (p=.956>.05). While small decrease is observed in the post-test mean value of the control group ($\overline{x}_{controlposttest}$ - $\overline{x}_{controlpretest}$= -.18), the standard deviations of both pre and post-test are found as considerably high ($sd_{controlpretest}$=16.29, $sd_{controlposstest}$=15.23). The fact that standard deviations are high in control group means that the group has not got a normal distribution of the test scores and there are too high and low scores in the group. The fact that there is not a significant difference between the pre and post-test, besides, shows too high and low scores in the groups remained the same in the post-test. So, it is possible to believe that successful and unsuccessful students in the groups remained the same after the implementation process with the lack of a learning-process difference as high and low students got similar results in the post-test (Table 2).

The difference of multimedia-based and traditional instruction on achievement

When Table 3 is analyzed, it could be said that there is a significant difference between the reached values of two groups [t(65) = 6.908, p=.000<.05]. The mean difference of the experimental group is 13.4286 while the mean difference of the control groups is -.1875. This data proves that the increase in student achievement in experimental group is higher than the increase in the control group. This increase in the experimental group where multimedia was used is statistically significantly higher than the group where traditional instruction was implemented (p=.00<.05).

DISCUSSION

According to pre-test results gained from the achievement test, there is no significant difference in experimental and control groups, which means the two groups were highly similar to each other in terms of academic success, and the significant difference is in the benefit of post-test results. When the experimental group results were analyzed within itself, there is a significant difference between the pre and post-test results of the experimental group while there is not a difference between the pre and post-test results of the control group.

Previous studies show the use of multimedia and technology use in education and social studies increase students' academic success. Same studies indicate the use of multimedia and technology positively affects students' attitude, motivation and attention towards the lesson.

In this study, where the effect of multimedia technique on students' academic success was analyzed, no significant difference between the control and experimental groups' pre-test results were detected. In the web-based studies of Karadeniz and Akpinar (2015), the same situation was observed. This could be explained as it is important in terms of identifying the abilities of the students, their readiness for the course, their pre-gained objective and behaviors and which objectives were reached (Öncü, 1994, Akt et al., 2007).

When we analyze the pre and post-test results of the control group, it can be observed that there is no significant difference between the two achievement tests. This shows that the traditional instruction implemented in the study had no effect on the success level of the

Table 3. Groups comparison of pre and post-tests.

Pre and post tests	N	$\overline{x}$	sd	*t*	sd	P
Experimental	35	13.4286	8.18638	6.908	65	0.000
Control	32	-0.1875	7.91665			

students. In general, on the other hand, it is possible to believe that traditional instruction has little effect on the success level of students.

When the experimental and control groups' pre-test and post-test scores were analyzed, the significant difference is in the benefit of the experimental group, which means the experimental group had increase in the post-test. This situation is also in parallel with Şahin (2000), Akbaba (2009) and Çoruk and Çakır (2015)'s studies. Şahin (2000) states students who are instructed with multimedia are more successful compared to students instructed in traditional ways. Akbaba (2009) reached similar results in his dissertation named "The Effect of Multimedia Use on Academic Achievement and Attitude in Ataturk's Principles and Reforms Course" and he asserted the academic success level of the classroom using multimedia was higher than the classroom which did not use. In Çoruk and Çakır (2015)'s study, "The Effect of Multimedia on Primary School Students on academic Achievement and Anxiety"; moreover, the result is not different. They highlighted that multimedia increases student success. In all three studies, it has been indicated that instructions with multimedia use increased student achievement. Arıcı and Yekta (2005), on the other hand, found no significant difference between the pre and post-test results of the experimental and control groups. They found multimedia as neutral effective on the academic achievement of the students, which is a reverse result of the ones stated and this study.

Akın and Çeçen (2015) analyzed primary school students' opinions about multimedia tools in their study. In their study, instruction via multimedia was applied before student opinions were obtained. Primary school students were glad to have multimedia-based instruction, and they wanted to have this kind of instruction afterwards. Moreover, it has been observed by the researchers that student motivation increased after the implementation.

It has been found in research that the use of multimedia in the learning process does not only increaser success level of the students but create positive changes in the attitudes of the students towards lessons. Akbaba et al. (2012) state the use of multimedia positively affects 7th grade students' attitudes towards social studies lesson. In the same sense, Yünkül and Er (2014) found students' attitudes towards lesson were positively affected by the use of multimedia as the students in the experimental group were identified as having better attitudes towards lesson. However, Altınışık and Orhan (2002) found reverse results as having no significant difference between pre and post-test results was found. Altınışık and Orhan explained the reason of this none-difference situation as it was students' first experience of multimedia use and time limitation. Moreover, Aytan and Başal (2015) found Turkish teacher candidates' attitudes towards web 2.0 tools were positive, these tools improve critical thinking and ICT skill, information exchange feedback process in their study web 2.0 tools' effects were investigated.

In conclusion of this discussion part, it could be asserted that multimedia use increases student success and motivation while positively affecting student attitudes towards lessons.

RESULTS AND DISCUSSION

According to the result of this study which aims to put forward the effect of multimedia technique on the academic achievement of students, the significant different between the control and experimental group is found to be in the benefit of the experimental group. In other words, multimedia technique is a much better instruction way than traditional ways. Additionally, students' interest, motivation and participation increased according to the researcher and experimental group's teacher observations.

In control group, on the other hand, traditional instruction had no effect on the academic achievement of the students. It has been concluded that students in the control group had difficulties in concretization abstract topics and this made their learning process harder. It goes without saying that the materials used in the experimental group were more attention catching and enjoyable than the ones used in the control group.

For the experimental group, it has been observed that all students were in the learning process while control group students could not be addressed as a whole. This means multimedia use could include more students into learning process. This way, all students in a classroom would be addressed.

RECOMMENDATIONS

These recommendations could be listed on the basis of

the results presented in the article:

1. From the effect of multimedia on student achievement, which requires computer skills of the teachers; it could be stated that teachers should not be behind in terms of technology knowledge. For this, in-service courses should be opened.
2. Materials with today's technology for social studies lesson should be chosen and developed.
3. The technological groundwork of the schools should be improved and schools should be designed in a way to present opportunities for multimedia use.
4. The number of movies, slides, animations, photographs and voice records used for the objectives of the lessons should be increased and choices should be varies.
5. Students should be integrated more into the learning process by enabling them to prepare some multimedia materials (slides, Internet searches, etc.).

Conflict of interests

The authors have not declared any conflicts of interest.

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