

An Analysis of the Effects of Multimedia Teaching on Student Achievement

Ramazan Bulutⁱ

Abstract

Multimedia settings can be defined as digital settings in which elements with visual, audio or visual-audio characteristics that appeal to individuals' auditory and visual senses are presented in a combined way. Such settings are employed in numerous fields including movies, advertisements, tourism, commerce and education. The aim of the study is to analyse the effects of social studies education based on multimedia setting on students' academic achievement. The study was designed using the explanatory sequential design which is part of the mixed method. The major finding of the study is that social studies teaching based on the multimedia setting had much more positive effects on student achievement than traditional teaching, but this effects was not statistically significant. The qualitative findings suggested that the reason for it is related to crowded classroom size, high levels of students' academical readiness and noise in the classrooms. It is possible to conclude that teaching based on multimedia setting has much more positive effects on academic achievement in contrast to traditional teaching and it makes topics to be learned much more understandable and learning environment much more fun.

Keywords: Multimedia learning, academic achievement, social studies

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ⁱ **Ramazan Bulut**, This study is based on a PhD thesis by Ramazan Bulut.

Email: bulut0476@gmail.com

INTRODUCTION

As a result of technological advances many distinct equipment that can be employed in the teaching and learning environment has evolved. It is stated that technology has a function of developing several materials and tools with the goal of making life much easier, raising the life standards and controlling the environment. Such tools are considered to be an integral part of life and change over time (Ersoy, 2013). Similarly, those tools and equipment used for educational purposes change in parallel to the advances in technology. The common educational materials and tools used in the past periods include books, notebooks, pen and pencils and blackboards. Today in addition to these traditional educational materials the following ones are also employed when they are available: radio, television, overhead, computers, Internet, CDs, DVDs, interactive board, e-books and e-journals. As stated above the changes in the use of educational tools are closely related to the technological advances.

Another effect of technological advances on education is that educational programs have been modified to keep up with these changes and developments. In Turkey one of the examples of such an effect is about the educational program for the course of social studies. In 2005 the Ministry of National Education began to implement a new educational program for the course of social studies. The gains, learning and teaching process and measurement process covered in the program were all modified and updated. The philosophical basis of the new program is the constructivist approach instead of traditional one. Adopting the constructivist approach made it possible to have a student-centered teaching and learning process instead of one based on a teacher-centered teaching and learning process. The program emphasized the fact that teaching and learning environment should be enriched through activities which reinforce active student involvement. For such activities the Ministry recommends the use of some multimedia materials including atlas, sphere, picture, photo, animation, simulation which stimulate student senses (MONE, 2010).

Stimulating more than one sense of students in the teaching and learning process increase both the productivity of learning process and the permanency of the learning. Research suggests that learning occurs with senses varying rates: 83% by seeing, 11% by hearing, 3,5% by smelling, 1,5% by touching and 1% by tasting (Çilenti, 1988). Therefore, one of the most significant sense for learning is seeing. Another research argues that individuals can remember 90% of what they both do and tell, 70% of what they tell, 50% of what they see and hear, 30% of what they see, 20% of what they hear and 10% of what they read (Yalın, 2015). In other words, learning which is defined as the long lasting behavioral change as a result of individuals' experience (Driscoll, 2012) can be much more productive and long lasting if students actively involve in the learning process and if their senses of seeing and hearing are stimulated. Stimulating more than one sense of students is possible through the use of multimedia environment in the learning process.

Multimedia settings can be defined as digital settings in which elements with visual, audio or visual-audio characteristics that appeal to individuals' auditory and visual senses are presented in a combined way. It is also defined as an environment which emerges from the combination of visual and auditory materials including videos, movies and animations (Akkoyunlu and Yılmaz, 2005). Therefore, multimedia environment is made up of those materials which mobilize more than one sense of the students.

Mayer (2002) who developed the cognitive theory of learning in multimedia settings stated that instead of using only verbal images using both verbal and visual have much more positive effects on learning. Mayer (2009) terms learning which occurs as a result of using both words and visuals as multimedia learning. Mayer's theory (2009) is based on the following three theories: Dual Coding Theory, Limited Capacity Theory and Active Memory Theory. Figure 1 below presents the components of the cognitive theory of learning in multimedia settings.

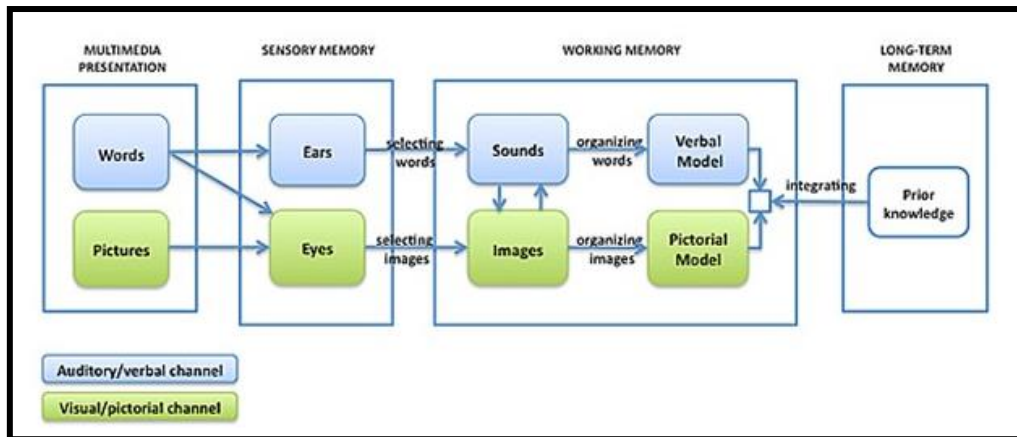


Figure:1 Cognitive Theory of Multimedia Learning¹

Figure 1 shows that in multimedia teaching the pictures and words covered are taken to sensory memory through senses. For instance, pictures are perceived by eyes and words are again perceived by eyes if these are given in written form and perceived by ears if they are given through verbal form. The words and pictures in sensory memory are transferred to short-term memory to be processed. Short-term memory retains them for a short period and processed. It has two major components. The first one covers voices and visual images in pictures which are not processed. There is a relationship between voices and images which is represented with arrows which refers to the fact that voice can be transformed into a visual image and a visual image can be transformed into voice (Mayer, 2009). For instance, ears perceive the sound meaning of, for instance, the word “tree” and the related image occurs in the mind or any image transforms into sound. There are verbal and visual models on the right side of working memory which transform pictures into visual model and words into verbal model (Clark and Mayer, 2016). Following these processes visual and verbal models are related and combined. Next to the working memory there is long-term memory which stores information for a long period of time. Here information is retained much longer in contrast to working memory. In order to be processed information in the long-term memory should be relocated to the working memory (Mayer, 2009). In the initial period the rate of forgetting about information is higher, but later it becomes lower. Repeating information and transferring it to the long-term memory may decrease the rate of forgetting about information (Senemoğlu, 2013).

Multimedia settings have been commonly used in many different fields, including education. Multimedia settings facilitate learning and make learning activities much more meaningful, long lasting and attractive (Eryaman, 2006,2007; Yaşar and Gültekin, 2012). Research suggests that 92% of the participants considered multimedia learning setting fun and entertaining (Arkün, 2007). There are numerous studies indicating that multimedia teaching has positive effects on student attitudes (Beydoğan and Hayran, 2015; İnan, 2015; Özüpekçe, 2015; Yeşiltaş, 2010). Akın (2015) analysed the effects of the multimedia teaching on Turkish language courses and concluded that it has much more positive and desired effects on student attitudes in contrast to traditional teaching approach based on textbooks. The other studies dealt with the effects of multimedia teaching on student attitudes found no significant effects (Akbulut, 2013; Bulut and Yazıcı, 2017; Balkan, 2013; Bayturan, 2011; Çener, 2011).

The studies which analysed the effects of multimedia learning on student achievement have found similar results like those which examined the effects of multimedia learning on student attitudes. Some studies concluded that multimedia learning has significant effects on student achievement (Sezgin, 2009; Taşçı and Soran, 2008; Yılmaz, 2012; Yünkül and Oğuz-Er, 2014). For instance, Sezgin (2009) analysed the effects of multimedia setting and computer setting on student

¹ Figure was adopted from the website “<http://slideplayer.com/slide/9878856/>” (URL- 1)

achievement and permanent learning. The findings of the study indicated that the experiment group which received multimedia teaching had significantly much more higher scores on achievement and permanent learning in contrast to the control group. In addition, nearly all students reported that they liked multimedia teaching. However, there are other studies which concluded that multimedia teaching has no desired effects on student achievement (Altınışık, 2001; Bayırtepe and Tüzün, 2007; Yazar, 2010). In short research on the effects of multimedia learning on student achievement produced different findings. This study analysed the effects of the multimedia setting on student achievement, contributing to the ongoing discussions on the topic. The findings of the study is thought to assist the activities to raise student achievement.

Purpose of the Study

The aim of the study is to analyse the effects of social studies education based on multimedia setting on students' academic achievement. In parallel to this aim the study attempts to answer the following research questions:

- ✓ Is there any statistically significant difference between the experiment and control groups in terms of their pre-test scores?
- ✓ Is there any statistically significant difference between the experiment and control groups in terms of post-test scores?
- ✓ Is there any statistically significant difference between the pre-test and post-test scores of the experiment group?
- ✓ Is there any statistically significant difference between the pre-test and post-test scores of the control group?
- ✓ What are the student views about social studies course based on multimedia teaching approach?

METHOD

Design of the Study

The study employed a mixed method. It is defined as a research method in which both quantitative and qualitative data are collected in a manner that both approaches are combined to analyse the topic at hand (Creswell & Garrett, 2008). Given that it combines quantitative and qualitative approaches it minimizes the disadvantages of using just one of them in the research (Johnson & Onwuegbuzie, 2004).

There are many designs under the mixed method. Researchers choose the best design in accordance with the aims of the study (Teddlie & Tashakkori, 2015). In the current study the explanatory sequential design was employed. This design includes a sequential use of the methods. At the first step the quantitative method is used. Following the identification of the quantitative results a decision is made over which of them should be further analysed through the qualitative method. At this point some of the unexpected, interesting results are focused. At the second step the qualitative method is employed. At the final step the results collected from both methods are interpreted and summarized. Then a discussion is made regarding how qualitative findings account for quantitative ones (Creswell & Plano Clark, 2014).

Participants

The participants of the study are fifth grade students attending Hoca Ahmet Yesevi Secondary School in Afyon Karahisar province. In the interviews with school personnel about the socio-economical status of the students it was reported that the students were successful and most of them came from higher socio-economical families. In addition, their parents were reported to have higher levels of education and were conscious about their children's education. The participants for the quantitative part of the study were chosen through conventional sampling technique. This technique makes it possible for the researcher to find participants among those who are easily accessible (Aziz, 2013). There were two groups of the participants, the experiment and control groups. The experiment group was the students of 5/A and the control group was the students of 5/E. The pre-test was administered to 42 experiment subjects and to 39 control subjects. For the qualitative part of the study the participants were chosen through the maximum sampling technique. It was employed to increase the possibility of including students with different views (Yıldırım and Şimşek, 2013).

The Scale Data Collection Tools

The data were collected through the "achievement test on let's know our region unit". The test was developed based on the major topics and gains covered by the unit. Each topic and each desired output were represented by an item in the test. On the other hand, more significant ones were represented by two or more items. During the development of draft test form the following item pools were employed [URL:6](#); MEB, 2014a, 2014b, 2014c; MONE General Directorate of Measurement, Evaluation and Examinations [ÖDSGM], 2016; [URL:9](#) ; Özensoy and Aynacı, 2016a, 2016b, 2016c; [URL: 10](#); URL: 11). The draft test was reviewed by field specialists in terms of content, language and developmental level of the participants. Based on the feedbacks from the specialists five items were excluded. The draft test consisted of 69 items. It was then reviewed by three social studies teachers who suggested that the number of items should be reduced. Finally, six more items were also excluded from the test and it covered 63 items under two sections.

In a pilot study the test was administered to the fifth grade students attending three different public secondary schools (Hoca Ahmet Yesevi secondary school, Kocatepe secondary school and 100. Yıl Hisarbank secondary school) which served the children from different socio-economical status. It was administered to 168 students. The data obtained were analysed in terms of validity and reliability. In the item analysis the focus was on which items should be included in the test considering difficulty level, discrimination power and item-total correlation coefficients (Can, 2013; Erkuş, 2014; Özçelik, 2010).

Based on the findings of the pilot study the test contained 52 items. However, social studies teachers suggested that the test should contain 30-35 items due to content and developmental characteristics of the students. Therefore, some items were excluded to have a test of 33 items. The test has a difficulty level of intermediate. All items have an acceptable level of discrimination which t-test results indicated.

The KR-21 reliability coefficient of the test was found to be 0.94. Its Kuder-Richardson (KR-20) reliability coefficient was found to be 0.95 and it was equal to the Cronbach's Alpha reliability coefficient. It is reported that the answers to the items are two (i.e., true-false) the KR-20 reliability coefficient of the scale and its Cronbach's Alpha coefficient are the same (DeVellis, 2014). On the other hand, it is stated that when the coefficient value is near to 0 the reliability of the scale is low, while when it is near to 1 the scale has higher reliability (Özçelik, 2010). Tekindal (2009) reported that a good cognitive measurement tool should have an alpha coefficient between 0.80 and 0.90. Therefore, it can be stated that the test developed in the study is a reliable measurement tool.

Interview Form

In order to reveal the student views about the multimedia teaching a survey interview with open-ended items was carried out. It is reported that this kind of interview is not so much different from the structured interviews in terms of content and methodology. The survey interviews include a series of items and the participants are asked to answer them in their way using their subjective views (Yıldırım and Şimşek, 2013).

The items were developed following the review of related studies (Akbulut, 2013; Baysan, 2015; Daşdemir, 2012; Gürer, 2013; Kan, 2012; Kunduz, 2013; İbili, 2013; Yazar, 2010). Then a draft item form was developed. It was reviewed by four specialists (two in educational sciences, one computer education and technology education, and one in Turkish language education and social studies education) in terms of content and the wording of the items. The draft interview form was administered to the participants of the pilot study to determine whether or not the writing of items and their meanings were proper for the participants' cognitive level. Based on the reviews of the specialists and the findings of the pilot study the items were revised to finalize the interview form. The interview form was consisted of four items.

Data Collection Process

Before the implementation daily course outlines developed based on multimedia teaching approach were reviewed by the specialists. Then the course outlines were used in the pilot study for three weeks. Based on the findings of the pilot study the course outlines were revised and modified. Then the six-week experiment was initiated. The pre-test was administered to both groups nearly one month before the implementation. Following the implementation the post-test was administered to the participants of the study. The quantitative data were first analysed. It was followed by the analysis of the qualitative data gathered from the structured interviews in which four items were asked to the participants.

Materials Used in the Experiment and Control Groups

In the experiment group the course was delivered in accordance with the principles of the multimedia teaching approach. In order to develop daily course outlines the related research was reviewed. More specifically, audio-visual materials (animations, videos, maps, photographs, pictures, etc.) were taken from different educational platforms such as the Educational Communication Network (ECN), Vitamin and Morpa Kampüs and from other websites. Some of these audio-visual materials were recorded to use them later in the learning and teaching process and the others were used online during the class hour.

In the control group traditional materials such social studies textbook, guides and study sheets were employed. The same unit was taught in both groups. In addition, the study sheets were also the same.

Data Analysis

The quantitative data obtained from the pre-test and post-test were analysed through the following ways;

- ✓ Given that the distribution of the pre-test scores of the experiment and control groups was found to be normal, these scores were analysed using t-test.

- ✓ In order to identify whether or not the pre- and post-test scores of the experiment and control groups significantly differ their scores were analysed. Given that these scores normally distributed t-test was employed.
- ✓ In order to identify whether or not the pre- and post-test scores of the experiment group significantly differ t-test was used.

The qualitative data were analysed through content analysis, which was completed following four steps. The first step is coding. The data were read for many times before coding. The next step was to develop themes. Codes were classified to produce themes. Then the data were placed into tables. The last step was the interpretation of the data (Yıldırım and Şimşek, 2013). In order to increase the interbal consistency of the analyses a co-observer was informed about the procedures and the data coded were analysed by the co-observer. The coder agreement was calculated using the following formula: “[agreement / (agreement + disagreement) x100]” (Miles and Huberman, 1994; cited in Yapıcıoğlu, 2016: 76). The coding reliability coefficient was found to be 93%.

FINDINGS

This section presents a discussion of the quantitative and qualitative findings.

Quantitative Findings

As mentioned above the first research question was “Is there any statistically significant difference between the experiment and control groups in terms of their pre-test scores?” Table 1 presents the results of t-test which was used to determine whether or not there was a statistically significant difference between the pre-test scores of the groups.

Table 1. Results of t-test on the pre-test scores of the groups

Group	N	X	S	sd	t	P
Experiment groups	42	14,76	5,22	79	1,069	,288
Control group	39	16,03	5,42			

Table 1 shows that the pre-test scores of the experiment group ($X_{42}=14,76$) is lower than those of the control group ($X_{39}=16,03$). However, it is found that this difference is not statistically significant [$t_{(79)} = 1.07, p>0.05$].

As stated earlier the second research question was “Is there any statistically significant difference between the experiment and control groups in terms of their post-test scores?” Table 2 presents the results of t-test which was used to determine whether or not there was a statistically significant difference between the post-test scores of the groups.

Table 2. Results of t-test on the post-test scores of the groups

Group	N	\bar{X}	S	sd	t	p
Experiment group	42	5,60	5,68	79	-,961	,339
Control group	39	4,49	4,59			

As can be seen in Table 2 the results of t-test indicate that the post-test score of the experiment group is 5,60, while that of the control group is 4,49. Therefore, it is higher for the experiment group. However, this difference is found not to be statistically significant [$t_{(79)} = -,96, p>0.05$]. In other words,

multi-media based social studies teaching has much more positive effects on student achievement in contrast to traditional teaching, but this effect is not statistically significant.

The third research question of the study is given as follows: “Is there any statistically significant difference between the pre-test and post-test scores of the experiment group and control group?” In order to determine it t-test was employed and the results of t-test are given in Tables 3 and 4.

Table 3. Results of t-test on the pre- and post-test scores of the experiment group

Experiment group	N	\bar{X}	S	sd	t	p
Pre-Test	42	14,76	5,22	41	-6,386	,000
Post-Test	42	20,36	6,48			

As can be observed in Table 3 there is a statistically significant difference between the pre-test score of the experiment group ($X_{pre-test}=14,76$) and the post-test score of the experiment group ($X_{post-test}=20,36$) [$t_{(41)} = -6.39, p<0.05$].

Table 4. Results of t-test on the pre- and post-test scores of the control group

Control Group	N	\bar{X}	S	sd	t	p
Pre-Test	39	16,03	5,42	38	-6,101	,000
Post-Test	39	20,51	5,24			

Table 4 indicates that there is a statistically significant difference between the pre-test score of the experiment group ($X_{pre-test}=16,03$) and the post-test score of the control group ($X_{post-test}=20,51$) [$t_{(38)} = -6.10, p<0.05$].

Qualitative Findings

This section presents the qualitative findings of the study. In the interview the participants were first asked to answer the following question: “How did animation, photographs, pictures and maps used in the course affect your learning of the topics? Give some examples.” The themes and codes appeared in relation to this item and their frequency is given in Table 5.

Table 5. Student views on multimedia based teaching on learning of topics

Themes	Codes	f	
Positive Views	Better understanding/learning	23	
	Concrete/Visualization	12	
	Efficient, Productive and Attractive Learning	Academic achievement	26
		Facilitation	6
	Long-lasting learning	2	
	Total	69	
Desire to Learn	Motivation increase	16	
	Total	85	
	Negative views	Insufficient	2
No effect		1	
Total		3	
Total		88	

As can be seen in Table 5 the majority of the students (37 students) reported that multimedia based teaching positively affected their learning. Such positive student views were divided into two themes of “efficient, productive and attractive learning” and “desire to learn”.

Of these two themes the former one, “efficient, productive and attractive learning”, has much more higher frequency. The positive effect of the multimedia teaching on student achievement partly occurs due to the fact it causes efficient, productive and attractive learning. This theme covers five codes ranking from the highest and lowest frequency as follows: academic achievement (26), better understanding/learning (23), concrete learning/visualization of learning (12), facilitating learning (6) and long-lasting learning (2).

As can also seen in Table 5 the code with the highest frequency is “academic achievement. This finding suggests that the multimedia teaching positively produce student achievement. The direct quotations related to this code are given as follows:

S16: “I think it increased my achievement. Because I understood better there were visuals in the course.”

S3: “I affected positively my achievement. Now it is much higher.”

S39: “I increased my achievement. Now I do not make errors.”

S24: “I think it positively affected my achievement. Because I learned much more.”

These quotations also suggest that the multimedia teaching positively produce student achievement.

The second most frequent code under the theme of “efficient, productive and attractive learning” is “better understanding/learning”. The direct quotations related to this code are given as follows:

S5: “It affected well my learning. I understood better all topics due to the use of animations, photographs, etc.”

S30: “Good. I understood better the topic. Teacher asked questions about the photographs. The course was good and nice.”

S24: “It affected my understanding well. The reason for better understanding was the use of animations, maps and pictures in the course.”

S8: “I understood everything better and began to like all.”

S31: “Courses were fun and we all understood the topics better.”

S14: “I understood better the topics.”

S27: “In this way I understood the topic better.”

S38: “It well affected my understanding of the topic. Now I better know the topics.”

The direct quotations above clearly indicate that multimedia teaching makes the topics much easier to learn and understand.

The third most frequent code under the theme of “efficient, productive and attractive learning” is “concrete learning/visualization”. The direct quotations related to this code are given as follows:

S10: "Photographs and maps make it easier for me to learn. Thus, they had positive effects on my learning. For example, I could not see how it was before, I saw it through the photographs and learned well."

S16: "We used to read the textbook, but I did not understand it very well. However, now I could well understand it due to the use of animations, pictures and other visuals."

S17: "Yes, I think that it positively affected my learning. Because of the visuals I understand the materials much better."

S11: Before we did not see any maps and animations in social studies courses. But in this course our teacher used animations which made it possible for us to learn the content."

S12: "I think that it positively affected my learning. Learning the materials through visuals is much easier."

S6: "It positively affected my learning. Because just reading the textbook does not help my learning and understanding."

S24: "It positively affected my learning. Animations, maps and pictures made it easier for me to understand the content better."

S4: "It positively affected my learning; because when I look at pictures and photos I understand better the issue."

The direct quotations above clearly indicate that multimedia teaching and multimedia learning environment make the topics much more concrete and visual and therefore, make them much easier to learn and understand.

The third most frequent code under the theme of "efficient, productive and attractive learning" is "long-lasting learning". The direct quotations related to this code are given as follows:

S5: "It had positive effects on my learning. Because when pictures, animations and photographs made my learning long-lasting."

S20: "Yes, it reinforced the learning about the topics."

The direct quotations above clearly indicate that multimedia teaching makes learning much more long-lasting.

As can be seen in Table 5 another theme under the positive views is "desire to learn". Therefore, it is safe to argue that one of the factors affecting student achievement is "desire to learn". This theme covers only one code, "motivation increase". The frequency of this code is sixteen. The direct quotations related to this code are given as follows:

S3: "I liked social studies course and in the course I felt that I desired to learn the topics."

S19: "My desire to learn the topics improved."

S1: "It was fun so I did better."

S10: "I think it affected my learning. It really affected my learning and my interest."

S8: "I understood everything better and begin to like."

The direct quotations above clearly indicate that multimedia teaching improved students' motivation to learn.

Table 5 also shows that there are some students (3 students) who had negative views about the multimedia teaching used in social studies courses. The direct quotations below exemplify such negative views about the multimedia teaching.

S13: "Our teacher showed us the plains, but in the examination I could not give the correct answer to the item about it."

S25: "It does not affect much."

S23: "I don't think that it affected."

Another question asked to the participants in the interviews is given as follows: "What are the problems you observed during the six-week implementation?" The themes and codes appeared in relation to this item and their frequency is given in Table 6.

Table 6. Student views on in-class problems

Theme	Code	f
Classroom Management	Noise + (not being able to listen to course)	30
	Not having chance to answer	4

Eleven participants of the study reported that they did not experience any problem during the implementation. The others reported that there were some problems related to the experimental procedure. As can be seen in Table 6 the views of the students who experienced problems during the implementation are mostly related to "classroom management". The theme of "classroom management" includes two codes: noise and not having chance to answer.

Of these two codes the code of "noise" has much higher frequency (30). Therefore, the participants reported that during the implementation undesired noise occurred in the class. The related quotations are given as follows:

S11: "My friends shout during the class. We might understand better the topics if they talked less and was respectful."

S22: "I could not understand what teacher said due to the noise in the classroom."

S10: "The problem was that my friends talked too much."

S8: "My friends shouted and talked too much. They did not allow me to listen to the course."

S12: "My friends' talking too much."

S27: "Talking too much during the class..."

S3: "My friends talked too much, so the course was taught a bit slow."

S35: "My friends talked too much and did not allow me to listen to the course."

The quotations above indicate that during the course based on multimedia teaching undesired noise occurred in the classroom. Some students reported that they cannot manage to listen to the course due to the noise.

Another code under the theme of classroom management is not having chance to answer. In other words, for students not having chance to answer is a problem. The related quotation is given as follows:

S24: "Some problems occurred due to the noise by the students. They did not allow me for having a chance to make comments."

In the interviews the next item was "what do you suggest to increase student involvement in social studies courses?" The themes and codes appeared in relation to this item and their frequency is given in Table 7.

Table 7. Student suggestions about raising student involvement

Themes	Codes	f
About Learning Environment	Having a chance to say something	9
	No noise	6
	Less crowded classes	4
	Total	19
About Students	Listening to the course	6
	Studying	2
	Total	8
About teacher	Rewards	1
	Fun topics	1
	Total	2
Total		29

As can be seen in Table 7 the participants suggested several ways to increase the student involvement in social studies course. The content analysis showed three themes: about learning environment (19), about students (8) and about teachers (2).

Given that the most frequently stated theme is about learning environment it can be stated that for them in order to increase student involvement learning environment should be modified. This theme involves three codes of which the code of having a chance to say something has the highest frequency. The related quotations on this code are given as follows:

S39: "Having a chance to say something."

S30: "Having a chance to say something should be given to all students."

S12: "I want every student should have a chance to say something in the course."

These quotations indicate that for the participants having a chance to say something is one of the factors to improve student involvement.

Another suggestion to improve student involvement was given as a learning environment where there is no undesired noise. The related quotations on this code are given as follows:

S7: "We would participate more if there was no noise in the classroom."

S16: "Social studies courses should be taught in a classroom with no undesired noise and with less."

S19: "My friends should not talk too much..."

S22: "Classroom should be silent..."

These quotations indicate that for the participants a learning environment with undesired noise is one of the factors to improve student involvement.

Another suggestion to improve student involvement was given as the classrooms with less students. The related quotations on this code are given as follows:

S3: "If the class size is much less, the courses will be much more productive."

S10: "There might be less students in the classrooms. Then the placement of chairs can be rearranged."

S20: "I would like to have classroom with less students."

S16: "Social studies courses should be taught in a classroom with no undesired noise and with less..."

These quotations indicate that for the participants a classroom with less students is one of the factors to improve student involvement.

As can be seen in Table 7 the participants developed some suggestions to improve the student involvement which are about themselves. This theme involves two codes: "listening to the course" (6) and "studying" (2). The related quotations on these two codes are given as follows:

S1: "Listening to the course in a productive way."

S31: "Students should listen to the courses."

S37: "We should listen to the courses."

S25: "Always studying."

These quotations indicate that for the participants listening to the course and studying are among the factors to improve student involvement.

As can be seen in Table 7 the participants also suggested those ways to improve student involvement which are about teachers. This theme has two codes: "rewards" and "fun topics". The related quotations on these two codes are given as follows:

S4: "Teacher should reward us..."

S6: "Topics of the social studies course should be entertaining..."

These quotations indicate that for the participants rewards and those topics having fun are among the factors to improve student involvement.

In the interviews the participants also asked to answer the following item: "How do you want to be taught about other topics in social studies courses? Why?" The themes and codes appeared in relation to this item and their frequency is given in Table 8.

Table 8. Student views about how they would like to learn the other social studies topics

Themes	Codes	f
Views about Learning Environment	Multimedia setting	24
	A silent learning setting	3
	Total	27
Views about Teaching Process	Through fun	6
	Through playing games	1
	Through using study sheets	1
	Through rewards	1
Total	Total	9
Total		36

As can be seen in Table 8 the participant views about how they would like learn about the other topics in social studies courses are grouped under two themes: learning environment and teaching process. The latter has much higher frequency. The codes contained under this theme are given as follows: multimedia teaching (24) and a silent learning environment (3). These views suggest that the participants also wanted to have a multimedia based learning environment to learn about other social studies topics. The related quotation on this code is given as follows:

S10: "I would like to learn the others with photographs, pictures, maps and animations. Because courses are much more interesting in this way."

S16: "I would like to learn the others with photographs, pictures, maps and animations. Because I could understand the content better in this way."

S6: "I would like to learn the others with photographs, pictures and animations."

S12: "I would like to learn the others with videos and animations."

S13: "I would like to learn the others in this way."

S23: "Like that, because it is very nice."

These quotations indicate that the participants would like to learn the other topics in social studies courses through the multimedia teaching in which animations, pictures, photographs and maps are used.

Another code under the theme of learning environment is "a silent learning environment". This code indicates that the participants would like to learn the topics in a learning environment with no undesired noise. The related quotation on this code is given as follows:

S22: "I would like to learn the topics in a silent and peaceful classroom environment."

S28: "I would like to learn the topics in a silent and entertaining classroom environment."

As can be seen in Table 8 the participant views about how they would like learn about the other topics in social studies courses are also about the teaching process. Under this theme there are four codes: through fun, through playing games, through study sheets and through rewards.

The related quotations on the code of through fun are given as follows:

S7: "I wish it was fun. Beacuse we might both have fun and learn the materials."

S11: "I wish it was fun, included animations and much more exciting."

S38: *"I wish it was fun and was taught through animations."*

These quotations suggest that the participants would like learn the content through fun. The direct quotations about other codes, namely through playing games, through study sheets and through rewards, are given as follows: .

S5: *"I would like to learn the unit through watching videos and working with study sheets."*

S34: *"I would like to learn the unit through fun, pleasure and playing games, etc."*

S4: *"I would like to learn the unit through rewards. Under such a condition both me and my peers would listen to teacher with much more motivation."*

DISCUSSIONS AND CONCLUSION

The pre-test scores of the participants from the achievement test on the unit of let's know our regions are found not to significantly differ in that that of the experiment group was $x=14,76$ and that of the control group was $x=16,03$. Therefore, both groups had a similar level of academical achievement.

Following the six-week implementation the test was again administered to the both groups as post-test. The post-test scores of both groups significantly increased. Therefore, it is safe to argue that the methods used in both groups were influential in improving student learning. There are some findings suggesting that the traditional teaching method employed in the control group has significant effects on student achievement (Baysan, 2015; Küslü, 2015). There are also other findings indicating that the multimedia teaching method employed in the experiment group has significant effects on student achievement (Çoruk and Çakır, 2017; Leow and Neo, 2014; Lui, Olmanson, Horton and Toprac, 2011; Saad, Dandashi, Aljaam and Saleh, 2015; Saran and Seferoğlu, 2010; Singh, 2013). The views of the participants in the experiment group also support this result. More than half of the participants reported that the multimedia teaching improved their achievement in social studies course and made it possible for them to better understand the content. Some of the participants stated that the animations, pictures, photographs and maps used in the multimedia teaching facilitated learning of the content, made the topics concrete and learning long-lasting. Two out of three students in the experiment group, on the other hand, reported that the multimedia teaching did not affect their learning, hence their achievement. It may be resulted from different learning styles. Given that the multimedia teaching is not always time and cost effective, personal differences cannot be taken into consideration. These factors may be considered to be disadvantages of the multimedia teaching.

It is also found that although the post-test scores of the experiment group was higher than those of the control group, this difference is not statistically significant. This finding is consistent with some previous findings, but there are also some other previous findings which are inconsistent with it. Altınışık (2001) found that the multimedia teaching in the social studies courses did not make a significant difference in the achievement of the experiment subjects. Yazar (2010) concluded that there was no significant difference between the achievement scores of the experiment group in which the multimedia teaching was employed and those of the control group. Bayırtepe and Tüzün (2007) found that there was no significant difference between the achievement scores of the experiment group in which the multimedia based software was employed and those of the control group.

The reason for not having a significant difference between the achievement scores of the experiment group and those of the control group in the study may be that the achievement levels of both groups were already high. In accordance with the principle of individual differences that is used in the multimedia teaching designs the multimedia teaching has much more positive effects for those with less knowledge in contrast to those with higher levels of knowledge (Mayer, 1999). As stated earlier the school administrators reported that the children attending the schools had a good academical background. Similar observations were expressed by the teachers working at the schools. It

was also reported that the students were successful and most of them came from higher socio-economical families. In addition, their parents were reported to have higher levels of education and were conscious about their children's education. Therefore, it can be stated that the multimedia teaching did not produce the desired level of achievement in the social studies courses due to the fact that the participants were successful learners. As stated earlier Mayer (2009) argued that the multimedia teaching has much more positive effects for those with less knowledge in contrast to those with higher levels of knowledge. Because those children with lower levels of achievement need more of the use of visual and verbal materials together. In other words, the multimedia learning environments contribute to learning of the material in an easier way for such students.

On the other hand, it can be argued that the multimedia teaching did not produce the desired level of achievement in the social studies courses due to the fact that the classrooms were very crowded. Some of the students participated in the study reported that the classroom was crowded and more than half of them stated that the classroom was noisy so that they could not understand what the teacher said in the course. Some others stated that they could have a chance to discuss the topic with the teacher and therefore, could not participate in the class discussions. Some students suggested that in order to improve student involvement there should be a silent learning environment and others argued that the classroom size should be lower. Işık (2011) argued that the size for classrooms should be between 20-30 students. It is reported that classroom management will be much easier in such classes and different teaching methods can be employed. The other advantage of such a classroom size is that the teacher could be familiar with the students. However, if the classroom size is higher than 30 students, such classrooms are "crowded". In such classrooms classroom management can be a problem. In addition, it is difficult for the teacher to be familiar with students. Tabanlı (2008) argued that crowded classrooms may limit the benefits of the teaching methods and techniques in addition to the problems related to classroom management. Çınar, Temel, Beden and Göçgen (2004) found that crowded classrooms have negative effects on student achievement, attendance and result in time consuming. In short, it is possible to state that the multimedia teaching did not produce the desired level of achievement in the social studies courses due to the fact that the classrooms were very crowded.

However, it should be noted that if the implementation will be done on a different group of participants, the effects of the multimedia teaching will differ. In some studies it is found that the multimedia teaching had significant effects on student achievement (Mayer, 2002; Mayer, 1997; Mayer and Moreno, 2002a; Taşçı and Soran, 2008). Beydoğan and Hayran (2015) dealt with the effects of the multimedia teaching on the teaching of some social studies concepts. It is concluded that the academic achievement of the experiment subjects was much higher than that of the control subjects. Sezgin (2009) also concluded that the multimedia teaching significantly improved student achievement in contrast to computer-based teaching. It was also found that the learning of the students taught through the multimedia teaching was long-lasting. Bülbül (2009) analysed the effects of simulations on student achievement and found that this technique significantly improved student achievement. The reason for positive effects of simulations on student achievement was stated to be the fact that it made students active participants of the learning process. Toros (2015) analysed the effects of the multimedia teaching on student achievement. It was concluded that the academic achievement score of the experiment subjects was higher than that of the control subjects. In addition, the multimedia teaching was found to be very effective to avoid misconceptions about climate, weather, geography, map and scale. Another study also found that the experiment subjects taught through the multimedia teaching were much more successful than the control subjects (Küslü, 2015). Singh (2013) analysed the effects of multimedia teaching on geography teaching and learning and found that multimedia teaching is much more influential on geography teaching and learning in contrast to traditional teaching approach. The reason for it is that traditional methods make students passive recipients of the knowledge and that traditional methods do not address multi sense of students. On the other hand, the multimedia teaching addresses more than one sense of students making it much easier to learn the content and it makes topics concrete and learning long-lasting. It also makes students active participants of the learning process. All these characteristics of the multimedia teaching have positive effects on student achievement.

Based on the findings of the study the following suggestions are developed:

- ✓ Given that the implementation was carried out in a crowded classroom, the course could not be delivered using full student-centered approach. It is thought that the effects of the multimedia teaching were limited due to this factor. It is predicted that the effects of the multimedia teaching will be much more when it is used in the classrooms with less students. A similar study can be repeated in the classrooms with less students.
- ✓ One of the major findings of the study is that the multimedia teaching makes it possible for students to learn the content through fun. Although the quantitative findings do not much support it, the qualitative results suggest that the multimedia teaching positively affects student learning. Therefore, it can be stated that the multimedia teaching should be used in the learning and teaching process.
- ✓ The findings of the study suggest that the multimedia teaching facilitates learning, makes the topics concrete and produces long-lasting learning. In order to improve long-lasting learning it can be suggested that the multimedia teaching should be supplemented with the tests on comprehension, repetition and interactive techniques.
- ✓ The participants of the study had higher levels of academical achievement. However, it is stated that multimedia setting are much more influential on the students with lower levels of academical achievement which is in consistent with the individual differences principle of multimedia teaching (Mayer, 2009). Therefore, future studies may be carried out on the participants who have lower, intermediate and higher levels of academical achievement to have much clearer understanding of the effects of multimedia teaching on student achievement. Such studies may be designed using the embedded theory or explanatory sequential design techniques.
- ✓ The reasons for not having desired results in student achievement when the multimedia teaching is used should be analysed to describe the required characteristics of the approach.

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