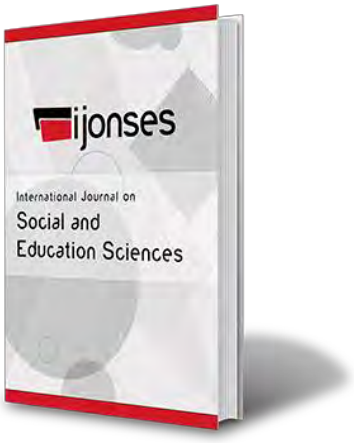

Development of Museum Education Activities for Social Studies Course and Evaluation of their Effects on Students' Academic Achievement

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To cite this article:

Eski, H. E. & Akman, O. (2023). Development of museum education activities for social studies course and evaluation of their effects on students' academic achievement. *International Journal on Social and Education Sciences (IJonSES), 5*(2), 341-353. https://doi.org/10.46328/ijonses.555

International Journal on Social and Education Sciences
2023, Vol. 5, No. 2, 341- 353 https://doi.org/10.46328/ijonses.555

Development of Museum Education Activities for Social Studies Course and Evaluation of their Effects on Students' Academic Achievement

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Article Info

Article History

Received:
10 September 2022
Accepted:
12 April 2023

Keywords

Out-of-school learning
Museum education
Social studies

Abstract

With the work done in the process, it was tried to raise awareness about museums and to explain how valuable museums are for a new perspective on education and most importantly for the social studies course. In the study, a 2x2 split-plot mixed design was used. In the quantitative part of the study, dependent and independent variable measurements were made on the experimental and control groups. In the qualitative part, semi-structured interview technique was applied. The participants of the research are 50 7th grade students in a public school in the center of Gaziantep in the 2020-2021 academic year. The quantitative data of the study were analyzed with the SPSS 22.00 program, and the Shapiro-Wilk normality test and skewness calculation were performed to find answers to the research questions of the study. Afterwards, the post-test was applied to both groups. As a result of the research, it was determined that museum education, which is one of the out-of-school learning environments for the social studies course, improved the course success level of the students in the experimental group. In addition, the data obtained from the semi-structured interview form reveal important results in terms of revealing the students' thoughts on museum education and its impact and make our research more valuable.

Introduction

Museums, which sometimes host objects found in daily life, sometimes the personal belongings of a king and sometimes the scientific works created by a scientist at the end of intense labor, are important structures that enlighten and continue to enlighten the history of humanity. The study conducted by Mercin (2003) also shows parallelism in terms of content and the structure of museums. In his study, he defined museums as places where social memory is exhibited with their content, accumulation and often spatial location. Visual elements have contributed to historical awareness both directly and indirectly. It has assumed important roles in the development of social memory and contributing to this development. The importance of museums, which have an important place in this respect, is an undeniable fact for the basis of the states that work in the process of nationalization at the point of transferring the concrete documents and artifacts of the past periods to both the current generation and future generations. Museums in Turkey, which have a long history, are a good learning environment for social studies lessons (Egüz & Kesten, 2012). In addition to the basic book knowledge that the students have, it is aimed to make their own inferences about how scientific knowledge is obtained by being able to observe all kinds of

works of art, literary products or works of labor of scientists and communities that have been active in the past life and similar to the conditions of that day. It will be aimed to help students develop valid and justified hypotheses about argumentation and critical thinking (see Noroozi et al., 2012, 2018, 2020), innovative thinking, generating innovative ideas, and how to realize the new ideas produced in the field of science and technology. Together with the process and at the end of the process analysis, it is aimed to raise awareness about museums and to realize that museums have an important structure in terms of educational perspective and especially in terms of social studies course and to enable students to gain new skills about education.

Museums and Social Studies

It would be appropriate to give some noteworthy examples from abroad about the concept of museum education, the importance of which is frequently mentioned in educational activities in Turkey, in order to compare our country with foreign resources. For example, through the Museum Pedagogy Center, which started to operate in Germany in 1973, different educational programs, museum trips, game applications and publications were implemented simultaneously both in historical places and in 14 different museums, and at the same time, special programs created in digital environments were coordinated with school programs. Individuals at different school levels are given excursions, information, discussions and workshops under the supervision of a guide at pre-planned times (Şar & Sağkol, 2013). The German Museum Pedagogy Center carries out its activities in coordination with the educational programs implemented in schools, and the programs implemented in these schools include museum visits that are decided to be implemented at least twice a year (Abacı, 1996).

The Social Studies program implemented in Turkey has been put forward with the aim of raising individuals who are self-developing, have effective communication skills, keep up with the innovations of the time and produce different ideas, reflect the innovations made in the field of education to this system, and reject rote memorization due to the constructivist approach that puts the student at the center and aims at continuous structuring of knowledge (Yazıcı & Koca, 2008). Social Studies teachers trained for this purpose try to present the targeted educational environments to their students by using new expression, methods and techniques in their lessons. Since this course is generally based on the evaluation of past experiences, social and cultural heritage in the context of the environment in which they live, it should be taught by taking into account the elements of tangible and intangible cultural heritage. From this point of view, museums constitute favorable educational and training spaces for students to make sense of history in the context of the conditions of that day and to equip them with information about the past.

In the light of the above-mentioned information, the problem of this study is the development of museum education activities for the social studies course and the evaluation of the effect on students' academic achievement. In the light of this problem, answers to the following sub-problems were sought;

1- Is there a significant difference between the achievement test post-test mean scores and pre-test mean scores of the experimental group participants who participated in social studies museum education?

2- Is there a significant difference between the post-test mean scores of the achievement test and the pre-test mean scores of the control group participants who continued the social studies course through

classical learning?

3- Is there a significant difference between the mean achievement test posttest scores of the participants in the experimental group who participated in museum education activities and the mean achievement test posttest scores of the participants in the control group who continued their education through classical learning?

4- Does gender have an effect on the post-test achievement scores of the experimental group?

While evaluating the qualitative data set of the research, an answer was sought to the question ”What are the students' views on museum education and its effect on social studies course out-of-school learning environments?”

Method

Research Design

This research has two separate data sets using two research methods: quantitative research and qualitative research. The quantitative dimension of the research was carried out with a 2 x 2 quasi-experimental design with experimental and control groups with pretest-posttest application. The quasi-experimental design was found appropriate to conduct the study as this way since the participants in the experimental and control groups were not determined as control and experimental groups by the principle of randomization or lottery and the existing branches were used. A semi-structured interview form was utilized in the qualitative research section structured using a qualitative design.

Working Group

The experimental group consisting of 25 students (14 girls and 11 boys) and the control group consisting of 25 students (13 girls and 12 boys) who were continuing their education and training at the 7th grade level in a state secondary school constituted the study group of the research.

Experimental Process

The data collection process took place in three stages. In the first stage, a pre-test related to the relevant outcome was administered to the experimental and control groups. Then, the subjects were taught to the experimental and control groups with standard teaching methods and techniques in accordance with the curriculum in a classroom environment with the same characteristics. The experimental group also visited the museum. Before the visit, the experimental group was informed about the process and attention was drawn to the period in which the scholars who grew up in the Turkish-Islamic civilization worked. In the second stage, the post-test, which was prepared by taking the opinions of experts, was applied to the experimental and control groups in the classroom environment. At this stage, it was tried to measure whether there was a significant difference at the informational level between the experimental and control groups regarding the process. Finally, in the third stage, semi-structured interviews were conducted with 4 female and 4 male participants who were voluntarily selected among the participants in the experimental group.

Data Analysis

SPSS 22.00 program was used in the analysis of quantitative data. In addition, a 2x2 split-plot mixed design was used in the quantitative dimension of this study. In the aforementioned design, the first factor refers to the experimental and control groups, which are independent treatment groups, and the other factor refers to the pre-test and post-test measurements, which are repeated measurements of the dependent variable under different conditions.

Table 1. Normality Test Results

	Experimental Group		**Control Group**	
	Pre-test	**Post-test**	**Pre-test**	**Post-test**
N	25	25	25	25
$\bar{X}$	38.88	90.08	38.72	68.32
S	5.35	7.31	5.12	6.92
Median	40.00	92.00	40.00	68.00
Minimum	28.00	80.00	28.00	56.00
Maximum	48.00	100.00	48.00	80.00
Shapiro-Wilk	.937	.886	.925	.941
P	.127	.009	.067	.158
Skewness	-.345	.032	-.501	.234

When Table 1 is examined, according to the results of the Shapiro-Wilk test, it is seen that the pretest scores of the experimental group and the pretest and posttest measurement scores of the control groups are normally distributed ($p>0.05$). The post-test measurement of the experimental group did not show a normal distribution ($p<0.05$). Skewness values between -2 and +2 indicate that the scores do not show a significant deviation from the normal distribution. Since the skewness value was determined to be within the specified limits, it was determined that the post-test scores of the experimental group also showed a normal distribution. Since the variables showed normal distribution characteristics, it was decided to use parametric tests.

Results

Findings Related to Quantitative Data of the Study

When Table 2 is examined, the mean scores of the participants in the experimental group from the achievement test pre-test measurement are 38.88 (Sd: 5.35) and the mean scores from the post-test measurement are 90.08 (Sd: 7.31). The mean scores of the participants in the control group from the achievement test pre-test are 38.72 (Sd: 5.12) and the mean scores from the post-test are 68.32 (Sd: 6.92).

When Table 3 was examined, it was determined that the mean scores of the experimental and control group participants in the achievement test pre-test measurements did not show a significant difference ($t(48) = .302$, $p>.05$). This finding shows that the experimental and control groups were similar in terms of achievement test

mean scores and standard deviation values.

Table 2. Experimental and Control Groups Achievement Test Pre-test and Post-test Mean Results

	Pre-test			Post-test		
Groups	**N**	$\bar{X}$	**Sd**	**N**	$\bar{X}$	**Sd**
Experimental Group	25	38.88	5.35	25	90.08	7.31
Control Group	25	38.72	5.12	25	68.32	6.92

Table 3. Unpaired Samples t Test Results of the Achievement Test Pre-test Measurements of the Experimental and Control Groups

	Groups	**N**	$\bar{X}$	**Sd**	**df**	**t**	**p**
Pre-test	Experimental Group	25	38.88	5.35	48	.108	.915
	Control Group	25	38.72	5.12			

When Table 4 was examined, there was a significant increase in students' achievement scores after the museum education program (t(24)=-52.25, p<.05). While the mean achievement test score of the students before the application was $\bar{X}$=38.88, the mean score after the application increased to $\bar{X}$=90.08. It shows that the museum education activity program was effective in increasing achievement test scores. This finding supports the hypothesis that "the achievement test posttest mean scores of the experimental group participants who participated in social studies museum education are significantly higher than the pre-test mean scores".

Table 4. Repeated Measures t-test Results for the Achievement Test Pre-test and Post-test Measurements of the Experimental Group

Groups	**N**	$\bar{X}$	**Sd**	**df**	**t**	**p**
Pre-test	25	38.88	5.35	24	-52.25	.000*
Post-test	25	90.08	7.31			

When Table 5 was analyzed, it was observed that there was a significant increase in the scores of the students in the control group (t(24)=-52.32, p<.05). Although the students were not subjected to the application, the mean achievement test score was $\bar{X}$=38.72, while the mean post-test score increased to $\bar{X}$=68.32. This finding rejects the hypothesis that "there is no significant difference between the post-test mean scores of the achievement test and the pre-test mean scores of the control group participants who continue the social studies course through classical learning."

Table 5. Repeated Measures t-test Results for the Achievement Test Pre-test and Post-test Measurements of the Control Group

Groups	**N**	$\bar{X}$	**Sd**	**df**	**t**	**p**
Pre-test	25	38.72	5.12	24	-52.32	.000*
Post-test	25	68.32	6.92			

When Table 6 was analyzed, it was found that the mean scores of the experimental and control group participants in the post-test measurements of the achievement test showed a significant difference (t(48)=-10.80, p<.05). The mean post-test scores of the experimental group participants ($\bar{X}$=90.08) were higher than the mean post-test scores of the control group participants ($\bar{X}$=68.32). It shows that the museum education activity program was effective in increasing achievement test scores. This result supports the hypothesis that "the mean achievement test post-test scores of the experimental group participants who participated in museum education activities are significantly higher than the mean achievement test post-test scores of the participants in the control group who continued their education through classical learning".

Table 6. Unpaired Samples t-test results of the Post-test Measurements of the Achievement Test of the Experimental and Control Groups

	Groups	**N**	$\bar{X}$	**Sd**	**df**	**t**	**p**
Post-test	Experimental Group	25	90.08	7.31	48	10.80	.000*
	Control Group	25	68.32	6.92			

When Table 7 was examined, it was seen that the pre-test and post-test measurements in the experimental group did not show a significant difference for male and female students (t(23)=5.463, p>.05). The mean difference between the pre-test and post-test measurements of female students was $\bar{X}$=51.71, while the mean difference between the pre-test and post-test measurements of male students was $\bar{X}$=50.54. This result rejects the hypothesis "The scores of the experimental group on the post-test achievement measurements are significantly higher in the direction of girls".

Table 7. Unrelated Samples t-test Results for the Achievement Test Measurements of the Experimental Group

Groups	**N**	$\bar{X}$	**Sd**	**df**	**t**	**p**
Female	14	51.71	3.66	23	5.463	.565*
Male	11	50.54	6.26			

Findings Related to Qualitative Data of the Study

In order to answer the qualitative sub-problem of the research, "What are the students' views on museum education and its effect on social studies course out-of-school learning environments?", a 9-question semi-structured interview form covering the content of the research was used as a data collection tool and content analysis was conducted. When Table 8 is examined, all of the interviewed students stated that the type of museum they visited was "Science Museum".

Table 8. Questions, Answers and Number of People related to whether Students Know the Type of Museum They Visited

Question	**Answers**	**Frequency (f)**
What is the type of museum you visited?	A.1. The Science Museum	8

When Table 9 is analyzed, it is seen that all of the interviewed students stated that the artifacts were not brought to the museum from somewhere but were made as replicas in accordance with the original.

Table 9. Questions, Answers and Number of People regarding whether the Students know where the Artifacts come from in the Museum

Question	Answers	Frequency (f)
Where did the artifacts come from?	A.1. Made as a replica in accordance with the original.	8

When Table 10 was analyzed, all of the interviewed students stated that there were mostly artifacts belonging to Turkish-Islamic scientists in the museum. Some of the participants gave the following details in addition to their answers above: K3; artifacts in the field of physics and astronomy, K5; artifacts in the field of physics, chemistry and health, K6; artifacts in the field of science and geography, and K7; artifacts in the field of physics and science.

Table 10. Questions, Answers and Number of People regarding which Artifacts are mostly exhibited in the Museum

Question	Answers	Frequency (f)
Which artifacts are mostly in the museum?	A.1. There are works of Turkish-Islamic scientists.	8

When Table 11 was analyzed, it was seen that all of the interviewed students expressed their positive opinions about the exhibition of artifacts in museums. Among the students, K1, K3, K4, K5, K7 and K8 stated that thanks to these museums, they learnt and recognized their past and had knowledge and culture about it; K3 and K7 stated that it was important because it introduced our scientists to the world; K2 stated that thanks to these museums, they got to know old technology and tools.

Table 11. Questions, Answers and Number of People regarding the Students' Opinions on the Exhibition of Artifacts in the Museum

Question	Answers	Frequency (f)
What is your opinion on the exhibition of artefacts in the museum?	A.1. Positive	8
	A.2. Negative	0
Why?	B.1. We learn and recognize our past and gain knowledge and culture	6
	B.2. It is important in terms of introducing our scientists to the world	2
	B.3. Recognize old technology and tools	1

When Table 12 was examined, it was seen that K1, K2 and K3 among the interviewed students stated that similar or identical artifacts in the museum are also used today; K4, K5, K6, K7 and K8 stated that these artifacts form the basis of today's technology.

When Table 13 was analyzed, K1, K3, K4, K6 and K7 of the interviewed students stated that they knew that Turkish-Islamic scientists had made important contributions to humanity before coming to the museum; K5 and

K8 stated that they were very intelligent and successful; K2 stated that he did not know that they were such an advanced society.

Table 12. Questions, Answers and Number of People related to How We Can Establish a Connection between the Artefacts in the Museum and Today's Technology

Question	Answers	Frequency (f)
How can we establish a connection between the artifacts in the museum and today's technology?	A.1. similar or identical artifacts in the museum are also used today	3
	A.2. these artifacts form the basis of today's technology	5

Table 13. Questions, Answers and Number of People related to the Students' Thoughts about Turkish-Islamic Scientists before Coming to the Museum

Question	Answers	Frequency (f)
What are your thoughts about Turkish-Islamic scientists before coming to the museum?	A.1. I knew that he made important contributions to humanity	5
	A.2. I thought they were very intelligent and successful	2
	A.3. I didn't know they were such an advanced society	1

When Table 14 was analyzed, all of the interviewed students agreed that the museum had positive effects on the subjects covered in the Social Studies course.

Table 14. Questions, Answers and Number of People related to the Effects of the Museum on the Subjects covered in the Social Studies Course

Question	Answers	Frequency (f)
What would you say about the effects of the museum on the subjects you teach in the Social Studies course?	A.1. Positive	8
	A.2. Negative	0
Why?	B.1. It facilitated the understanding of the subjects	6
	B.2. It helped me to learn the subjects permanently	3
	B.3. I gained in-depth knowledge	1

Among the students, K1, K3, K4, K5, K6 and K7 stated that this trip facilitated the understanding of the subjects; K5, K7 and K8 stated that it contributed to permanent learning of the subjects; K2 stated that he gained in-depth knowledge. Some of the students expressed their views as follows:

> *"I think it had positive effects. I felt like I experienced it by touching and seeing it, which enabled me to have more in-depth knowledge." (K2)*
>
> *"It made it easier for me to understand the lesson. It affected me positively. I think I have learnt information that I will definitely remember in my ongoing life."(K7)*

When Table 15 was examined, all of the interviewed students stated that the museum contributed to the subjects they learnt.

Table 15. Questions, Answers and Number of People related to whether the Museum contributed to the Subjects Learnt by the Students, and if so, What They Were

Question	Answers	Frequency (f)
A. Did the museum contribute to the subjects you learnt?	A.1. Contributed	8
	A.2. No contribution	0
B. If yes, what were they?	B.1. My general culture has improved	3
	B.2. Contributed to my internalization of the subjects	3
	B.3. I learnt by whom the tools and inventions we use today were made	3
	B.4. It aroused the desire to make scientific studies and inventions	2

Among the students, K3, K4 and K8 stated that the museum improved their general culture; K2, K6 and K7 stated that it contributed to the internalization of the subjects; K1, K6 and K7 stated that it contributed to learning who made the tools and inventions we use today; K3 and K5 stated that it aroused the desire for scientific studies and inventions. Some of the students expressed their views as follows:

> *"I think that with the development of my general culture, it will contribute to me in future history lessons. At the same time, these artifacts made me think that I can also do science-oriented studies." (K3)*
>
> *"It contributed to my internalization of the subjects. I thought that some scientific works belonged to western scientists. It is a source of pride that such scientists lived in our own lands." (K6)*

Discussion

Within the scope of the Social Studies course, in the study conducted to support the ability to evaluate the contributions of the scholars who served science depending on Turkish-Islamic culture and civilization to the scientific development process through museum visits, some conclusions were reached in the light of the information obtained in this process and the data obtained from the literature review. Before the application, it was observed that there was no significant difference between the mean pretest scores of the students in the experimental and control groups. It is stated in the literature that this is accepted as a prerequisite in experimental research (Çerkez, 2011; Sofuoğlu, 2019; Kaba, 2021; Sevigen, 2021; etc.).

It was concluded that the achievement test post-test averages of the experimental group students in which museum education activities were carried out were higher than the pre-test averages. It was concluded that museum education activities had a positive effect on the students' academic achievement in the related acquisition in the social studies course. Parallel to these findings, in the Energy Park study, which was also carried out with 7th grade students, it was observed that there was a significant difference between the academic achievement pre-test results and post-test results of the experimental group students (Bozdoğan, 2007:214). In the study conducted by Çerkez (2011), it was concluded that the academic achievement post-test results of the experimental group students who participated in the study based on museum activities for the achievements of the Economics and Social Life unit were significantly higher than the pre-test results. There are also different studies in which significant results were obtained in favor of the experimental group (Önder et al., 2009; Kaba, 2021).

It was hypothesized that there was no significant difference between the post-test mean scores of the achievement test and the pre-test mean scores of the control group participants who continued the social studies course through classical learning, but it was found that a significant difference emerged as a result of the research. This situation shows that school-based classical learning activities are one of the factors that positively affect students' academic achievement. In the studies in the literature, similar to our research results, it was determined that there was a significant difference between the pre-test and post-test scores of the academic achievement test of the control group at the end of the application process and it was concluded that the results of the experimental group were higher than the control group (Çerkez, 2011 ; Önder et al., 2009 ; Kaba, 2021).

It was concluded that the mean achievement test post-test scores of the participants in the experimental group were significantly higher than the mean achievement test post-test scores of the participants in the control group. Based on these data, it can be said that when museum education practices are given in support of school-based education, they have a positive effect on the process of creating synthesis knowledge and scientific process skills by integrating students' prior knowledge with the new knowledge they obtain after museum education. The results of Yurdakul (2005), Rapp (2005), Yeşilbursa (2006), Gökkaya and Yeşilbursa (2009), Schunk (2009), Çerkez (2011) are in parallel with the results of the research and support this argument. When the post-test achievement test measurements of the experimental group students were examined, it was determined that the gender factor had no effect on the scores obtained. In the study conducted by Çerkez (2011), it was determined that museum education-based practices did not create significant differences in terms of male and female students. In the study conducted by Şişman (2019), it was determined that there was no significant difference between male and female students in the title *"the effect of museum trips on s*tudies", similar to the gender factor result of our research.

The fact that all of the students in the experimental group to whom the semi-structured interview form was applied answered the question *"What is the type of museum you visited?"* as science museum shows that the museum education program implemented was effective in raising awareness and motivating the students. Again, in response to the question "Where did the artifacts come from?", which was one of the interview questions about the artifacts in the museum where the activity was carried out, they answered that they were made for the museum in accordance with the original or in the form of replicas. It can be said that students' perception levels have also improved thanks to museum education practices.

The fact that the museum in which the study was conducted was created in a certain field, namely the works of Turkish-Islamic scientists, was effective in the interviewed students' answering the question "Which artifacts are mostly in the museum?" as Turkish-Islamic scientists. This is a proof that the starting point of this study, "Evaluates the contribution of Turkish-Islamic scientists to scientific development." is effective in raising awareness about the acquisition. The answers given by the students to the question "Which artifact in the museum impressed you the most?" such as surgical materials, wheel system, roller lever, instrument inspired by the movements of the sun and the moon in space, sundial, precision balance are important in terms of showing that the students have different perspectives, different needs and attitudes. In addition, as an answer to the why question, the answers given about the fact that some of the works are used today and their working principles reveal the cognitive behavior of establishing a connection between the past scientific knowledge and the present.

When the participant students were asked the question "What are your thoughts about the exhibition of artifacts in the museum?", the answers such as "we learn and recognize our past, we gain knowledge and culture, it is important in terms of introducing our scientists to the world, we recognize old technology and tools" are in parallel with the studies (Dönmez & Yeşilbursa, 2014; Üztemur, 2017) on the basis of historical knowledge. Again, in response to the question "How can we establish a connection between the artifacts in the museum and today's technology?" in the interview form, they stated that the artifacts themselves or similar artifacts are used today and form the basis of today's technology. Considering the statements given, it can be concluded that it reinforces the behavior of establishing a connection between the past and the present.

In response to the question "What are your thoughts about Turkish-Islamic scientists before coming to the museum?", most of the participants gave clues about their prior knowledge and readiness levels with the statements that they made great contributions to humanity and that they were intelligent and successful. It was concluded that all of the students interviewed on the question "What would you say about the effects of the museum on the subjects you learn in the Social Studies course?" had positive thoughts. This also coincides with the quantitative results of our research. In addition, expressions such as museum education practices facilitate the understanding of the subjects, create a basis for permanent learning, and provide in-depth knowledge coincide with our research objectives (Çetindağ-Kuşan, 2005; Çulha, 2006; Yeşilbursa, 2006; Demirboğa, 2010; Filiz, 2010; Yazıcıoğlu, 2010; Çerkez, 2011; Güler, 2011; Avcı-Akçalı, 2013; Yorulmaz, 2016; Üztemur, 2017; Aydoğan, 2020; Yıldırım, 2020; Sevigen, 2021).

Conclusions

It was concluded that museum education contributed to the subjects learnt. Answers such as my general culture improved, it contributed to my internalization of the subjects, I learnt by whom the tools and inventions we use today were made, it aroused the desire to make scientific studies and inventions are indicators of positive effects on students' scientific process skills. Likewise, the fact that the study motivated students to make scientific inventions and studies made our research even more valuable. As a result, it was concluded that museum education activities, one of the out-of-school learning environments, were effective in increasing students' academic achievement, making learning by doing and experiencing valuable depending on the constructivist education approach, and developing positive thoughts about the social studies course. Based on the study results, the following recommendations are made:

- The social studies course curriculum can be organized by taking out-of-school learning environments into consideration and course hours can be increased.
- Virtual museum visits can also be organized in schools that do not have the necessary facilities through various information tools.
- The procedures required for museum visits can be facilitated and museums can be used more actively for social studies lessons.
- In cooperation with local administrations, non-governmental organizations, etc., museums can be actively used for other branches.
- Museum visits can be organized to be a source of scientific study platforms such as Teknofest and

TÜBITAK 4006 and to reveal the feelings of scientific activity in students.

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