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The Effect of Planned Trips to Zoos on Learning in Science Education And Determining Student Remarks About The Trip Process[1]

Fen Eğitiminde Hayvanat Bahçelerine Düzenlenen Planlı Bir Gezinin Öğrenme Üzerine Etkisi ve Gezi Süreciyle İlgili Öğrenci Görüşlerinin Belirlenmesi[2]

Alperen Okur, *Milli Eğitim Bakanlığı*, alprn_1986@hotmail.com, ORCID: 0000-0002-7716-0585
Mustafa Uzoğlu, *Giresun Üniversitesi*, mustafauzoglu@gmail.com, *ORCID:* 0000-0002-4346-5161
Aykut Emre Bozdoğan, *Tokat Gaziosmanpaşa Üniversitesi*, aykut.bozdogan@gop.edu.tr, ORCID: 0000-0002-5781-9960

Abstract: In this study, researching the effect of a planned trip to one of the informal learning environments, zoos, on learning and taking students' opinions about the trip were aimed. The working group consists of 15 fifth grade students. The Experimental method was used in this research. The academic achievement test developed by the researcher was applied to the students before and after the trip to determine the effect of the planned zoo trip on the students' learning. To determine the change in students' misconceptions, concept maps were drawn before and after the trip. For the students' views about this learning experience, a semi-structured interview form was used. Pre and posttest results gotten from the achievement test were evaluated with Wilcoxon signed ranks test; the data obtained from the concept maps were analyzed with error frequencies, and the students' judgments received from a semi-structured interview about this learning experience were examined with content analysis method. Results of the research showed that a well-organized zoo trip has a positive effect on learning; that there is a meaningful difference between students' pretest and posttest academic achievement scores for the benefit of posttest; that it does not have any effect on misconceptions about general classification, however, it is effective on, more specifically, misconceptions about animal classification. Students have found this trip entertaining and informative.

Keywords: Informal learning environment, zoo trip, student opinions, informal learning, misconceptions, out of school learning

Öz: Bu çalışma ile informal eğitim ortamlarından biri olan hayvanat bahçelerine yapılan planlı bir gezinin öğrenme üzerine etkisi ve öğrencilerin geziye ilişkin görüşlerinin belirlenmesi amaçlanmıştır. Bu araştırmada deneysel desen kullanılmıştır. Araştırmanın çalışma grubunu beşinci sınıfta öğrenim gören 15 öğrenci oluşturmuştur. Araştırmada, planlı yapılan hayvanat bahçesi gezisinin, öğrencilerin öğrenmelerine etkisinin belirlenebilmesi için, araştırmacı tarafından geliştirilen akademik başarı testi, gezi öncesi ve sonrası öğrencilere uygulanmıştır. Öğrencilerin kavram yanılgılarındaki değişimi tespit için gezi öncesi ve sonrasında kavram haritaları çizdirilmiştir. Öğrencilerin bu öğrenme deneyimine ilişkin görüşleri için ise, yine araştırmacı tarafından geliştirilen yarı yapılandırılmış görüşme formu kullanılmıştır. Araştırmada başarı testinden elde edilen ön ve son test sonuçları, uygulanan Wilcoxon işaretli sıralar testi ile; çizdirilen kavram haritalarından elde edilen veriler hata frekansları ile; öğrencilerin bu öğrenme deneyimine ilişkin yarı yapılandırılmış görüşme formundan elde edilen görüşleri ise içerik analizi ile değerlendirilmiştir. Araştırma sonuçları, iyi planlanmış bir hayvanat bahçesi gezisinin öğrenme üzerinde olumlu etkisi olduğunu, öğrencilerin ön test akademik başarı puanları ile son test akademik başarı puanları arasında son test lehine anlamlı bir farklılığın olduğunu; genel sınıflandırma ile ilgili kavram yanılgıları üzerinde etkisi olmadığını ancak daha özel olarak hayvanların sınıflandırılması ile ilgili kavram yanılgıları üzerinde etkili olduğunu göstermiştir. Öğrenciler, hayvanat bahçesine yapılan gezi faaliyetini eğlenceli ve bilgilendirici bulmuş, eğlenerek daha iyi öğrendiklerini ifade etmişlerdir.

Anahtar Kelimeler : İnformal eğitim ortamları, hayvanat bahçesi gezisi, öğrenci görüşleri, informal öğrenme, kavram yanılgıları, okul dışı öğrenme.

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INTRODUCTION

Today, education activities continue during life in every field possible. Thanks to the acceleration of advances in science and technology, it has gained importance to get people to have the new information easily, apprehensibly and pleasurably. Informal educational environments also come to the fore with such characteristics as providing easy access to information and being fun (Churchman, 1987). For this, formal education in schools should be supported by informal education environments (Bozdoğan and Yalçın, 2006). Mass media such as radio, television, newspaper, journal, internet,and science centers, science and technology museums, sports centers, natural history museums, botanical parks, zoos, aquariums, timberlands, libraries, open-air labs, natural centers (lakes, caves, etc.) and camps are the informal environments that can be used in education (Howe & Disinger, 1988; Hannu, 1993). Thanks to the trips to that informal education environments, students take the opportunity of seeing events objectively with living and nonliving things. Those atmospheres also provide students having different learning styles with different learning opportunities and help every student get information at their speed of learning. In these organized trips fitting to its purpose, students can build their information best by using their time efficiently (Bozdoğan and Yalçın, 2009). These trips, which positively affect students' interest and attitudes to science, are important for their future works and choice of profession (Bozdoğan and Yalçın, 2006). For this reason, Akgün (2001) suggested that informal educational environments should be utilized in a large amount in science courses.

Because those informal learning experiences are beneficial for students' learning has been revealed (Gerber, Cavallo and Marek, 2001), it's being discussed that these experiences may be used in science education (Turkmen, 2010). With rich resources, informal education environments provide teachers and students with unique learning experiences by playing a special role (Rodari, 2009) in science teaching according to students' interests (Ramey Gassert, 1997). However, informal education environments could not be helpful with unplanned, unscheduled, spontaneous trips but with trips and activities planned and organized with special aims. However, informal education environments may be useful for science education when evaluated as trips and activities organized for certain purposes, not as places where unplanned, spontaneous learning takes place (Lâçin Şimşek, 2011). The purpose of the learning activities held in informal education environments is to increase students' learning rates with learning environments' being varied and changed and to ensure that they develop a positive attitude towards science and technology. Through purposeful and planned learning experiences to those environments, students find opportunity on behalf of apprehending the effects of these experiences on daily life and the real-life problems which do or may arise in these atmospheres (Apaydın, 2008). Learning experiences provided to students in informal education environments ensure that they develop knowledge, understanding, skills, attitudes, and values, which has special importance in our day (Korkmaz, 2004). It will be a good occasion for also effective and permanent learning that students transfer what they learn at school to out-of-school education, that they experience about the situations learned in natural and unnatural environments, that they reinforce the knowledge (Lâçin Şimşek, 2011). Trips to informal education environments allow misconceptions to eliminate learning (Stover & Saunders, 2000; Tenenbaum et al. , 2004; Bozdoğan, 2016).

According to science curriculum prepared in the year 2013, in learning environments, students should be active in the implementation phase of lessons and teachers should be in the guide position (MONE, 2013). Learning environments are not bounded with schools and classes (MONE, 2017). For this reason, it is observed that various trips and observation teaching activities are included in the science curriculum for the achievements planned for the related units and subjects. These trip-observation activities can be conducted in fields (lakeshores, jungles, streams and stony places, etc.), hydroelectric plants, in operations that make yarn-weave, olive oil and flour- welded productions, in natural monuments (Fairy chimneys in Nevşehir, Pamukkale Travertines, etc.), in observatory and water treatment plants (Bozdoğan, 2007). In draft science curriculum prepared in 2017, there are also regulations that can be realized in informal learning environments at all grade levels (MEB, 2017). When the studies

about using zoo trips, one of the informal education environments in the literature, in science education viewed, it is indicated that these trips have positive effects on variables such as knowledge (De White & Jacobson, 1994; Keny, 2009; Yavuz, 2012; Jensen, 2014), manner (Tunnicliffe,1998; Swanagan, 2000; Falk et al. , 2007), interest, and motivation (Randler et al. , 2007; Bätz, Wittler and Wilde, 2010; Dohn, 2011, Yavuz & Balkan Kıyıcı, 2012b). Although trips to informal education environments in the Science syllabus has been suggested, it is seen in the research done that these trips are not at a sufficient level. Some reasons such as economical justifications, worry about the curriculum's not being completed, crowded student groups, thinking of the possibility of discipline problem, failing at providing means of transport, excessiveness of red tape, it's necessitating special preparations for both students and teachers, teachers' avoiding taking any responsibility and negative attitudes of administrators and parents make usage of non-formal education environments in education hard (Ata, 2002; Güven et al. , 2004; Bozdoğan, 2007; Demir, 2007; Aktepe, 2009; Ertaş et al. , 2011; Tatar & Bağrıyanık, 2012). Besides, being inadequate in planning and implementation of the trips, teachers hinder the use of the out-of-school environments in science education efficiently (Ekici; 2002, Türkmen, 2010; Griffin as cited in Bozdoğan, 2012; Tatar & Bağrıyanık, 2012; Yavuz, 2012).

In this study, the effects of a planned trip to zoos -one of the informal education environments- on students' academic success and misconceptions and student remarks about the trip have been examined. Later on, creating a source for teachers about plannings and preparations that are to be done for trips to zoos has been aimed.

METHOD

The study consists of quantitative and qualitative parts. Experimental method was used in the quantitative part. In a research, if there are measurable variables and it is aimed to reveal cause-effect relationships between variables experimental method is used (Büyüköztürk et al. , 2012). The quantitative part of the research has been done according to one group pretest-posttest experimental design. In this design, the influence of the experiment is tested with a study on a group. Before the practice of the measurements related to a group's dependent variable are obtained by using the same measuring tools and are applied to the same group as pretest beforehand and posttest afterward. The meaningfulness of the difference between pretest and posttest which belongs to the group in the design is tested statistically. The design's figurative outlook is displayed inTable 1 below (Büyüköztürk et al. , 2012).

Table 1. *One group pretest posttest experimental design*

Group	Pretest	Operation	Posttest
G_1	O_1	X	O_2

G_1 : Experiment Group
X : Operation (Trip to Zoo)
O_1 : Pretest Implementation;
O_2 : Posttest Implementation

The experimental design of the research's quantitative part is displayed in Table 2. In the experimental design that has been used in research, independent variable (operation) examined on experiment group is "zoo trip". Academic achievement tests and concept maps are analyzed to determine the effect of the independent variable (zoo trip) on the dependent variables (academic success and misconceptions).

Table 2 Research's experimental design

Groups	Pretests	Implementation	Posttest
Experiment group	-"Animal-thematic" academic achievement test -Concept map	Giresun zoo trip and activities	-"Animal-thematic" academic achievement test -Concept map

In the qualitative part of the research, data have been collected with semi-structured interview form for supporting the quantitative data; and to determine the misconceptions, concept maps were made to be drawn before and after the zoo trip (Table 2).

Working Group

Zoo trip has been organized in terms of the learning outcome what is "He/She classifies the living creatures according to their similarities and differences with giving examples.", which is in the 5th -grade science curriculum. Working group of the research consists of 5th -grade students who study enrolled at a secondary school affiliated to the Ministry of National Education in the 2013-2014 academic year. Within this scope, 15 fifth grade students participated in the research, eight of which are girls and seven of which are boys.

Data collection tools

"Animal-thematic" academic achievement test prepared by receiving expert opinions was implemented by the researcher for collecting data in the survey, and concept maps were made to draw for misconceptions. For analyzing the place and importance of zoos in science education, some interview has been done with the students accompanied by semi-structured interview form. There are some explanations about data collection tools below.

Academic Achievement Test

In this survey, "Animals" test was developed to investigate the effect of using zoos -one of the informal education environments- in science education on 5th -grade students' learning. While the test was being improved, first of all, "Academic Achievement Test Question Pool" with 40 multiple-choice questions was created, which is related to the learning outcome "He/She classifies the living creatures according to their similarities and differences with giving examples." in the 5th -grade science education program. It was put into final form under the feedbacks that were got from four science teachers to determine the expediency of the questions. The test which was made final with the opinions for confirming that the questions were valid and safe performed as a pilot scheme with the attendance of 108 sixth grade students. The reason why the pilot scheme was performed with the 6th -grade students is that these students have reached the acquisition of "He/She classifies the living creatures according to their similarities and differences with giving examples". Test results got from the pilot scheme have been done question difficulty analysis with the benefit of SPSS program and it's been seen that the difficulty index of the questions in the test changes between 0,300 and 0,783, and that discrimination index changes between 0,200 and 0,933. As a result of the analysis made, six questions whose difficulty and distinctiveness was low were taken out of the test. With 24 questions, in the end, the test's KR-20 reliability coefficient has been calculated as 0,881; KR-21 reliability coefficient as 0,873; Spearman-Brown reliability coefficient as 0,903. Table of specifications belonging to "Animal-thematic" academic achievement test with 24 questions are represented in Table 3.

Table 3. *Academic achievement test table of specifications*

Concepts	Level of Behaviour Information	Comprehension	Implementation	Analysis	Total
Classification	xx	xx	xx	xx	8
Animals	xx	xxx	x	x	7
Chordates	x	xxxxx	xx	x	9
Total	5	10	5	4	24

Semi-Structured Interview Form

To determine the opinions of students about the trip, some conversations have been done with them in company with semi-structured interview form. A literature review about informal education environments, science education in informal education environments and science education at the zoo was made while semi-structured interview form questions were being prepared. With the questions' being examined, interview question pool has been created and the form has been finalized by receiving expert opinions (4 science teachers). After zoo trip has been carried out with the interview form whose final state composes of 7 questions, participating students have been interviewed face to face; conversations have been recorded with the tape recorder. Interview records are broken down by the researcher.

Concept map

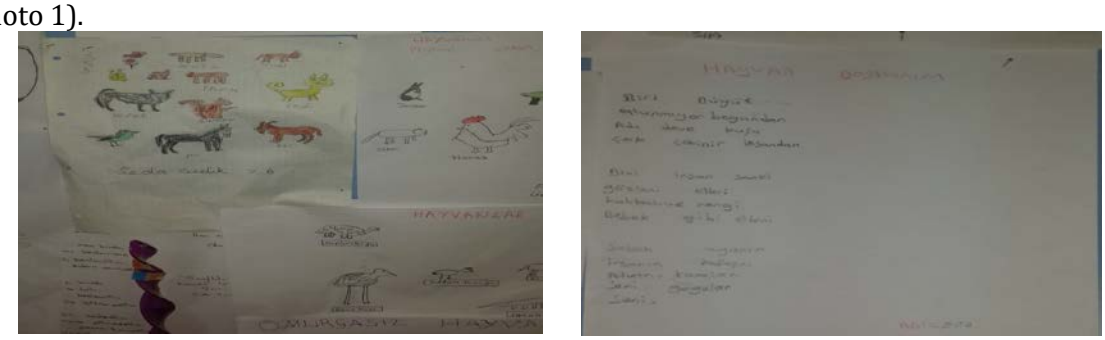
Concept maps are the schemas that enable to establish a relationship between learning styles and meaningful learning. Concept maps in which a wider concept is used as the title and which is a two-dimensional schema that shows the connections of the title with other concepts can be used before, during and after the class for the evaluation of learning (Kaptan, 1998). Concept maps are also used for identifying the misconceptions of students (Kaya, 2003). For this purpose, students were given a concept map draft for specifying the misconceptions that exist in students' mind and for understanding whether those misconceptions were removed or to what extent they were. Concept map draft was prepared with expert opinions related to the acquisition of "By giving examples to the living creatures, he/she classifies them according to their similarities and differences.", which is in the fifth-grade science curriculum. Some boxes were left empty and some were filled in the concept map draft. Students were asked for filling the empty boxes with the words given. Three of the boxes that were to be written living creatures classes in it (plants, fungi, microscopic creatures) were filled, but the box that was to be written the animal classes in it was left empty. Vertebrates from the animal class were given, in contrast, the box of invertebrates was left empty. Three examples from vertebrates and invertebrates were wanted, and all boxes of vertebrates and just one example part of invertebrates were left empty. Misconceptions were determined by applying the concept map draft to the students before the trip, correspondingly considering the incorrect answers about living creatures classes, examples of vertebrate and invertebrates animals. Whether the misconceptions were eliminated or not was identified with applying the same concept map after the trip.

Implementation Steps

For the search in which the effects of a planned zoo trip on academic achievements of students and their misconceptions and the student views about the trip would be determined, it was planned that the trip would be made in accordance with the acquisition of "By giving examples to the living creatures, he/she classifies them according to their similarities and differences." existing in the fifth grade science curriculum. Implementation steps of this study are given below.

1- To determine the acquisition that is gained with the trip activity.

2- To choose the informal learning environment suitable for the acquisition.
3- To prepare assessment tools for determining to what extent the trip activity give the acquisition to students (Academic achievement test, concept map, etc.).
4- To analyze the validity and reliability of the assessment tools.
5- To prepare a semi-structured interview form.
6- To arrange a vehicle for the trip and to map out a route.
7- To exchange correspondence with the school administration and district national education directorate.
8- To take warrants from parents by informing them about the trip.
9- To get an appointment from the zoo authorities.
10- To visit the zoo in advance and get the necessary information about the zoo.
11- To prepare introductory brochures including short questions about the zoo, which would be answered before the trip with the information got in the former visit. On the face of the brochure, there are an instruction, some animal photos were taken during the former visit, an informative text about the zoo, questions about the information included in the brochure that is to be answered by the students before the trip, and the zoo's contact info.
12- To give prior knowledge to the students about the aim of the trip, basic concepts to be learned, activities they would encounter and should do during the trip.
13- To prepare questions for keeping them interested during the trip.
14- To implement the assessment tools as a pretest.
15- To distribute the brochures to the students and arrange a trip.
16- To distribute the form of "Questions To Be Answered During the Trip".
17- To tour with a guide.
18- To implement the assessment tools as posttest after the trip for determining the effect of the trip on learning.
19- To make semi-structured interviews with the students.
20- To get the students to make drawings and write poems about the trip and to display them on school panels and publish the photographs taken during the trip on the school's website (Photo 1).



a. **b.**

Photo 1. Artwork (a) and poem (b) work that the students made after the trip.

Analysis of Data

In the quantitative part of the research, the data obtained from the achievement test have been analyzed by using non-parametric Wilcoxon signed ranks test in SPSS 16.0 program. Non-parametric tests are the methods that do not include any distribution assumption and that do not assume that the data which would be analyzed haven't come from any distribution. Wilcoxon signed ranks test is used to test the significance of the difference between two relevant measurements. It is supposed that two variances are not proportional and the data are not distributed normally. It is more suitable to use it when the working team members are less than 30 (Büyüköztürk, 2017). The data obtained from semi-structured interview form in the qualitative part of the search have been construed with the content analysis method. Content analysis is one of the commonly used methods for analyzing qualitative methods. First of all, in this method, the researcher categorizes search topics. Afterward, he counts the words,

sentences, and pictures related to those categories in the data set he's studied and determines the frequencies in those categories (Silverman as cited in Özdemir, 2010). To state whether this trip is beneficial to removing students' misconceptions, whether the trip was effective in terms of eliminating students' misconceptions or not has been tried to be determined by comparing misconception frequencies of the students before and after the trip.

FINDINGS

Findings Obtained From Quantitative Data

To search the effects of a planned zoo trip on students' learning, firstly, pretest and posttest scores obtained from the evaluations regarding the dependent variable were analyzed with descriptive statistics. The descriptive statistics relating to the comparison of pretest & posttest scores of the working team are presented in Table 4 below.

Table 4. *The descriptive statistic results relating to comparison of pretest & posttest scores of the students*

	N	Mean	Standard Deviation	Minimum	Maximum
Pretest	15	14,1333	5,60442	5,00	23,00
Posttest	15	19,6667	5,10835	9,00	24,00

When Table 4 is viewed, it is seen that posttest means of students are higher than pretest means. When the highest and lowest scores that students got from tests are compared: It is seen that the lowest score in pretest is five, the lowest score in posttest is nine, the highest score in pretest is twenty-three, the highest score in posttest is twenty-four. It's possible to say that there's a difference in favor of posttest scores of the students when the results in Table 4 are interpreted. Test results have been compared with Wilcoxon signed ranks test to determine the significance of this difference. Wilcoxon signed ranks test results are presented in Table 5 below.

Table 5. *Wilcoxon signed ranks test results relating to the comparison of pretest & posttest scores of students*

Variables		N	Mean Rank	Total Rank	Z	P
Academic Achievement Test	Negative Rank	0	,00	,00	3,065	,002
	Positive Rank	12	6,50	78,00		
	Equal	3				
	Total	15				

According to Wilcoxon signed ranks test results, it is stated that there is a meaningful difference between pretest academic achievement score and posttest academic achievement score in favor of posttest ($Z=3,065$; $p=.002<.05$). This result shows that the zoo trip has an influence on students' learning. It can be also said that, regarding the pretest and posttest means, this influence is in a way of increasing learning.

Findings Obtained From Qualitative Data

Findings Obtained From Interview Form: Frequency of the answers students gave to 1st and 2nd questions which are to determine the student opinions about the entertaining and informative side of the trip is shown in Table 6 below.

Table 6. *Frequency distribution of student answers to 1st and 2nd questions ın a semi-structured ınterview form*

Question	Yes (f)	No (f)
1. Do you think the trip was entertaining?	15	-
2. Do you think the trip was informative?	15	-

When the Tablo 6 is checked, it is seen that all of the students have attended to the trip have found the trip both entertaining and informative according to the answers to 1st and 2nd questions.

In Table 7, frequencies of the new information students have learned thanks to the zoo trip have been stated by categorizing them.

Table 7. *Frequency Table of the Student Answers to "Is there any new information you've learned about animals by means of this trip?"*

Question 3. Is there any new information you've learned about animals by means of this trip?	Frequency
I learned nutrition patterns.	6
I learned vertebrates.	6
I learned how they are domesticated.	2
I learned about their modes of living.	3
I learned new creatures.	9
I learned new information about the creatures I know.	10

When Table 7 is examined, it is seen that students get different information about animals through the zoo trip. Those pieces of information vary with nutrition patterns, modes of living (reproduction, growth, etc), how they are domesticated and being vertebrate. 9 students state that they have learnt new creatures thanks to the trip and 10 students have stated that they have learnt new information about the creatures they already know. Below are the answers of students.

> *"I've learnt the modes of lives of ostriches and that they bury their heads in the sand. And I also learnt that peacocks are vertebrated." (M1)*
> *"I've learnt living vertebrates, by whom some animals are domesticated and their nutrition patterns." (F3)*
> *"I've learnt the length of lives of animals. I learnt their nutrition patterns. I learnt that the monkeys' hands are similar to those of human beings." (F5)*
> *"I've learnt animals' nutrition patterns and the ones with the vertebra." (F7)*
> *"I have seen pony for the first time and learnt that they resemble horses. I've seen vertebrates." (F8)*
> *"I have seen Sultan chicken and Guineafowl for the first time. I've learnt those have vertebra and the eagle have, too." (M3)*
> *"I've learnt the reproduction ways of animals. I've thought that ponies were the babies of horses." (M5)*

Frequency of student answers to "Is it beneficial to plan such trips about our science curriculum? What kind of benefit does it provide?" are ranked in Table 8 below.

Table 8. *Frequency table of student answers to "What kind of benefit can be gained from such trips in science education?"*

Question 4. What kind of benefit can be gained from such trips in science education?	Frequency
It is beneficial.	15
Visual learning provides permanent information.	5
Field trips are informative.	13
It is better to learn by having fun.	9

It is seen that all of the students think that a trip about the science curriculum will be beneficial when Table 8 is examined. 5 students said that they learn better by seeing, so the trip will be beneficial. 13 students said that learning by touring is informative. 9 students stated that trips are entertaining, so they can learn better. 1 student said that arranging such trips in other classes will be beneficial, too.

"It would be helpful. For example, if (...) teacher took us to nongovernmental organizations in Social Sciences class, we could understand better." (M6)
"What we learn in class, what the teacher teach us would be inadequate. But, if he teaches us by touring, we will both have fun and learn." (F1)
"It would be entertaining. We could learn better in this way." (F2)
"It would be helpful. Instead of seeing them in the coursebooks or on the computer screens, seeing them alive provides a better understanding." (F5)
"It is beneficial. If you plan a trip, we see everything and they will stick our minds. It would be adventurous." (F6)
"It would be helpful. It is much more entertaining to learn by touring. Maybe students get bored in class. Outdoors could do them good." (F7)
"We could understand the lecture by touring instead of seeing things in the coursebooks. We both tour and see new things that we've not seen before and learned new information." (M2)
"It would be helpful. When we organize a trip to places relating to the subjects we've not understood, we can both learn and tour." (M5)
"It would be helpful. We could both tour and learn." (M6)

Frequencies of the student answer they gave to the question of "were your teacher's guidance beneficial during the trip?" are presented in Table 9 below.

Table 9. *Frequency table of student answers to the question of "Was your teacher's guidance during the trip beneficial?"*

Question 5. Was your teacher's guidance during the trip beneficial?	Frequency
It was beneficial.	15
It informed.	5
It prevent us to be distracted.	5
Both seeing and listening was more catchy.	1
No comment.	8

It is seen that all of the students think that their teacher's guidance during the trip was beneficial when Table 9 is examined. Five students said that the guide informed them, five students said that it prevented them to be distracted and one student said that it is more catchy to listen to the guide while touring. Eight students said the guide was helpful but didn't comment about how beneficial it was. Answers of the students who commented to this question are indicated below.

"It helped. Children would wander around just for fun without the guidance. They wouldn't have learned." (F1)
"It helped. If you hadn't guided us, they wouldn't have read the brochures. But they listened when you told. You informed us." (F2)
"It helped. We might not have known dangerous species and been hurt." (F3)
"It helped. Everyone would look at different animals and couldn't get sufficient information without you. Instead of data plates near the cages, your telling was more helpful." (F4)
"It was useful. It is more didactic to both see animals and listen to its characteristics." (F7)
"It was useful. Everyone would have fallen apart without you." (M2)
"It was helpful. We could not have gotten some information." (M3)
"Our attention would be distracted by animals. Because of this, we couldn't have learnt information about an animal thoroughly." (M4)

Frequencies of the student answer to the question of "Do you have any suggestions about the trip?" to determine if the students have any offer is shown in Table 10 below.

Table 10. *Frequency table of student answers to the question of "do you have any suggestions about the trip?"*

Question 6. Do you have any suggestions about the trip?	Frequency
It would have been better if there had been more various animals in the zoo.	1
There should have been invertebrate animals in the zoo.	3
Officials should also have lent assistance.	2
We could have gone somewhere else.	1
No comment.	9

It is seen that it would have been better if there had been more various animals in the zoo according to one student in Table 10.

"Being in the existence of more various species would have been better for us." (F2)

Three students have said that they think invertebrate animals should have been displayed in addition to vertebrate animals. Two students have indicated that officials in the zoo should also have assisted them.

"It would be better for us if we could tour with the officials and get some information from them after we had observed the animals." (F1)
"It would be better if the officials had assisted us." (F3)

One student has indicated that he wanted to go somewhere else after the zoo trip.

Frequencies of student views about the efficacy of the brochures distributed before the trip is presented in Table 11 below.

Table 11. Frequency table of student answer to the question of "were the brochures distributed before the trip efficient?"

Question 7. Were the brochures distributed before the trip efficient?	Frequency
It was.	15

It can be seen that all the students have said that the brochures were useful according to Table 11. Answers of the students who have commented about the efficacy of the brochures are stated as follows:

"They were useful. I was informed before going to the zoo." (F_4)
"They were very useful. I learned better when I read the brochure and answered the questions. I recognized the animals whose photos we saw in the brochures quickly." (F6)
"I recognized the animals we saw in the brochures quickly when we arrived at the zoo." (F5)
"The brochures were beneficial. It was good that they introduce e animals to us before going there." (M5)
"They were helpful. I got the information about the zoo before going there." (F1)

Findings Obtained From Concept maps: Comparison of number of students' pretest & posttest according to having misconceptions is presented in Table 12.

Table 12. *The number of students according to having misconceptions*

	Number of the Students Having Misconceptions	Number of the Students Having No Misconceptions	Number of the Students Not Being Evaluated
Pretest	6	7	2
Posttest	4	9	2

It is seen that before the trip 6 students had different misconceptions and 7 did not. Because the concept maps that 2 students made were completely wrong, misconception situation of those students wasn't taken under review. It can be seen that after the trip the

number of students who have misconceptions is four and who does not is nine. Because concept maps of the same two students who were not taken under review before the trip were also completely wrong, they were not evaluated, either. Misconceptions students have and pretest & posttest frequencies of those are presented in Table 13.

Table 13. *Frequencies of the students' misconceptions*

Misconception	Pretest Frequency	Posttest Frequency
Living creatures are classified as fungus, plants, microscopic creatures, animals, vertebrates and invertebrates.	4	4
Eagles are invertebrates.	1	0
Snails are vertebrates.	1	0
Iguanas are invertebrate animals.	1	0

It is possible to say that four students (F_4, F_5, M_2, M_4) had misconceptions about the classification of animals before the trip when looking at Table 13. These students didn't insert vertebrates and invertebrates in the animal kingdom. With including them in living creatures class directly, those students classify the living creatures as six different groups. This situation did not change for those students after the trip. Students' misconception of "Living creatures are classified as a fungus, plants, microscopic creatures, animals, vertebrates and invertebrates." couldn't have been removed after the zoo trip. One student (M_1) showed that "eagles" are invertebrates in his concept map before the trip, but then he removed that misconception and include "eagles" invertebrates in his concept map after the trip. One student (F_3) included "snails" among vertebrates and "iguanas" among invertebrates in her concept map before the trip. After the trip, she corrected those misconceptions in her concept map.

DISCUSSION and CONCLUSION

In the research in which the effect of a planned trip to zoos -one of the informal education environments- on students' learning is studied, it's been seen that the posttest results of students are higher than the pretest results. A lot of similar research in literature shows that zoo trips have positive effects on learning (Prather, 1989; Rammey & Gassert, 1997, Falk & Adelman, 2003; Kenny, 2009; Bätz, Wittler and Wilde, 2010; Randler, 2010; Wilson et al., 2011; Randler, Kummer and Wilhelm, 2012; Yavuz, 2012; Görmez, 2014). This result resembles the work in which Prather (1989) reviewed the value of trips in science education. Prather concluded these trips influence both factual and cognitive learning (as cited in Woerner, 1999). In addition to this, Ramey Gassert (1997) inferred that informal education environments give the goals of the science curriculum in their work studying contributions of science centers, science museums, zoos to education and they specified informal environments presents rich learning resources for teachers. Falk and Adelman (2003) concluded in their work that knowledge levels of the visitors going to National Baltimore Aquarium to determine to what extent the informal education environments such as zoos, aquariums, and natural history museums contribute to education improved positively. They determined that visitors' attitudes also improved positively. Kenny (2009) determined that a zoo trip increases students' success in science, but this increase is less than the increase in the success of those who take education at school. Bätz, Wittler, and Wilde (2010) showed in their search in which they studied if the effect of zoo trip on learning changes related to sex or not that trip had a positive effect on each student, but girls had further and more meaningful information than boys had. Randler (2010) showed that besides the frequency of zoo trips, frequency of walking in the nature, reading about animals, using the net as a guideline resource, observing animals, feeding birds and visiting the natural history museum and playgrounds have also positive effects on knowledge levels, which are stated in his search studying the effects of activities done in leisure time on knowledge level about animals.

Wilson et al.. (2011) inferred from their study they done with 1st grade students that students in the class where they brought animals from zoo within the scope of the project "our

zoo to you" wrote longer and consistent texts and they included terms and words related to science when compared to the students who take traditional education. Randler, Kummer and Wilhelm (2012) research show that a zoo trip has positive effects on learning the adaptation and acts of vertebrates. Yavuz (2012) concluded that zoo trips have positive effects on students' academic achievements in the research of the effects of using zoos in science education on academic achievement and anxiety. It can be seen in the results of the works in trips to other informal education environments except for zoos (science centers, museums, botanical parks, aquariums, planetariums, etc.) it affected student successes positively, too. (Demirbaş, 2005; Erim, 2005; Şahan, 2005; Bozdoğan and Yalçın, 2006; Tortop, 2007; Bozdoğan, 2007; Bozdoğan, 2009; Yardımcı, 2009; Yavuz & Balkan Kıyıcı, 2012a; Şahin and Sağlamer Yazgan, 2013).

On the other hand results of some studies done in this field show that the effects of informal education environments on learning are negative. For example, research of De White and Jacobson (1994) in which the trip results of students of the teachers who took trip education and who did not are compared shows that those trips have positive effects on the learning results of students whose teacher took that education. In other words, there is no contribution of zoo trips that are organized with uneducated teachers to the student learnings. Similarly, Toffield et al. (2003) and Lukas and Ross (2005) concluded that unplanned and unscheduled zoo trips have no effects on students achievements. Holland et al. (2015) deduced that stable views and limited interactions in zoos did not provide the visitors' knowledge level with any required change. Consequently, it might be said that a planned trip to zoos has positive effects on learning. Works in the literature (Woerner,1999; Hurley, 2006; Bozdoğan, 2008b; Patrick et al. , 2013) also emphasize that they need to be correlated with curriculums and their being well planned for a certain aim is important for the zoo trips to achieve their goals.

All of the students stated the trip was entertaining according to results of the semi-structured interviews. Result of the works done in other informal education environments supports this research's result (Orion & Hofstein, 1994; Tofield et al. , 2003; Davidson, Passmore & Anderson, 2006; Bozdoğan, 2012; Yavuz, 2012; Sontay et al. , 2016; Türkmen et al. , 2016). Churchman (1987) indicated in his work that one of the aims of these trips is to have fun. According to the work of Yavuz (2012) in which it gathered teacher and student remarks about the trip, students found the zoo entertaining, teachers said zoos could make science lessons enjoyable. All the students said the zoo trip was informative. This result has parallels with the works in the literature (Anderson and Zhang; 2003; Tatar & Bağrıyanık, 2012; Yavuz, 2012; Tükmen, 2017; Öner and Güneş, 2017). In works of Öner and Güneş (2017) teachers remarked students learn as if they discovered the information themselves in the informal education environments.

All of the students said such trips in science courses will be useful. They counted the reasons why such trips are helpful as learning better while having fun and concrete experiences. It was deduced from the works done in different informal education environments in literature that trips provide better learning because they are entertaining (Topallı, 2001; Bozdoğan, 2012; Luebke and Matiasek, 2013; Bozdoğan and Ustaoğlu, 2016; Sontay et al. 2016). Students who got verbal information about animals before the trip developed concrete experience when they meet one-to-one and interacted with the animals and stated that they learned better when they saw the animals. There are also remarks related to the fact that students' concrete experiences during the trip are effective on learning (Ramey Gassert,1997; Bozdoğan, 2008a, Yavuz, 2012; Ay, Anagün and Demir, 2015). All the students said the teacher guidance during the trip was helpful. They answered the question of 'what kind of benefit' as his briefing, preventing their attention from being distracted, telling about the animals they saw and its permanence. Works in literature also gain attention for the benefit of a guide during trips (Ata, 2002; Güleç and Alkış, 2003; Tenenbaum et al. , 2004; Bozdoğan and Yalçın, 2009; Jensen, 2014; Türkmen, 2015).

All students found the brochures distributed before the trip useful. They had rudiments about their trip thanks to the brochures. Works in literature have indicated that preparing brochures before the trip will be helpful (Ata, 2002; Bozdoğan, 2007; Bozdoğan, 2012).

According to results of the concept maps made for determining whether the trip was effective on removing student misconceptions, zoo trip did not influence over misconceptions of

the general classification but eliminated misconceptions of animal classification more specifically. Students met the animals about which they had misconceptions, and afterward, they had the correct knowledge. They did not have any experience about classification at the zoo directly, though. It is thought that the zoo trip has no impact upon misconceptions of the general classification. Similar to the result of the research, while some works in literature says trips are influential in terms of eliminating misconceptions (Stover & Saunders, 2000; Tenenbaum et al, 2004; Boram as cited in Bozdoğan, 2007; Bozdoğan, 2016), some other research says trips may cause misconceptions (McComas as cited in Tekkumru Kısa, 2005; Öner and Güneş, 2017).

Conducting trips to informal education environments conspiratorially is important concerning achieving its goal. By considering the results of the reserach it would be proper to give preservice science teachers lectures on planning trips in faculties of letters. In-service training and trip planning training can also be given to science teachers who are currently in charge. It will be helpful to plan trips to zoos often on subjects about animals in science curriculum within the bounds of possibility. Lessons can be taught during those trips if possible. So, students will have concrete experiences at first hand and learn with fun. Trip activities in the science curriculum should be increased. Teachers should give place to such activities in their annual plan concordantly. Students should be informed about the zoos they will go or other informal education environments and acquainted with acquisitions they will gain thanks to the trips. Teachers should lay the groundwork for leading students during the trip and know the zoo they will visit. Different activities can be improved by creating different steps according to necessity in the process of planning a trip.

This research is limited to fifth-grade students. Other research works on the use of zoos in education can be done in science courses at different levels of education. Studies about zoos' effects on students' affective characteristics, such as interests in science, attitudes towards it, worries about it can be done. Extensive research that will study the effects of zoos and other informal education environments on misconceptions can be done. The query of the permanence of the information obtained from the zoo trip was taken into consideration, but permanency test could not have been applied because the trip was organized towards the end of the term. The effects of zoos on the permanence of the information learned can be studied in research to be done. Additively, works that will study the cognitive or affective influences of zoos or other informal education environments can be performed.

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