

AN INVESTIGATION OF MIDDLE SCHOOL STUDENTS' VIEWS ABOUT KONYA SCIENCE CENTER

Ortaokul Öğrencilerinin Konya Bilim Merkezine Yönelik Görüşlerinin İncelenmesi

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Hasan ÖZCAN*

Ramazan DEMİREL**

Soner ERGÜL***

ABSTRACT: In this study, it was aimed to reveal middle school students' views about Konya Science Center. The study was conducted with 40 fifth and sixth-grade students from a public school in the 2nd term of the education year 2017–2018. A case study methodology was used as a qualitative research design. As a data collection tool, a form including open-ended questions about Konya Science Center was used both before and after visiting the science center. Besides, semi-structured interviews were carried out with the students after the visit. A content analysis technique was used to analyze the research data. The findings showed that the participants had some experience about the affordances and limitations of science centers after the visit. Students expressed that science centers help them develop new scientific ideas and that they are interesting and intriguing. Also, they expressed that there are too many scientific activities to implement in the science center. Based on the research findings, school principals are suggested to increase the number of visits to science centers. Besides, it should be emphasized that science center visits are not just for fun but for having students learn and consolidate the curriculum learning objectives.

Keywords: Science Education, Out-of-school Learning, Science Center, Field Trip, Middle School Students

ÖZ: Bu çalışmada ortaokul öğrencilerinin Konya Bilim Merkezi gezisi ile ilgili görüşlerinin ortaya konulması amaçlanmaktadır. Araştırma 2017–2018 eğitim öğretim yılının 2. döneminde 5 ve 6. sınıfta öğrenim görmekte olan 40 kız öğrenci ile gerçekleştirilmiştir. Nitel

* Doç. Dr., Aksaray Üniversitesi/ Eğitim Fakültesi/ Matematik ve Fen Bilimleri Eğitimi Bölümü/ Fen Bilgisi Eğitimi Ana Bilim Dalı, hozcan@aksaray.edu.tr, ORCID ID: orcid.org/0000-0002-4210-7733.

** Doktora Öğrencisi, Aksaray Üniversitesi/Fen Bilimleri Enstitüsü/ İlköğretim/ Fen Bilgisi Eğitimi Bilim Dalı, nramazandemirel.42@hotmail.com, ORCID ID: orcid.org/0000-0003-3679-5960.

*** Dr. Öğr. Üyesi, Samsun Ondokuz Mayıs Üniversitesi/ Eğitim Fakültesi/ Matematik ve Fen Bilimleri Eğitimi Bölümü/ Fen Bilgisi Eğitimi Ana Bilim Dalı -Üniversite/Fakülte/Bölüm/Anabilim Dalı, sergul@omu.edu.tr, ORCID ID: orcid.org/0000-0002-6826-5481.

araştırma yöntemine sahip çalışmada durum çalışması deseni kullanılmıştır. Veri toplama aracı olarak bilim merkezi gezisi ile ilgili açık uçlu soruların yer aldığı form öğrencilere gezi öncesinde ve sonrasında uygulanmıştır. Gezi sonrası öğrencilerle ile yarı yapılandırılmış görüşme gerçekleştirilmiştir. Yapılan görüşmelerde öğrenciler; bilim merkezi gezisinin olumlu yönleri, sınırlılıkları ve bilim merkezi gezisi ile ilgili deneyimlerini belirtmişlerdir. Form ve yarı yapılandırılmış görüşme verilerinin analizinde içerik analizi kullanılmıştır. Öğrenciler bilim merkezinin ilginç ve merak uyandırıcı, yeni bilgileri keşfetmeye yardımcı olduğu ve bilim merkezi gezisinin sınırlılığının olmadığı belirtmiştir. Yapılan araştırma esas alınarak, okullar tarafından düzenlenen bilim merkezi gezilerinin artırılması, bilim merkezi gezilerinin sadece eğlenme amaçlı değil, aynı zamanda öğrencilerin programdaki kazanımları edinme ve pekiştirmelerinin vurgulanması gerektiği şeklinde öneride bulunulmuştur.

Anahtar Kelimeler: Fen Eğitimi, Okul Dışı Öğrenme, Bilim Merkezi, Gezi-Gözlem, Ortaokul Öğrencileri

INTRODUCTION

In science learning, the use of the environment in which the event or phenomenon actually takes place rather than the written sources makes learning more meaningful. Out-of-school environments are also learning areas for students. Students are restricted to academic activities in the classroom without interacting with the environment. Schools may be inadequate in terms of learning activities, in which case students' understanding, processing, and co-operation skills are not sufficiently developed (Wijayanti and Munandar, 2017).

Because students consider science courses given in the school as boring, they do not actively participate in the lessons and they often describe science as a difficult subject (Türkmen, 2015). As the learning process does not realize suddenly, it is necessary for the students to see different learning opportunities in the classroom and to spend more time in participating in extracurricular science programs in the school; visit science centers, botanical gardens and science festivals in out-of-school, libraries and home learning, especially in science courses (Falk, Needham, Dierking and Prendergast, 2014).

Science teaching is usually carried out in the classroom, laboratories, and out-of-school settings (Sontay, Tutar, and Karamustafaoğlu, 2016). Out-of-class education is also referred to as out of school education, and informal education (Saraç, 2017). Out-of-school learning is expressed in the form of learning that occurs outside the formal education system. Out-of-school learning is included in some countries' legislation as using out-of-school resources for formal education (Vainikainen, Salmi, and Thuneberg, 2015).

Today's developing science and technology show that only the education

and training that is realized in the schools are not enough for the learning of the students. Out-of-school learning is a broad concept that provides a link between formal learning and informal learning, with innovations by science and technology education and teaching, and an opportunity for learners to learn according to individual learning differences. Science centers and planetariums serve within the context of out-of-school learning. Science centers are informal learning environments where universal laws and facts are presented for all age groups (Şen and Akdeniz, 2017). Out-of-school learning consists of three dimensions: content, expansion, and teaching. "Content" includes the natural environment and the relationship of people with the environment. "Expansion" refers to the fact that the topic at hand is transferred to out of school environment through activities. On the other hand, teaching is the use of activities for the development of cognitive, affective, and psychomotor skills of students (Selanik-Ay and Erbasan, 2016). Inquiry-based learning is used in out-of-school education (Sontay et al., 2016).

It is stated in the science curriculum that was updated in 2018 that the students should use the learning environments in the school as well as the learning environments in the out-of-school. Science centers, planetarium, museums, botanical, and zoological gardens may be considered among these environments (Ministry of National Education [MoNE], 2018). In the Science Education Curriculum, which was updated in 2018, also which includes the importance of "Out-of-school Learning Environments in Science Teaching", the scope of out-of-school learning environments and teaching materials. Although extracurricular activities are as important as in-school activities in the learning of students; schools do not attach much importance to out-of-school activities as they are required to do (Selanik-Ay and Erbasan, 2016).

Visiting the out-of-school science center and the laboratories found in these centers provides students with the opportunity to discover new information in the well-equipped learning environment and to easily carry out activities and experiments on their own. Science centers offer exploration, invention, and original experiments to the students (Rennie and McClafferty, 1996). Using non-school learning methods is effective in the learning of students who are experiencing difficulties in learning with traditional learning methods in a class (Vainikainen, et al, 2015).

The out-of-school learning method is efficient in learning the scientific methodology and increasing the inner motivation of the students. Students make observations and gain new experiences (Şen and Akdeniz, 2017). Out-of-school learning environments provide students with increased interest, motivation, attitude, and academic achievement towards the course (Bostan

Sariođlan and Küçüközer, 2017). The field trip method, used in the out-of-school learning environments, is a method that enables the students to better understand the events or facts in their real environment. The field trip method helps students to improve their ability to collect, observe, and comment on data. It ensures that more of the learners are involved in the learning process. Out of school method has its limitations although it has some affordances. Visit management has more legal responsibilities and it requires preliminary organization activities given factors such as transportation, accommodation, and travel plan (Atayeter and Tozkoparan, 2014). Permission must be obtained from student parents, school administrators, and necessary institutions before the visit. The necessity of taking an appointment with the organization to be visited and transportation problems may cause interruptions. Students, who attend visits to science centers, consider such visits as fun, seeing the education dimension as a secondary issue. Teachers should make the visit plan in detail and it is important to ensure the students reach the learning objectives (Şen and Akdeniz, 2017). It is necessary to plan the environment, method, and teaching process for out-of-school education (Bostan Sariođlan and Küçüközer, 2017).

Science Centers

Science Centers are areas of informal education that bring science and knowledge together. Science centers do not only provide informal education for students but also assume the mission to ensure that people meet with scientific knowledge and to ensure the dissemination of scientific knowledge. The concept of the science center is a novel concept in our country, but the number of research studies about science centers is increasing. Science centers are considered as a research field for many disciplines (Koyuncu, Bilici, Kirgiz, and Güney, 2016).

Each year, around 300 million young people and adults visit around 3000 science centers in all regions around the world. Scientific centers offer mechanical, electronic, and computer facilities with visual, auditory, and tactile constructions and scientific facts to visitors (Çolakođlu, 2017). Science centers make science accessible to many youngsters and adults with their innovative, motivating, and entertaining aspects (Falk et al., 2014).

In science centers, (Çıđrık and Özkan, 2016) it is aimed to increase the interest and motivation towards informing, to ensure gaining of affective and psychomotor skills, to teach science effectively, and to give scientific process skills. Science centers are providing students with a student-centered learning environment and thus increasing the learning and permanence of the knowledge gained by the students (Türkmen, Topkaç, and Atasayar, 2001, 2016).

Students do not spend much time on these activities because they may not understand the activities and experiments exceeding their levels in the science center. It is important for students to perform activities that are appropriate to their levels as time is limited. (Hakverdi Can, 2013). Clear and strong evidence of the importance of visits and comprehensive supportive international data are limited, although visits to the science center play a critical role in supporting the learning of science (Falk et al., 2014).

In the meeting held by Science and Technology High Council, based on the importance of science centers, it was decided to open the Science Centers in all metropolitan cities as of 2016, and in 81 cities by 2023 (Çolakoğlu, 2017). The first science center in Turkey is Feza Gürsey Science Center and it is located in Ankara is. The Konya Science Center was opened in 2014 for public use.

Konya Science Center

Konya Science Center is the first science center in Turkey, supported by the Scientific and Technological Research Council of Turkey (TÜBİTAK). Konya Science Center includes theaters, theme parks, theme parks, outdoor exhibitions, observation and navigation towers, planetarium, wind power plant and solar panels, conference halls, laboratories, and libraries. Konya Science Center accepts visitors from all ages and offers entertaining and interactive environments for them and ensure them to meet and connect with science and technology, to stimulate scientific curiosity and learning, to produce new ideas, ensuring them learning in a real-life setting. In this way, science centers provide the opportunity to educate individuals who are innovative and self-confident.

Konya Science Center includes "Sultans of Science where the discoveries belonging to Muslim scholars take place", "Vital Systems, Cells: Building stones of the body", "Our Body in which the Genetic, Clinical and Biomedical Laboratory is located", "Constantly Changing World", "Our energy resources and Anatolian geography "Our Universe in which information about the solar system and planets is given", "New Horizons in which Robotics and Material Technology takes place", "Basic Steps where observation, understanding and physics applications take place", "Minia Seljuk where the Minimal architecture works of Anatolian Seljuk and Great Seljuk states are located" and exhibition galleries such as open-air exhibitions.

In Konya Science Center, there are also many workshops and laboratories including Life Laboratory, Mathematics and Technology Laboratory, Physics Laboratory, Design Workshop, Curious Little Inventors, Waste Boiler, Prof. Dr. Aziz Sancar laboratory, Basic Steps laboratory, Robot Arena, and Science shows. In addition, there is a Planetarium with the themes of the Invisible

Earth's Mystery, Dynamic World, Astronaut, Tree's Life, Return to the Moon, Space and Return, and Butterfly Flying themes.

The teacher conducts planning and programming both before and after visiting the science center and guides students to learn. Science centers provide permanent and meaningful learning to students by embodying abstract knowledge, improving mental process skills, and increasing active participation (Çığrık and Özkan, 2016). Science center visits should not only be intended for entertainment purposes but they should be associated with course gains (Yurtkulu, Şare Akkuş, and Laçın Şimşek, 2017).

Planetarium

Planetarium, also called as House of Planets is a showroom where the artificial view of the sun, the stars, planets, and other celestial objects are projected to the dome with the help of special reflector equipment (Şen and Akdeniz, 2017). Planetariums facilitate the learning of students by presenting the movements of celestial bodies in the sky in a virtual environment (Sontay et al., 2016). Planetariums may be found in the science centers and also mobile planetariums are available (Şen and Akdeniz, 2017).

The embodiment of abstract space concepts in the planetariums is suitable for the cognitive levels of the students and makes learning enjoyable and entertaining (Sontay et al., 2016). The use of the planetarium by teachers is an additional tool ensuring students think differently about the concepts taught at school. Through the planetarium, students are provided the opportunity to observe the interaction at the space and explain why it is necessary to experience precise results about the Earth (Thornburgh, 2017).

The objective of the Study

In this study, it was aimed to reveal middle school students' views about Konya Science Center. It is attempted to identify the students' opinions about the science center visit and the effectiveness of the visit.

Importance of the Study

In addition to the formal education put into practice at schools, the use of out-of-school learning environments such as science centers, planetariums, museums, and botanical and zoo gardens have been increasing in parallel with the developments in science and technology. Today, out-of-school learning methods are not unplanned and unscheduled activities but considered as complementary tools for formal education. The science course is one of the lessons that may be used in out-of-school learning environments (Bozdoğan and Kavcı, 2016). Science center education is one of the out-of-school learning

methods (Vainikainen et al., 2015). Although the number of science centers in our country is increasing day by day, the use of science centers in education and training is not sufficient because the presentation of science centers is not done properly/ sufficiently (Gökçe, 2016). Since the target population of science center visits is students and teachers, knowledge and awareness of students and teachers about science centers should be increased (Çolakoğlu, 2017).

In recent years, demand for out-of-school learning institutions has increased to demonstrate post-visit effects (Jensen and Lister, 2016). There has been a recent increase in the number of studies conducted in non-school learning environments to explore and exhibit interactivity and learning, as well as participants' opinions about the visits. In field trip studies, it is investigated how students remember what they visit, what they learn, or how students and teachers use a visit as a cognitive tool. In the study, questions are used to evaluate and explore the effectiveness of the content of the visit and visitor-related questions such as behavior, interaction, and dialogue of the visitor in a visit-related and scientific context are used. (Davidsson, 2012). The number of studies on science teaching in out-of-school learning environments is increasing rapidly (Bostan Sarıoğlu and Küçüközer, 2017). While the number of international studies related to out-of-school learning is high, the number of national studies is limited (Türkmen, 2015). While the literature focuses on examining the effect of informal learning environments on the academic achievement, interest, and motivation of students, the number of researches on student views on the use of non-school learning environments is limited. For this reason, this study was attempted to reveal the opinions of middle school students about Konya Science Center.

METHODOLOGY

The sample of the study is composed of 5th and 6th-grade students of a middle school under the administration of Konya Provincial Directorate of National Education. In order to select the sample study group, the purposive sampling method was used. consist of a total of 40 students participated in the research (20 fifth grade students and 20 sixth grade students).

A case study methodology was used as a qualitative research design. A case study is a research method used to understand, explain, and describe the causes and consequences of a current event. In a case study, it is tried to identify if there is an event or phenomenon. The event is thoroughly examined and fully described in its real environment. The case studies have an important place in the development and implementation of theories in the field of educational sciences (Ozan Leylum, Odabaşı, and Kabakçı Yurdakul, 2017).

As a data collection tool in the research, a questionnaire was used prepared by the researcher containing questions to identify students' views about Konya Science Center. There are 10 open-ended questions in the interview form. The interviews were carried out with the students both before and after the visit. Semi-structured interviews were conducted with 10 randomly selected students after the visit to provide more comprehensive information about the questions in the interview form. In the interviews, the students expressed the affordances and limitations of the science center visit their experience with the science center visit.

The reservation was made by telephone 3 months prior to the visit to Konya Science Center and the staff of the science center was informed related to the visit. Before the visit, necessary permissions were taken from the students' parents and governors. The participants consisting of 40 students had the chance to visit the robots and planetarium galleries. They were able to see the robots closely in the Robots gallery and examine their movements. In the planetarium gallery, they were able to observe the features of the Solar System and the planets.

Some precautions were taken in order to establish the validity and reliability of the current study. In this context, data collection tools comprising open ended questions and interview questions were examined by two field experts and two science teachers with respect to their appropriateness for students' cognitive development levels and the extent of their representativeness of the content. Based on the views of field experts, three items that do not correspond to students' developmental levels and two items that refer to the same phenomenon were eliminated from the data collection tools. Next, pilot study was conducted with 18 fifth grade and 23 sixth grade students by visiting Konya Science Center along with the guidance of students' science teacher. The first author of this study and a science expert analyzed the research data and codes and categories emerged consequently. To determine the level of inter-rater agreement between the two coders, Miles and Huberman's (1994) formula was used. The coefficient of inter-rater agreement between the two coders was found to 88.14%. This coefficient shows that the data collection tools have good reliability.

The content analysis technique was used in the analysis of the questionnaire and semi-structured interview data. The answers given by the students to the questions have been converted into codes and similar expressions were grouped under the same code. Codes were subdivided into sub-codes and their relation to each other was examined.

FINDINGS

The findings based on the data obtained from the examination of the responses of the students in the sample related to the science center visit and comments on these findings were included. In this part of the research, students' views about the science center visit are given.

Table 1: Students' Views about the Purpose of the Science Center Visit

Grade	Codes about Views	<i>n</i>	%
5th Grade	Learn more	35	7
	Fun	15	3
	Discover	10	2
	Learning with school	10	2
	Curiosity about science	10	2
	Utilizing technology	10	2
	Learn the instruments used in science	10	2
6th grade	Travel	40	8
	Learn information	30	6
	Wonder	10	2
	Learning Solar System and Space	10	2
	See the earthquake chamber and interesting tools	10	2
Total		100	20

As shown in Table 1, 5th-grade students described the purpose of the visit as learning more (35%), having fun (15%), learning with the school, exploring, wondering, benefiting from technology, and learning the instruments used in science. Student 4 stated as follows: We went to the science center to travel, to see the instruments used in science, to learn about these instruments, and to learn where they were used. The 6th-grade students, on the other hand, used explanations for the purposes of visit as: (40%), learning information (30%), curiosity, learning the solar system and space, getting information about the earthquake chamber, and seeing interesting instruments. Fifty percent of the students stated the purpose of the visit as sightseeing, 40% as learning information, and 20% as curiosity and learning the solar system and space. This result reveals that middle school students stated the purpose of visiting the science center as learning more information than having fun.

Table 2: Students' Views About How They See the Science Center

Grade	Codes about Views	N	%
5th grade	Enjoyable	40	8
	Terrific	20	4
	Informative	10	2
	Science-related tools	10	2
	Engrossing	10	2
	Didactic	10	2
6th grade	Beautiful	40	8
	Enjoyable	15	3
	Informative	15	3
	Interesting	10	2
	A place for asking questions wondered	5	1
	A place like a science world	5	1
Total	A place with great robots and historical monuments	5	1
	Heavenly place	5	1
Total		100	20

As shown in Table 2, the answers given by the 5th-grade students to the question "What was the science center like?" are: enjoyable (40%), great (20%), informative (10%), science-related tools (10%), thought-provoking, and didactic. 6th-grade students used expressions including beautiful (40%), enjoyable (15%), informative (15%), interesting (10%), a place to remember, a place with great robots and historical monuments, a heavenly place, a place for asking questions wondered, and a science world. Student 1 responded to this question as: The science center was nice, fun, and informative. Based on this finding, it can be concluded that middle school students' views about the environment of the science center are positive and that the students find the science center as a fun place.

Table 3: Students' Views About the Benefits of the Science Center Visit

Grade	Codes about views	N	%
5th grade	Knowledge learning	35	7
	Contributing to the science course	15	3
	Contributing to computer lesson with robotic coding	10	2
	Teaching the solar system and space	5	1
	Give interesting information	5	1
	Promote scientists	5	1
	Providing discovery	5	1
	Helping to reinforce what they learn	5	1
	Teaching robots	5	1
	Better teaching by using tools	5	1
6th grade	Introducing the world	5	1
	Informing	20	4
	Providing learning by seeing and doing	15	3
	Ensuring the permanence of knowledge	15	3
	Facilitating the understanding of Science at school	10	2
	Providing insight into internal organs	10	2
	Increasing general culture	10	2
	Teaching by showing instead of reading	5	1
	Teaching what to do in an earthquake	5	1
	Teaching the solar system, planets, space ships and astronauts	5	1
Total	Introduction of historical works	5	1
		100	20

As shown in the Table 3, 5th-grade students expressed the benefits of the science center visit as knowledge learning (35%), contributing to the science course (15%), contributing to computer lesson with robotic coding (10%), teaching the solar system and space (5%), introducing the world, giving interesting information, promoting scientists, providing discovery, helping to reinforce what they learn, teaching robots, and better teaching by using tools. Student 3 stated as follows: You are coding many robots in the science center, this contributes to the computer course, while the solar system and the planets contribute to the science course. Sixth-grade students stated expressed the benefits of the science center visit as: informing (20%), providing learning by seeing and doing (15%), ensuring the permanence of knowledge (15%), facilitating the understanding of science at school (10%), providing insight into internal organs, introduction of historical works, teaching the solar system, planets, space ships and astronauts, increasing general culture, teaching by showing instead of reading, and teaching what to do in an earthquake. This result shows that students consider the benefits of a science center visit as a learning method that helps them learn information and helps them to understand lessons in school.

What are the restrictions of the science center visit? Both 5th and 6th-grade students responded by asking that there is no restriction. Student 5 responded to this question as No, I mean, I think the visit to the science center has no harm. This finding suggests that students' science center visits thought that learning and discovering information is an activity that helps and explains information, helps in lessons and has no drawback (restriction).

Table 4: Students' Views About Science Center Visit

Grade	Codes about views opinions	N	%
5th Grade	Officer in the science center	75	15
	Class teacher	25	5
6th Grade	Officer in the science center	85	17
	Class teacher	15	3
TOTAL		100	20

As shown in Table 4, 5th-grade students answered the question "Who do you like to guide you in the science center visit?" as: officers in the science center (75%) and class teacher (25%). Those choosing officers in the science center substantiated their choice by saying that he/she has more information /knowledge on the science center as the students choosing their class teacher said that they visit better with the class teacher and feel safer by him/ her. Student 4 stated as follows: The officer at the science center must guide during the visit. Because our teacher tells us just what to do. The officer would provide more comprehensive information. 6th-grade students, on the other hand, are divided as 85% as officers in the science center and 15% as a class teacher. The students preferring officers stated that the officers at the science center have more information about the tools in the center, may provide more information, and he/she is more experienced. The students preferring the teacher stated that they will not visit there with a person not known to them. Given these results, it may be commented that the students prefer the officers in the center as a guide during the visit on account of his/ her experience and knowledge about the science center.

On the other hand, 5th-grade students stated that that making such visits to the science centers must absolutely be done and that they can better understand the science course. Because science lessons are closer to science, it is necessary to make such visits. It's nice and fun. Many subjects related to science lessons are better understood. It allows us to reinforce what we see in school. It would make a great contribution to the science course. We see visualizations of what we have been studying in Science and have used permanent expressions and expressions. According to 6th-grade students, it should be done frequently, it brings advantages, and ensures them to be more prepared for the lesson.

They know the lesson better. Their knowledge becomes more and more. They learn new things that they do not know. It must be done once a year. It is both informative and instructive. Such visits must be increased. Student 2 stated as follows: I think it's a visit that must be repeated minimum once a year. Because I loved this visit. Both informing and entertaining. It was seen that all of the students who participated in the research wanted to make such visits and increase the number of visits to the science center.

Table 5: Students' Views about Whether They Want to Make Such Visits When They Become a Teacher

Grade	Codes about Views opinions	N	%
5th Grade	Yes, I want to make it.	85	17
	No, I don't want to make	15	3
6th Grade	Yes, I want to make it.	75	15
	No, I don't want to make.	15	3
	It depends on my students.	10	2
Total		100	20

To the question "Would you like to make such visits if you become a teacher in the future?", 85% of the 5th-grade students answered as yes and 15% of the students responded as no. The students desiring to go visits stated that the visits are both fun and informative and increase interest in the course. Everyone should learn it, children would learn by entertainment, they would visually see what they were told in the courses. Those not desiring to do such visits stated that I don't think that my students would need such visits. For the same question, 75% of the 6th-grade students stated that as yes 15% of the students responded as no, and 10% of them stated that it would depend on the needs of his/ her future students. Those desiring to make these visits stated that they would have fun and information. I would want my students to have the knowledge and happiness. Those not wanting to make visits responded that I do not want to deal with them on the visit and you will be responsible for the children during the visit. You will be in trouble if any problem occurs during the visit. Student 7 stated as follows: Yes, I would love my students to experience the happiness I felt learning information on this issue. These results show us that most of the students would prefer to make such visits if they become a teacher in the future.

The 5th-grade students responded to the question "What did you learn from the science center visit?" as follows: I learned how to determine the position of the pole star and how robots work. I learned about the solar system and planets. I learned how scientists live in space, the greatest stars, the information about space and constellations, the order of planets according to their closeness to

the sun, the place in which robots are used, the universe, the stars, the planets, respectively. Student 6 stated in this way: I used the expression that I knew that the closest planet to the Sun was Mercury, the farthest planet was Neptune, not the pole star of the brightest star, Mars was called the red planet. 6th-grade students responded as: I learned space better. I learned about our history. I learned about the animals that lived in the past and their climate. I learned that Konya was by the sea. I learned what to do in hydropower, piloting, and earthquake. They learned about the solar system and astronauts, historical artifacts, internal organs, and the benefits of electricity. Based on this finding, it can be interpreted that students think that the science center visit is effective in gaining knowledge and in the permanence of the knowledge gained and that it is a useful method for the solar system and space.

It can be seen from the findings of the study that non-school learning methods such as visits and observation should be used in addition to formal education-teaching activities in the schools. It is not a correct idea to think that the educational curriculum is given only in schools that are surrounded by walls on four sides. It can be seen that the field trip method with the emphasis on planned and educational gains is an effective method in the learning process. Students indicated that they were learning more and lasting information by having fun with the use of out-of-school learning methods and that the types of visits like science center visits should be increased in classes, especially in science classes.

DISCUSSION, CONCLUSIONS, AND RECOMMENDATIONS

In this study, middle school students' views about Konya Science Center were examined. The students responded that science center is interesting and provoking curiosity, improved their knowledge gained in the science course and other lessons, it is better to learn any topic by seeing and experiencing, that the center of science helped them to discover new information, that there is no disadvantage of the science center visits, and that the number of such visits should be increased.

When the literature is reviewed, it is possible to see research studies in which similar results were obtained. Sontay et al. (2016) found related to "Planetarium" visit by 8th-grade students in middle school that visit was more fun and effective as one of the out-of-school learning environments, the knowledge gained became more permanent, and that it was appropriate to make such visits for the science lesson and that out-of-school learning environments are to be used. Bozdoğan (2017) thinks that teacher candidates have limitations in using out-of-school learning environments, such as having

fun learning, concretizing theoretical information, providing permanent and meaningful learning, eliminating misconceptions, and increasing attitudes and motivations towards the lesson. Çıgırık and Özkan (2016) studied the effect of learning activities in the science center on the attitude of 7th-grade students towards science class and learning persistence and the results of the research activities in the curriculum were found to be statistically significant in terms of the students' academic achievement and attitudes towards science. Bostan Sarıođlan and Küçüközer (2017) found that out-of-school learning environments increased the permanence of information obtained, that out-of-school education is more relevant to everyday life, and that it increased interests of the students. Bozdođan and Kavcı (2016) stated that with out-of-school learning activities, middle school students were able to learn with entertainment, increase participation, and better understand the topics and concepts.

Gökçe (2016) believes that the Science Center is effective in social studies courses in acquiring knowledge, skills, attitudes, and values, increasing interest, and curiosity towards social information embodying topics in social information, learning by living and establishing a relationship with daily life. Türkmen et al. (2016) have shown that informal learning environments such as the Natural History Museum and Botanical Garden and Herbarium have a positive effect on students' learning. The students stated that they had fun during the visit and that such activities should be organized more in the lessons. Furthermore, it was stated that the Natural History Museum and the Botanical Garden were not suitable for efficient informal learning environments and that the staff were inadequate to direct the students.

Different results have been obtained in some studies in the literature. Hakverdi Can (2013) stated that 4th and 5th-grade students in elementary school acted as if they were in a playground for entertainment purposes rather than a center where experiments and activities were held on a science center tour. Türkmen (2015) believes that the visits conducted are not efficient since the primary school teachers are lack of knowledge about it in addition to additional costs, environment, inadequacy, bureaucratic problems, the intensity of curriculum, and due to the fact that teachers do not visit the classroom environment before the visits with the students.

Considering the results of the study, the following recommendations were made: It should be emphasized that in the use of out-of-school learning environments, students should not see visits as merely an entertainment and enjoyment tool and that the primary purpose of the visit is to achieve educational objectives in the relevant discipline.

Science center visits should be planned before visiting the out-of-school learning environment and the benefits to be gained regarding school disciplines should be determined in advance. After the visit, the worksheets containing the achievements of the science center should be distributed to the students related to the science center visit conducted.

Fun activities and interactive applications should be provided in out-of-school learning environments, to enhance the motivation and knowledge of students, and the number of these applications should be increased. New programs can be developed in science centers based on their achievements in school disciplines.

Visits to science centers and botanical gardens must be free of charge for students to increase the number of students participating in the visit.

The number of studies on out-of-school learning environments for primary and middle schooling can be increased since there are fewer studies at the primary and middle school level, while there are more research studies on middle school and university students related to out-of-school learning environments.

Out-of-school learning environments can be easily used in science classes and their use in other disciplines should also be increased. Teachers and teacher candidates may be given seminars and training for informing them about out-of-school learning methods and activities that can be used in non-school learning environments, their participation in project work may be encouraged.

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