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The Impact of Out-of-School Learning Environments on 6th Grade Secondary School Students Attitude Towards Science Course

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Abstract

This study was conducted for the purpose of determining the impacts of out-of-school learning environments on 6th-grade students' attitudes towards science course. In the study, the quasi-experimental model and pretest-posttest control grouped experimental design was employed. The experimental process step of the study was carried out on 6th-grade students who receive education in a secondary school in Turkey in 2017 and maintained for 18 weeks. 60 students are included in the study group of the research (control group=30, experimental group=30). For the purpose of measuring the attitude scores towards science course, "The Scale of Attitude towards Science Lesson" was used. The experimental phase was performed by science lesson teacher both in the control and experimental groups. No experimental process was applied in the control group. The instruction was provided in accordance with the Science Course Curriculum. While the instruction was provided in line with the control group in the experimental group, out-of-school learning environments were also included in the teaching process. Out-of-school learning environments were specified by considering the learning outcomes in the 6th-grade science curricula. Experimental group students visited out-of-school learning environments with the guidance of the science teacher. Science museum, anatomy museum, planetarium, nature trip, science festivals, energy park and aqua park are among the out-of-school learning environments. As a result of the study, it was seen that the attitudes of the students in the experimental group were increased at a significant level, and no significant improvement was realized in control group students' attitudes.

Keywords: out-of-school learning, out-of-school learning environments, out-of-class learning, informal learning, attitude towards science course, science education

1. Introduction

Today, it is thought that education-instruction should be actualized in the environments that are most similar to the reality in order to raise individuals as ones who are able to read and understand, able to use the information in real life, to produce and able to catch up with the age. This situation means that providing education only within the borders of the school wall will not be able to actualize the education and instruction of an individual precisely. In this direction, out-of-school learning environments are needed at the present day (Bakioglu, 2017). In the study conducted by Sontay, Tutar & Karamustafaoglu (2016), it was stated that out-of-school learning environments should be used more actively and integrated into curriculums in order to make learning entertaining and enable students to participate in learning environments willingly.

Out-of-school learning environments based on the argument that asserts that learning can be actualized in every part of life and not only as an individual activity in a classroom. It proposes every kind of learning environment that can support formal education as an implementation field (Lacin Simsek, 2011). The concept of out-of-school learning environment includes many fields from diverse living spaces that are out of the school borders to virtual environments (Eshach, 2007). In this context, a museum, zoo, botanic garden, planetarium, industrial organization, national park, science festival and nature education can be given as an example for out-of-school learning environments (Lacin Simsek, 2011; MEB, 2013; MEB, 2017;Turkmen 2010, Yildirim, 2018; Yildirim & Sensoy, 2018a; Yildirim & Sensoy, 2018b;Yildirim & Sensoy, 2016).Out-of-school learning activities are carried out for the purpose of contributing to the lectures and learning outcomes at outside of the school borders (Karademir, 2013). Out-of-school learning environments which are more natural, flexible and entertaining in comparison to the education provided in schools enable students to gain different experiences and with different activities and emancipate teaching from being dependent on books and classroom atmosphere are rich educational sources (Noel, 2007), and have features to support the education given in schools (Taylor

& Caldarelli, 2004). The general framework of the out-of-school science learning has been determined as excitement for science, interest, creating intrinsic motivation, models concerning scientific concepts, meaning, explanation, producing reflections for gaining knowledge on phenomena in nature, and researching these phenomena through observation and examination and participating in scientific activities for (National Research Council, 2009). In the study conducted by Yurtkul, Sare Akkus & Lacin Simsek (2017), it was stated that out-of-school learning environments are spaces where an individual have both physical and mental experiences and planning the visits by associating with learning outcomes of the course would provide an opportunity to make the visits more productive.

Out-of-school learning is explained as a learning environment that is made outside of the school borders in a planned and programmed way which also includes entertainment and personal interests. For this reason, in order to reach the aims in the context out-of-school learning environments, there are requirements and substantial points to consider in pre-trip, during-trip and after-trip phases. Before the trip, educational preparations should be made (planning trips and activities in line with the learning outcomes in the curriculum, preparing worksheets etc.), transportation, eating-drinking, planning the accommodation, receiving necessary permissions, informing parents and students and receiving information about the location that will be visited by the teacher should be done. During the trip guidance service should be provided, students should be enabled to participate, asked questions and leisure activities should be planned. After the trip student classroom activities should be planned in order to share students' observations in the classroom for supporting the teaching that is actualized at out-of-school environments (Ata, 2002; Bozdogan, 2007; Ertas & Sen, 2017; Lacin Simsek, 2011).

In spite of the fact that out-of-school learning environments provide rich learning occasions, they do not guarantee that the expected learning will be reached in every case (Griffin, 2004). Students confront various challenges in the visits that are conducted independently from subject area and time. This situation reveals that there is a need for well-equipped instructors who will guide in out-of-school spaces (Cigrik, 2016). Teachers have an important role in terms of organizing out-of-school environments in a way to support education in school (Kete & Horasan, 2013).

Science subjects involve phenomena and events that are seen and experienced in real life and they are intertwined with the daily life (Lacin Simsek, 2011). On the other hand, learning in school (formal learning) is far from real life experiences, less associated with real objects and incidents, related with symbols, and it provides fewer opportunities for students to socialize (Ramey-Gassert, 1997). In this context, it can be said that formal learning should be supported by out-of-school learning environments.

Out-of-school learning activities have a substantial role in respect of students learning processes in science education (Ozturk, 2014). Out-of-school learning environments provide an awareness of the relationship between science and society that could not be gained by school-based science learning environment (Jarvis & Pell, 2005). Out-of-school learning environments also contribute to classroom education and lifelong learning of students (Gardner, 1991). When the literature is reviewed, it was stated that out-of-school learning environment help students to take a responsibility in understanding and learning scientific concepts (Olson, Cox-Petersen & McComas, 2001), and students can establish relationships between information and what was learned besides learning in informal learning environments (Balkan Kiyici & Atabek Yigit, 2010).

Out-of-school learning environments that are included in learning-training processes via trips are considered as an important opportunity as they are more entertaining, flexible, natural, rich–in terms of making activities that are not possible to carry out within a school and finally providing learning opportunities for individuals in every age are seen as important advantages (Taylor & Caldarelli, 2004). Out-of-school science experiences may affect positive attitude towards science, interest, motivation and developing skills regarding science (Lin & Schunn, 2016). If the informal learning environments are examined from the aspect of science education, science education can be provided not only in a closed classroom environment but also outside of the school. Education that is provided at out-of-school learning environments is effective in respect of students' academic achievement, attitude towards the course and increasing their interest (Bostan Sarioglan & Kucukozer, 2017). In the study conducted by Lakin (2006), it was stated that out-of-school activities have a positive impact on attitudes, values and beliefs, are entertaining and exciting and individuals can remember activities for a long time. When the literature is reviewed, research studies which reached the results that out-of-school learning environments provide favorable improvement in cognitive characteristics as learning, success, understanding, reminiscence, scientific process skills and making connections with life, and also provide positive improvement in affective characteristics as attitude, attention, motivation, will, curiosity, self-efficacy perception etc. and support formal education were seen (Altintas, 2014; Atmaca, 2012; Ballantyne & Packer, 2009; Berberoglu & Uygun, 2013; Bozdogan, 2007; Carrier, 2009; Cavus, Umdu Topsakal & Oztuna Kaplan, 2013; Ertas, Sen & Parmaksizoglu, 2011; Erten & Tasci, 2016; Guisasola, Morentin & Zuza, 2005; Knapp, 2000; Nadelson & Jordan, 2012; Olson at al., 2001; Sontay & Karamustafaoglu, 2017; Stavrova & Urhahne, 2010; Tatar & Bagriyanik, 2012; Yavuz & Balkan Kiyici, 2012; Yavuz Topaloglu, 2016).

In the study conducted by Yildirim & Sensoy (2018b), it was emphasized that it is required to include informal learning environments in teaching-learning process and integrate formal and informal learning environments. In this way, students can see what is learned in real life and realize it, the feelings of making observations and curiosity can be maintained at a high level and more permanent learnings can be realized (Balkan Kiyici & Atabek Yigit, 2010).

In addition, studies that emphasize that the attitude towards the course is one of the most important affective characteristics which is also the variable that is examined in the research (Akyol & Dikici, 2009; Guden & Timur, 2016; Gurbuzoglu Yalmanci, 2016; Hamurcu, 2002; Karasakaloglu & Saracaloglu, 2009; Kenar & Balci, 2012; Kurbanoglu & Takunyaci, 2012; Ozbas, 2016; Yildirim & Kansiz, 2017a; Yildirim & Kansiz, 2017b). The attitude that students have towards the science course also have an impact on science success levels (Altinok, 2004; Dieck, 1997; Hamurcu, 2002; Kenar & Balci, 2012; Martinez, 2002; Yaman & Oner, 2006; Yildirim & Kansiz, 2017a; Yildirim & Kansiz, 2017b). As attitudes of children started to be shaped in early ages, the primary school period has an important role in respect of developing positive attitudes towards science (Jewett, 1996; Parker & Gerber, 2000). The results of the study conducted by Mattern & Schau (2001) demonstrate that attitudes that are gained in the student times have an impact on working and researching the field of science. The learning-teaching process should have the properties of improving students' attitude (Milli Egitim Bakanligi [MEB], 2006). In addition, attitude is also included in the skills that should be developed in the science teaching process (MEB, 2013). When it is considered that the attitude towards a course is an effective variable on success and learning, it is also necessary to develop an attitude in the teaching process in a positive way. In order to develop an attitude towards a course in a positive direction, it can be said that it is necessary to include out-of-school learning environments that will appeal to personal differences in the formal education process, enrich teaching process, attract attention, make learning fun and provide experience.

According to 2013, 2017 and 2018 Science Course Curriculums, the active role of the student and directive and directory role of the instructor was taken as a basis. In order to enable students to learn knowledge in the field of science, in-classroom and out-of-school learning environments are designed based on a learning strategy that is based on researching-questioning. In this context, out-of-school learning environments (art-science-archaeology museums, zoo, natural environments etc.) should be used as well (MEB, 2013; MEB, 2017; MEB, 2018). The report published by National Research Council (NRC) on 2009 states that learners have many opportunities to learn science beyond the school, and they experience statements concerning science, explorations, and phenomena by visiting different organizations apart from the school (NRC, 2009).

In the study conducted by Yildirim & Sensoy (2016), it was pointed out that out-of-school learning environments ought to be contained in the learning process in terms of developing a positive attitude towards science course; in this way the objectives of benefitting from out-of-school learning environment that are stated in Science Course Curricula and developing positive attitudes towards science course can be reached. Furthermore, there are studies which state that out-of-school learning environments ought to be included in the learning process (Buyuksahin, 2017; Cifci & Dikmenli, 2016; Cigrik, 2016; Colakoglu, 2017; Erten, 2016; Lacin Simsek, 2011; MEB, 2013; MEB, 2017; Randler, Baumgartner, Eisele & Kienzle, 2007; Randler, Kummer & Wilhelm, 2012; Sontay at al., 2016; Turkmen 2010; Yavuz Topaloglu & Balkan Kiyici, 2017; Yildirim, 2018; Yildirim & Sensoy, 2018a; Yildirim & Sensoy, 2018b; Yildirim & Sensoy, 2016). According to Karademir (2013), out-of-school activities can be made more effective by linking with lessons. Reaching the mind of a learner where learning is built in a cognitive, affective and physical way can be possible only by entering into all living spaces of a person. The way of doing this is to transfer knowledge out-of-school (Buyuksahin, 2017). Melber & Brown (2008) emphasized in their study that early experiences of students will be effective in terms of career choices of students, it is known that informal activities (museum visit etc.) in primary school years had an impact on careers selections of many scientists, and so informal education should be given importance.

In this context, it is thought that the study has an importance from the aspects of involving out-of-school learning environments would enable experiencing events, phenomena, principles and laws, provide easiness in learning by concreting abstract concepts, contribute to the development of affective characteristics as interest, attitude and motivation and contribute to the creation of learning environments where the students are researching and questioning and responsible for learning, and the teacher is guiding and directing – which is taken as a basis in science curriculums. In addition, it was emphasized within the objectives of the science curriculum that improving the attitude and benefitting from out-of-school environments are required. In this context, it is thought that the studies on determining the impact of out-of-school learning environments on learning outcomes as students' attitude towards science course may contribute to the literature.

1.1 Aim of the Study

This study was conducted for the purpose of examining the impact of out-of-school learning environments on the attitude levels of 6th-grade secondary school students towards science course. In order to reach this aim, the given research questions were examined.

1. Is there a meaningful difference between the attitudes of 6th-grade students who visited out-of-school learning environments towards science course in the beginning, at the end and 3 months after the research process?

2. Is there a meaningful difference between the attitudes of 6th-grade control group students who were applied the 2017 academic year science curriculum towards science course in the beginning, at the end and 3 months after the research process?

3. Is there a meaningful difference between the attitudes of experimental group who visited out-of-school learning environments and control group students who were applied 2017 academic year science curriculum towards science course in the beginning, at the end and 3 months after the research process?

2. Method

2.1 Research Design

In the design of the study quasi-experimental method and pretest-posttest control grouped experimental design was used (Linn & Gronlund, 2000). The method of the study is quasi-experimental as randomness principle or drawing were not employed and existed classes were used in the appointment of students both in control and experimental groups (Buyukozturk, Kilic Cakmak, Akgun, Karadeniz & Demirel, 2016; Karasar, 2016).

2.2 Study Group

The study group consisted of sixth-grade students who receive education in a secondary school in Turkey in the year of 2017. In the study, the random assignment method was employed to decide which sixth-grade branches that are already existed will be chosen as the experimental and which will be chosen as the control group. The study group consists of 60 students. 30 of these students of the study group are included in the control and 30 of them are included in the experimental group.

2.3 Characteristics of the Research Sample

The characteristics of participants were detected through the personal information section of scale. The participants of the study consisted of 60 students in total who receive education in a secondary school in Turkey at the 2017 academic year. There are 16 female-14 male students in the control group and 15 female-15 male students in the experimental groups which mean that there are 31 female-29 male students in the study. All of the participants are living in the city center. The average studying times of the participants that they allocated for the science course apart from the time they share for preparing for science course examinations were examined. In terms of the weekly study times for the science course, it was determined that in the control group, 5 students stated that they study for 4 hours, 8 students stated that they study for 3 hours, 10 students stated that they study for 2 hours, 5 students stated that they study for 1 hour and 2 students stated that they do not study. On the other hand, it was indicated that in the experimental group, 4 students share 4 hours, 9 students 3 hours, 8 students 2 hours, 6 students share 1 hour and 3 students stated that they do not study.

2.4 Sampling Procedures

In the sample selection, it was considered that there are a science teacher and students that the researcher can direct and provide educational support in respect of out-of-school learning environments easily. Therefore, the research's sampling method is convenience (Buyukozturk at al., 2016; Karasar, 2016).

2.5 Data Collection Tools

So as to detect the attitude scores of students, the Attitude Scale towards Science Lesson that was developed by Kececi & Kirbag Zengin (2015) was employed. This scale was used as pretest at the beginning of the study, posttest to detect the impact of the implementation process and as monitoring test 3 months after the research process. The attitude scale is in a structure of five-point likert scale from "Completely Agree" to "Completely Disagree". There are 31 items in the scale. Before the research process, the attitude scale was applied to 318 sixth grade students who were not applied an experimental process. With the data obtained from this implementation, the Cronbach Alpha reliability coefficient of the scale was found as 0,87. In the analysis of the data, the scoring was made for each positive expression as "Completely Agree" 5 points, "Agree" 4 points, "Slightly Agree" 3 points, "Disagree" 2 points, "Completely Disagree" 1 point. In the scoring of the negative expressions in the items, the opposite of the given scoring was applied. The total score received from the attitude scale was divided into the number of items (31), an attitude towards the science course score for each student was calculated. According to this, the highest point that can be gotten from the scale is 1, and the highest score is 5. The total score got from the attitude scale expresses students' attitude levels of students towards science course.

2.6 Data Analysis

Data were analyzed with the Statistical Package for the Social Sciences 22. In order to examine whether the attitude scale towards the science course have a normal distribution or not; mode, median, arithmetic average, standard deviation, skewness, kurtosis and Shapiro-Wilk Test was used. In the determination of whether there is a difference at a significant level between the attitude scores of experimental and control group students the “Independent Samples t-Test” was employed. So as to determine if there is a difference at a significant level between the scores of the pretest that was applied at the beginning of the implementation phase of the study, posttest that was applied at the end of the implementation phase and monitoring test that was applied 3 months after the research process the “One-Way ANOVA for Repeated Measures” was implemented. In this analysis, in order to detect the direction of the difference where a meaningful *difference* occurs, Bonferroni analysis was applied. The analysis results were evaluated at 0.05 significance levels and findings were obtained (Buyukozturk, 2016). In the analysis where a significant difference occurred, the impact size was calculated by using Eta Squared (η2) value. The ranges that were used in the interpretation of the η^2 (Eta Squared) are given as “$.01<\eta^2<.06$ small, $.06 \leq \eta^2<.14$ middle and $.14 \leq \eta^2$ large impact (Cohen, 1988).

The question of which statistical methods will be used in the analysis of the pretest, posttest and monitoring test data was examined. In this context, parametric-nonparametric statistic may be used in the analysis of quantitative data. In order to use parametric statistic method, the distribution of quantitative data should be normal (Sim & Wright, 2002). Based on this, descriptive analyses were applied so as to determine the statistical method that will be used in the analysis of the research data and the results that were reached were presented in Table 1. By assessing the data given in Table 1, it was evaluated whether the pretest, posttest and monitoring test scores demonstrate a normal dispersion or not.

Table 1. The descriptive statistic results regarding pre, post, monitoring tests

Test	Groups	N	$\bar{x}$	S	Median	Mod	Skewness	Kurtosis	Shapiro-Wilk p
Pretest	Control	30	99.50	14.42	100.00	100.00	-0.02	-0.78	0.57
	Experiment	30	98.93	16.11	97.50	97.00	-0.22	-0.80	0.46
Posttest	Control	30	100.30	15.28	103.50	104.00	-0.10	-0.73	0.75
	Experiment	30	119.80	15.39	123.00	121.00	-0.44	-0.87	0.16
Monitoring Test	Control	30	99.77	14.68	100.50	103.00	0.05	-0.38	0.98
	Experiment	30	118.77	16.37	123.50	124.00	-0.42	0.06	0.36

When the findings given in Table 1 are examined, it may be told that the median-mode-mean of the control and experimental group students’ pretest, posttest and monitoring tests receive closer values, and skewness-kurtosis coefficients are in the interval of -1.5---+1.5. In addition, it is seen that the significance values of the Shapiro-Wilk Test of pretest, posttest and monitoring test scores is bigger than 0.05. When the findings of; the closeness of arithmetic mean-median-mode values of the control and experimental group students’ pretest, posttest and monitoring test on attitude towards the science course; the range of skewness and kurtosis values (-1.5-+1.5 interval), and the fact that Shapiro-Wilk Analysis significance level is higher than 0.05 are taken into the consideration, it may be said that the data of control and experimental group students’ pre-test, post-test and monitoring test are distributed normally (Baykul & Guzeller, 2014; Kalayci, 2016; Koklu, Buyukozturk & Bokeoglu, 2006; Tabachnick & Fidell, 2013). According to these descriptive statistical results, it was decided to use parametric tests in the analysis of the data that show a normal distribution.

2.7 Implementation of the Research

The study was conducted on 60 sixth-grade students who receive education in a secondary school in Turkey in total, in the second semester of the 2017 academic year and continued for 18 weeks. The implementation phase of the study was realized by the same science lesson school teacher both in the science lesson given to control and experimental groups.

In the beginning of the study the Attitude Scale towards Science Course was implemented to students in both control and experimental groups as the pretest so as to detect their attitude levels towards the science course. No experimental process was implemented to the control group and an instruction that is in line with the Science Lesson Curricula was provided. While teaching was provided in line with the Science Course Curriculum in the experimental group, out-of-school learning environments were included in the instruction process.

Out-of-school learning is a learning environment that is conducted in a planned and programmed way outside of the school borders, aims the development of affective, cognitive and physical skills, supports formal instruction, associated with the learning objectives specified in curriculums, targets to reach the objectives in curriculums that also include entertainment and personal interests. Therefore, there are requirements to actualize and given attention in terms of pre-visit, during-visit and post-visit in order to ensure affective, cognitive and kinetic development that is aimed in out-of-school learning environments. In this context, educational preparations such as planning activities and out-of-school learning environments by associating them with the learning outcomes in the curriculum, preparing worksheets etc. were done. In transportation, eating-drinking and accommodation was planned before the trip, parents and students were informed, information regarding the out-of-school environments that will be visited was received in advance. The out-of-school environments were determined in way to contribute to the development of the learning outcomes in 6^{th} grade science curriculum as given in Table 2 (a part of the outcomes were included).

Table 2. The relationship between sixth-grade science course learning outcomes and out-of-school learning environments

Unit	Learning Outcome	Out-of-school Learning Environment	The Relationship Between a Learning Outcome and Out-of-School Learning Environments
Systems in Our Body	Demonstrates the organs that comprise the respiratory system on a model. Explains the structures and organs that comprise the circulatory system with their tasks.	Ankara University (A.U.) Veterinary Anatomy Exhibition Room, Feza Gursey Science Center, Aquavega	Examines and observes the respiration and circulation organs on the examples of living spaces.
Light and Sound	Observes the reflection of light on straight and uneven surfaces and demonstrates by drawing beams. Comprehends the situations that can occur as a result of interplay between sound and matter.	Middle East Technical University Society and Science Implementation and Research Center, Golbasi Municipality Science Center	Observes the results by doing light and sound experiments.
Reproduction, Growth and Development in Plants and Animals	Compares the reproduction types in plants and animals. Explains the growth and development process through examples.	A.U. Children Science Center Insect Festival School, A.U. Faculty of Agriculture Museum Nature Trip	Observes the parts of a flowery plant and pollination. Examines reproduction and metamorphosis phases in insects.
Heat and Temperature	Classifies matters according to conduction. Discusses the importance of insulation in respect of family-national economy and efficient use of resources. Researches and presents the impact of the use of different type of fuel for heating purposes on people and the environment.	General Directorate of Renewable Energy Example Building, Natural History Museum-Energy Park	Examines insulation in buildings. Learns the concepts of renewable and non-renewable energy Observes underground coal mines.
Conduction of Electricity	Classifies the matters according to their status of electrical conduction by using the circuit designed by oneself. Guesses the variables that the radiance of a lightbulb depends on in a circuit and tests his/her guesses by trying.	Hacettepe University Physics Engineering Physics Game Unit	Understands conductive and non-conductive matters, and variables that the radiance of a lightbulb depends on by making experiments.
Our Earth, Moon and Our Source of Life is Sun	Expresses the phases of the moon which reflects the light that it takes from the Sun and associates the reason of the visibility of the phases with the rotation of the moon around the Earth	METU Society and Science Implementation and Research Center-Planetarium, Polatli Municipality Science Center and Ulug Bey Planetarium	Observes the Moon
Force and Movement	Explains the resultant force Demonstrates more than one force that affect an object through an experiment and drawing. It discovers and compares the balanced and unbalanced forces by observing the moving states of the objects.	Science Festival	Observes resultant force, balanced and non-balanced forces

Students in the experimental group visited the out-of-school environments given in Table 2. Among the out-of-school learning environments, there are nature trips, science festivals, planetarium, science museum, natural history museum, an agricultural faculty museum, anatomy museum, energy park, and aqua park. It was paid an attention to the provision of a guidance serviced during visits, encouraging students to participate in activities, asking questions of students during the activity and making leisure activities. After the visits made to the out-of-school learning environments, observations of students were share in the classroom. For the purpose of supporting the teaching made in out-of-school learning environments, the activities specified in science curricula were actualized. In order to detect the attitude levels of students in control and experimental groups towards science course, the Attitude Scale towards Science Course was applied as a posttest at the end of the implementation phase. Three months after the implementation of the posttest, the scale was applied as a monitoring test.

3. Findings

The equivalency of the students in control and experimental groups in terms of the attitude levels towards science course were compared at the beginning of the study and the results were given in Table 3.

Table 3. Independent samples t-test analysis results on pretest scores of attitude towards the science lesson

Groups	N	x̄	S	df	t	p
Control Group	30	3.21	0.47	58	0.15	0.89
Experiment Group	30	3.19	0.52			

According to Table 3, it can be said that there is no meaningful difference between the pretest scores of attitude towards the science lesson before the experimental process for students in control (x̄=3.21) and experimental (x̄=3.19) groups ($t_{(58)}$= 0.15; p>.05). According to this finding, it can be said that attitude levels of the students in control and experimental groups towards the science lesson are at similar level before the research process.

Table 4. Independents samples t-test analysis results on posttest scores of attitude towards the science lesson

Group	N	x̄	S	df	t	p*
Control	30	3.24	0.49	58	-4.93	.001
Experiment	30	3.87	0.50			

* p<0.05

According to Table 4, it can be said that there is a meaningful difference between the posttest attitude scores regarding the science lesson of the students in control and experimental groups at the end of the research process ($t_{(58)}$= -4.93; p <.05). This meaningful difference is in favor of the experimental group. When the posttest scores towards the science lesson of students in experimental (x̄=3.87) and control (x̄=3.24) group students are compared, it can be stated that the averages of the students in the experimental group are higher than the averages of the students in the control group at a significant level. The calculated effect size is $\eta 2$=0.30. As the effect size is higher than 0.14, it can be said that the effect size is high (Cohen, 1988).

Table 5. Independents samples t-test analysis result on monitoring test scores of attitude towards the science lesson

Group	N	x̄	S	df	t	p*
Control	30	3.22	0.47	58	-4.73	.001
Experiment	30	3.83	0.53			

* p<0.05

According to Table 5, it can be said that a meaningful difference emerged between the attitude towards the science course of the students in control and experimental groups after three months after the application phase of the research was concluded ($t_{(58)}$= -4.73; p <.05). This finding can be explained by the fact that, the monitoring test average was for the experimental group students (x̄=3.83) and it was higher than the average of the control group students (x̄=3.22) at the end of the research process. The calculated effect size is $\eta 2$=0.28. As the effect size is higher than 0.14, it can be said that the effect size is high (Cohen, 1988).

Table 6. Descriptive statistics results on control group students' pretest, posttest and monitoring test scores of attitude towards the science lesson

Test No	Test	N	x̄	S
1	Pretest	30	3.21	0.47
2	Posttest	30	3.24	0.49
3	Monitoring test	30	3.22	0.47

Table 7. One-Way-ANOVA for repeated measures analysis results on the control group students' pretest, posttest and monitoring test scores of attitude towards the science lesson

Source of Variance	Sum of Square	df	Mean Square	F	p	Significant Difference
Between Subjects	19.552	29	0.674	1.14	0.33	-
Measurement	0.010	2	0.005			
Error	0.264	58	0.005			
Total	19.826	89				

According to the findings in Table 6, the control group students' attitude towards the science course posttest average is

($\bar{x}$=3.24) higher than the pretest ($\bar{x}$=3.21) and monitoring test ($\bar{x}$=3.22) averages. In addition, when the findings in Table 7 are examined, it can be said that the difference between the attitude pretest, posttest and monitoring test scores are not at a significant level ($F_{(2-58)}$=1.14; p>.05). According to this finding, it may be stated that the attitudes of the control group students are at a like level at the beginning of the implementation phase, when the implantation phase was concluded and three months after the conclusion of the implementation phase.

Table 8. Descriptive statistics results on experimental group students' pretest, posttest and monitoring test scores of attitude towards the science lesson

Test No	Test	N	$\bar{x}$	S
1	Pretest	30	3.19	0.52
2	Posttest	30	3.87	0.50
3	Monitoring test	30	3.83	0.53

Table 9. One-Way-ANOVA for repeated measures analysis results on the experimental group students' pretest, posttest and monitoring test scores of attitude towards the science lesson

Source of Variance	Sum of Square	df	Mean Square	F	p*	Significant Difference
Between Subjects	22.028	29	0.760			
Measurement	8.635	2	4.318	243.85	.001	2-1 3-1
Error	1.027	58	0.018			
Total	31.69	89				

* p<0.05

The findings given in Table 8 and 9 demonstrate that a significant difference emerged between the pre, post and monitoring test scores on attitude towards the science course of the students in the experimental group ($F_{(2-58)}$= 243.85; p<.05). According to the Bonferroni analysis results in Table 9, this significant difference emerged between the pretest and posttest, in favor of the posttest, and between the monitoring test and pretest, in favor of the monitoring test. According to this finding, it can be said that attitudes of the experimental group students at the end of the application process ($\bar{x}$=3.87) and three months after the application ($\bar{x}$=3.83) were significantly higher in comparison to the beginning of the application ($\bar{x}$=3.19). In addition, according to the Table 9, it can be said that the monitoring test score average that was obtained three months after the implementation phase of the research study –despite the fact that it is lower than the posttest average- the 0.04 point average between the monitoring test and posttest is not significant. This result demonstrates that the attitude levels of experimental group students towards the science course are at a similar level at the end of the application and 3 months after the application was finished. Based on these results, it can be said that the out-of-school learning environments has an impact at a significant level in terms of the development of an attitude towards the science course. The calculated effect size is $\eta 2$=0.97. As the effect size is higher than 0.14, it can be said that the effect size is high (Cohen, 1988).

4. Discussion and Conclusion

This study was conducted to examine what kind of and the impact that out-of-school learning environments have on 6th-grade student's attitude towards the science course. At the beginning of the research, the attitude levels towards the science course ($t_{(58)}$= 0.15; p>0.05) were similar for the control and experimental group students. It can be said that these finding are appropriate for the examination of the experimental process impact on control and experimental group students' attitude levels towards the science course. The research findings demonstrate that the attitude scores of the experimental group students towards the science course are meaningfully higher than the control group students at the end of the application ($t_{(58)}$= -4.93; p <0.05). Three months after the experimental process was completed, the attitude scores of the experimental group students towards the science lesson are also significantly higher than the control group students ($t_{(58)}$= -4.73; p <0.05). According to this, it may be said that out-of-school learning environments are more effective in respect of increasing the attitude levels of secondary school 6th-grade students towards the science course and ensuring the consistency of this increase after a period as 3 months in comparison to the teaching provided for the control group.

The control group students' attitude levels towards science lesson are similar at the beginning of the application, at the end of the application and three months after at the end of the application ($F_{(2-58)}$= 1.14; p>0.05). On the other hand, it was determined that the experimental group students' attitude scores at the end of the application process and three months after the application are significantly higher in comparison to the beginning of the application ($F_{(2-58)}$= 243.85; p<0.05). In addition, attitude levels of the experimental group after the research process and three months after the conclusion of the research show similarities. According to these conclusions, it may be expressed that out-of-school learning environments are affective in respect of improving the attitude levels of the sixth-grade students towards the science course and ensuring the permanency of the development in the attitude level.

When the research studies in the literature on the impact of out-of-school environments on the affective characteristics; the findings that express that out-of-school environments have positive impacts on affective characteristics such as interest and attitude draw the attention. One of these studies is the study conducted by Senturk (2009) for the purpose of examining the impact of science centers which is among the out-of-school learning environments on attitudes on science. In this study, the effect of Science Center on students' attitudes towards science was examined. An attitude scale was applied to students a week before the visit to the science center, after the visit and one week after the visit. In the study, it was reached to the conclusion that the science center has a great potential in terms of improving secondary students' attitudes towards science. When the fact that this result was obtained after an hour of a visit that is relatively short, is taken into the consideration, it was stated that science centers can be used by an educator in order to develop students' attitudes towards science. Cigrik (2008) conducted a study to determine the influence of learning activities occur in a science center on 7th-grade students' science course success, attitude and motivation. The experimental group students made the activities in a science center within a four weeks period and the control group students made it in the school laboratory. In the research, it was detected that there is a meaningful and favorable development in attitudes of students towards the science course. According to the permanency test applied to both of the groups, it was seen that the difference between the control-experiment groups maintained. In the research carried out by Cildir (2007), it was seen that Feza Gursey Science Center is an appropriate institution for adult education implementations and teachers are affected by the activity positively. Lukas & Ross (2005) investigated the effect of the Chicago Lincoln Zoo on the level of information and attitude of the visitors. In the research, it has been determined that the information and attitudes change according to the planned and programmed visits. This research's results have been shown that experiences gained in informal environments enable individuals to increase their level of knowledge and attitudes.

Ozturk (2014) tried to detect the impact of the education given in Mevlana Society and Science Center on attitudes towards scientific process skills and science. In the research, it was found out that the teaching program applied in the science center is effective in terms of enhancing scientific process skills, yet not adequately effective in terms of increasing the attitude towards science. It can be said that the cause for this result stems from the period of the experimental process that is not long enough to change the attitudes of students. In the study conducted by Cavus at al. (2013), the impact of the activities carried out in Bilgievleri (knowledge houses) on providing students environmental awareness was examined through teacher opinions. As a result of the study, it was determined that out-of-school learning environments have positive impacts on providing environmental awareness to students, and for this reason, the number of out-of-school environments and activities carried out in these environments should be increased. In the study carried out by Nadelson & Jordan (2012), it was found out that attitudes of the students are in a positive direction after a one-day field trip. In the study conducted by Tekbiyik, Seyihoglu, Konur & Vekli (2013), it was determined that the science camp improved the attitudes of primary school students towards science. Gursoy (2018) detected that out-of-school learning environments contributed to the cognitive-emotional and life skills of prospective teachers.

In the meta-synthesis study conducted by Sozer (2017), it was determined that active out-of-school learnings had a favorable impact on student's attitude towards the lesson. Bozdogan (2007) examined the impacts of trips made to science-technology museums on interest and success of students concerning scientific subjects. In the research, it was determined that the activities that are carried out in the science center and the equipment in the science center have a significant impact on improving secondary school students interest and academic success levels regarding science subjects and maintaining the continuity. Tatar & Bagriyanik (2012) found out that informal learning environments are effective in terms of increasing students' interest, willingness and curiosity according to teachers. In the study conducted by Falk & Adelman (2003); it was reached to the conclusion that out-of-school learning environments such as science museum zoo, aquarium and natural history museum contribute to the development in students' knowledge and attitudes. In the study conducted by Sahin (2012), the influence of science festivals on 10^{th} grade high school students' attitudes on chemistry was searched. In the research, it was detected that science festivals have a positive impact on the attitude towards chemistry. Knapp (2000) examined the impact of long-duration field trips which is among the informal learning environments on the memories of primary school students. In the study, it was reached to the result that the interest of the students was increased and students were able to learn permanent knowledge on the subjects that were related to the activities and exhibitions. Cicek (2008) examined whether science festival has an impact on the 2nd-grade high school students success in chemistry and increasing their attitudes towards the chemistry course. In the study, it was found that science festivals have a positive impact on improving attitudes concerning chemistry course and learning chemistry, and science festivals can be carried out in schools. In the study conducted by Yildirim & Sensoy (2016), the effect of science festivals on 6th-grade students' attitudes was examined. In the study, it was found out that the attitudes of the students towards science course increase in a positive direction through science festivals and this increase was maintained. In addition, it the studies conducted by Betts (2014), Czerniak (1996), Sorge, Newsom & Hagerty (2000), it was emphasized that science festivals contribute to the increase in attitude in a positive direction.

Yildirim & Sensoy (2018a) found out that the attitudes of 6th-grade students who participate in science festivals developed in a positive direction and this development were also maintained at the end of a three month period. In the study conducted by Cigrik (2016), it was emphasized that science centers generally make a positive contribution to the attitude towards science. In the study carried out by Bostan Sarioglan & Kucukozer (2017), it was stated that teaching provided in out-of-school learning environments is effective in respect of increasing students' attitudes towards the course. Eshach (2007) states that out-of-school learning environments have an impact on enabling students to be more willing to learn by increasing their interest and motivation. Kelly (2000) indicated that prospective teachers trust that out-of-school learning environments attract the attention of students and rise their motivation. In the research done by Sonmez, Gokbulut & Sapsaglam (2013), it was identified that out-of-school activities affects children's attitude towards science positively. In the study carried out by Bozdogan (2017), it is stated that prospective teachers express that out-of-school learning environments would provide an opportunity to learn by fun, and students can develop positive attitude and values.

In the studies made by Cavus, Oztuna Kaplan, Sunbul & Cetin (2010), De White & Jacobson (1994), Jarvis & Pell (2005), Lakin (2006), Okur (2012), Pekmez, Yilmaz & Kahveci (2010), Prokop, Tuncer & Kvasnicak (2007), Ramey-Gassert (1997), Stavrova & Urhahne (2010) and Tasdemir, Kartal & Kus (2012), it was emphasized that out-of-school learning environments improves the attitude positively.

Falk & Adelman (2003) conducted a study to inquire into the extent to which informal science teaching institutions performed their educational duties. For this purpose, they examined the change in knowledge and attitudes of visitors to the National Baltimore Aquarium. As a result of the survey, it was determined that the information and attitude after the trip had a positive development. Ertas & Sen (2017) stated that science centers which are among out-of-school learning environments improve positive attitude towards science. Guler (2011) examined the impact of a planned museum trip to the attitude of primary school students' attitude. In the research, a significant difference between control and experimental group students' attitude levels was found in favor of the experimental group. Wulf, Mayhew & Finkelstein (2010) reached the result that an informal science program has a positive impact on student's attitudes towards science. Bartley, Mayhew & Finkelstein (2009) found that after-school science activities that are based on questioning contribute to the development of fifth-grade students' attitudes. According to Ramey-Gassert, Walberg & Walberg (1994), informal learning environments have advantages of improving the attitude. In the study conducted by Randler at al. (2007), it was indicated that support of the out-of-school education and teaching activities that are conducted in formal education will reinforce existed learnings, and improve students' various affective characteristics. Research results that were obtained by Erten (2016) demonstrate that out-of-school learning environments will improve interest and positive attitude towards science course besides improving scientific process skills. Briefly, in the research studies that are given above, it was reached to the conclusion that out-of-school learning environments contribute to students' affective characteristics such as interest, motivation and attitude. As it can be seen, the given research result supports the conclusion of this study that asserts that out-of-school learning environments have a significant impact on the development of an effective variable such as attitude towards the science course.

If the conclusions of this study are summarized, it may be expressed that out-of-school learning environments contribute to the development of secondary school sixth-grade students' attitude levels towards the science course at a significant level, and this situation did not change three months after the experimental process. In addition, while the experimental and control group students' attitude towards the science course levels were similar in the beginning of the application, it was determined that the experimental group students' attitudes towards the science course were meaningfully higher than control group students at the end of the application process and three months after the application. The reason of this result that was reached in the study can be explained by the facts that active participation of students in out-of-school learning environments, learning by doing-living, the fact that the visited places arouse the interest of students as they are out-of-school locations and experiencing course subjects in real life environments.

When the positive impact of out-of-school learning environment on attitude towards science course is taken into the consideration, it can be said that it is required to include out-of-school learning environments that may appeal to individual differences in formal education process, enrich the teaching process, draw attention, make learning fun, provide an experience in a real-life environment, facilitate learning through the experiences obtained in real-life environments; to not limit education with school borders, and formal learning environments should be supported by out-of-school learning environments so as to improve attitude towards the course. In this way the objectives of benefitting from out-of-school learning environment given in the science course curricula within the scope of formal education and improving the attitude towards the science course can be reached. In the study conducted by Stocklmayer, Rennie & Gilbert (2010), it was indicated it is required to widen the integrative situation between formal and informal education in order to provide an effective science education. In the study carried out by Yildirim & Sensoy (2018b), the positive impact of informal learning environments on students' cognitive and emotional characteristics was indicated and it was emphasized that it is necessary to include informal learning environments in the learning process, to increase the number of activities made in informal learning environments and to integrate formal and informal learning environments. It can be said that proliferation of visits to out-of-school learning environments and enabling students to participate in such trips can contribute to the development of students' cognitive, affective and physical skills and their socialization. In addition, it can be suggested to make studies to examine what kind of an impact that out-of-school learning environments have on different affective-cognitive characteristics of students besides attitude.

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