TÜRK FEN EĞİTİMİ DERGİSİ
Yıl 12, Sayı 3, Eylül 2015

Journal of
TURKISH SCIENCE EDUCATION
Volume 12, Issue 3, September 2015

http://www.tused.org

The Opinions of Science and Technology Teachers Regarding the Usage of Out-Of-School Learning Environments in Science Teaching

Melike YAVUZ TOPALOĞLU[1], Fatime BALKAN KIYICI[2]

[1] PhD Student., Sakarya University, Institute of Educational Science, Sakarya-TURKEY
[2] Assoc. Prof. Dr., Sakarya University, Faculty of Education, Sakarya-TURKEY

Received: 29.01.2015 **Revised:** 20.07.2015 **Accepted:** 31.08.2015

The original language of article is English (v.12, n.3, September 2015, pp.31-50, doi: 10.12973/tused.10145a)

ABSTRACT

The goals of this study are to explore and document the science and technology teachers' opinions regarding (a) the out-of-school learning environments, (b) the contribution of these environments make to science teaching, (c) the aims of their usage in science teaching, and (d) why they are not being used in science teaching. Semi-structured interviews were conducted to elicit teachers' opinions about the current situation of out-of-school learning environments in science teaching. Study data were collected from 36 science and technology teachers in the Gölcük district of Kocaeli province in 2011-2012 academic year. Interview analyses revealed that teachers were cognizant about the role of out-of-school learning environments in the teaching and learning processes. Participants associated out-of-school learning environments with numerous examples. The teachers stated that out-of-school learning environments have a positive effect on students' cognitive and affective development. They pointed out that due to various problems that arose while carrying out these activities, they could not use these environments at the desired level. The teachers recommended solutions to these problems and stated that out-of-school learning environments could be used more often in the field of education to resolve these problems.

Keywords: Informal Learning Environments; Out-of-School Learning; Science Teaching; Teacher's Opinion.

INTRODUCTION

Today's rapidly evolving and developing knowledge base requires individuals to obtain various qualifications. The role of education is critical at this point as education means helping individuals to intentionally gain the necessary knowledge and skills, within a specific period of time, and the framework of a curriculum, in order to reach certain goals (Laçin Şimşek, 2011). In this regard, formal education plays as much an important role as informal education in bringing these qualifications to individuals (Chin, 2004; Balkan Kıyıcı & Atabek Yiğit, 2010). Learning is not only about all of the processes between teacher and student within a specific programme, it also takes place outside of school. Informal education, which means life-long learning, also involves all of the learning that exists outside of school (Eshach, 2007). In this regard, as with formal education, informal education enhances

Corresponding author e-mail: meykeyavuz@hotmail.com

individual development, increases the welfare of society, and helps the individual learn by creating a perfect environment (Türkmen, 2010).

Both formal and informal education play an important role in achieving specified goals and producing qualified individuals. Informal education includes the unintended learning that happens in the informal learning environment, such as outside of the classroom, either voluntarily or involuntarily, without any plans or programmes being set for learning time, learning support, and reaching goals (Borat, 2009). Meanwhile, learning, which is the result of educational and training activities performed within informal learning environments (according to certain plans and programmes in order to reach specific goals), is called out-of-school learning (Laçin Şimşek, 2011). Thus, Hannu (1993) describes out-of-school learning as learning that takes place within school time, within the scope of institutions and environments but outside of the physical borders of the school, yet in-line with the curriculum. Hence, informal learning and out-of-school learning differ in terms of whether or not the learning occurs within a certain plan and programme. In this regard, informal learning environments are used for out-of-school learning; these environments are called out-of-school learning environments (Wellington, 1990; Hannu, 1993). Therefore, the use of out-of-school learning environments in educational activities will help attain the goal of producing qualified individuals (Ramey-Gassert, 1997; Melber & Abraham, 1999; Anderson, Lucas & Ginns, 2003; Chin, 2004; Türkmen, 2010).

In our current technological era, it is vital to raise individuals who follow advances in science and technology, understand the natural world, use scientific knowledge, and follow scientific processes to solve problems (MEB, 2006, MEB, 2013). Hence, these individuals will be able to construct scientific knowledge, value society and nature, and are literate in science.The natural sciences taught in formal education are essential. Science confronts us with events and phenomena that occur in daily life, while involving practical applications and abstract subjects (Doğru & Balkan Kıyıcı, 2005, MEB, 2006). Consequently, science, which allows human beings to identify themselves and their surroundings, is usually recognized as one of the courses in the school curriculum, yet from time to time students may have a hard time understanding it (Kaptan & Korkmaz, 2002). Science is found in everyday life. While improvements in science help advance technology, another notion is that science is at the centre of human life; every new step in technology helps science to advance (Demirci, 1993).

For a nation's future and the progress of society, interrelated scientific and technological concepts were integrated within education, highlighting the importance of science and technology education (Tan & Temiz, 2003). Thus, the aims of science and technology education for individuals are to make sense of the nature and natural occasions, to create solutions for problems using the five senses, and to be science literate (Türkmen, 2010). However, if formal education in the classroom is applied away from real objects, facts, and events; understanding subjects related to science, and constructing them in their minds in meaningful way, may become difficult for students. A science and technology course that lacks authentic activities will not be meaningful for students. Students may develop negative attitudes towards science. Hence, the aims, objectives, and necessary learning will most likely be difficult to reach within the framework of a science and technology course. Supporting formal education with out-of-school learning environments will be a key solution in order to prevent these problems. This is because individuals interact with objects and realize facts within science topics in order to accomplish accurate and meaningful learning with the use of out-of-school learning environments (Ramey-Gassert, 1997).Thus, in order to provide accurate and meaningful learning, the use of out-of-school learning environments, for example, zoos, museums, and science centres, is attracting the attention of science educators (Smith, McLaughlin & Tunnicliffe, 1998). Many studies presented in the literature show that using out-of-school learning environments to support formal education presents an authentic

experience for students. This allows students to interact with real objects, maintains their interest, keeps their curiosity alive (Pedretti, 1997; Meredith, Fortner & Mullins, 1997), allows individuals to understand scientific concepts, and also helps students take responsibility in their later learning (Olson, Cox-Petersen & McComas, 2001). Accordingly, it is possible to list museums, nature camps, botanical gardens, planetariums, zoos, industrial institutions and national parks as the main out-of-school learning environments that will ease the process of formal science education (Hannu, 1993; Howe & Disinger, 1998; Hill, Hannafin & Domizi, 2005; Laçin Şimşek, 2011).

Studies about out-of-school learning in Turkey are limited, and usually involve studies conducted in museums, science centres, and Nature camps. Therefore, it is necessary to carry out research that investigates the effect of using out-of-school learning environments in science education, which identifies problems using these environments, and which investigates issues that limit the use of out-of-school learning environments. The importance of these learning environments for educational goals is increasing day by day. In this regard, it is necessary for teachers to be aware of these out-of-school learning environments and their effects on learning. Identifying the opinions of teachers who are executors of activities regarding out-of-school learning environments, the problems they come across, and their solutions to these problems will address their perception of out-of-school learning environments. The goals in this study are to present the opinions of teachers regarding out-of-school learning environments, and to define the issues teachers may have encountered during the application of practices in out-of-school learning environments, together with solutions they have created in order to overcome these issues.

METHODOLOGY

This research is a descriptive qualitative study where the opinions of science and technology teachers regarding the current state of out-of-school learning environments in science teaching are gathered through semi-structured interviews.

a) Participants

The study participants were 36 science and technology teachers from Gölcük, Kocaeli, during the 2011-2012 academic year. Gölcük district is close to many out-of-school learning environments. We purposively chose the Golcuk district because of its characteristic. The purposive sampling method, which allows studying information-rich groups in-depth and in-detail (Yıldırım & Şimşek, 2011) was used while selecting the study group.

Table 1. *Demographic information about the participants*

	N	%
Sex		
Female	25	69.44
Male	11	30.56
Total	36	100
Years Taught		
1-5 years	18	50
6-10 years	10	27.78
11-15 years	5	13.89
16-30 years	3	8.33
Total	36	100
BS degrees		
Science and Technology Education Graduate	33	91.67
Chemistry Education Graduate	2	5.55
Biology Graduate	1	2.78
Total	36	100

Our participants were 25 female (%69.44) and 11 male (%30.56) science and technology teachers. Eighteen of them taught 1-5 years (%50); 10 of them taught 6-10 years (%27.78); 5 taught 11-15 years (%13.89); and 3 taught 16-30 years (8.33). While 33 of the teachers were science and technology education graduates (91.67), one of the remaining three teachers was a chemistry education graduate (%2.78) while the other two were biology graduates (%5.55).

b) Instrument

In order to research the importance, usage and current state of out-of-school learning environments in science teaching, semi-structured interviews were conducted with 36 science and technology teachers. (Patton, 2002).

A review of literature on informal learning, out-of-school learning, informal learning environments, out-of-school learning environments, and the science and technology course curriculum was conducted as the semi-structured interview protocol was designed. Subsequent to the review, in the second stage, topic titles were determined. After that, an item pool which is containing the questions related to the titles was established. In the third stage, a draft protocol was generated by choosing proper semi-structured interview questions and three experts in science education reviewed the protocol. Based on the feedback, we modified the interview protocol and re-organized the questions. The final interview protocol included seven questions. Thirty-six science and technology teachers volunteered participating in the interviews. The interviews were conducted in two months. Each of the interviews took, on average, one to one-and-a-half hours, and were audio-recorded on a digital recorder. The interview data were transcribed verbatim within the next three months. Next, we analyzed the transcriptions

c) Data Analysis

We employed content analysis. The purpose of the content analysis is to adjust and explain similar and relevant information from the gathered data into a certain concept and theme. In light of this, the organized logical facts are transformed into a format that is understandable by the reader. With content analysis, data are gathered through four phases (Yıldırım & Şimşek, 2011; Charles ve Mertler, 2002). At the stage of the codification of data, the information written and edited by the researcher is divided into meaningful parts and the conceptual meaning of every single part is investigated. These parts are defined by codes (Creswell, 2003). The codes gathered from the data are classified under certain categories called themes. In the process of defining themes (Şencan, 2005), and at the stage of editing and defining the data parallel to codes and themes, the codified and themed data are edited and reformatted to be more simply understood by the reader. Within the stage of interpretation of the findings, different inferences are made from the gathered data and the findings reach significance by creating relationships between the gathered information. The data of the teachers' opinions gathered through this research is symbolized as: T1, T2, T3,.....T36. Statements gathered through content analysis are presented in *italic*, and parts that could not be defined in the teachers' opinions are presented in a series of dots.

.

FINDINGS

Findings obtained from the interviews carried out with the teachers are presented in this section.

The first interview question directed to the teachers at the interviews and analysed within the research was "What are your opinions about out-of-school learning environments?" A codification diagram based on the teachers' answers is presented in Table 2.

Table 2. *Teachers' opinions regarding out of school learning environments*

Theme	Code	Teachers	Frequency (f)	Percentage (%)	Total Percentage (%)
Learning	Learning by Doing	T1, T2, T3, T4, T5, T7, T14, T16, T17, T19, T21, T23, T24, T28, T30, T31, T32, T34	18	11.32	30.81
	Permanent Learning	T5, T,30, T31, T34, T35	5	3.14	
	earning in the Medium	T7, T12, T19, T36	4	2.51	
	Testing What is Learnt	T5, T24	2	1.26	
	Learning by Discovery	T34	1	0.63	
	Active Learning	T21	1	0.63	
	Implicit Learning	T10	1	0.63	
	Learning Well	T1, T11	2	1.26	
	Learning through Senses	T1, T5, T6, T7, T10, T12, T14, T17, T18, T30	10	6.29	
	Interpretation of Science	T4, T7, T10, T30	4	2.51	
	Acquiring various Behaviours	T28	1	0.63	
Supporting	Supplement the Course	T5, T9, T12, T15, T19, T20, T22, T26, T27, T30, T32, T33, T34, T35, T36	15	9.43	27.67
	Solidify Abstract Knowledge	T1, T4, T7, T14, T19, T20, T25, T32, T35	9	5.66	
	For the Purpose of Reinforcement	T2, T9, T11, T13, T33	5	3.14	
	Contribute to Education	T2, T8, T11, T28	4	2.51	
	Increase Retention	T4, T34	2	1.26	
	Increase Motivation	T8, T20, T24	3	1.89	
	Simplify Learning	T21, T30, T35	3	1.89	
	Take Attention in Learning	T27, T36	2	1.26	
	Implementation in curriculum	T5	1	0.63	
Affective Domain	Loving the Teacher	T6	1	0.63	9.43
	Increase Love to the Course	T6, T7, T14	3	1.89	
	Increase Interest to the Course	T8, T10, T14, T20	4	2.51	
	Students Enjoy the Course	T6, T8, T10, T14, T17, T24, T30	7	4.40	
Affect	Effect to Success	T14, T17, T33	3	1.89	4.41
	Effect Social Interaction	T9,T28	2	1.26	
	Generate Misconception	T4	1	0.63	
	Students Join Society	T11	1	0.63	
Purpose	Relate Theoretical Knowledge with Daily Life	T5, T7, T9, T10, T11, T16, T26, T27, T30, T32, T35	11	6.92	11.95
	Use Theoretical Knowledge with Daily Life	T5, T9, T12, T16, T30, T35	6	3.77	
	Recognize the Benefits of Theoretical Knowledge to Daily Life	T5, T30	2	1.26	

Table 2. *Continued*

Theme	Code	Teachers	Frequency (f)	Percentage (%)	Total Percentage (%)
Quality	Out of School	T1, T4, T5, T6, T9, T10, T11, T12, T13, T14, T16, T22, T25, T26, T27, T28, T30, T31, T36	19	11.95	15.73
	Out of Class	T1, T6, T36	3	1.89	
	Trip	T8	1	0.63	
	Observation	T5, T19	2	1.26	
			159	100	100

In Table 2, when the teachers' answers are examined it is possible to see that 30.81% of the answers contain terms about *learning* in out-of-school learning environments, 27.67% of the answers tell us that these environments are supportive, 15.03% of the answers are about the quality of out-of-school learning environments, 11.95% of the answers contain the purposes about the usage of these environments and 9.43% are about the affective domain. The remaining 4.41% mention the effects of out-of-school learning environments. When the teachers' statements are examined it is seen that the teachers' opinions are supportive about learning in out-of-school learning environments.

Some excerpts from the interviews with teachers:

Teachers	Theme	Excerpts
T14	Quality Learning Supporting Affective Domain Affect	*"… So, even if it is at home, when it is out-of-school, the lesson is considered not to be boring anymore…"*
T30	Quality Learning Supporting Affective Domain Purpose	*"I think that the things kids see outside let them be more open and learning is easier. It (outdoor learning) is considered to be in the category of learning by living and making; making learning more permanent."*
T35	Learning Supporting Purpose	*"Informal learning environments are the most permanent learning places. The most permanent learning category, which proposes the students to give live and concrete examples."*

The second interview question was "Can you give examples of out-of-school learning environments?" The coding scheme created from the answers given by the teachers during the interview is presented in Table 3.

.

Table 3. *Teachers' opinions regarding examples of out of school learning environments*

Theme	Code	Teachers	Frequency (f)	Percentage (%)	Total Percentage (%)
Industrial Organizations	Wind Power Plant	T10	1	0.63	10.06
	Power Station	T20, T23	2	1.26	
	Factory	T3, T8, T9, T10, T11, T12, T19, T32	8	5.03	
	Recycling Plants	T9, T10, T11, T21, T27	5	3.14	
Multipurpose Institutions and Organizations	Zoos	T1, T2, T5, T6, T8, T9, T10, T14, T17, T18, T19, T20, T21, T24, T26, T27, T29, T30, T31, T32, T33, T34, T36	23	14.46	33.32
	Museums	T8, T14, T17, T23, T24, T26, T27, T31, T33	9	5.66	
	Botanical Gardens	T1, T5, T7, T14, T20, T21, T26, T34	8	5.03	
	Science and Technology Museums	T2, T3, T21, T34	4	2.51	
	Monuments	T1	1	0.63	
	Observatories	T3, T5, T16, T36	4	2.51	
	Aquariums	T5	1	0.63	
	Science Centres	T3, T5	2	1.26	
	Meteorological Station	T18	1	0.63	
Health Organizations	Hospitals	T7, T12, T17, T18, T35, T36	6	3.77	4.40
	Hot Springs	T1	1	0.63	
Information Communication Technologies	Newspaper	T24	1	0.63	7.56
	Television/	T25, T27, T30	3	1.89	
	Radio	T29, T30	2	1.26	
	Computer Software	T26, T28, T33	3	1.89	
	Internet	T27, T33	2	1.26	
	Computer Games	T4	1	0.63	
Agencies that Support Education	Private Teaching Institution	T13, T15, T33	3	1.89	11.32
	Study Centres	T13	1	0.63	
	Laboratory	T2, T5, T7, T19, T20, T34	6	3.77	
	Student Knowledge Hall	T15	1	0.63	
	Science and Technology Club	T1, T8, T16, T24, T26, T27	6	3.77	
	Private Lessons	T33	1	0.63	
Organizations	Science Fair	T1, T8, T14	3	1.89	7.55
	Science Festival	T2, T5, T7, T17, T31	5	3.14	
	Exhibition	T5, T7, T12	3	1.89	
	Book Fair	T8	1	0.63	
Open Public Space	Nature	T5, T9, T10, T14, T19, T28, T30, T35	8	5.03	15.73
	Garden	T6, T9, T16, T27, T30, T31, T36	7	4.40	
	Lakeshore	T11, T26	2	1.26	
	Picnic Place	T12, T35	2	1.26	
	Forest	T19	1	0.63	
	Sea	T19	1	0.63	
	Vegetable Glasshouse	T19, T27	2	1.26	
	Street	T22, T35	2	1.26	
Places of Entertainment	Cinema	T6, T14	2	1.26	3.78
	Circus	T6	1	0.63	
	Theatre	T8	1	0.63	
	Ice-Skating Rink	T10	1	0.63	
	Sound Studio	T18	1	0.63	
Nearby Environments	Family	T28	1	0.63	6.29
	Home	T9, T13, T14, T15, T22, T27, T29, T30, T33	9	5.66	
			159	100	100

In Table 3, when the teachers' answers are examined, it possible to see that 33.32% of the examples were related to multi-purposed foundations-corporations and centres, 15.73% of the examples were related to open public spaces, 11.32% of the examples were related to school-assistant units and 10.06% of the examples were related to industrial foundations. A further 7.56% emphasized information communication technologies in order to illustrate out-of-school learning environments, 7.55% exemplify the organizations that are made, 6.23% exemplify the near surroundings, and 4.40% exemplify health corporations. The rest: 3.78% mention recreation areas.

Some excerpts from the interviews with the teachers:

Teachers	**Theme**	**Excerpts**
T1	Multipurpose Institutions and Organizations Health Organizations Organizations Agencies that Support Education	*"…In order to find it out about how to use thermal energy sources, nearby places such as the zoo in Darıca, the Science and Technology fair in Kocaeli, 'Yuruyen Kosk' and the botanical park in Yalova, the natural statue in Uluçınar, Bursa, could be visited."*
T8	Industrial Organizations Multipurpose Institutions and Organizations Places of Entertainment Organizations Agencies that Support Education	*"For example, even a school garden could be an informal learning environment because it involves a science lesson." "… Additionally, we have our tours to the factories here…"*
T22	Open Public Space Nearby Environments	*"So, by mentioning informal learning environment, if you don't say it is definitely here, and ask is it anywhere informal, I'd say everywhere. Home, streets, every place you step, even everywhere you breathe is a learning environment, in my opinion."*

The third interview question was "How do you think the usage of out-of-school learning environments would contribute to the learning process?" The coding scheme created from the answers given by the teachers during the interviews is presented in Table 4.

Table 4. *Teachers' opinions regarding the contribution of out-of-school learning environments to education*

Theme	Code	Teachers	Frequency (f)	Percentage (%)	Total Percentage (%)
Learning	Permanent Learning	T3	1	1.22	32.94
	Individual Learning	T3, T16, T17, T28	4	4.88	
	Learning by Doing	T3, T10, T16, T17, T19, T21, T29, T31, T33, T35	10	12.20	
	Learning through Senses	T3, T8, T17, T20, T23, T33, T35	7	8.54	
	Easily Learning	T28	1	1.22	
	Comprehensive Learning	T30	1	1.22	
	Short Term Learning	T36	1	1.22	
	Learning through Multiple Intelligence	T1, T35	2	2.44	
Affective Domain	Feel Comfortable	T7, T30	2	2.44	9.76
	Love to the Course	T10	1	1.22	
	Prevent Get Boring	T14, T24, T30	3	3.66	
	Increase Interest to the Course	T30	1	1.22	
	Increase Interest to Science	T26	1	1.22	
Affect	Prevent Forgetting	T8, T20, T21, T28, T30, T31	6	7.32	14.64
	Increase Success	T14	1	1.22	
	Increase Retention	T4, T33, T34, T35	4	4.88	
	Increase Motivation	T8	1	1.22	
Scientific Process Skills	Problem Solving Skills	T22	1	1.22	6.12
	Make inferences	T22	1	1.22	
	Have different perspectives	T22, T28	2	2.44	
	Observation	T3	1	1.22	
Supporting	Supplement the Teacher	T2, T11	2	2.44	36.60
	Supplement the Course	T5, T11, T12, T20, T33	5	6.10	
	Solidify Abstract Knowledge	T3, T23, T25	3	3.66	
	Create a Basilar to Future Learning	T34	1	1.22	
	Provide Discovery Chance	T4, T20	2	2.44	
	Provide Opportunity for Socialization	T7	1	1.22	
	Rehearsal / Reinforcement of Course	T13, T32	2	2.44	
	Provide Opportunity for Self Knowledge	T7, T22	2	2.44	
	Provide Opportunity for Self Assessment	T7	1	1.22	
	Provide Opportunity to Practice Theoretical Knowledge	T5, T9, T16, T17, T33	5	6.10	
	Choice of Profession	T12	1	1.22	
	Provide Opportunity to Relate Knowledge with Daily Life	T15, T27	2	2.44	
	Prevent Rote Learning	T15, T27	2	2.44	
	Set Intellectual Connections	T28	1	1.22	
			82	100	100

In Table 4, when the teachers' answers are examined, it is possible to see that 36.60% of the teachers think that it is supportive, 14.64% think it is effective, 32.94% think it is about learning, 9.76% mention about affective domains, and the remaining 6.12% mention about scientific process skills. Analyses revealed that a lot of the teachers state that usage of out-of-school learning environments supports teaching and eases/enriches learning.

Some excerpts from the interviews with teachers:

Teachers	Theme	Excerpts
T3	Learning Scientific Process Skills	*"… In the school environment everything is theory. This makes things stay abstract. It subjects) will provide a permanent learning for children to see, touch, live and investigate things themselves."*
T7	Affective Domain Supporting	*"… In a different environment, the child will both feel free and get the chance to explain the issue. …Will get a chance to analyse what he/she could and could not learn…"*
T8	Learning Affect	*"… Its effect is huge, its effects reach 90%, maybe even 100%. The student cannot forget what he/she has experienced, cannot forget what he/she had seen…"*

The fourth interview question asked "Are you using out-of-school learning environments?" When the teachers' responses were coded, 61.11% of the teachers reported that they use out-of-school learning environments, but 38.89% mentioned they did not use out-of-school learning environments. Analyses revealed that that most of the teachers use out-of-school learning environments.

Teachers who mentioned they were using out-of-school learning environments were asked "For what purpose do you use them?" The code schemes emerged from the teachers' answers are presented in Table 5.

Table 5. *Opinions of teachers who use out-of-school learning environments, regarding the purpose of using these environments*

Theme	Code	Teachers	Frequency (f)	Percentage (%)	Total Percentage (%)
Supplement to Subjects	In Velocity Unit	T1, T19	2	5.41	51.35
	Subjects Related to Flowering and Non-Flowering Plants	T7, T9	2	5.41	
	In Environment Related Subjects	T26	1	2.70	
	In Light Unit	T35	1	2.70	
	In Units Related to Animals	T30, T32	2	5.41	
	In Chemical Equations Unit	T36	1	2.70	
	In Pressure Unit	T36	1	2.70	
	In Related Units	T22	1	2.70	
	While Teaching a Lesson	T5, T6, T11, T12, T14, T19, T20, T22	8	21.62	
Contribution to Students	Review the Course	T13	1	2.70	21.62
	Solidify Abstract Knowledge	T3, T19, T20	3	8.11	
	Inform	T26	1	2.70	
	Supplement to the Homework	T35	1	2.70	
	Trip/Observe	T1, T8	2	5.41	

Table 5. *Continued*

Theme	Code	Teachers	Frequency (f)	Percentage (%)	Total Percentage (%)
Affect	Boring	T14	1	2.70	10.80
	Success	T14	1	2.70	
	Interest	T2	1	2.70	
	Curiosity	T2	1	2.70	
Learning	Learning of Plant Species	T7, T20	2	5.41	10.82
	Permanent Learning	T8, T19	2	5.41	
Learning Environment	Environment for Learning Well	T27	1	2.70	5.40
	Create Different Learning Environments	T24	1	2.70	
			37	100	100

Table 5 represents that 51.35% of the teacher participants viewed the use of these environments is helpful for the subjects taught, 21.62% of the teachers think that they benefit students, 10.82% think that they have a role in learning, 10.80% think that they have positive effects and 5.40% think that they provide a learning environment. Half of the participants mentioned that the purpose of using out-of-school learning environments is that they are beneficial to the subjects.

Teachers who mentioned they were not using them (out-of-school learning environments) were asked "Why don't you use them?" The coding schemes emerged from the teachers' responses are presented in Table 6.

Table 6. *Teachers' opinions regarding reasons for not using out-of-school learning environments*

Theme	Code	Teachers	Frequency (f)	Percentage (%)	Total Percentage (%)
Teachers Quality	Served for a Long Time	T15	1	5.88	47.05
	Being Newly Appointed	T23, T25, T29, T34	4	23.53	
	Do not Feel the Need	T18	1	5.88	
	Feel Anxious	T33	1	5.88	
	Express Verbally	T4	1	5.88	
School's Condition	Financial Difficulties	T17, T21, T28	3	17.65	29.41
	Transporting Students Daily to a Central School	T10	1	5.88	
	Laboratory Sufficiency	T34	1	5.88	

Table 6. *Continued*

Theme	Code	Teachers	Frequency (f)	Percentage (%)	Total Percentage (%)
Process	Problems Experienced in Planning	T10	1	5.88	11.76
	Being in Planning Stage	T16	1	5.88	
The Content of Science and Technology Programme	Covering the Last Units	T31	1	5.88	11.76
	Shortage of Time	T28	1	5.88	
			17	100	100

In Table 6, 47.05% of the teachers give the reason as teacher quality, 11.76% give condition of school and 11.76% give content of the science and technology programme as the reason. Nearly half of the teachers think the reason for not using out-of-school learning environments is the qualification of the teachers.

Some excerpts from the interviews with teachers:

Teachers	Theme	Excerpts
T18	Teachers Quality	*"No, I did not use them. I did not really need to use them, they are indeed necessary, but I simply didn't."*
T35	Contribution to Students	*"If it is something to observe only in daytime, we have lessons in the school garden."*

The fifth interview question asked "While using out-of-school learning environments as an educational resource what problems have you encountered, or may encounter, and what do you suggest in order to solve these problems?"

Teachers' opinions about existing problems and problems they may possibly run into while using out-of-school learning environments were identified from the interview data. The codification diagram, based on the teachers' answers, is presented in Table 7.

Table 7. *Teachers' opinions regarding problems they faced/will face while using out-of-school learning environments*

Theme	Code	Teachers	Frequency (f)	Percentage (%)	Total Percentage (%)
Parents	Socio-Economic Condition	T1, T6, T7, T16, T17, T18, T21, T22, T23, T24, T35	11	7.48	9.52
	Unconsciousness of the Parents	T13, T15, T31	3	2.04	
Student	Private Teaching Institution	T3, T21	2	1.36	2.04
	Students' Readiness	T32	1	0.68	

Table 7. *Continued*

Theme	Code	Teachers	Frequency (f)	Percentage (%)	Total Percentage (%)
School's Condition	Crowdedness of Students	T4, T13, T14, T21, T34	5	3.40	19.04
	Dual System in Education	T3	1	0.68	
	Attitude of Executives	T6, T7, T17, T20, T22, T28, T34	7	4.76	
	Financial Impossibility	T1, T5, T7, T8, T12, T15, T16, T19, T21, T25, T26, T28, T29, T30, T32	15	10.20	
Teachers	Responsibility	T1, T24, T25	3	2.04	12.92
	Student Control	T9, T14, T20, T21, T25, T27, T28, T31, T34	9	6.12	
	Safety of Students	T14, T17	2	1.36	
	Being Organized	T15, T20, T26, T27, T31	5	3.40	
Science and Technology Programme	Lack of Class Hours	T1, T23, T24	3	2.04	8.16
	Insufficiency in Time to Teach all Units in the Curriculum	T2, T11	2	1.36	
	Mismatch of Class Hours with the Content	T23, T30	2	1.36	
	Not Teaching a Lesson	T8, T10, T21, T27, T30	5	3.40	
Time	Length of Time Spent Getting Permission	T8, T10, T11, T12, T28, T31	6	4.08	5.44
	Students' Readiness	T32	1	0.68	
	Length of Time Spent in Intervention	T20, T29	2	1.36	
Transportation	Transportation Problem	T3, T16, T25, T30, T32	5	3.40	10.88
	Supply of Vehicle	T5, T9, T12, T26, T32	5	3.40	
	Road Safety	T9	1	0.68	
	Distance of Environments	T1, T2, T8, T12, T32	5	3.40	
			147	100	100

From Table 7, it is seen that 31.96% of the teachers' answers were about official correspondence, 19.04% about school situations, 12.92% emphasize the teachers, 10.88% are about transportation, 9.52% about the parents, 8.16% about the science and technology curriculum and 5.44% about time; finally 2.04% are about the students. The answers show that most of the teachers associated the problems they run into (or will run into) with official correspondence

Some excerpts from interviews with the teachers:

Teachers	Theme	Excerpts
T17	Parents School's Condition Teachers	*"Student security, because I take responsibility for the student..."*
T21	Parents School's Condition Teachers Student Science and Technology Programme	*"...for example in schools where there are only two or three classes, you can't perform all of them at the same time, you need to divide them into days, but time is a constrain*
T23	Parents Science and Technology Programme	*"...Because of matters about the student being ready, insufficient weekly course hours, the inconsistency between the syllabus and course hours."*

Teachers' opinions about suggestions for overcoming problems they may possibly run into (or the problems they already have) while using out-of-school learning environments are presented in Table 8.

Table 8. *Teachers' opinions regarding overcoming the problems they faced/will face while using out-of-school learning environments*

Theme	Code	Teachers	Frequency (f)	Percentage (%)	Total Percentage (%)
Parent	Raising Awareness of Parents	T6, T13, T15, T23, T25, T27, T32, T36	8	9.52	11.90
	Parents Can Take Their Children Away	T7	1	1.19	
	Parents Can Come to Trip	T9	1	1.19	
School's Condition	Class Size Can Be Diminished	T3, Ö13	2	2.38	4.76
	Schools Can Allocate Money	T17, T18	2	2.38	
Teacher	Briefing about the Use of Environments	T5	1	1.19	14.28
	Moral Support	T17, T20, T28, T36	4	4.76	
	Doing Organization Well	T26	1	1.19	
	Prefer Nearby Environments	T22, T36	2	2.38	
	School Principle's Support	T20, T28	2	2.38	
	Activities Can Be Flexible	T20	1	1.19	
	Grouping Students	T34	1	1.19	

Table 8. *Continued*

Theme	Code	Teachers	Frequency (f)	Percentage (%)	Total Percentage (%)
Official Correspondence	Permission Can Be Made Easier	T8, T11, T33	3	3.57	3.57
Student	Should Be Informed	T28, T31	2	2.38	2.38
Science and Technology Programme	Reducing Content	T2	1	1.19	13.09
	Can Be Added to the Programme	T1, T3, T4, T19, T24	5	5.95	
	Can Be Made Obligatory	T5	1	1.19	
	Education Programme Can Be Arranged	T14, T26, T23, T35	4	4.76	
Financial Possibility	Ministry of Education Can Be Sponsor	T1, T16, T21, T29	4	4.76	23.80
	Sponsors Can Be Found	T20, T29, T30	3	3.57	
	School Council Can Support	T20, T29, T30	3	3.57	
	Parents Can Support	T20, T28, T32	3	3.57	
	City Hall Can Support	T16, T21, T25, T26, T29, T30	6	7.14	
	Activities Can Be Conducted by City Hall	T7	1	1.19	
Time	Permission Can Be Taken Soon	T10, T33	2	2.38	9.52
	Extra Time	T1, T3, T5, T24	4	4.76	
	Can be at the Weekend	T21, T34	2	2.38	
Ministry	Programme Can Be Monitored	T4	1	1.19	14.28
	Exam Based Education Should Be Given Up	T3, T5, T7, T10, T11, T12	6	7.14	
	Extra Teachers Should Be Charged	T13, T36	2	2.38	
	Class Hours Should Be Extended	T18	1	1.19	
	Take These Environments to School	T7, T12, T19	3	3.57	
Environments' Features	Out of School Learning Environments Should Be Improved	T1	1	1.19	1.19
			84	100	100

Table 8 shows that 23.8% of the statements were about finances resources. It also shows that 15.47% of the statements mentioned the Ministry of Education, 14.28% put emphasis on teachers, 13.09% were about a science and technology programme, 11.9% were about parents and 9.52% were about time. In addition to these 4.76% were about the condition of the school, 3.57% were about official correspondence, 2.38% were about students, and the remaining 1.19% of the statements mentioned features of the environment. The majority of

the teachers related their suggestions to problems that have emerged (or may emerge) while using out-of-school learning environments with money (or finances).

Some excerpts from the interviews with teachers:

Teachers	Theme	Excerpts
T17	School's Condition Teacher	*"...The school for example, sparing the resource for this class. Sparing the resource for science and technology class, saying that they are giving this resource to us, and we will teach this, this and that."*
T20	Teacher Financial Possibility	*"To resolve, we need the families to be present in the same area, because they somehow collect their children when they are around, we need to work in cooperation with the families..."*
T24	Science and Technology Programme Time	*"...Informal learning environments need to be included in the syllabus and time should be allocated. May be included into the programme. Every week, four hours can be allocated for science and one hour can be allocated for these kind of activities."*

DISCUSSION

The goals of this study were to elicit teachers' opinions about out-of-school learning environments, the contribution of these environments to science education, and why teachers use them or why they do not use them. Most of the teacher participants' opinions were classified under the themes of "learning that takes place in out-of-school learning environments; using out-of-school learning environments to support formal education; the effects of these environments on students; and their for reasons going to these environments." In addition, other opinions emphasize the quality of out-of-school learning environments. In their studies, Randler, Kummer and Wilhelm (2012), similar to the opinions of the teachers in this study, emphasized that out-of-school learning environments have a positive effect on students' learning processes and should be used supplementary to formal education.

Similarly, when the educational attainments and activities included in the curriculum of science and technology teaching of the MEB Head Council of Education and Morality were analysed, it is apparent that most of the topics included in the science and technology course are associated with out-of-school learning environments. Various educational trip-observation activities were included in the curriculum in order for students to gain knowledge and skills. Among the units these activities included are Reproduction, Growth and Development in Animals, What does the Earth's Crust consist of? in 6th grade; the units Human and Nature, Solar System and Beyond: Space Puzzle in 7th grade; and the unit Matter and its Features in 8th grade. According to the curriculum, these activities can be carried out in out-of-school learning environments, for example, zoos, observatories, hydroelectric plants, national parks, lakesides and field areas such as streams and soil (MEB, 2006; MEB, 2013).

It can be stated that teachers took part in this study were aware of the positive effects of out-of-school learning environments on students' learning. When the opinions of teachers using out-of-school learning environments were considered and that they were asked why they used them, along with their opinions regarding the contribution of these environments to education, it was apparent that they supported the use of out-of-school learning environments in education. They felt that these environments eased and enriched learning, while also positively affecting the student's affective and cognitive domain development. Several studies in the literature have presented similar findings with the present study (Falk & Adelman, 2003; Chin, 2004; Lukas & Ross, 2005; Braund & Reiss, 2006; Randler, Baumgärtner, Eisele

& Kienzle, 2007; Kenny, 2009; Randler, Kummer & Wilhelm, 2012; Dohn 2013; Khalil & Ardoin, 2011; Yavuz & Balkan Kıyıcı, 2012). In this study, examples of out-of-school learning environments asserted by the teachers are multipurpose institutions and centres, public places, industrial institutions, training units, organizations, information communication technologies, immediate surroundings, recreation spaces and health institutions. The examples out-of-school learning environments asserted by the teachers are coherent with literature. Hence, Laçin Şimşek (2011) and Hill, Hannafin and Domizi (2005) stated that these aforementioned environments present opportunities for out-of-school learning. Private teaching institutions, etude centres, laboratories, student information houses, science and technology societies, private lessons and such kind of education units and activities were among the examples. These environments were perceived as out-of-school learning environments by the teachers simply because educational activities also occurred in these areas as well as outside of the classroom.

The quality of teachers, a school's condition, the process and content of science and technology programmes were stated as reasons for not using out-of-school learning environments in teaching. While teachers were able to associate out-of-school learning environments with educational activities, a finding not to be overlooked is that 38.89% of the teachers did not use out-of-school learning environments. When the reasons for not using these environments were analysed, the findings show that it was mostly about the qualification of the teachers who conducted these activities. Financial limitations, not believing that it is necessary, and lacking the experience of conducting these kinds of activities before were reported as the main reasons why teachers did not use the environments.

As emphasized by Dewitt and Osborne (2007), the main reason is the great responsibility teachers need to take in order to reach the goals when using out-of-school learning environments, and the factors that need to be taken into consideration. In this regard, the biggest problem encountered by teachers who want to use out-of-school learning environments is the process related with the official correspondence. Although they are aware of the positive effects of out-of-school learning environments on students, they choose not to use these kinds of environments due to the length, complexity, and sometimes the negative results, of the administration process. Teachers reported the following problems: the prolonged dual education system, excessive number of students, the attitude of current school managers, and lack of financial opportunities in schools.

Similarly, Meiers (2010) stated that budget cuts and standardized test applications lowered the number of trips to the informal learning environments. Meiers provided the reasons as managers, teachers, application length in programme, and attitudes towards trips. The problems that relate to the quality of the teachers were defined as the teachers' organisational capabilities, supervising, and providing security for them. Griffin and Symington (1997) stated that trips to out-of-school learning environments can be stressful for teachers due to the trip itself, together with its organisation. Suggested solution for overcoming these problems can be listed as: improvements in finances, improvements that can be done under the control of the Ministry of Education, and improvements related to the role of the teacher in this process. A connection can be seen between the problems stated by teachers and solutions suggested by teachers.

CONCLUSION and SUGGESTIONS

Teachers stated that they are aware of the necessity of using out-of school learning environments in educational activities and provided many examples. At the same time, they put emphasize on the fact that out-of-school learning environments can contribute to teaching by easing and enriching the learning process, and affect the various affective and cognitive

features of the students. Even though science and technology teachers are aware of the importance of using these kinds of environments in the science and technology curriculum, they have mentioned that they are not able to do so (or will not be able to do so), primarily due to difficulties in the processes of administrative permissions and for many other reasons.

Teachers have stated that if the current problems were eliminated, out-of-school learning environments would be more usable in education activities, and suggested solutions to the problems that might emerge or had already emerged. Therefore, in addition to this study, similar long term and extensive empirical studies concerned with the effects of out-of-school learning environments should be conducted with different age groups, different grade levels, different topics and courses. At the same time, studies should be designed to define the proficiency of teachers related to their level of ability in using out-of-school learning environments.

REFERENCES

Anderson, D., Lucas, K. B., & Ginns, I. S. (2003). Theoretical perspectives on learning in an informal setting. *Journal of Research in Science Teaching 40*(2), 177-199.

Balkan Kıyıcı, F.,& Atabek Yiğit, E. (2010). Science education beyond the classroom: A field trip to wind power plant. *International Online Journal of Science Education, 28*(12),1373-1388.

Borat, O. (2009). *İnformal öğrenme sisteminin kurulması için örgün ve yaygın öğrenme sistemlerinin incelenmesi.* "Hayat Boyu Öğrenme Kapsamında Türkiye'de İnformal Öğrenme Üzerine Ortak Bir Anlayış Geliştirme ve Farkındalık Oluşturma" projesi konferansları bildiri kitabı. Ankara: MEB TTK yayınları.

Braund, M.,& Reiss, M. (2006). Towards a more authentic science curriculum: The contribution of out-of-school learning. *International Journal of Science Education, 28*(12), 1373-1388.

Charles, M. C.,& Mertler, C. A. (2002). *Introduction to educational research* (4th ed.). Boston, MA: Allyn & Bacon.

Chin, C-C. (2004). Museum experience: A resource for science teacher education. *International Journal of Science and Mathematics Education, 2*, 63-90.

Creswell, J. (2003). *Research design: Qualitative, quantitative and mixed methods approaches* (2nd ed.). Thousand Oaks, CA: SAGE Publications.

Demirci, B. (1993). Çağdaş fen bilimleri eğitimi ve eğitimcileri. *Hacettepe Üniversitesi Eğitim Fakültesi Dergisi, 9*, 155-160.

DeWitt, J.,& Osborne, J. (2007). Supporting teachers on science-focused school trips: Towards an integrated framework of theory and practice. *International Journal of Science Education, 29*(6), 685-710.

Doğru, M. & Kıyıcı, T. (2005). İlköğretimde fen ve teknoloji öğretimi. M. Aydoğdu ve T. Kesercioğlu (Editör), *Fen eğitiminin zorunluluğu* s. 1-24. Ankara: Anı Yayıncılık.

Dohn, N. B. (2013). Upper Secondary Students' Situational Interest: A case study of the role of a zoo visit in a biology class. *International Journal of Science Education, 35*(16), 2732-2751.

Eshach, H. (2007). Bridging in-school and out-of-school learning: Formal, non-formal, and informal education. *Journal of Science Education and Technology, 16*(2), 171-190.

Falk, J.H.,& Adelman, L.M. (2003). Investigating the impact of prior knowledge and interest on aquarium visitor learning. *Journal of Research in Science Teaching, 40*(2), 163-176.

Griffin, J.,& Symington, D. (1997). Moving from task-oriented tolearning-oriented strategies on school groups. *Science Education, 81*, 763-779.

Hannu, S. (1993). Science Centre Education. Motivation and Learning in Informal Education. Unpublished doctoral dissertation. Helsinki University, Finland.

Hill, J.R., Hannafin, M. J.,& Domizi, D. P. (2005). Resource-based learning and informal learning environments: Prospects and challenges. L.T. Wee Hin, & R. Subramaniam (Ed.). *E-learning and virtual science centers*. USA, PA: Information Science Publishing.

Howe, R.W. & Disinger, J.F. (1998). Teaching environmental education using out-of-school settings and mass media. ERIC/SMEAC *Environmental Education Digest*, No. 1, ED 320 759.

Kaptan, F. ve Korkmaz, H. (2002, Eylül). *Probleme dayalı öğrenme yaklaşımının hizmet öncesi fen öğretmenlerinin problem çözme becerileri ve öz yeterlik inanç düzeylerine etkisi*. V. Ulusal Fen Bilimleri ve Matematik Eğitimi Kongresi, Ankara.

Kenny, H.A. (2009). Monkeying Around: Examining the Effects of a Community Zoo on The Science Achievement of Third Graders. Unpublished dissertation. The University of Toledo, Ohio, USA.

Khalil, K.,& Ardoin, N. (2011). Programmatic evaluation in association of zoos and aquariums–accredited zoos and aquariums: A literature review. *Applied Environmental Education & Communication, 10*(3), 168-177.

Laçin Şimşek, C. (2011). Okul dışı öğrenme ortamları ve fen eğitimi. C. Laçin-Şimşek (Editör), *Fen öğretiminde okul dışı öğrenme ortamları* (1.Baskı.), s. 1-23. Ankara: PegemA.

Lukas, K. E.,& Ross, S.R. (2005). Zoo visitor knowledge and attitudes toward gorillas and chimpanzees. *The Journal of Environmental Education, 36*(4), 33-48.

MEB (2006).*Talim ve Terbiye Kurulu Başkanlığı, İlköğretim Fen ve Teknoloji Dersi (6, 7 ve 8. Sınıflar) öğretim programı*. Ankara: MEB Yayınları.

MEB. (2013). *İlköğretim Kurumları (İlkokullar ve Ortaokullar) Fen Bilimleri Dersi (3, 4, 5,6,7 ve 8. Sınıflar) Öğretim Programı*. Ankara: MEB Yayınevi.

Meiers, N.J. (2010). *Designing effective field trips at zoos and aquariums: A literature review*. Middlebury College, Vermont. 16.01.2012 tarihinde http://middlab.middlebury.edu/files/2010/08/LitReviewmeiers.pdf adresinden erişilmiştir.

Melber, L.H. & Abraham, L.M. (1999). Beyond the classroom: Linking with informal education. *Science Activities, 36*, 3-4.

Meredith, J.E., Fortner, R.W.,& Mullins, G.W. (1997). Model of affective learning for non formal science education facilities. *Journal of Research in Science Teaching, 38*(8), 805-818.

Olson, J.S., Cox-Petersen, A.M.,& McComas, W.F. (2001). The inclusion of informal environments in science teacher preparation. *Journal of Science Teacher Education, 12*(3), 155-173.

Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed). Thousand Oaks, CA: Sage Publications.

Pedretti, E. (1997). Septic tank crisis: A case study of science, technology and society education in an elementary school. *International Journal of Science Education, 19*(10), 1211-1230.

Ramey-Gassert, L. (1997). Learning science beyond the classroom. *The Elementary School Journal, 4*, 433-450.

Randler, C., Baumgartner, S., Eisele, H.,& Kienzle, W. (2007). Learning at workstations in the zoo: A controlled evaluation of cognitive and affective outcomes. *Visitor Studies, 10*(2), 205-216.

Randler, C., Kummer, B.,&Wilhelm, C. (2012). Adolescent learning in the zoo: Embedding a non-formal learning environment to teach formal aspects of vertebrate biology. *Journal of Science Education and Technology, 21*(3), 384-391.

Şencan, H. (2005). *Sosyal ve davranışsal ölçümlerde güvenilirlik ve geçerlilik* (1.Basım). Ankara: Seçkin Yayıncılık Sanayi ve Ticaret AŞ.

Smith, W.S., McLaughlin, E.,& Tunnicliffe, S.D. (1998). Effect on primary level students of in-service teacher education in an informal science setting. *Journal of Science Teacher Education, 9*(2), 123-142.

Tan, M.,& Temiz, K.B. (2003). Fen öğretiminde bilimsel süreç becerilerinin yeri ve önemi. *Pamukkale Üniversitesi Eğitim Fakültesi Dergisi,13*(1), 89-101.

Türkmen, H. (2010). İnformal (sınıf-dışı) fen bilgisi eğitimine tarihsel bakış ve eğitimimize entegrasyonu. *Çukurova Üniversitesi Eğitim Fakültesi Dergisi, 3*(39), 46-59.

Wellington, J. (1990). Formal and informal learning in science: The role of the Interactive Science Centres. *Physics Education, 25*, 247-252.

Yavuz, M.,& Balkan Kıyıcı, F. (2012). Science and technology teachers' opinions regarding the usage of zoos in science teaching. *The Online Journal of New Horizons in Education, 2*(4), 21-33.

Yıldırım, A.,& Şimşek, H. (2011). *Sosyal bilimlerde nitel araştırma yönteml*eri (8.Baskı). Ankara: Seçkin Yayıncılık.