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SCIENCE EDUCATION IN OUTDOOR LEARNING ENVIRONMENTS FROM THE PERSPECTIVE OF PRESCHOOL TEACHERS: DEFINITIONS, OPPORTUNITIES, OBSTACLES, AND POSSIBLE SOLUTIONS

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ABSTRACT

The present study aims to reveal the opinions of pre-school teachers concerning science education in outdoor learning environments in terms of the definition of the subject matter, opportunities, obstacles, and possible solutions. 105 pre-school teachers participated in this study. In the study, a questionnaire consisting of open-ended questions prepared by the researchers was used as a data collection tool. The collected data were analyzed with two-step content analysis. As a result, teachers define outdoor learning as learning everywhere outside of school, the environments where they think that science activities can be carried out is mostly park-garden-forest, nine of the teachers do not teach science from outside of school, 13 of them do partially, 83 teachers stated that they teach science outside of school. Those who teach science, who do not perform science activities put forward reasons such as ensuring safety, permit procedure and cost, they think that outdoor learning environments provide students with the opportunity to learn permanently, learn by doing and and through experience, learn in a natural environment; they have difficulty of control and safety problems in these environments, It has been determined that they think that solutions can be found in the design of schoolyards and raising awareness among families.Considering the results of the study, suggestions are presented for what can be done in outdoor learning environments and for future studies.

Keywords: Outdoor Learning, Science, Science Education, Pre-School Teacher

INTRODUCTION

Science education usually takes place in three learning environments: the classroom, the laboratory, and outdoor learning environments (Funderburk, 2016). Putting many scientific concepts into practice through experimental and real-life means is vital. In this regard, it indicates that learning does not exclusively take place in the classroom setting but also in places where social life takes place such as museums, zoos, botanical gardens, playing grounds, civil society organizations, stadiums, and hospitals (Yurtkulu, Şare Akkuş & Laçin Şimşek, 2017). Şen (2019) states that individuals' learning processes are divided into two as formal and informal learning and that out of school learning carried out in out of school environments should enrich / support formal teaching.

Outdoor learning activities are crucial as far as the discovery of nature, social experiences, and concrete living experiences by students are concerned (Tal, Bamberger & Morag, 2005). Outdoor learning environments are also proven effective in increasing the interest and success in science classes among

students (National Research Council [NRC], 2009). The review of the relevant literature reveals that outdoor learning environments have positive effects on the attitudes, values, and beliefs among students; that they influence learning about various scientific subjects by exploration as well as the improvement of curiosity; that they allow first-hand knowledge acquisition; that they create opportunities for observations and social interactions; that they contribute to personal development; that they facilitate learning and contribute to the development of scientific skills such as observation, data collection, analysis, inference, and interpretation (Balkan Kıyıcı & Atabek Yiğit, 2010; Erten & Taşçı, 2016; Kefi, 2016; Strauss & Terenzini, 2007). In addition, Çiçek and Saraç (2019) stated that activities carried out in out-of-school learning environments support individuals' science literacy skills and Bostan Sarıoğlan and Küçüközer (2017) stated that they provide permanent learning.

Studies show that students make research, become more curious, ask questions, and assume responsibilities in outdoor learning environments while teachers opting for such environments tend to prefer inquiry approaches in their courses (Thomas, 2010). There are many potential reasons for this. However, one might argue that one of the most important reasons is the fact that the teacher is no longer at the center of education but plays a guiding role in learning. As for students in this context, they act as listeners and/or spectators and also active participants making inquiries about their learning process while discovering the learning environment (Çığrık, 2016).

Teachers have a big role to play in terms of allowing students to enjoy these benefits of outdoor learning environments. Their knowledge and preparedness in terms of relevant skills are vital.

Purpose of the Study

The active use of out-of-school learning in the educational process is becoming widespread today. For this reason, it is important that the current teachers' perspectives on this method, their dominance of this method and their belief in its effectiveness will affect their inclusion of out-of-school learning environments in their teaching. Especially energetic children in early childhood being in the classroom for a long time is actually not very suitable for their nature. It is also believed that out-of-school learning environments in the pre-school period are a separate value for children who are in search of exploring their environment in the pre-school period to learn by doing and living. As a matter of fact, the understanding of the benefits of activities carried out in out-of-school learning environments for the development of early childhood has affected the pre-school education policies and pedagogy, especially in Scandinavian countries. (Lee-Hammond & Waller, 2014). On the other hand, it is stated that there are few studies on out-of-school learning environments especially in the preschool period in Turkey (Karamustafaoğlu, Ayvalı & Ocak, 2018). Therefore, it can be said that there is a gap in the relevant literature. It is hoped that the current research, which is a step taken to close this gap, will draw attention to the use of out-of-school learning environments in the preschool period and lead the studies on the subject to be carried out in the future. Based on this, the present qualitative research study aims to reveal the opinions of pre-school teachers concerning science education in outdoor learning environments in terms of the definition of the subject matter, opportunities, obstacles, and possible solutions.

METHODOLOGY

Design

This research was conducted based on the qualitative research method case study design. According to Creswell (2008), a case study is an in-depth examination of a limited system based on large and comprehensive data sets.

Sample

It uses homogeneous sampling, one of the methods of purposeful sampling. In this study, the primary criteria for participants were working in the city center and having 5-10 years of professional expertise.

The purpose behind the selection of these criteria is to ensure that the teachers participating in the study have the means to experiment with outdoor science education and a certain level of experience. Ultimately, 105 pre-school teachers (100 Females, 5 Males) participated in this study.

Data Collection Tools

A questionnaire consisting of open-ended questions is used in the study as the data collection tool. The reason behind the selection of this data collection tool is that when compared to a scale of closed-end questions, questionnaires allow for deeper understanding while enabling further generalization in the relative sense when compared to semi-structured interviews (Creswell, 2008). While determining the open-ended questions to be asked, two meetings were conducted with the researchers, two experts on science education, and one expert on pre-school education. Discussing possible questions and the suitability of these questions for the purpose of the study during these meetings, the researchers and experts reached a consensus in this regard. The survey starts with questions on gender and professional expertise followed by 10 open-ended questions on the subject matter. The participants were asked to write their answers in the gaps under each open-ended question and were provided with additional paper. Some items in the questionnaire are as follows:

- What is outdoor learning? Explain with your own words.
- Which places can be considered as outdoor learning environments in which science education can take place? Can you provide some examples?

Data Analysis

Taking place in the fall semester of the 2019-2020 school year, the questionnaire was given at schools where participants work on days and at hours suitable for the teachers. After the data were collected, all of them were transferred to MS Excel before being printed. Then, each document was coded starting from T1, (T1, T2, ... T105) following the control of the data. The data were analyzed by means of content analysis. One of the researchers and a specialist in science education analyzed the data independently. Creswell's (2008) approach was adopted during the content analysis. Creswell argues that content analysis involves three main stages, namely preliminary exploratory analysis, coding process and thematic analysis. Reliability coefficients among the coders were calculated to finalize the themes. While doing so, the first step was to ensure consistency between the main themes. Then, the number of participants considered to be classified under each theme. The discussion was maintained until 100% consensus is achieved during the examinations.

RESULTS

The initial step of the study was to identify the definitions given by participants for outdoor learning environments. Table 1 shows the findings obtained at the end of the analysis of the answers given by the participants.

Table 1
The definitions

Code	Frequency*
Learning that takes place anywhere but school	40
Learning by doing and through experiment	24
Learning in real life	11
Learning through the social environment	10
Learning in parks, gardens and forests	9
Learning at a museum	5

Informal learning	4
A supporting endeavor for scholastic learning	4
Latent learning	3
Learning at home	3

***** Some participants' answers were coded more than once. Therefore, the frequency sum shows the total number of codes and this number is not equal to the number of participants.

As seen in Table 1, the participants generally described outdoor learning as *learning that takes place anywhere but school*. The majority of respondents in this group defined this description through their explanations arguing that instances of outdoor learning involve the activity of learning outside a plan or schedule within natural contexts. A small number of participants merely stated that the concept signifies learning outside the school without further explanations. The following two statements show how the participants made their definitions:

T20: "*Evidently, outdoor learning means learning at any location. Maybe at home, in a garden, at a park, sometimes at a museum*".

Learning by doing and through experiment was the second most popular definition among the participants for outdoor learning. They elaborated on their definitions by stating that while in-class learning is dominated by the transfer of theoretical knowledge, outdoor learning practices provide students with the change of learning by doing and through experience. The following statement is an example of this opinion.

T93: "*Outdoor learning can be defined as permanent learning by doing and through experience. You learn things within the course of real life. It is usually informal*".

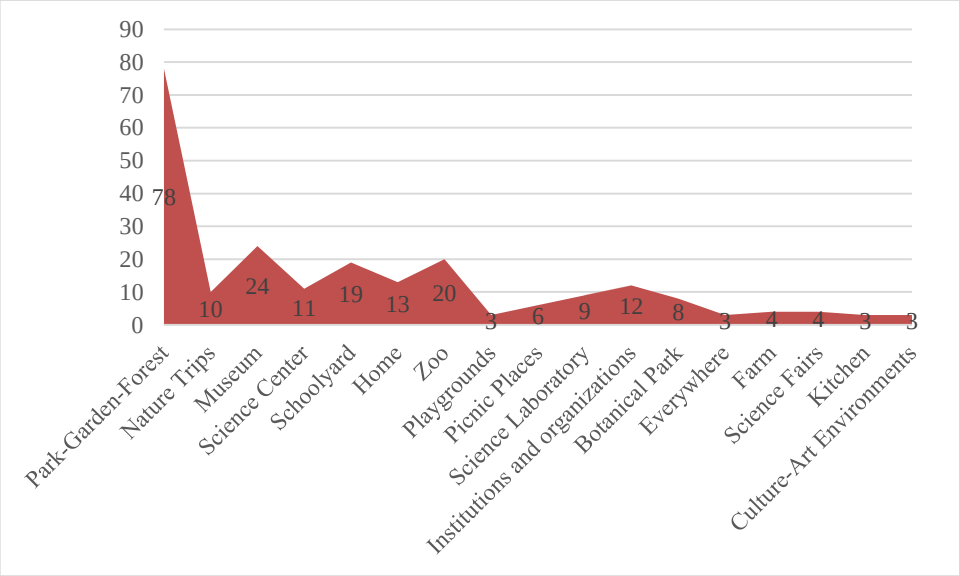
Some participants used the definition of *learning in real life* for the concept of outdoor learning. Most of these participants expounded their definitions as the learning on one's own as a result of a circumstance one encounters in life. A small number of participants in this group stated that creating a classroom environment for learning is unnecessary, claiming that they are particularly against conducting science class activities in the classroom. The following statement constitutes an example of this opinion.

T60: "*Outdoor learning occurs through real-life instances, [it is] learning by doing and through experience. You do not draw plans or try to come up with a special environment*".

There were also participants defining outdoor learning as *learning through the social environment*. These participants mainly described outdoor learning as learning not from the teacher but from other individuals like friends. Some participants in this group emphasized that learning through one's social environment is an unplanned means of learning.

Some other participants defined learning in outdoor learning environments as *learning in parks, gardens and forests*. These individuals indicated specific settings for outdoor learning environments. Similarly, there were also participants coming with the definitions of *learning at a museum* and *learning at home*. Participants defining outdoor learning as *informal learning* indicated that such kind of learning is without a plan or schedule and usually occur on its own. Some of the participants arguing that outdoor learning generally takes place spontaneously defined it as *latent learning*. Another remarkable definition of outdoor learning was *a supporting endeavor for scholastic learning*. According to the participants expressing such an opinion, outdoor learning complements in-school learning and is insufficient on its own to teach a subject.

To understand the definitions of outdoor environments given by the participants, they were asked to indicate which settings are suitable for conducting science class activities. Diagram 1 shows the findings obtained at the end of the analysis of these answers.



Graph 1. Outdoor learning environments suitable for science and nature activities according to the participants

As seen in Diagram 1, the three most-repeated learning environments considered to be suitable for pre-school science and nature activities were parks-gardens-forests, museums and zoos. Schoolyards, botanical gardens and science centers were also among frequently-given answers.

The pre-school teachers participating in the study were asked if they organized science and nature activities in outdoor learning environments. While 9 participants stated that they did not teach science outside school, 13 said they made partial attempts and 83 indicated they prefer outdoor science education.

Upon being asked for justifications of their opinions, the participants saying *no* stated that it was difficult to ensure safety as pre-school children are too young, that they did not want to be bothered with permission procedures, and that outdoor learning entails certain costs they cannot afford, thus not opting for outdoor of school teaching of science. Those claiming to have made *partial* efforts stated that they rarely undertake such an endeavor due to the crowdedness of classroom groups and limited means, adding that it was not always possible to have favorable weather conditions. The two following statements provide an example of these opinions.

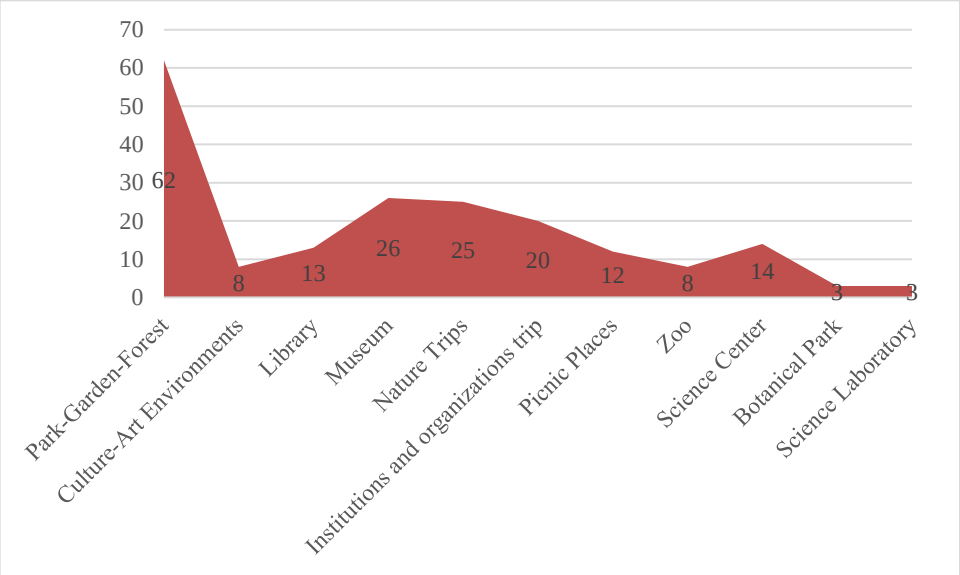
T50: "*To be honest, I do not prefer [outdoor school teaching]. Even in the simplest sense, it is difficult to ensure the safety of these young children. The parents do not want to give permission, anyway. If you manage to get their permission, other paperwork for permissions is tiring. [So,] I do not do it*".

The top three opinions among the participants saying *yes* were the opportunity of *learning by doing and through experience*, the consequent *permanence* of the knowledge learned, and *effective and productive learning*. Furthermore, *first-hand experience, fast learning* and the *enhancement of learned knowledge* are among the other opinions considering the contributions of outdoor learning to students' cognitive activities. On the other hand, additional opinions among participants concerning the contributions of outdoor learning to students' affective activities include the *amusing nature* of the activities concerned, the *difference* of these activities in comparison to the usual ones, and their

consecutive *interesting nature* as well as *their contribution to student motivation*. The two following statements provide an example of these opinions.

T47: "*I liken this to learning how to drive by not actually driving but pretending to drive. Driving allows you to learn by doing and through experience, you learn fast, you retain what you learn. That is why I prefer [outdoor school teaching], of course*".

Graph 2 shows the information concerning the environments in which the prospective pre-school teachers participating in the study had teaching experience. It shows that the top three settings indicated by participants in this regard are parks-gardens-forests, museums and nature excursions.



Graph 2. Outdoor learning environments that participants have experienced so far

Opportunities

Table 2 shows the opportunities outdoor science teaching for pre-school children according to the participants.

Table 2
Opportunities

Code	Frequency*
Permanent learning	37
Learning by doing and through experience	26
Learning in the natural environment	21
Students are more eager	15
Interesting	14
Increase effective participation	13
Effective and efficient teaching	12
Support to school	10
Abstract knowledge	6

Experience in a free environment	6
Rich in terms of content	4
Awareness of one's surroundings	4
Positive attitude towards science	4

As seen in Table 2, the top three opinions concerning the opportunities provided by outdoor science teaching are *permanent learning, learning by doing and through experience*, and *learning in the natural environment*. The participants arguing for *permanent learning* and *learning by doing/through experience* mostly stated that while learning science in outdoor learning environments, children feel freer and have the chance to directly put their scientific knowledge into practice. The following statement is an example of these opinions.

T7: "*The topics of science are completely integrated into life itself. Science might seem to be an abstract subject for students. However, we can understand science courses very well by doing and through experience, and we retain what we learn by these means. Outdoor learning environments make this possible. I believe such environments are more effective than the classroom setting as they are natural and liberated*".

Participants advocating *learning in the natural setting* stated that science courses cover topics from natural sciences, arguing that teaching science in the natural setting is easier than trying to simulate natural environments in the classroom setting. The participants also emphasized that teaching science in outdoor learning environments make students *more motivated, make the subject more interesting* and *increase effective participation*, claiming that it fosters *an effective and productive learning* environment and *supports* in-school teaching. The following statements are examples of this opinion.

T105: "*Science education in outdoor learning environments has the potential of enriching, supporting and complementing the education within the school context*".

Additionally, the participants argue that outdoor science teaching allows for the *concretization of abstract knowledge*, helps students gain *experience in a free environment*, is *rich in terms of content, increases awareness of one's surroundings*, and contributes to *a positive attitude towards science*. One statement exemplifying these opinions is given below.

T85: "*Outdoor learning education is much more interesting for students. In particular, nearby excursions such as trips to a botanical garden raises awareness about one's natural surroundings. Places like observatories make it easier to like science. This is my opinion*".

Obstacles

Table 3 shows the opinions of participants concerning the obstacles for pre-school children when it comes to outdoor learning environments.

Table 3
O*bstacles*

Code	Frequency*
Difficulty of control	33
Issue of safety	33
Danger	31
Administration's lack of support	30

Limited possibilities	24
Costs	21
Disallowance of parents	20
Accidents	18
Difficulty of gathering attention	18
Permissions / Procedures	18
Difficulty of transportation	17
Challenge of making each student participate actively	17
Environmental conditions	16
Teachers' limited knowledge	13
Lack of teams	10
Difficulty of the organization	8
Not suitable for every student	6
Crowded classrooms	5
Children with allergies	3
Acquisition of incomplete or inaccurate knowledge by students	3
Nothing	7

The most frequently cited ones were the *difficulty of control*, *issue of safety*, and *danger*. Most of the pre-school teachers expressing the argument of *difficulty of control* elaborated on their opinions by underlining the challenging nature of commanding a classroom in outdoor learning environments due to the young age of students. The following statement is an example of this opinion.

T30: "*Young children are quite active. Due to their young age, it is difficult for them to focus on a single thing. Therefore, it can be quite challenging to manage a classroom, particularly in outside spaces*".

The number of participants believing *the issue of safety* to be one of the obstacles to outdoor science education is considerable. These participants argue that ensuring safety in such environments in which they would teach science is a demanding endeavor. Indicating that outdoor activities are inherently *dangerous*, the participants concerned stated that they might be extra perilous particularly for younger students.

According to participants, *the school administration does not provide support for outdoor of school science education.* These participants believe that whenever a teacher decides to plan such an activity, the administration poses obstacles when it comes to obtaining permissions or arranging costs, avoiding responsibility whenever a negative development arises and leaving the teacher on their own. The following statement exemplifies these opinions.

T61: "*[Outdoor] learning environments in which the course is to be conducted might be dangerous sometimes, so one cannot organize a class without ensuring maximum security, it is difficult. Thus, families may not support such learning environments. For instance, I wanted to observe birds with*

students nearby a lake, but the families did not allow it. In such practices, the school management does not want to take up any responsibility..."

The *limited possibilities* for outdoor science activities, certain *costs* entailed by such activities, and the unwillingness of both parents and the school management to cover these costs are among other obstacles to outdoor science teaching. Another impediment is the *disallowance of parents* for outdoor learning activities. The primary reason underlying this is their concern about their children's safety; the second reason is that they have a hard time affording the costs entailed by such activities. A handful of participants stated that some parents are worried that their children may catch a cold outside and get sick. Regardless of the safety measures taken in outdoor learning environments, some *accidents* may still occur. This is also deemed to be a hindrance. In addition to these, other obstacles to outdoor science teaching include *the difficulty of gathering attention* due to the multitude of external stimuli, the difficulty of obtaining *permission* before the organization of such activities, the *difficulty of transportation* and possible accidents during transportation, and the *challenge of making each student participate actively*, particularly in crowded classes. The following statement is an example of these opinions.

T2: "*There might be accidents that you cannot prevent regardless of the precautions you take. Like traffic accidents, for example. On the same category, the difficulty of transportation is also a factor. It is difficult in terms of both the distance and the provision of a vehicle*".

Furthermore, the participants also stated that *environmental conditions* also pose an obstacle to outdoor science education. They frequently underline unfavorable weather conditions such as rain and wind. Indicating the *limited knowledge among teachers* concerning outdoor science education consequently leading to their avoidance of such methods, teachers also underlined the *lack of teams*, stating that a single teacher is not sufficient for such practices and that they need to be accompanied by supporting staff. The following statement is an example of this opinion.

T11: "*Primarily, the knowledge among teachers on the subject matter is insufficient. I mean, let us be honest, teachers do not possess the knowledge to provide science education in outdoor learning environments. This leads to the inability of teachers to sufficiently guide students in this respect and to the incorrect implementation of science education. Even if the teacher is well-informed, they cannot undertake the organization on their own. They cannot do it by themselves, they need a team*".

On the other hand, merely seven participants stated that they encounter no obstacles while organizing outdoor science education activities and claimed that a good teacher can provide effective education under any circumstances. The following statement provides an example of these opinions.

T100: "*Actually, any setting is possible for science education, that is why I do not see any obstacles. This setting might even be our own homes. Those making excuses do not really want to deal with these practices*".

Solution Proposals

Table 4 shows the opinions of participants concerning the solutions they propose for overcoming the obstacles to outdoor pre-school science education or, in other words, to minimize the impediments of such practices. The most frequently cited opinions of pre-school teachers regarding the elimination of impediments to outdoor science education are *the curriculum, design of schoolyards* and *raising awareness among families*.

Table 4
Solution Proposals

Code	Frequency*
Curriculum	36
Design of schoolyards	32
Raising awareness among families	23
Family participation	21
Collaboration with the administration	21
Supporting staff	19
Regulation of permission procedures	18
Financial means	18
In-service training programme	18
Planned excursions	16
Dissemination of various centers	15
Preschool science lab	15
Reduction in classroom sizes	10
Solution of logistic difficulties	3

The participants emphasizing *the curriculum* indicated that outdoor learning education must be officially included in the pre-school curriculum, arguing that such practices would be left to the pleasure of teachers if this step is not taken, leading to inconsistencies among schools. A couple of participants supporting this opinion stated that the inclusion of outdoor learning education in the curriculum would result in increased focus during bachelor's studies. The following statement exemplifies this opinion.

T29: "*The government has to do this, has to include it in legislation. It cannot be left to the pleasure of the teacher...*"

The teachers participating in the study indicate that they are unable to teach in outdoor learning environments anytime they want due to issues like unfavorable weather conditions, the difficulty of transportation, and the inability to obtain permission from parents and the school administration. One solution they propose for these is the design of *schoolyards* in a way allowing for the organization of science activities.

The participants having a hard time obtaining permission from parents regarding outdoor of school teaching practices proposed *raising awareness among families* and, if required, undertaking some of the practice with *family participation*. The following statement exemplifies this opinion.

T18: "*If the family jointly participates [in the activity] or is provided with sufficient explanation concerning the places to be visited, they will not pose an obstacle, leading to more effective outdoor school education.*"

Similarly, the participants struggling with the lack of support from the school administration stated that the teacher must be in *collaboration with the administration*. The participants arguing that teachers face challenges in managing the entire process on their own indicated that *there is a need for supporting*

staff to help teachers with outdoor school learning activities and for *the regulation of permission procedures*.

For some participants, *financial means must be provided* for schools to provide outdoor science education. In this context, the participants suggested that museums be free for student visits and that schools allocate a sufficient budget for such practices.

Certain participants claimed that some teachers lack adequate knowledge of outdoor of school education. These participants argued that *an in-service training programme* is required for teachers on the subject matter. The following statement exemplifies this opinion.

T47: "*In-service training courses must be given to teachers regarding science and nature activities to be organized outside school*".

The participants emphasized the need for organizing the visits within the scope of outdoor of school education in the form of *planned excursions*, i.e. trips organized within the framework of a pre-determined plan. If this is not the case, these excursions would deviate from their educational aims, being mere trips leading to misinterpretations, misconceptions, or mislearning. The following statement exemplify the opinions of participants arguing in this regard:

T1: "*These excursions must not be just about sightseeing. I, for example, took my students to a water treatment facility and prepared my questions for them beforehand. If this is not the case, students would learn inaccurate and incomplete information*".

Indicating that particularly teachers working in smaller cities have a hard time finding suitable places for outdoor of school education practices, the teachers participating in the study emphasized the need to *make more accessible* the centers where such activities can be organized. The majority of the participants thinking so suggest, in particular, making science centers more accessible in more cities. Finally, they suggest *a reduction in classroom sizes* and *the solution of logistic difficulties* by the allocation of safe means of transport for schools by provincial directorates for national education. The following statement represents many of the opinions indicated above.

T51: "*Each school must have its own bus. The 6-year-olds must learn about what happened in Çanakkale in Çanakkale, learn about Atatürk in Ankara… Science centers must not be places to visit once a year but once a week to conduct courses. The number of these centers in all provinces must be increased. Museums, zoo must be free. The administration must provide support in this respect and classrooms must not be too crowded*".

DISCUSSION

Firstly, the definitions among teachers regarding outdoor learning environments were identified, revealing a wide range of answers. This attempt revealed that teachers mostly define outdoor learning as learning anywhere except for the school, subsequently mentioning the concepts of learning by doing/through experience, learning through real life, and learning with the social environment. In this respect, one might argue that teacher define outdoor learning based on a wide domain. A study by Öztürk (2019) states that teachers define such learning environments as instances of learning that occur within the societal framework, are based on practice, have multiple components, and involve learning by doing and through experience. Şen (2019) defines out-of-school learning as the use of informal learning environments as an enriching tool to support formal education. Göloğlu Demir (2021) also defines out-of-school learning as learning activities carried out in areas and institutions (such as universities, research centers, industrial chambers) outside the school building. Considering that outdoor learning environments are referred to by many names such as outdoor science, extra-curricular activities and learning outside the classroom (Dierking et.al, 2003), the definitions given the participants are similarly within a wide framework.

Secondly, the participants were asked about the places where it would be possible to make science-related activities; the most popular answer was parks-gardens-forests, followed by museums and zoos. Ertaş-Kılıç and Şen (2017) include out-of-school science learning environments; science camps, science centers, technology museums, industrial establishments, science museums, zoos, botanical gardens, planetariums and aquariums. In another example, Bakioğlu and Karamustafaoğlu (2020) used the medical faculty, dialysis center, oral and dental health center and school garden as out-of-school learning environments on organs and systems in the science course. Furthermore, the assessment revealed that 9 out of all the pre-school teachers participating in the study indicated that they did not organize such activities while 13 made partial attempts and the remaining 83 taught science in outdoor learning environments. As a result of a study conducted by Davies and Hamilton (2016) with preschool teachers, it has been determined that more than half of the teachers believe that teaching can be as rich as it is in the classroom. In particular, those not organizing outdoor science teaching activities reported reasons such as security, permission procedures and costs, considering the young age of students. In this respect, one might argue that the teachers responding in the negative avoid experiencing such settings due to these concerns. At this point Türkmen (2010) underlines the necessity of emphasizing the importance of the subject matter by organizing in-service training courses for teachers and of encouraging teachers regarding learning in informal settings, these two necessities entail a responsibility to Turkish educators.

The study reaches the conclusion that teachers cite most frequently cite permanent learning, learning by doing/through experience, and learning in the natural setting upon being asked about the opportunities of outdoor science education for pre-school children. Supporting this idea, Dinata and Amprasto (2018) found that while teaching the concept of ecosystem to high school students, field trips positively affected students' scientific literacy and attitudes towards science. Additionally, the fact that teachers indicated various factors such as increased student willingness, stimulated interest, active participation, effective and productive learning, support for scholastic learning, and concretization of knowledge shows that they consider outdoor learning environments to be quite beneficial for students. In this regard, one can see that teacher emphasize the significance of these learning environments for the student to structure the knowledge they are given. The 2018 science education curriculum also mentions the need for complementary outdoor science teaching for students to learn scientific knowledge in a meaningful and permanent manner (Ministry of National Education [MNE], 2018). Similarly to teacher opinions cited in the present study, the studies by the NRC (2009) and Eshack (2007) also state that outdoor learning environments are effective in the fostering of interest among students regarding science classes. Supporting the findings of this study, Balkan Kıyıcı and Yavuz Topaloğlu (2016) stated that out-of-school learning environments are interesting and intriguing. In a study conducted in the USA, it was determined that the welfare, pleasure and interest levels of both children and teachers increased in out-of-school learning environments in the preschool period (Guardino et al., 2019).

The outcomes obtained from the opinions of the participants concerning the obstacles to outdoor science education for pre-school children are quite abundant and varied. The difficulty of commanding a class, safety issues and danger, in particular, were the most frequently expressed opinions among teachers. While the difficulty of commanding a classroom and the dangers are explained through the young age of students, the safety issues concern the conditions in the learning environment concerned. In this regard, the perception among students, particularly those at the primary or middle-school level, deeming these learning environments not as an educational activity but as fun-oriented excursions might have led to these opinions expressed by teachers. The study by French (2007) also indicates that the educational activities conducted in informal learning environments are generally considered as entertainment instead of education by students. Similarly to the impediments expressed by the participants of the present study, the study by Ocak and Korkmaz (2018) conducted with science and pre-school teachers revealed that the participants considered dangerous situations, crowdedness, and financial constraints within the scope of the sub-theme of disadvantages of outdoor learning environments. Similarly, in a study conducted by Kubat (2018) with the participation of science teacher candidates, it was determined that the lengthy and troublesome legal proceedings are seen as the disadvantages of out-of-school learning environments. Thomas (2010) also indicates that the

inadequacy of guidance during these excursions and the difficulties teachers face while managing student groups are some disadvantages of outdoor of school education. In this regard, one might say that the conclusions of various studies show similarities with the present study. The present study also found that 13 of the participating teachers regarded the limited knowledge of teachers on outdoor science teaching pose an obstacle. Similarly, the inadequate knowledge among teachers concerning field excursions is also cited as a reason in a study by Güler (2009). In parallel with the current research, a study was conducted by Karamustafaoğlu, Ayvali & Ocak (2018) with the participation of preschool teachers. As a result of the research, the barriers that preschool teachers mentioned for the use of out-of-school learning; limited opportunities, restrictive regulations, time constraints and difficulties arising from administrators and parents. In a study conducted by Bilton (2020) with preschool teachers, it was determined that the number of children in the classrooms and the low number of teachers was a factor that made it difficult to use out-of-school learning environments. Finally, the teachers were asked about their solution proposals to minimize the difficulties cited above that may be encountered during these practices; the curriculum, the design of schoolyards and the endeavor of informing parents were the most frequently expressed opinions. As stated here, it emphasizes that out-of-school learning activities should be based on curriculum (Oktay, Üner & Şen, 2021). Furthermore, family participation, collaboration with the administration, support staff, regulation of permission procedures, provision of financial means, and in-service training were among the ideas indicated in teacher opinions. In this part, it was observed that those unable to organize outdoor science activities proposed offers for the reasons indicated by the participating teachers. The study by Ürey and Kaymakçı (2020) also revealed that teachers expressed the need for in-service training and for the excursion to be converted into a grade by teachers through observation forms and checklists to make parents and students aware of the importance of outdoor learning practices. These findings seem to be in line with the outcomes of the present study. Furthermore, the study concerned also cites the need for encouraging teachers based on teacher opinions, which was not seen in the present study. The reduction of permission procedures and the maintenance of teacher-administration collaboration were mainly expressed by administrators.

CONCLUSION

The main conclusions reached in the research are:

1. According to the majority of participating teachers, out-of-school learning is defined as learning that takes place everywhere outside of school.
2. According to the participant teachers, the main out-of-school environments where science activities can be carried out are park-garden-forest, then museums and zoos.
3. The majority of participating teachers teach science in out-of-school settings. On the other hand, the teachers who did not fulfill it, put forward reasons such as the difficulty of providing security in terms of age group, permission procedure and cost.
4. Participant teachers think that teaching science in out-of-school environments has many benefits such as permanent learning, learning by doing and learning in a natural environment, making students more willing, interesting, active participation, providing effective and efficient teaching, supporting the school and concretizing information.
5. Participant teachers stated that the obstacles of teaching science in out-of-school environments are especially difficult to master, security problems and dangerous for preschool children.
6. Participating teachers suggested solutions such as informing families, family participation, cooperation with the administration, auxiliary personnel, arrangement of leave procedures, providing financial means and in-service training, especially the design of the curriculum and school gardens, in order to overcome the obstacles mentioned.

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