Journal of Teacher Education and Lifelong Learning (TELL)

Volume:5 Issue:2 Year: 2023 Research Article ISSN: 2687-5713

Opinions of Teachers' Conducting Science Courses Regarding Outdoor Education: A Phenomenological Study

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Article Info

Article History
Received: 01.06.2023
Accepted: 11.10.2023
Published: 26.10.2023

Keywords:
out-of-school learning, phenomenology, science education, teachers' opinions

ABSTRACT

This study aims to determine the opinions of teachers who conduct science courses regarding out-of-school learning (OSL) environments. The participants who enrolled in this study were designed with a phenomenology research design, consisting of 33 teachers working in public schools in a district of Sakarya province. The interview form was developed by the researchers and used as a data collection tool. The data were analyzed through content analysis. According to the results, the subject area in which most OSL activities are carried out in science lessons is the content of "Living Beings and Life." According to the findings, the teachers emphasized informing the students about the content of science and learning outcomes and preparing a plan before the OSL activities were organized. Besides, they insisted on the importance of the teacher's role as a guide for the students during the implementation of the OSL activities and evaluating the students who made observations during the OSL at the end of the process. Regarding the challenges experienced in implementing OSL activities, issues such as paperwork and official transactions were mentioned during the planning of the activities. Besides, the problems encountered in classroom management, the difficulties experienced in virtual trips, and the disinterested attitudes of the individuals involved in the community awareness activities were also indicated.

Citation: Elmalı,Ş.; Balkan-Kıyıcı, F. & Akkuş, A. S. (2023). Opinions of Teachers' Conducting Science Courses Regarding Outdoor Education: A Phenomenological Study. *Journal of Teacher Education and Lifelong Learning*, 5(2), 644-655.

INTRODUCTION

Society predominantly considers schools as the primary learning spaces for scientific knowledge (Kisiel, 2003). However, it is crucial to recognize that learning extends far beyond the confines of the classroom, encompassing social and cultural contexts (Osborne & Dillon, 2007; Shaby et al., 2019; Tran, 2011). In order to better understand children's science learning, not only their learning that occurs in school but also their learning outside of school should be examined because there are many indications supporting the claim that learning takes place in an environment beyond the boundaries of the school (Shaby et al., 2019; Tran, 2011). OSL activities present new opportunities beyond the constraints of school bells and classroom hours, allowing students to engage with science in meaningful real-world contexts (Braund & Reiss, 2006). Rather than competing with or substituting classroom learning, OSL offers an integrative learning style that enriches education by providing a different dimension (Füz, 2018).

OSL activities can complement formal education content in schools by helping to create a more authentic science-making environment (Dairianathan & Subramaniam, 2011). It can stimulate curiosity, interest, motivation, and desire to learn, which are neglected in traditional school environments. It is argued that out-of-school learning is among students' and teachers' most rewarding pedagogical activities. This pedagogy is extremely important for teachers, as it helps students understand science in a fun, different, and more holistic way. It offers the opportunity to try new pedagogical methods and develop as a teacher (Rodehn, 2019). According to Vedder-Weiss & Fortus (2013), parents', peers', school, and teachers' perceptions of mastery emphasis are positively related to students' engagement in and out of school. Students are expected to find connections between out-of-school experiences and the science content taught in the classroom (Tran, 2011). However, it is stated that teachers are generally unaware of their roles, and their attitudes and opinions significantly affect the learning success of out-of-school learning experiences (Garner et al., 2015) For example, Henriksson (2018) found out that primary school teachers thought that OSL activities increase the children's interest but added that the scientific subject knowledge is limited, and teachers talked very little about the learning aims for teaching in out-of-school settings. The originality of this research lies in its focus on teachers' opinions, their role in facilitating OSL activities, and bridging out-of-school experiences with classroom content. By exploring these aspects, the study aims to contribute to understanding OSL implementation and its impact on students' learning experiences.

The research questions concern teachers who had OSL experience in their science courses. These are as follows:

1. In which grade level and subject area were the OSL activities implemented?

2. How did they plan the OSL activity process?

3. What indicators or assessment methods were used to evaluate the contribution of OSL activities to student learning?

4. What kind of problems did they encounter while performing OSL activities?

5. What are their reasons for implementing OSL activities?

LITERATURE REVIEW

Out-of-School Learning

The literature based on out-of-school learning demonstrates the value of out-of-school learning environments (Anderson et al., 2006; Anderson et al., 2000; Ramey-Gassert et al., 1994; Rennie & McClafferty, 1996). Out-of-school learning (OSL) is learning that progresses in a planned and adaptive way in institutions, organizations, and various real-world situations beyond the formal or nonformal education areas (Tamir, 1990) and shares the feature of mediating formal education (Eshach, 2007).

OSL is also defined as any class or student group activity organized by the school in a place outside the school and outside the school walls, in a natural or artificial environment during the school term (Füz, 2018). Places outside of the school to be learning environments can be considered OSL environments, such as; science and technology museums, zoos, botanic gardens, planetariums, industrial establishments, and national parks (Laçin-Şimşek, 2011), education tracks, agricultural facilities and factories (Füz, 2018). OSL environments offer a possible atmosphere where students can explore their ideas (Dairianathan & Subramaniam, 2011). In these environments, how science is conveyed and student experiences generally arouse excitement (Braund & Reiss, 2006). When students remember their experiences positively, they are likely to be open to further teaching in that field (Dairianathan & Subramaniam, 2011). For this reason, OSL environments propose precious opportunities. These environments create interest in the learner, a real connection with the thing studied, and long-term memory (Rodehn, 2019). Hence, the contribution of OSLs to permanent learning can be understood.

The diversity of experiences in OSL settings is more extensive than in traditional classroom instruction (Uitto et al., 2006). Out-of-school science learning experiences offer a unique learning opportunity for students of all ages (Tran, 2011). It increases students' interest in school lessons and provides better learning outcomes for visual and kinesthetic learners (Uitto et al., 2006). A growing number of studies reveal that OSL environments positively affect students' learning (Guardino et al., 2019). In order to improve students' science learning, the impact of their out-of-school experiences on their classroom learning should not be ignored.

Teachers' Roles in Out-of-School Learning

Teachers play the most crucial role in finding connections between students' out-of-school experiences and the science content taught in the classroom (Tran, 2011). By building the necessary bridges between students' knowledge and understanding, teachers can overcome challenges and take advantage of the opportunities inherent in OSL environments (Faria & Chagas, 2012). Despite the positive effects and contributions of out-of-school learning environments, some problems might occur in achieving learning goals (Griffin, 2004). For instance, for the field trips to reach their purpose, it is essential for the teachers to be aware of their duties and responsibilities and to perform the appropriate guidance process (Griffin & Symington, 1997). Teachers need to plan educational preparations, bureaucratic affairs, transportation, etc. The healthy execution of this process will be reflected in what teachers think about their out-of-school environments and how they perceive these environments.

Unfortunately, teachers' perceptions have rarely been the focus of research on the impact of out-of-school experiences aimed at supporting in-school learning (Luehmann & Markowitz, 2007). However, teachers' opinions on OSL experiences are essential to assess the potential impact (Guardino et al., 2019). Moreover, in the research conducted in our country on OSL environments, most of them are designed with the quantitative approach according to the type of method used (Saraç, 2017). In order to reduce this gap, this study was conducted with a qualitative method in order to obtain the opinions of teachers who play a leading role in the field and who teach science courses on the benefits of OSL environments that can be planned and managed by themselves as a part of science programs or as an extra-curricular activity (Braund & Reiss, 2006).

METHOD

Research Design

The current research was designed with the phenomenology method of the qualitative approaches. Phenomenology is a way of connecting science education theory and practice (Ostergaard et al., 2008). The use of this method aims to describe the phenomenon as accurately as possible, avoiding any pre-given framework but staying true to the facts (Groenewald, 2004). This study is aimed to determine the opinions of teachers who conduct science courses on using OSL environments.

Participant Selection Procedure

The research question guiding the study is about the usage of OSL environments. The most obvious element that comes to mind is to get the opinions of the teachers who apply to OSLs about the efficacy of OSL environments. Given that teachers are directly involved in the teaching process, they have a unique ability to observe and interpret the effects of instructional practices on student learning. The primary school teachers are included in the study because they conduct science lessons at the 3rd and 4th-grade levels. In this study, unlike the investigations in which teachers' opinions on using of OSL environments were taken, the study group was determined by focusing on the relevant discipline, not teachers' fields. Conducting science courses is the focus of identifying participants for this study. Teachers participated in the study based on volunteerism. The researchers prepared the questionnaire form. The most important feature of the questionnaire is that it includes questions that question the teachers' experience of OSL.

Participants

Within the scope of the research, 33 teachers working in a state schools affiliated with the Ministry of National Education in a district of Sakarya Province were reached. While determining the participants of the research, 70 teachers were reached, but teachers with experience in out-of-school learning environments that could be a part of the research problem constituted the research participants. Among the current research participants, science teachers (n=11) and primary school teachers (n= 22) could be included in the research problem and had experience in OSL environments. Science courses in the Turkish education system are carried out by primary school teachers at the 3rd and 4th-grade levels and science teachers at the 5th, 6th, 7th, and 8th-grade levels. Primary school teachers were included in the study because they conduct science courses at the 3rd and 4th-grade levels. It is essential to describe the participants in detail in the studies designed with the qualitative method. Characteristics of the participants are given in Table 1 below.

Table 1. *Characteristics of the participants*

		N
Field	Science	11
	Primary school	22
Gender	Female	16
	Male	17
Professional seniority	Less than 5 years	4
	6 to 10 years	8
	11 to 15 years	8
	More than 16 years	13
Educational Institution	Faculty of Education	31
	Faculty of Science	2
	Other	1
Educational level	Bachelor	31
	Masters	2
The prior learning experience according to fields	Science teachers	11
	Primary school teachers	22

Data Collection Tools and Procedure

The data in this study were obtained with a questionnaire developed by the researchers. The questionnaire consists of the "Personal Information Section," which consists of questions to determine some demographic characteristics of the participants, and the "Questions" sections, which include open-ended questions to determine their views on using OSL environments.Some sample questions in the form are as follows:

"What out-of-school learning means to you?

"What do you think are the out-of-school environments to be used in science lessons?"

"How can out-of-school learning environments contribute to the teaching of science lessons?"

Before the questionnaire form was developed, the relevant literature was examined, and a draft form was prepared. The draft form was presented to experts' opinions. The questionnaire was refined based on insights and suggestions provided by experts in the field of science education. One of the strengths of this form is that the open-ended questions, which could be completed in approximately 10 minutes, are detailed with probing questions.

What is essential in phenomenological research is how that person makes sense of this situation rather than how many people experience it. From this point of view, the importance of numerical data should be decided by the researcher himself (Ersoy, 2019; p.133). In the table given in the findings related to the first sub-problem, the percentage values for the grade level and subject areas are essential for analyzing the problem.

Data Analysis

In phenomenological research, data analysis is conducted to reveal experiences and meanings. For this purpose, in content analysis, data is conceptualized, and categories that can describe the phenomenon are discovered (Yıldırım & Şimşek, 2016; p.72). In this study, which employs descriptive and content analysis, codes and categories were obtained for each sub-problem framework. What remains unchanged in different experiences is the essence of that phenomenon (Mayring, 2000). Based on the view that the codes frequently expressed by the teachers and the categories created by the codes are the essence of the phenomenon of the study, the research is designed to infer the meaning and structure of the participants' experience of the relevant phenomenon. The coder reliability was ensured in data analysis. Compatibility between encoders was calculated as 89 %. The agreement between the coders is expected to be at least 80% (Patton, 2018).

Consistency

In qualitative research, validity refers to the researcher's control for the accuracy of the findings through specific processes. In contrast, reliability refers to the consistency of the researcher's approach from the point of view of different researchers (Creswell, 2017). In the data analysis process, attention was paid to adverse event analysis (Mroczkowski et al., 2021) to determine the reliability of the researcher's results. The findings present these examples in the presence of data that contradicts the emerging categories and codes. In qualitative research, the researcher may use different pseudonyms for individuals and places to protect the participants' identities (Creswell, 2017). In this study, the teachers who had the experience of OSL were referred to as T1, T2, T3, …, and T33.

FINDINGS

Findings related to the first sub-problem

The first sub-problem of the study was about which grade level and subject area the OSL activities were implemented by the teachers conducting science courses with OSL experience. Codes and categories were created in line with the answers given by the participants. The categories created are grouped under the units of "Earth and Universe," "Living Beings and Life," "Physical Events," and "Matter and its Nature" and are presented in Table 2.

Table 2. *Grade Levels and Subject Areas*

Grade Level	Category	Code	f	%
3rd grade	Physical Events	Let us recognize the force	3	11,42
		Electric vehicles	1	
	Living Beings and Life	A Journey to the World of the Living	4	11,42
	Earth and Universe	Getting to Know Our Planet	1	2,85
4th grade	Living Beings and Life	Human and Environment	11	34,28
		Food	1	
	Physical Events	Effects of the Force	4	11,42
5th grade	Living Beings and Life	Human and Environment	2	5,71
6th grade	Physical Events	Force and Motion	4	11,42
	Matter and its Nature	Matter and Heat	1	2,85
7th grade	Physical Events	Interaction of Light with Matter	2	5,71
	Matter and its Nature	Pure substances and mixtures	1	2,85

According to Table 2, OSL activities were carried out in the subject area of "Living beings and life" mainly at the 4th-grade and in primary school levels. At the middle school level, it is seen that the 8th-grade level of OSL activity is not applied, and the subject area of Physical Events comes to the fore. The subject area in which most OSL activities are carried out at all levels is the subject area of "Living Beings and Life."

Findings related to the second sub-problem

The second sub-problem of the study was about how they planned the OSL activity process. The codes and categories were created in line with the answers given by the participants. The categories created were gathered under the headings "Before, during, and after the OSL Activities" and presented in Table 3.

Table 3. *OSL activity process*

Categories	Code	f
Before OSL activities	Presentation	15
	Planning	10
	Getting official permissions	4
	Announcement	3
	Supplementing teaching materials	2
	Field trips	2
	Watching documentaries	1
	Drawing attention	1
During OSL activities	Observation	14
	Guidance	6
	Structured student engagement	5
	Making statements	5
	Drawing attention	5
	Demonstration	2
	Group activities	1
	Worksheet exercises	1
After OSL activities	Evaluation	23
	Questioning techniques	6
	Making products	5
	Long-lasting learning activities	2
	Implementations	2
	Making suggestions	1

According to Table 3, in the "Before OSL Activities" category, it is seen that the teachers focused on a theoretical presentation about the learning goals and planning before the OSL activities. T13 indicated that he informed students of the content concepts before the OSL activity within the scope of the "Explaining the differences between natural and artificial environment" learning outcome.

When the codes that make up the "During OSL activities" category are examined, it is seen that the students make observations during the implementation of the OSL activities. It was also emphasized that the teachers were the guide in that process. T6 stated, "We observed the living things around with the students." T26 added, "The position of the sun was observed in the morning, noon, and evening." They mentioned the importance of making observations during the activity. T18 stated that "It should be active with them without intervening too much depending on the event." He stated that the teacher undertakes the role of a guide and that structured student engagement should be provided.

When the codes consisting of the "After OSL Activities" category are examined, it is seen that the teachers emphasized that the process should be evaluated after the OSL activities. They underlined the importance of assessing the process. For example, T3 explained, "I learned about the efficiency of the process through evaluation activities." He also talked about the place and importance of post-event evaluation in the process.

Findings related to the third sub-problem

The third sub-problem of the research was about how teachers with experience in OSL evaluated the contribution of OSL activities. Codes and categories were created in line with the answers given by the participants. The categories created were grouped under the titles of Cognitive and Affective elements are presented in Table 4.

Table 4. *Contributions to OSL activities for students*

Categories	Code	f
Cognitive elements	Long-lasting learning	14
	Concretization	4
	Enjoyment of learning	3
	Observational skills	2
	Appealing to five senses	2
	Improving thinking skills	1
	Improving learning skills	1
Affective elements	Raising interest in the lesson	3
	Gaining environmental awareness	2

As can be seen in Table 4, the "cognitive elements" category is examined and teachers express the reflections of OSL activities on student learning. T5 stated, "This subject has become more concrete in the students' minds." In this statement, she pointed to permanent learning and concretization. When the codes that consist of the "Affective elements" category are examined, it is understood that participants also mentioned the affective contributions of students, such as interest and environmental awareness of the OSL activities. T6 indicated, "Students were more motivated to the lesson by doing activities." and T19 made statements as "I observed that they created environmental awareness."

Findings related to the fourth sub-problem

The fourth sub-problem of the study was what kind of challenges the teachers who conduct science lessons encountered while performing the OSL activities. Codes and categories were created in line with the answers given by the participants. The categories created are grouped under official procedure, classroom management, and other headings are presented in Table 5.

Table 5. *Challenges experienced in OSL activities*

Categories	Code	f
Official procedures	Parent permission form	3
	Transportation	3
	Paperwork	2
	Budget	2
	Timing	2
	Lack of interest from workplaces	1
Classroom management	Controlling students' behaviours	3
	Unadaptive students	3
	Ensuring safety	1
Other	Unreadable text at virtual tours	1
	Disinterested attitudes of the individuals	1

According to Table 5, the codes constituting the category of "Official Procedures" were analyzed; it is seen that teachers emphasize problems such as paperwork and official procedures during the planning phase of OSL activities. "The lack of interest from workplaces" code is among the exciting findings. T16 noted the neutral feedback received from the workplaces where the OSL activity was planned to be organized as a problem encountered in the process.

In the "Classroom Management" category, the teachers emphasized the problems encountered in implementing OSL activities related to classroom management outside the classroom. T5 said that "It becomes difficult to control students' behaviours that cause problems." Additionally, T14 expressed that "It can be difficult to control in crowded classes."

When the codes that make up the "other" category were examined, it was found that the problems experienced in the virtual trips that had never been mentioned in the "official procedure" and "classroom management" categories were mentioned. For example, the unreadable text of exhibition pictures in virtual tours. In addition, the indifferent attitudes of the individuals who are parties in the community awareness studies have been mentioned. T1 said that "Harmful habits would not have quite struck the people around us."

Findings related to the fifth sub-problem

The fifth sub-problem of the study was to determine why teachers who teach science courses and have experience in OSL want to pursue these activities. Codes and categories were created based on the answers given by the participants. The category was grouped under the "Contributions to the learning process" and is presented in Table 6.

Table 6. *The reasons for pursuing OSL activities*

Categories	Code	f
Contributions to the learning process	Enjoyment of learning	4
	Long lasting learning	3
	Learning by doing	1
	Concretization	1
	Reinforcement	1
	Associating with daily life	1
	Increasing joining the lessons	1

Table 6 shows the codes forming the "Contributions to the Learning Process" category. It is seen that the reasons why teachers want to pursue the activities are centered on their contributions to the learning process. It was observed that teachers stated that OSL activities contributed to students in many ways. In particular, it was determined that they emphasized the enjoyment of learning and providing long-lasting learning.

DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

Among the results obtained in light of the first sub-problem, it was found that at the primary school level, most of the OSL activities were carried out in the subject area of "Living Beings and Life" at the 4th-grade level. In contrast, the subject area of “Physical Events” came to the fore at the middle school level, and no OSL activities were used at the 8th-grade level. Among the significant results, the subject area in which the highest number of OSL activities were carried out at all levels was the subject area of "Living Beings and Life". The primary school teacher is the person who makes the critical decision about whether or not to involve students in a particular OSL experience (Luehmann & Markowitz, 2007). It is precious for primary school teachers to engage in OSL activities within the scope of science courses. In this study, it was observed that primary school teachers included OSL activities in their science lessons.

It was seen that teachers focused on theoretical information and planning for the science acquisition learning goals before OSL activities among the results obtained in light of the second sub-problem. During the implementation of the OSL activities, it was determined that the students made observations, and the teachers acted as guide positions. It is seen that teachers emphasized that the process should be evaluated after the OSL activities as they thought that an evaluation after the completion of the process would give better and more comprehensive ideas. Planning an activity in an OSL environment is a challenging task. There are many logistical variables to consider before, during, and after the trip (Kisiel, 2003). A preparatory learning phase at school is necessary to enhance effective learning during an OSL experience (Garner et al., 2015). Science teachers are expected to be willing to explore and utilize these new experiences to guide their students to develop their understanding of science by visiting OSL environments and then through appropriate post-visit activities. The reality is that teachers need to implement specifically designed post-visit activities (Anderson et al., 2000). Once the OSL activities are completed, the content and topics covered should be revisited at school (Garner et al., 2015). In most cases, evaluation is not done through formal grades but through mutual feedback by the participants of the group and their teachers (Fallik et al., 2013).

The results from the third problem showed that the teachers mentioned the contributions of OSL activities to students in cognitive and affective areas. In the cognitive sense, teachers emphasized the reflections of OSL activities on student learning, such as long-lasting learning, concretization and enjoyment of learning. They also mentioned the affective contributions of OSL activities on students, such as interest and sensitivity to the environment. According to the teachers' views, OSL is based on students being active in the learning process and using all their senses (Tuuling et al., 2018). Learning by doing and experiencing and appealing to the five senses are among the codes created in this study.

According to the results obtained in the fourth sub-problem are the challenges encountered by teachers during the planning phase of OSL activities, such as paperwork and official procedures, difficulties encountered in classroom management outside the classroom, problems experienced in virtual excursions, and the unwillingness attitudes of individuals involved in the community. Teachers' concerns about their ability to manage or control student behavior, especially in learning environments outside the classroom, and their inability to maintain control are frequently expressed by teachers (Dillon et al., 2006).Furthermore, Anderson et al. (2006) revealed that the difficulties teachers experienced in organizing OSL activities were related to cost, time, and the program of the out-of-school learning environment itself.

The findings obtained from the fifth and last sub-problem showed that the reasons why teachers would like to pursue the OSL activities were categorized under the category of "contributions to the learning process." Long-lasting learning, concretization, and enjoyment of learning were among the most frequently mentioned codes by teachers. Tran's (2011) study provides strong evidence to support

that students' engagement with out-of-school experiences can lead to positive learning outcomes. An enjoyable visiting experience will predispose students to further cognitive learning (Dairianathan & Subramaniam, 2011).

Consequently, the participants mainly addressed the cognitive aspects of the contributions of OSL activities to students as the reasons for pursuing OSL activities. It was observed that they did not mention the social, personal, and psychomotor benefits of OSL activities. The results in this direction are also striking in the literature. In the Tuuling et al. (2018) study, only a few teachers mentioned the role of OSL learning in supporting children's social and personal development. However, negative situational analysis requires presenting the findings of studies that contradict the study's results. There are also studies in the literature that contradict this finding. In the study by Guardino et al. (2019), most participants stated that OSL helped students' cognitive and social development and increased their awareness of environmental problems. Among the results of this study, a few of the teachers also indicated acquiring environmental awareness. Nevertheless, it was seen that teachers develop cognitive understanding while addressing the contributions of OSL activities to students; they still need to address social and personal aspects. However, OSL experiences provide opportunities to actively support the affective dimension of classroom learning rather than the cognitive aspects of science alone (Mayoha & Knuttona, 1997).

Raising awareness of OSL can arouse teachers' desire to plan OSL activities. It is recommended that courses on OSL should be included in the education of pre-service teachers. These courses should be directed toward the development of projects. In this study, teachers pointed out the cognitive contributions of OSL to students. In future research, in-depth studies can be conducted on why and which dimensions teachers focus on the contributions of OSL. Qualitative studies produce analytical generalizations by their nature. The results obtained in this study can be generalized analytically. In this respect, mixed-method design studies will add depth to the studies on OSL. Data collected from different provinces and districts will provide a broader perspective.

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