A REVIEW ON TURKISH GRADUATE STUDIES PERFORMED ON OUT-OF-SCHOOL LEARNING ENVIRONMENTS*

TÜRKİYE'DE OKUL DIŞI ÖĞRENME ORTAMLARI İLE İLGİLİ YAPILMIŞ LİSANSÜSTÜ TEZLERİN İNCELENMESİ

Araştırma Makalesi
Research Paper

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Abstract:

The activities carried out in the out-of-school environments are important for enriching the learning experiences of the students, socializing the students and providing permanent learning. The purpose of this research is to examine conducted postgraduate studies in Turkey regarding out of school learning environments with the content analysis method. A total of 40 (8 Ph.D., 32 graduate thesis) studies have been analyzed in the relevant area. The studies were examined within the framework of the subject area, methodology, sampling, data collection tools, data analysis methods. Results showed that research studies was more prevalent in the field of science. Science centers, museums, and zoos are generally preferred within the application areas. It has also found that the studies are mostly carried out with secondary school students and teachers. Generally, interview forms, likert type scales, and success tests were used as data collection tools and descriptive and predictive data analyzes were used as data analysis methods. When studies are examined in terms of research approaches, quantitative and mixed approaches appear to be the first. Another result is that learning in non-formal settings enhances student achievement, develops scientific process skills, and positively affects attitudes and motivations towards the course.

Keywords: Chemistry Education, Out-of-School Environment, Postgraduate Dissertations.

Öz:

Okul dışı öğrenme ortamlarında yürütülen faaliyetler, öğrencilerin öğrenme deneyimlerini zenginleştirmek, öğrencileri sosyalleştirmek ve kalıcı öğrenim sağlamak için önemlidir. Bu araştırmanın amacı, Türkiye'de okul dışı öğrenme ortamları ile ilgili yapılan lisansüstü çalışmaları içerik analizi yöntemiyle incelemektir. İlgili alanda toplam 40 (8 doktora, 32 lisansüstü) çalışma incelenmiştir. Çalışmalar konu alanı, metodoloji, örnekleme, veri toplama araçları, veri analizi yöntemleri çerçevesinde irdelenmiştir. Sonuçlar, araştırma çalışmalarının fen alanında daha yaygın olduğunu göstermiştir. Uygulama alanları genellikle içerisinde bilim merkezleri, müzeler ve hayvanat bahçeleri tercih edilmiştir. Ayrıca, çalışmalar çoğunlukla ortaokul öğrencileri ve öğretmenlerle yürütülmüştür. Veri toplama araçları olarak genellikle görüşme formları, likert tipi ölçekler ve başarı testleri, veri analiz yöntemleri olarak da tanımlayıcı ve yordayıcı veri analizleri kullanılmıştır. Çalışmalar, araştırma yaklaşımları açısından incelendiğinde, nicel ve karma yaklaşımlar ilk sırada yer almaktadır. Elde edilen diğer bir sonuç ise, sınıf dışı ortamlardaki öğrenmenin, öğrenci başarısını arttırdığı, bilimsel süreç becerilerini geliştirdiği ve derse yönelik tutum ve motivasyonlarını olumlu yönde etkilediği etkilediğidir.

Anahtar Kelimeler: Kimya Eğitimi, Okul Dışı Öğrenme Ortamı, Lisansüstü Tezler.

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INTRODUCTION

Individuals need to view, touch, smell, hear, practice, wonder and produce solutions to problems so that they will be able to act like a scientist, that is, to understand and make sense of the phenomena occurring in the outer world (Türkmen, 2010: 46-59). From this standpoint, it has been found out that out-of-school learning environments have a high potential in learning of science and other disciplines, offer students an opportunity to have hands-on experience by using most of their sense organs, and provide great contribution to the association of subjects with daily life (Rennie and Williams, 2002: 706–726; Ertaş, et. al., 2011: 178-198.). When the literature is reviewed, it is seen that there are many definitions related to out-of-school learning. The simplest definition of non-formal learning is "all of the places used outside the classroom for teaching and learning" (Manifesto, 2006). Non-formal learning in science education is denoted in various terms such as "out-of-school learning", "free-choice learning", "lifelong science learning", "science learning in everyday life" (Dierking, et. al., 2003: 108-111). Free-choice learning is usually defined as the learning in informal learning areas or in environments such as museums, science centers, zoos, nature centers, Internet, TV, books and field visits (Şimşek, 2011). Free-choice learning environments offer individuals an opportunity for direct experience with real objects, humans, and environments. Free-choice learning environments are voluntary settings usually with social environments, designed in the frame of needs and interests of students. Visitors of these environments may be single, or in small groups or family groups of various ages, genders, and specializations, with their previous learning experience and miscellaneous learning styles (Kola - Olusanya, 2005: 297-307).

Learning at school is criticized in the sense that it is far from real life experience, rather linked to symbols and it provides less opportunity for socialization to students (Rennie and McClafferty, 1995: 175-185). Whereas, it is stated that out-of-school learning environments increase students' willingness to learn and improve their motivation and attitudes toward learning (Ramey - Gassert, 1997: 433-450). Mc Comas (2006: 26-30) argues in his study that out-of-school learning environments can improve all of the cognitive, affective and psychomotor aspects of learning, while school environments often focus on the cognitive aspect. Schools need to create ways by which students can establish bonds between their daily lives and the subjects they learn in class. "When we focus solely on the time students spend in the classroom, we may fail to notice other areas and environments which will contribute to their education" (Bransford et. al., 2000). Therefore, it is considered that practice-based activities performed in out-of-classroom environments may enable students to find an opportunity to associate the subjects in the curriculum with their daily lives. Practice-based instruction is usually at a limited level due to a shortage of time, costly tools/ equipment and a shortage of resources at schools (Garner and Eilks, 2015: 1197-1210). Nevertheless, practice-based instruction plays a key role in any form of education (Abrahams, 2011; Tobin, 1990: 403-418). Out-of-school learning environments which

support in-class learning are believed to be alternative environments which will assume this key role by providing unique contributions to school lessons.

While offering rich learning opportunities, out-of-school learning environments do not guarantee that a targeted learning will always be achieved; there might be hindrances to learning in such environments (Griffin, 2004: 59-70). Therefore, visits to out-of-school learning environments must be thoroughly planned by handing out worksheets or assignment papers to students beforehand so that effective learning will be realized in such visits. Presentations prior to visits may also be helpful in such planning. This may ensure effective use of the time spent by students in out-of-school learning environments (Braun et. al., 2010: 151-168; Domizi, 2008: 97-110; Griffin, 2004: 59-70; Griffin and Symington, 1997: 763-779; Gutwill and Allen, 2012: 130 -181; Kisiel, 2005: 936–955).

Students participating at trips must be separated into groups, which is of importance for the efficiency of the trip. The duration to be designated for each activity must be pre-determined. Additionally, there are some activities which can be conducted through certain methods and techniques which can be used in out-of-school learning environments (Abacı, 1996; Demircioğlu, 2007; Kuruoğlu Maccario, 2002: 275-285; Şişginoğlu, 2011). Such activities include drama, observation, and observational drawing, group activities and worksheets. Additionally, the person or persons responsible for the students must guide the students by directing questions which they prepared earlier (if required), and thus help them reach the primarily targeted concept or achievement. After the trip, a discussion must be held with the students on positive and negative aspects of the trip, and any misconceptions must be clarified by probing into what the students have learned. (Anderson and Lucas, 1997: 485-495; Anderson, et.al, 2006: 365-380; Ash, 2003: 138–162; Bozdoğan, 2008: 19-41; Kisiel, 2005: 936–955; Martin, et. al., 1981: 301–309).

At the end of all these stages, the assessment must be performed by means of assessment instruments which are suitable for the nature of the environment. It is seen that assessment instruments used in the assessment of teaching in out-of-school learning environments have a formal structure and they do not provide an opportunity to associate concepts with daily life or enable reflection. From this aspect, it is considered that a multifaceted assessment of the process will be achieved by using the portfolio (product file) assessment approach. It can be said that out-of-school learning has started to gain importance in Turkey as well as all over the world. The questions of how the advantages of active out-of-school learning have been used to support in-class learning from the past until today, how they are reflected in the programs, what kind of applications are available and what kind of challenges have been encountered, and how can these advantages be used more effectively stand out as an important problem statement. It is necessary to find solutions to the problems encountered in this field, to examine the effectiveness of such practices on students, and to create more extensive and noteworthy studies.

In Turkey, studies on out-of-school learning environments were generally carried out as museum visits (Topallı, 2001; Güler, 2011: 169-179), science center visits (Tekkumru

Kısa, 2005; Bozdoğan, 2007; Hakverdi Can, 2013: 219-229), zoo visits (Yavuz and Balkan Kıyıcı, 2012), field trips (Erdoğan and Özsoy, 2007: 21-30; Güler, 2009: 30-43; Keleş et. al., 2010: 384-401; Köksal et. al., 2010: 395), energy park visits (Ertaş, et. al., 2011: 178-198.), planetarium tour (Sontay, et. al., 2016: 1-24) and nature trainings (Yardımcı, 2009). It is important and compulsory to review and assess existing studies to be able to guide future studies. With the review, it can be seen what has been done up to this time, what can be done after that, and all variables related to the subject, the boundaries of the subject area. The present study is limited masters and especially doctoral dissertations because they are more comprehensive and detailed in the related field than other studies (journal articles).

1. THE PURPOSE OF THE REVIEW

This study is aimed to reveal the descriptive characteristics, methodological aspects and general trends of graduate theses and dissertations published between the years 2007-2016. Answers to the following research questions are sought in the scope of the study:

- Which subjects are studied in the theses, and how is their distribution by year?
- How is the distribution of the types of theses (Doctoral Dissertation / Master's Thesis) by year?
- Which environments are studied in the theses, and how is their distribution by province?
- Which research methods are used in the theses?
- Which groups are used as a sample in the theses?
- How large are the sample sizes used in theses?
- Which data collection tools are used in the theses?
- Which research methods and data analysis techniques are used in the theses?
- What are the inferences from findings of the theses?

2. METHODOLOGY

In the present study, it was examined 40 theses (8 doctoral dissertations, 32 master's theses) about out-of-class learning environments. These theses have already been approved by the Council of Higher Education of Turkey (YÖK) and the Chair of Documentation Department between 2007 and 2016 and archived at the National Thesis Center. The theses were analyzed by using content analysis that is one of the qualitative research techniques. The content analysis is a technique of examining visual, printed, or verbal interview data (Cole 1988: 53–57) and also known as a technique of analyzing documents. In the study, the content analysis was used to combine the content of theses under the specified themes and concepts (Bauer, 2003: 131; Fraenkel and Wallen, 2000; Yıldırım and Şimşek, 2011).

2.1. The Selection and Analysis of the These

A number of criteria are ascertained in order to make a decision on the purpose of the study and on which theses will be reviewed in the scope of the study by taking keywords as the basis. These criteria are as follows;

1. The study must be a master's thesis or a doctoral dissertation,
2. The study must focus on active out-of-school learning environments supporting classroom learning in line with the purpose and sub-purposes of the research,
3. The study must be carried out between 2007-2016,
4. The study must be conducted in Turkey.

In the National Thesis Center, 40 theses with these criteria were found. A code (T_1, T_2, T_3,…T_{40}) was given to each so that it would be easier to analyze. In the analysis of the theses, the following themes were used; author name, publication year, publication type, purpose, method, sample, data collection tool(s) and data type (quantitative of qualitative). The themes were adapted from studies in the literature (Turna and Bolat, 2015: 35-55; Doğru et. al., 2012: 49-64).

3. RESULTS

Theses examined in the study were classified according to the determined themes and presented in Table 1.

Table 1: General Features of the Theses Included in the Study

Code	Author (Year) MSc/PhD	Purpose of Study	Method (Data Type - Model - Sample - Data Collection Tool)
T_1	Bozdoğan (2007), PhD	An examination on the effect of exhibitions and activities at science and technology museums on the interests and academic achievements of secondary level students.	Quantitative - Experimental, Survey - 3 49 students - Achievement Test, Questionnaire
T_2	Erdem (2007), MSc	A review on the opinions of Social Studies teachers on the excursion - observation method and on their problems and own competence regarding the excursion - observation method.	Quantitative - Survey - 76 teachers - Questionnaire
T_3	Mazman (2007), MSc	An examination on the use of the excursion - observation method by Social Studies teachers and the problems encountered.	Mixed - Survey - 154 teachers - Questionnaire
T_4	Kısa (2008), MSc	Development and implementation of the "Science Center Learning Package" and measurement of its effectiveness.	Quantitative - Experimental - 77 students - Achievement Test, Attitude Scale

Table 1 (Continued): General Features of the Theses Included in the Study

T_5	Çiçek (2008), MSc	An examination on the effect of science festivals on the improvement of the success of students in chemistry class and their attitude towards chemistry class.	Mixed - Experimental - 16 students - Achievement Test, Attitude Scale, Interview
T_6	Sapsız (2008), MSc	Identification of the basic levels of knowledge and personal opinions of students participating at scouting activities performed at elementary schools.	Quantitative - Survey - 163 students - Questionnaire
T_7	Şentürk (2009), MSc	A review on the effect of Middle East Technical University Science Center (ODTUBM) on attitudes of students towards science.	Quantitative - Experimental - 251 students - Attitude Scale
T_8	Demirci (2009), MSc	Identification of the opinions of classroom teachers on the importance of museum tours in the teaching of cultural elements.	Mixed - Survey - 212 teachers - Questionnaire
T_9	Kayağ (2009), MSc	Assessment of the opinions of Social Studies teachers on the use of excursion - observation method.	Quantitative - Survey - 150 teachers - Questionnaire
T_{10}	Arı (2010), MSc	Identification of the opinions of classroom teachers regarding Museum Consciousness learning activities.	Qualitative - Survey - 18 teachers - Interview
T_{11}	Filiz (2010), MSc	The manifestation of the meaning of social studies class accompanied by museum education for students.	Qualitative - Factual pattern - 25 students - Interview
T_{12}	Koçak (2010), MSc	An emphasis on the requirement of associating Visual Arts Education Class to museum activities in line with the opinions of students, teachers and museum officials on museum activities in elementary level arts education class.	Mixed - Survey - 125 students, 30 teachers - Interview
T_{13}	Yazıcıoğlu (2010), MSc	Identification of the effect of visits to historical places and museums in Secondary School Social Studies class on academic achievement and retention through comparison with the conventional method.	Mixed - Experimental - 80 students - Achievement Test, Interview
T_{14}	Özür (2010), PhD	Implementation of out-of-classroom activities in Social Studies class and evaluation of the results	Mixed - Experimental - 49 teachers, 125 students, and their parents - Survey, Achievement Test, Observation Form
T_{15}	Egüz (2011), MSc	Identification of the opinions of Social Studies teachers and students on the use of museums for purpose of Social Studies Education.	Qualitative - Survey - 10 teachers, 20 students - Interview
T_{16}	Sönmez (2011), MSc	The importance of museums in Social Studies class and the development of solution offers to problems encountered.	Quantitative - Survey - 20 teachers - Questionnaire
T_{17}	Çerkez (2011), MSc	A review of the effect of teaching practices based on museum education in Social Studies Education class for Grade 7 students of secondary schools on their attitudes towards the class and their academic achievements.	Quantitative - Experimental - 56 students - Attitude Scale, Achievement Test
T_{18}	Görkem (2012), MSc	Participation of students at social activities and a review of its effect on their affective and academic achievements.	Quantitative - Survey - 626 students - Survey
T_{19}	Kısa (2012), MSc	A review of the opinions of teachers and students on the use of museums in Social Studies education in terms of miscellaneous variables.	Quantitative - Survey - 1000 students, 65 Social St. teachers - Survey

Table 1 (Continued): General Features of the Theses Included in the Study

T_{20}	Onay (2012), MSc	Identification of the opinions of teachers, students, parents and principals on the effectiveness of educational club practices at elementary schools, and evaluation of their opinions through comparison in terms of certain variables.	Mixed - Relational Survey - 941 students, 27 teachers - Survey, Interview
T_{21}	Yavuz (2012), MSc	An examination on the effect of the use of zoos for educational purposes on academic achievements and concerns of elementary school students.	Mixed - Experimental - 65 students, 36 teachers - Test, Interview
T_{22}	Yıldırım (2012), MSc	A review on the implementation status of excursion - observation method in Secondary Level Social Studies classes	Quantitative - Survey - 143 teachers - Questionnaire
T_{23}	Atmaca (2012), MSc	Identification of the effects of a teaching program based on out-of-classroom science activities (OOCSA) on students of the Faculty of Education, HU.	Mixed - Experimental - 34 preservice teachers - Attitude Scale, Observation Form, Interview
T_{24}	Olgun (2012), MSc	An assessment of the contribution of a non-formal learning program to the creative problem-solving skills of elementary school students.	Mixed - Experimental - 50 team coaches, 25 students - Observation form, Questionnaire, Interview
T_{25}	Ertaş (2011), PhD	An examination on the effect of critical thinking education supported by scientific out-of-school activities in physics class on critical thinking tendencies of students and their attitudes towards physics class.	Mixed - Experimental - 120 students - Attitude Scale, Interview, Student diaries
T_{26}	Yazgan (2013), PhD	Identification of the effect of Research- Oriented Out-of-Classroom laboratory activities on academic achievements and conceptual understanding of students as well as their attitude towards the environment, their perceptions of inquiry-based learning skills and their study skills.	Mixed - Experimental - 89 students - Achievement Test, Attitude Scale, Perception Scale, Interview
T_{27}	Altıntaş (2014), MSc	An examination of the effect of informal learning environments on the achievements and attitudes of Grade 6 students at Secondary Schools towards nature and earth; identification of their personal perceptions in respect of their learning statuses in the informal education environment and their levels of understanding of the main points; identification of the sources from which students acquire the scientific information they use in daily life, and the sources which they use when producing solutions to problems they encounter in daily life.	Mixed - Experimental - 75 students - Achievement Test, Attitude Scale
T_{28}	Yaşar (2014), MSc	Identification of the interactions of students with science museum stations as well as their levels of knowledge before and after museum visits in frame of the content of science museum stations, by discovering at which level the stations accomplish the purpose of design and which practices are required for the improvement of stations, and making a summative assessment of the stations.	Qualitative - 12 students - Interview forms
T_{29}	Malkoç (2014), MSc	Identification of the use of out-of-classroom school environments in Social Studies education.	Qualitative - Survey - 40 teachers - Interview forms
T_{30}	Yorulmaz (2014), MSc	Identification of the meaning of the learning process in an overnight museum environment for secondary school students.	Qualitative - Case study - 18 students - Interview forms

Table 1 (Continued): General Features of the Theses Included in the Study

T_{31}	Armağan (2015), MSc	Design and implementation of an exemplary out-of-school learning environment model on the habitats in the frame of the unit titled "Let's Make a Travel and Learn About the World of Living Organisms" for Science class for Grade 4 students; identification of the reflections of the process.	Qualitative - Case study - 20 students and their parents - Interview, Worksheets, Student diaries, Performance assessment forms
T_{32}	Bodur (2015), MSc	Identification of the effect of out-of-classroom activities on academic achievements, scientific process skills and science learning motivations of grade 7 students in the frame of the unit titled "The Solar System and Beyond: The Puzzle of Space".	Quantitative - Experimental - 72 students - Achievement Test, Ability test, Motivation scale
T_{33}	Kulalıgil (2015), MSc	A study on the effect of teaching practices performed in out-of-classroom learning environments on academic achievements, creativity and science learning motivations of students.	Quantitative - Experimental - 43 students - Scale, Achievement Test
T_{34}	Sözer (2015), PhD	An assessment of the current status of active out-of-school learning supporting in-class learning at elementary schools in Turkey through a meta-synthesis method on basis of the findings of studies carried out in the field.	Literature review - Survey - 6080 students, 3077 teachers - 61 graduate theses
T_{35}	Demir (2015), MSc	A review on the levels of practice at museums for achievements which must be provided through museum education in social studies curricula of grade 5, 6 and 7 social studies teachers, and the problems they encounter while organizing trips to museums.	Quantitative - Survey - 55 teachers - Questionnaire
T_{36}	Öz (2015), MSc	A review of the effect of science center practices supported by research & inquiry-based activities on academic achievements, scientific literacy, and inquiry-based learning skills of grade 7 students.	Quantitative - Experimental - 58 students - Achievement Test, Scientific literacy test, Perception scale
T_{37}	Aslan (2015), PhD	A review of the effect of the design of an interactive out-of-classroom chemistry environment including entertaining and interactive daily life activities on students' levels of associating chemistry with daily life and their attitudes towards chemistry class.	Mixed - embedded design - 19 students - Worksheets, Attitude scale, Experience Form, Interview, Experiment Assessment, and Self-Assessment Form
T_{38}	Topaloğlu (2016), PhD	Identification of the effect of activities carried out in out-of-school learning environments based on socio-scientific subjects on the conceptual understanding and decision- making skills of grade 7 students, and students' opinions on activities carried out in out-of-school learning environments based on socio-scientific subjects.	Mixed - Embedded design - 21 students - Conceptual understanding test, Decision Making scale, Interview
T_{39}	Erten (2016), MSc	A research on the effect of school-based field visits on achievements of secondary school students related to their scientific process skills.	Quantitative - Experimental - 56 students - Observation forms, Worksheets, Interview form
T_{40}	Karakaya (2016), PhD	A research on the effect of instruction of the unit titled "Human and Environment" in the frame of science education through out-of-classroom teaching approach on the environmental literacy of grade 7 students and the reflections of students in the group applying the out-of-classroom teaching approach on the process.	Mixed - Experimental - 62 students - Environmental literacy scale

Ph.D.: Doctoral Dissertation, MSc: Master's Study.

3.1. Subjects Studied in the Theses and Their Distribution by Year

When the theses in Table 1 are reviewed, it is seen that the most common subject area is the "*Science Education*" which is studied in 16 theses (40%) in total (Table 2). Other subjects include social studies education, chemistry education, physics education, out-of-class learning environments, visual arts education, scouting, and social activities.

When Table 2 is examined, the research areas of the theses are seen to differ according to the years. There has been an increase in the studies carried out in science education beginning from the year 2012 (Table 2). Whereas, in the field of social studies education, there have been studies published almost every year since 2007. On the other hand, it is seen that no study has been performed prior to the year 2012 on physics education and social activities (Table 2). There are only 2 studies on out-of-school learning in scouting activities and Visual Arts Education. The relation between out-of-school learning environments and science courses is described as follows in the "Science Teaching Program" published by MOE (Ministry of Education) in 2017.

Table 2: Distribution of the theses subjects by year

Thesis subjects	Years										Total	
	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	N	%
Science Education	T_1	T_4	T_7	-	-	T_{21}, T_{23}, T_{24}	T_{26}	T_{27}, T_{28}	T_{31}, T_{32}, T_{33}, T_{36}	T_{38}, T_{39}, T_{40}	16	40
Chemistry Education	-	T_5	-	-	-	-	-	-	T_{37}	-	2	5
Physics Education	-	-	-	-	-	T_{25}	-	-	-	-	1	2.5
Social activities (primary school)	-	-	-	-	-	T_{18}	-	-	T_{34}	-	2	5
Social Studies Education	T_2, T_3	-	T_9	T_{11}, T_{13}, T_{14}	T_{15}, T_{16}, T_{17}	T_{19}, T_{22}	-	T_{29}, T_{30}	T_{35}	-	14	35
Scouting activities	-	T_6	-	-	-	-	-	-	-	-	1	2.5
Visual Arts Education	-	-	-	T_{12}	-	-	-	-	-	-	1	2.5
Out-of-class learning environments (Primary school)	-	-	T_8	T_{10}	-	T_{20}	-	-	-	-	3	7.5

In the Science Teaching Program, it is suggested that science courses be taught in student-oriented learning environments (problem, project, argumentation, collaborative learning, etc.). In-class and out-of-school learning environments should be designed according to the strategy of inquiry-based learning so that students can learn new knowledge meaningfully and permanently. In this framework, informal learning environments such as school garden, science centers, museums, planetarium, zoos, botanic gardens, natural environments etc. should also be used in the courses and associated with the content of course (MEB-I, 2017).

The above-mentioned explanation shows that the conclusions of studies on out-of-school learning environments in science education are being tried to be transferred to science teaching programs. Similarly, the updated Social Studies teaching program includes the following statement; "out-of-school learning environments should be used as much as possible in Social Studies education. Environments such as the immediate vicinity of the school (e.g. Schoolyard), marketplaces, governmental agencies, factories, exhibitions, archaeological excavation sites, workshops, museums and historical places (historical structures, monuments, museum cities, battlefields, virtual museum tours, etc.) can be selected for related activities" (MEB-II, 2017). With a similar change in the secondary school curricula, the number of studies in physics, chemistry and biology education can be increased. In addition to these data obtained, the distribution of master and Ph.D. theses by year is shown in Figure 1.

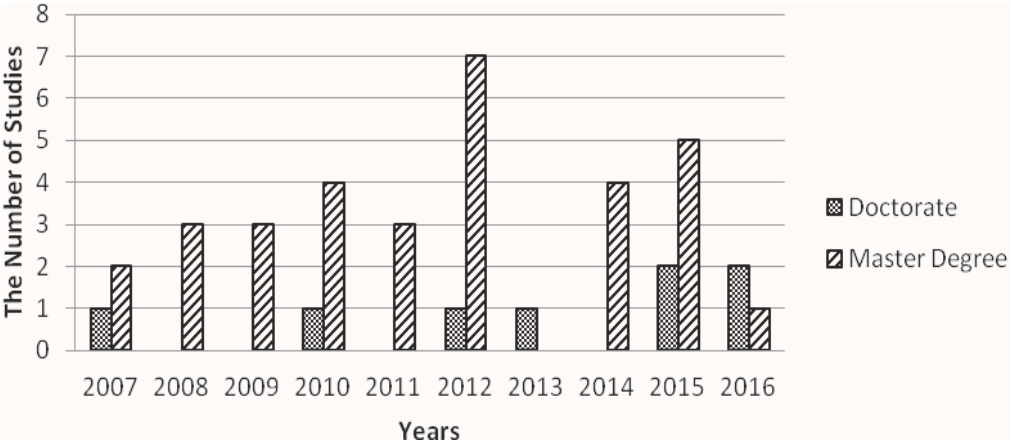

Figure 1: Distribution of the theses by year

Figure 1 shows that 32 master's theses and 8 doctoral dissertations were written on out-of-school learning environments between the years 2007-2016; and that there are no doctoral dissertations on this subject for the years 2008, 2009, 2011 and 2014, and no master's theses in 2013. As seen in Figure 1, most theses (8) published in 2012. There has been a significant increase in the number of studies in science education after 2011.

3.2. Provinces and Environments of Theses

When Table 3 is examined, it is seen that the studies on out-of-school learning environments have been carried out in various environments and provinces. It is observed that the majority of the studies have been conducted in Ankara and Istanbul provinces. Whereas, science centers are found out to be the most common out-of-school learning environment preferred to perform the studies. These environments are followed by museums and zoos. On the other hand, environments which are related to socio-scientific subjects such as hydroelectric power plants and dialysis centers are also included in the

studies as out-of-school learning environments. There are numerous reasons for the specific preference of science centers and museums. The learning environment at science centers is different from a school environment in the sense that it is more colorful and louder and it offers somewhat formal guidance in respect of unstructured interactions and materials (French, 2002). Informal institutions like science centers and science museums are designed to allow visitors to wander around freely and create their own learning (Wishart and Triggs, 2010: 670). Various provinces and regions must be selected for the establishment of science centers, museums, zoos, and botanical gardens so that studies on out-of-school learning environments can be carried out and become widespread across diverse locations. Consequently, there will be an increase in the number of individuals making use of such environments.

Some of the studies (T_2, T_3, T_8, T_9, T_{10}, T_{15}, T_{17}, T_{18}, T_{19}, T_{20}, T_{22}, T_{29}, T_{31}, $T_{34,}$ and T_{35}) are not included in the table as they are aimed at receiving opinions of participants and they are not performed in an out-of-classroom environment.

Table 3: Out-of-school learning environments and provinces in which they are located

Out-of-School Learning Environments	Provinces	Code	N
Science center	Ankara, İstanbul,	T_1, T_4, T_7, T_{23}, T_{25}, T_{32}, T_{36}, T_{40}	8
Museum	İstanbul, Ankara, Tokat, Amasya, Kütahya, Afyonkarahisar, Şanlıurfa, Çorum	T_{11}, T_{12}, T_{13}, T_{16}, T_{25}, T_{28}, T_{30}	7
Science school	Ankara	T_{27}	1
Zoo	Kocaeli, Ankara, İstanbul, Denizli	T_{21}, T_{23}, T_{26}, T_{33}	4
Camping trip	Ankara	T_6	1
Botanical garden	Ankara, İstanbul	T_{23}, T_{26}	2
Science fair	Ankara	T_5	1
Interactive Out-of-Class Chemistry Environment	Trabzon	T_{37}	1
Other (Hydroelectric power plant, dialysis center, tree planting activity, water treatment plant, hobby gardens, Arboretum, TUBİTAK Marmara Research Center, Ministry of Labor and Social Security)	Ankara, Gebze, Kocaeli	T_{14}, T_{24}, T_{25}, T_{26}, T_{33}, T_{38}, T_{39}	7

3.3. Approaches Used in the Theses

When the distribution of studies in Table 4 is examined by research approach, it is seen that quantitative research approach is used in 16 studies, qualitative research approach is used in 7 studies and both approaches are collectively used in 16 studies. One study (T34), on the other hand, has been conducted as a meta-synthesis study.

Table 4: Research approaches used in the theses

Research approach	N	Code	%
Qualitative	7	T_{10}, T_{11}, T_{15}, T_{28}, T_{29}, T_{30} and T_{31}	17.5
Quantitative	16	T_1, T_2, T_4, T_6, T_7, T_9, T_{16}, T_{17}, T_{18}, T_{19}, T_{22}, T_{32}, T_{33}, T_{35}, T_{36}, T_{39}	40
Meta-synthesis	1	T_{34}	2.5
Mixed	16	T_3, T_5, T_8, T_{12}, T_{13}, T_{14}, T_{20}, T_{21}, T_{23}, T_{24}, T_{25}, T_{26}, T_{27}, T_{37}, $T_{38,}$ and T_{40}	40

Mixed and quantitative research methods are seen to be the most commonly preferred approaches in the graduate theses reviewed. In this sense, it is thought that detailed studies must be performed with a higher number of qualitative researches. Moreover, it is anticipated that meta-synthesis studies will contribute to the literature of out-of-school learning environments (Sözer, 2015). During the graduate studies taking out-of-school learning environments as a basis, researchers referred to the mixed method in circumstances where they remain incapable of replying questions of the study by means of solely quantitative or qualitative approaches. In a study, Davies (2000) argues that combining qualitative and quantitative methods provides a more holistic structure, and helps to explain various aspects of the subject of study. Likewise, Johnson and Onwuegbuzie (2004: 14-26) made similar explanations while defending the strong aspects of the mixed approach.

3.4. Sample Groups and Sizes in Theses

Various types of sample groups and sizes are seen to be preferred in the graduate studies examined. According to Table 5, the sample group mostly includes secondary school students. Additionally, there are studies carried out with secondary and elementary level students. Other sample groups involve teachers, parents of students and bachelor students of the faculty of education. One of the reasons for this situation is that life sciences class is given at Grades 5, 6, 7 and 8. Moreover, many studies in the literature prefer a sample group consisting of secondary school students. (Beiers and Mc Robbie, 1992; Rix and McSorley, 1999: 577–593; Bozdoğan and Yalçın, 2006: 95-114; Shanely, 2006; Metin, 2009; Gafoor and Narayan, 2012: 191-204; Şahin and Sağlamer Yazgan, 2013: 107-122; Bozdoğan, et. al. 2015: 1-12). Another group which is often preferred as the sample group in the reviewed studies consists of teachers. From this aspect, it is thought that selecting teachers as a sample group is the correct decision as teachers are among the most important stakeholders of education and implementers of the program. Whereas, the study with the code T34 is not included in the review in terms of the sample group and size as it is carried out through the meta-synthesis method.

Table 5: The frequency of selection of sample groups and sizes

Sample Group	Sample Size					N
	10 - 50 persons	50 - 100 persons	100 - 200 persons	200 - 350 persons	350 and over	
Secondary school students (6 - 8)	T_{11}, T_{15}, T_{24}, T_{28}, T_{30}, T_{38}	T_{6}, T_{13}, T_{17}, T_{21}, T_{26}, T_{27}, T_{32}, T_{36}, T_{39}, T_{40}	T_{14}	T_{1}, T_{7}	T_{18}, T_{20}	21
Elementary school students (1 - 5)	T_{31}, T_{33}	T_{4}	T_{6}		T_{20}	5
Secondary level students (9 - 12)	T_{5}, T_{37}	T_{25}				3
Parents of students	T_{31}		T_{14}			2
Teachers	T_{10}, T_{12}, T_{14}, T_{15}, T_{16}, T_{20}, T_{21}, T_{29}	T_{2}, T_{19}, T_{35}	T_{3}, T_{9}, T_{22}	T_{8}		15
Undergraduate students (Faculty of Education)	T_{23}					1
Total	20	15	6	3	3	

When the studies are analyzed in terms of sample size, it is observed that, as shown in Table 5, the number of samples is 10 to 50 persons for 20 of the studies, 50 to 100 persons for 15 of the studies, 100 to 200 persons for 6 of studies, 200 to 350 persons for 3 of the studies and over 350 for the remaining 3 studies. This manifests that researchers have usually worked with small sample groups (with less than 100 individuals). This might be due to the shortage of time, official procedures and ethical problems (Erdoğmuş, 2009). Working with small sample groups might be more efficient in terms of maintaining control, having full command of the entire process, and collecting data more thoroughly. However, the number must be increased if the generalization is intended. On the other hand, the sample size is closely associated with the problem and purpose of the study.

3.5. Data Collection Tools Used in the Studies

Figure 2 shows that the data collection tools which are most commonly used in the studies. When the diagram is examined, it is observed that the interview technique is most commonly preferred as the data collection tool. The interview technique is followed by questionnaires, scales and achievement tests as data collection tools. Attitude scales rank the first of scales used. In addition, observations, worksheets, student diaries, reflective writings, forms, and documents are used.

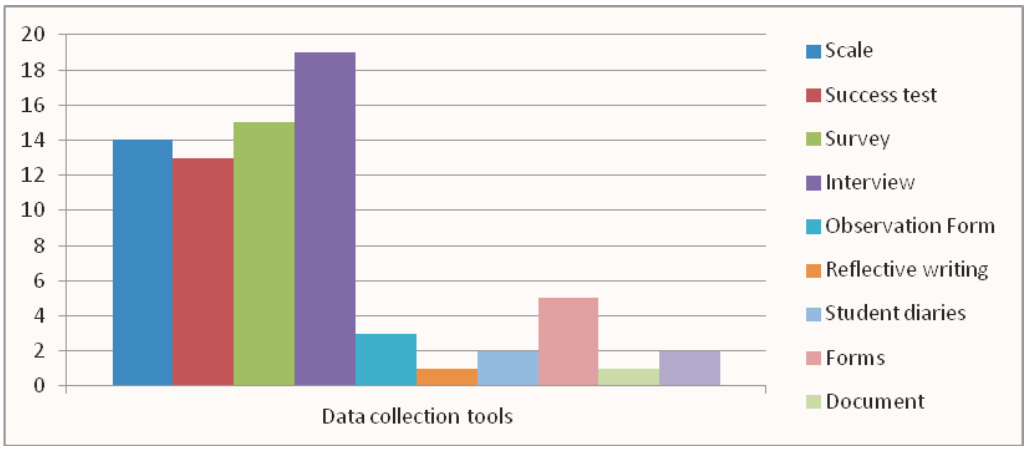

Figure 2: Commonly used data collection tools

Data collection tools are presented in Table 6 in comparison with the research approaches used in the theses. When the data collection tools used in the studies are examined, it is seen that the data are usually collected via questionnaires, scales, and achievement tests in the studies based on quantitative approach while they are usually collected via interviews in the studies based on and qualitative approach. Similarly, Chin and Hsiao-Lin (1999), Rennie and Williams (2000), Falk and Adelman (2003: 163-176.), Shanely (2006), Balkan Kıyıcı and Atabek Yiğit (2010: 1373-1388), Hakverdi - Can (2013: 219-229), Taşdemir, et. al. (2014: 61-72) and Türkmen (2015: 15-22) made use of interviews in their studies based on qualitative approach. Whereas, interviews, achievement tests, questionnaires, and scales are used together in the studies conducted with mixed research method. There are also other studies which include other data collection tools. Whereas, documents are used in the meta-synthesis study (T34). Similar studies are observed in literature reviews (Anderson, et. al., 2000: 658-679; Henriksen and Jorde, 2001: 189-206; Jarvis and Pell, 2002: 979-1000; Yardımcı, 2009; Aslan, 2015; Topaloğlu, 2016). When determining the data collection tool or the data collection method, it must be ensured that the most suitable tool and method for the research problem have been selected. It must be noted that it is important not only to collect data but also collect reliable and realistic data.

Table 6: Research Approach and Data Collection Tools used in the Theses

Data Collection Tool	Research Approach			Meta-synthesis
	Quantitative	Qualitative	Mixed	
Scale	6	-	8	
Interview	1	7	11	
Achievement Test	6	-	7	
Observation	1	-	3	
Worksheet	1	1	1	
Forms	-	1	1	

Table 6 (Continued): Research Approach and Data Collection Tools used in the Theses

Student diaries	-	1	1	
Questionnaire	9	-	6	
Reflective writing	-	-	1	
Document	-	-	-	1

3.6. Research Methods and Data Analysis Techniques Used in the Theses

Research methods and data analysis techniques used in the theses are comparatively presented in Table 7. As can be seen from Table 7, the most commonly used methods in the theses include the experimental method and the survey method. Apart from these, occasional use of case study, factual pattern, embedded design, and meta-analysis methods is observed (Table 7). For data analysis, T-test is the most commonly used method. Descriptive analysis and content analysis are also commonly used as data analysis methods. Descriptive statistics and t-tests are often used in the studies carried out through survey method.

Table 7: Research methods and data analysis techniques used in the theses

Data Analysis Method	Research Method					
	Experimental	Survey	Case study	Factual pattern	Embedded design	Meta-synthesis
Code	T_1, T_4, T_5, T_7, T_{13}, T_{14}, T_{17}, T_{21}, T_{23}, T_{24}, T_{25}, T_{26}, T_{27}, T_{32}, T_{33}, T_{36}, T_{39}, T_{40}	T_2, T_3, T_6, T_8, T_9, T_{10}, T_{12}, T_{15}, T_{16}, T_{18}, T_{19}, T_{20}, T_{22}, T_{29}, T_{35}	T_{28}, T_{30}, T_{31}	T_{11}	T_{37}, T_{38}	T_{34}
Quantitative Data Analysis						
Frequency / Percentage / Chart	3	9	-	-	2	1
t-test	13	7	-	-	1	-
ANOVA/ ANCOVA	6	3	-	-	1	-
MANOVA/ MANCOVA	1	-	-	-	-	-
F test	1	-	-	-	-	-
Regression	1	-	-	-	-	-
Non-parametric tests	2	3	-	-	2	-
Kolmogorov-Smirnov test	1	-	-	-	-	-
Qualitative Data Analysis						
Descriptive analysis	2	5	2	1	-	-
Content analysis	6	2	2	-	2	1

3.7. Analysis of Findings Obtained in the Theses Reviewed

In 15 of the theses reviewed (T2, T3, T8, T9, T10, T12, T14, T15, T16, T19, T20, T22, T29, T34 and T35), teachers reported that they tried to attract the interest of students in the out-of-school learning environment to be visited before the visit. It is observed

that they asked questions to students about the environment for this purpose, provided preliminary information about the environment and had a preliminary research done about the environment. In 18 of the theses reviewed (T4, T5, T13, T17, T18, T21, T24, T26, T27, T28, T31, T32, T33, T34, T36, T37, T39 and T40), it is observed that out-of-school learning environments improve students' attitude and motivation towards their lessons at school, enable them to see the relation of especially science (physics, chemistry, biology) classes to daily life, and increase their academic success. Studies with similar findings are common in the literature (Beiers and Mc Robbie, 1992; Bitgood, et. al., 1994; Rix and McSorley, 1999 577–593; Falk and Adelman, 2003: 163-176.; Bozdoğan and Yalçın, 2006: 95-114; Wulf, et.al, 2009: 92; Güler, 2011: 169-179; Daneshamooz et. al., 2013: 1875-1881; Aslan, 2015; Erten and Taşçı, 2016: 638-657). Additionally, 9 theses (T11, T12, T14, T15, T19, T20, T30, T34 and T38) emphasize that the effectiveness of out-of-school learning environments can be increased if visits to such environments are also backed by a variety of activities to make the visit more appealing for students, such as guidance service, worksheets, drama, games, note-taking, photographing, video recording, etc.. Similar findings are also observed in other studies in the literature (Abacı, 1996; Anderson, et. al., 2006: 365-380; Anderson and Lucas, 1997: 485-495; Ash, 2003: 138–162; Demircioğlu, 2007; Bozdoğan, 2008: 19-41; Kisiel, 2003: 3-21; Kuruoğlu Maccario, 2002: 275-285; Martin, et. al., 1981: 301–309; Şişginoğlu, 2005, 2011).

When the studies in which teachers are asked to provide their opinions on the use of out-of-school learning environments to support in-class learning are examined in terms of their findings, it is seen that teachers spend a moderate amount of time for out-of-school learning activities. Teachers report that the reasons for this situation include economic problems, excessive class size, inadequacy of class hours, difficulty of controlling students in learning environments, challenges in official procedures and transportation (T2, T3, T8, T9, T10, T12, T14, T15, T16, T19, T22, T29). Similar problems are also reported in some other studies in the literature (Bozdoğan, 2007; Bozdoğan, et. al., 2015: 1-12). Arslantaş (2006), Çelik (2010: 128-153), Egüz (2011), Palandökenler (2008) and Yıldırım (2014) concluded from their studies that social studies teachers collectively agree that the weekly hours designated for the class are inadequate. On the other hand, Chin and Hsiao-Lin (1999) found in their studies that museum education program eliminated misconceptions of teachers regarding museums, that teachers compared formal and informal education environments and included museum visits to their teaching methods. Some of the studies point out to the fact that teachers receive no in-service training seminars on the use of out-of-school learning environments to support in-classroom learning. When the in-service training programs announced by Ministry of Education are examined, it is seen that there is only one seminar which was on museum training for classroom teachers and social studies teachers in the scope of the in-service training program for the year 2008. However, it was again notified by Ministry of Education that the seminar on museum training for social studies teachers was canceled. Teachers in other branches also experience similar situations.

CONCLUSIONS and SUGGESTIONS

The results obtained from the analysis of theses indicated that the subject of out-of-school learning environments was mostly studied in science education. As a result of these studies, it has been tried to integrate the subject of out-of-school learning environments into science teaching programs (MEB-I, 2017). Whereas, it is understood that the number of theses in chemistry education, physics education, and other branches was quite insufficient. The number of master's theses is higher than doctoral dissertations, and the highest number of studies performed is within the year 2012. Considering that doctoral dissertations are relatively more significant and comprehensive than master's theses, it must be noted that this figure is quite insufficient. Results of the studies indicate that most of the studies were carried out in Ankara and Istanbul provinces. This result is not surprising, especially considering the provinces in which other out-of-school learning environments, as well as science centers and museums, are predominantly located. In most of the studies, the sample group visited an out-of-school learning environment; while, in 15 studies, persons who previously visited an out-of-school learning environment or were encouraged to use such out-of-school learning environments in order to support in-class learning were asked to provide their opinions. It was observed that the environments selected for visits usually include science centers, museums, and zoos (Table 3). In the code T37 study, an out-of-class environment for chemistry was designed and its effectiveness was investigated. When the studies are reviewed in terms of their research approaches, it is seen that the quantitative and mixed approaches are the most commonly preferred approaches, while the qualitative approach is relatively less preferred. This may be attributed to the fact that qualitative studies are not much preferred as they require a longer period of time and more detailed studies. Only one study (T34) used the meta-synthesis method. When the studies are examined in terms of sample types, it is seen that secondary school students are most commonly preferred as the sample group. The recent changes in the science curriculum whereby out-of-school learning environments have been included in teaching plans have brought along the need to work more frequently with that sample group. On the other hand, it is apparent that the number of sample groups studied is not much high. It is estimated that this preference is due to the suggestion that the studies should be carried out with less number of sample groups so that visits to out-of-school learning environments will be more effective and controlled. The most commonly preferred data collection tools are interviews, surveys, achievement tests and scales. As most of the studies were aimed at receiving opinions and identifying changes in attitude and academic success, it can be stated that the purpose matches the data collection tools selected. It is found out that the most commonly used quantitative data analysis type is t-test and the most commonly used qualitative data analysis type is content analysis. The reason for selection of the mentioned analysis methods is that the majority of the studies are experimental. Whereas, studies in which survey method is mainly preferred often use descriptive analysis, which matches the nature of the method.

It was observed that in out-of-school learning activities, teachers asked students to perform preparatory work prior to such activities and that the activities were found useful

by the students. It was also reported by the students and teachers that the learning in out-of-school learning environments is effective. It was observed that the students were pleased to take part in the reinforcing activities after the visits, and they cared about such activities and found them useful. Another finding is that the teaching in out-of-school learning environments improved students' success in the relevant class as well as their scientific process skills, and had a highly positive impact on their attitude and motivation regarding the class. In the light of all these findings, a number of suggestions are provided for researchers who may perform studies on similar subjects in the future:

- The findings obtained indicate that there are a high number of studies performed on science and social studies education. Therefore, it is anticipated that new studies on out-of-school learning environments in chemistry education, physics education and other branches will contribute to the literature.
- It is noteworthy that there are very few doctoral dissertations in out-of-school learning environments. The number of doctoral dissertations must be increased.
- Out-of-school learning environments are visited by people of all ages. From this aspect, choosing diverse sample groups for the studies may help the researcher produce a variety of solutions to problems.
- The number of samples may be increased for more data and more accurate results.
- Out-of-school learning environments are not limited to science centers and museums. Visiting other learning environments than science centers and museums such as factories, hospitals, caves, lakes can increase students' interest in the related field.
- It is considered that the use of qualitative research methods and literature reviews in addition to the mixed and quantitative methods will be effective in graduate studies carried out in our country in the sense that they will be more compatible with international publications.
- Working merely with quantitative or qualitative data collection tools restricted the data obtained from the study. Increasing diversity of data collection tools may contribute to obtaining more detailed and in-depth data.
- Topics suitable for out-of-school learning can be selected for teaching program, teachers can be assisted by handbooks containing exemplary course practices, and related in-service training seminars can be organized for teachers.
- In the Special Teaching Methods course given at faculties of education, pre-service teachers can be encouraged to do practices for teaching in out-of-school learning environments to support in-classroom learning.
- Researchers may be suggested to perform studies which examine out-of-school learning in various countries and compare them to the examples in our country. This may help us see how and to what extent we make use of out-of-school learning environments to support in-classroom learning.

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