

Thematic Analysis of Graduate Theses for Preschool Science Education in Turkey

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Abstract

This paper aimed to examine the graduate theses carried out in the field of preschool science education in Turkey between 2006 and 2021. Data were collected from the National Thesis Center of the Turkish Council of Higher Education by using three keywords preschool, science education, and science. A total of 60 theses, 50 of which are master's and 10 doctoral were reached. The research used a document analysis method. The thesis was analyzed under seven themes publication type and publication year, the topic, research approach, research method and models, research sample, data collection tool, and results of the research. It was concluded that 83.33% of the thesis are master's, most of them are conducted under the main themes of description and investigation, 65% preferred the quantitative approach, mostly descriptive research is used as a method and quantitative data collection tools are preferred, mostly studied the relationships between some known variables as attitude. The most striking result is that the effect of some practices employed for preschool science teaching in theses is generally positive. This result has been similarly cited in many other studies on science education. The thesis should be carried out for all stakeholders to reach the targeted point with preschool education.

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Introduction

The preschool period, in which basic knowledge, skills, and habits are acquired, has a critical importance for the education and development of the child. In this period, children are individuals who wonder, research, question, and solve problems with innovative and different perspectives like scientists (Akgundur & Akpınar, 2018; Alade et al., 2016). They exhibit innate scientific characteristics (Buyukktaskapu et al., 2012). Skills such as observing, interpreting information, classifying, making predictions, establishing relationships, and measuring developed by science begin to develop and be used when preschool children discover their attributes and carry out various plans in the physical environments they directly experience (Akman, 2003). The child's interaction with the natural environment constitutes the first experience with science, and this interest continues throughout life (Arnas-Aktas, 2002; Brenneman, 2011).

Science education activities for preschool children provide positive contributions to attitudes toward science, levels of comprehension, and thinking skills (Eshach & Fried, 2005). It is also known that science education affects the development of language and literacy skills in parallel with the cognitive development of children (Conezio & French, 2002; Eshach, 2003). Ozbey and Alisinanoglu (2008) stated that preschool children can even construct simple tool-equipment models to produce solutions to daily life problems with science activities. Similarly, it is stated that science, technology, engineering, and mathematics (STEM) education, which is one of the popular research fields of today, has an important role in ensuring the integration of preschool and conducting activities in this direction, gaining 21st-century skills and developing psychomotor skills. The value of science education for preschool children has led researchers to carry out studies.

There are many studies conducted on science and nature in the field of preschool education. These studies can be grouped under the following headings: (i) perspectives of preschool children towards a phenomenon or concept (Ayvaci et al., 2016; Fusaro & Smith, 2018; Guler & Akman, 2006; Kucuk et al., 2021; Taskin & Sahin, 2008); (ii) pre-school children's knowledge levels of some concepts (Guo et al., 2015); (iii) some interventions of teaching science concepts (Akerson et al., 2010; Cetin et al., 2012; Gunduz & Gultekin-Akduman, 2015; Impedovo et al., 2016; Kumtepe et al., 2009); (iv) comparing the effect of different teaching methods (Gencer & Akman, 2016; Gulay-Ogelman et al., 2015; Inan & Inan, 2015; Sackes et al., 2011; Samarapungavan et al., 2008); (v) views and knowledge levels of preschool teachers (Alabay, 2017; Bay, 2019; Can & Sahin, 2015; Cinar, 2013a, 2013b; Elmas & Kanmaz, 2015; Gezgin & Kilic, 2015; Inan, 2010; Sigirtmac & Ozbek, 2011; Spektor-Levy et al., 2013; Senel & Aslan, 2014); (vi) skill development of preschool children (Alabay & Ozdogan, 2018; Ayvaci, 2010; Bose, 2012; Piekny et al., 2014; Sahin et al., 2011), (vii) integration of science education into preschool programs (French, 2004; Eliason & Jenkins, 2003) and (viii) examination of materials for preschool children (Kucuk & Kucuk, 2021a; 2021b). The increase in the number of these studies has made it necessary to conduct meta-analysis and synthesis studies, which examine the tendencies that can be used as a source for new researchers. There are limited studies on how the current studies about preschool education are carried out. For example in a study done Gulay-Ogelman and Gungor (2015), they examined theses on environmental education for preschool children. The other two papers evaluated the science education articles on preschool education (Gunes, 2018; Ozen-Uyar & Ormanci, 2016). Now, it is a need to conduct such literature reviews to determine the current trends in science education in the field of preschool education both to direct new studies and to guide new researchers. For this purpose, postgraduate theses, which include the pre-school period and published in the

Higher Education Council of Turkey (YOK) National Thesis Database (see <https://tez.yok.gov.tr/UlusalTezMerkezi/>), are the main source to make a qualified inference for Turkey.

We believe that a relational analysis of the situations, solutions, and results obtained through a postgraduate thesis on science and nature in the field of preschool education will make an important contribution to the literature. By this, we aimed to present the trends in the graduate studies in the field, what research and analysis methods are used, which samples are studied, the distribution of the studies in the field by years holistically and comparatively and to contribute to the new studies to be carried out. The thematic examination of the postgraduate thesis on science and the nature of preschool education is limited to the thesis published in the thesis database between the years 2006 and 2021.

Method

The research is based on the qualitative approach and used the document analysis method. This method involves collecting all available records and documents on the subject and analyzing them using predetermined criteria and patterns. (Merriam, 2009). The theses collected in this study were classified according to the criteria determined by the researchers. The key concepts of "preschool", "science education" and "science" were used to reach the theses published in the National Thesis Center of the Council of Higher Education (see <https://tez.yok.gov.tr/UlusalTezMerkezi/>). A total of 60 dissertations, 50 of which were master's and 10 doctoral, were reached. The numbers of theses in the database are 190130, 190211, 209630, 210894, 257114, 257116, 210091, 218009, 220919, 228931, 261122, 263143, 263418, 278544, 278673, 279527, 331670, 336949, 331782, 354655, 356660, 376499, 379943, 388029, 395151, 395900, 415916, 425962, 429917, 439267, 440774, 441384, 484098, 517679, 517893, 519638, 527497, 527801, 530211, 532313, 533186, 534384, 534407, 551041, 555318, 556462, 575876, 583634, 599074, 599415, 601812, 626886, 628042, 629972, 629994, 630096, 634829, 649028, 660720 and 662090.

Data Analysis

The analyzes carried out belong to the thematic analysis method, which is one of the types of content analysis. Thematic analysis is a method that includes compiling the research carried out in the context of a determined subject, analyzing them in terms of various variables, and evaluating the data in an explanatory way (Au, 2007; Bag & Kucuk, 2019; Calik & Sozbilir, 2014; Namdar & Kucuk, 2018; Kucuk & Burkaz Ekinci, 2022). The analyzes were carried out on seven themes year and genre, subject area, approach, method, model, research group, data collection tool, and results.

Validity and Reliability

Both internal and external validity criteria were taken into consideration. To ensure the internal validity of the study, the member control process was carried out by the researchers. The member check process reveals whether the thesis is categorized correctly and systematically and whether there is a repetitive source (Cohen et al., 2000). The member's control process was carried out by the researchers and the criteria for internal validity. To provide external validity, the goal of creating original and creative criteria was taken into consideration in the data analysis. For the reliability analysis of the study; an inter-coder reliability formula was applied. The percentage of reliability agreement regarding the codes obtained by the researchers was calculated as 87%. It is well known in the field that a reliability coefficient above 0.70 is sufficient (see, Miles & Huberman, 1994)

Results

Publication Type and Publication Year

The distribution of the theses by year and type is in Table 1.

Table 1

Distribution of Theses Between 2006 and 2021 By Year and Type

Year	f	%	Type			
			Masters		Doctoral	
			f	%	f	%
2006	6	10,00	6	10,00	-	-
2007	2	3,33	2	3,33	-	-
2008	1	1,66	1	1,66	-	-
2009	1	1,66	1	1,66	-	-
2010	6	10,00	5	8,33	1	1,66
2011	-	-	-	-	-	-
2012	2	3,33	2	3,33	-	-
2013	1	1,66	-	-	1	1,66
2014	4	6,66	4	6,66	-	-
2015	4	6,66	2	3,33	2	3,33
2016	5	8,33	3	5,00	2	3,33
2017	1	1,66	-	-	1	1,66
2018	10	16,66	10	16,66	-	-
2019	8	13,33	7	11,66	1	1,66
2020	7	11,66	5	8,33	2	3,33
2021	2	3,33	2	3,33	-	-
Total	60	100	50	83,33	10	16,66

It is seen from Table 1 that 83.33% of the theses were master's and 16.66% were doctorate type. While most theses were published in 2018, no thesis was published in 2011.

The Subject of the Theses

The distribution of the theses by subject is in Table 2.

Table 2

Distribution of Theses Between 2006 and 2021 By Subject Area

Main theme	Subject Area of the Research	f	Total
Description	Attitudes of teacher candidates toward science teaching	7	25 (%34,72)
	Teachers' science self-efficacy	2	
	Teachers' opinions on science and nature activities	5	
	Opinion on the integration of science and art activities	1	
	Teachers' views on science education content	3	
	Practices and views on science education	3	
	The role of creative drama in cause and effect relationship	1	
	Science and nature activities in gaining environmental awareness	2	
	Explanation of intention and behavior based on the theory	1	
	Investigation	The effect of the activity/program on academic success	

	Effect of activity/program on cognitive development	2	(%55,55)
	The effect of the activity/program on conceptualism and readiness	2	
	The effect of the activity/program on scientific process skills	6	
	The effect of the activity/program on problem-solving skills	3	
	The relationship between attitude and understanding of concepts	2	
	The relationship between attitude and the use of science process	1	
	The relationship between attitude and learning-thinking styles	2	
	The relationship between attitude and science activity frequency-practice	3	
	The relationship between attitude and the method used in the lesson	3	
	The relationship between attitude and self-efficacy level	5	
	The relationship between attitude and scientific process skills	1	
	The relationship between attitude and cognitive flexibility	1	
	The relationship between self-efficacy and learning approaches	1	
	The relationship between self-efficacy and scientific process skills	1	
	The relationship between creativity and science learning	1	
	The relationship between activities and child painting	1	
	The relationship between pedagogical belief and teaching practice	1	
Development	Content standards assessment tools for science	1	3
	Guide materials for science education	1	(%4,16)
	Inquiry-based science activities	1	
Analysis	Research in science education	1	2
	Evaluating the relationship between periodicals and the history of science	1	(%2,77)
Ethnography	Research on science education in rural areas	2	2
			(%2,77)

Table 2 showed that 40 of the thesis are about analysis, 25 of them are description, three are development, and two are analysis and ethnography. A total of 60 theses have been studied but the total frequency of the subject area was found as 72. This is why research on more than one variable has been carried out in the thesis. It has been revealed that the theses are mostly carried out on the themes of investigation and description, and the effects of opinions, attitudes, and activities/programs on various variables are studied in these theses conducted.

Research Approach

The distribution of the theses by the research approach is in Table 3.

Table 3

Distribution of Theses Between 2006 and 2021 By Research Approach

Year	Quantitative		Qualitative		Mixed	
	f	%	f	%	f	%
2006	6	10,00	-	-	-	-
2007	2	3,33	-	-	-	-
2008	1	1,66	-	-	-	-
2009	-	-	-	-	1	1,66
2010	4	6,66	2	3,33	-	-
2011	-	-	-	-	-	-
2012	1	1,66	1	1,66	-	-
2013	1	1,66	-	-	-	-
2014	1	1,66	2	3,33	1	1,66
2015	3	5,00	-	-	1	1,66
2016	3	5,00	2	3,33	-	-
2017	1	1,66	-	-	-	-

2018	6	10,00	4	6,66	-	-
2019	6	10,00	2	3,33	-	-
2020	3	5,00	1	1,66	3	5,00
2021	1	1,66	-	-	1	1,66
Total	39	65,00	14	23,33	7	11,66

Table 3 showed that the thesis used a quantitative approach in the 2006 year. This situation continued for three years. There is only one thesis using the mixed approach in 2009. There are only qualitative studies by 2010, 2012, 2016, 2018, and 2019 years, not only quantitative studies by any year. However, the thesis is based on qualitative, quantitative, and mixed approaches by 2014 and 2020. However, the theses of all years are mainly based on the quantitative approach (65%).

Research Method and Model

The distribution of the theses by the research method and model is in Table 4.

Table 4

Distribution of Theses Between 2006 and 2021 By Research Method and Model

Research Method	Research Model	f	%	tf	t%
Descriptive	Field Study (Survey)	33	50,00	46	79,69
	Comparative Research	1	1,51		
	Developmental Research	-	-		
	Case Study	12	18,18		
Interpretive	Phenomenographic Research	1	1,51	3	4,52
	Ethnographic Research	1	1,51		
	Action Research	1	1,51		
Analytical	Document Analysis	3	4,54	3	4,54
	Historical Research	-	-		
Experimental	Simple Experimental Research	-	-	14	21,21
	Semi-Experimental Research	8	12,12		
	Full Experimental Research	6	9,09		

Table 4 revealed that the vast majority of the thesis was descriptive (79,69%) and then experimental (21,21%) research methods. In theses, descriptive research was used mostly as a field survey model (50%), and experimentally, the quasi-experimental model (12.12%) was used mostly.

Research Sample

The distribution of the theses by the research sample is in Table 5.

Table 5*Distribution of Theses Between 2006 and 2021 By Research Sample*

Sample Type	Research Sample	f	%	tf	t%
Student	Preschool children	22	31,88	23	33,33
	Middle school student	1	1,45		
Teacher Candidate	Preschool teacher candidate	6	8,70	6	8,70
Teacher	Pre-school teacher	33	47,82	35	50,72
	Class teacher	1	1,45		
	Science teacher	1	1,45		
Administrator	Head of Preschool	2	2,90	2	2,90
Document	Statistics, journals, theses, articles, etc.	3	4,35	3	4,35

Table 5 revealed that the vast majority of the thesis was conducted on teachers (50,72%) and then on students (33,33%). However, while the rate of studies on preschool teachers is 47,82%, the rate of studies on early childhood students is 31,88%. In 8.70 of the theses, preschool teaching undergraduate program students were studied. Nevertheless, more than one research group was involved in some studies that should be known.

Data Collection Tool

The distribution of the theses by the data collection tool is in Table 6.

Table 6*Distribution of Theses Between 2006 and 2021 By Data Collection Tool*

Type	Data collection tool	f	%
Quantitative Data Collection Tools	Survey form	10	60,75
	Scale	30	
	Test	9	
	Checklist/Chart	2	
	Form / Information Form	14	
Qualitative Data Collection Tools	Observation Form	13	39,25
	Interview / Interview Form	20	
	Video recording	1	
	Researcher Note/Diary	3	
	Document	5	

Table 6 revealed that quantitative data collection tools were preferred in 60.75% of the theses and qualitative data collection tools were preferred in 39.25%. For quantitative data collection tools, scales, questionnaire forms, and tests were used mostly. For qualitative data collection tools, observation and interview forms were used mostly.

Results of the Research

The distribution of the theses by the results of research is in Table 7.

Table 7

Distribution of Theses Between 2006 and 2021 By Results of Research

Main theme	Research Result	f	%
Significant Relationship or Difference	Between computer-assisted instruction and cognitive skills	4	51,94
	Between attitudes towards science and science and conceptuality	7	
	Between demographic characteristics and attitudes toward science	10	
	Between attitude towards science and scientific process skills	11	
	Between attitudes towards science and frequency of activity usage	11	
	Between demographic characteristics and activity usage frequency	9	
	Between self-efficacy and desire/desire to teach science	8	
	Between self-efficacy and attitude toward science	7	
No Significant Relationship or Difference	Between attitudes toward science and thinking styles	1	6,98
	Between teaching method preference and attitude	2	
	Between demographic characteristics and cognitive skills	4	
Positive Impact	Between teaching method preference and cognitive domain	2	31,00
	The effect of activity usage frequency on skill acquisition	17	
	The effect of teaching method choice on skill acquisition	21	
Negative Effect	The effect of activity usage frequency on environmental awareness	2	5,43
	Skill acquisition with a low socioeconomic level	3	
Development / Design	Cognitive development with lack of materials and lack of time	4	4,65
	Assessment tool for science and mathematics education standards	1	
	Need for guidance materials for skill areas development	3	
	Scientific and conceptual support suitable for student level	2	

Table 7 revealed that the thesis reported predominantly a significant relationship and/or difference (51.94%) and a positive effect (31%). It has been revealed that attitude towards science has been studied in many theses and has a positive relationship with scientific process skills, and is also affected by activity usage frequency and demographic characteristics of the sample.

Discussion

This study was carried out to examine the theses conducted in the field of preschool education science between 2006 and 2021 in terms of various variables and to guide the new researchers who plan to conduct research in the relevant subject area. It is seen that there has been an increase in the number of the thesis conducted in the last four years and most of them were carried out at the graduate level. There are only ten doctoral theses in 15 years and quite limited. This is because there is a limited number of preschool doctorate programs in Turkish universities as reported by the Council of Higher Education (2021). The research subjects and

themes of the theses were also examined. The thesis was carried out mainly within the scope of the main themes of situation description and investigation for postgraduate theses. Investigating the effects of the activities or the implementation of the program on scientific process skills in the preschool period and determining the relationships between attitude-self-efficacy levels were mostly researched. These two subject areas are frequently preferred studies in the science education literature and this is also true for preschool science education studies. The main goal of preschool science education is to enable children, who explore their environment and act with curiosity from an early age, to think like scientists. The results of the activities for the development of children's scientific process skills also overlap with this situation (Buyuktaskapu et al., 2012). By the main theme of description, it was found that the research subject areas related to the attitudes of pre-service teachers towards science teaching and teachers' views on science and nature activities were most preferred. There are also a thesis on the content and implementation of science education. Because one of the main factors that will enable science education to reach the desired level of success is the attitude toward science education (Okur-Akcay, 2014). It is also stated by the researchers that the science activities to be carried out in the preschool period will contribute positively to both the attitudes towards science and the success and school performance of individuals in their later years (Conezio & French, 2002; Eshach, 2003; Eshach & Fried, 2005; Ozbey & Alisinanoglu, 2008). To support this attitude studies towards a subject or course are frequently preferred in the field of preschool science education, as in other fields (see Table 2).

It was concluded that more than half of the theses used a quantitative approach and a qualitative approach is less preferred, while the mixed method studies are quite limited. We encountered a similar result in a general screening study of the theses in the field of preschool education conducted by Ahi and Kildan (2013). They attributed this situation to the fact that the studies carried out in the field of social sciences are mostly affected by the nature of science. For this reason, it is considered normal to prefer a quantitative approach in studies on preschool education, which is a field of social sciences. However, it is important that mixed methods research (Creswell, 2003; Kucuk, 2022), which aims to bring together the strengths of both quantitative and qualitative approaches in recent years, should be included in the thesis to be conducted in the field of education.

It is seen that more than half of the theses were conducted by preferring the descriptive research method. They were also carried out using a field survey and a case study model, and only one study was completed using a comparative research model. Next intensity is carried out in the experimental research method with a total of 14 theses (see Table 4). It is also striking that no thesis was carried out in the developmental research model. We encountered a similar result in research by Yilmaz et al. (2020) on the thematic analysis of articles on the same subject. It should be noted that the preferences regarding research methods and models in both postgraduate theses and articles in the national literature are stuck in descriptive studies. Longitudinal models that are not preferred from developmental research can be interpreted as an expected situation when evaluated in the context of time constraints for postgraduate theses. The preschool period is a critical threshold where the foundations of many skill types are laid (Arnas-Aktas, 2002; Brenneman, 2011). We believe that descriptive studies are not sufficient in terms of contributing to the literature, should guide preschool teachers, and create new information about the development of children.

It is also found that 35 theses were carried out with teachers (see Table 5). In 33 of these, researchers studied with preschool teachers, and classroom and science teachers were included in one thesis. The other study group predominantly worked with preschool children.

This result is quite similar to the other studies done by Ahi and Kildan (2013) and Ozen-Uyar and Ormanci (2016). It is noteworthy and positive that preschool children and teachers, which are the two basic elements of preschool education, are included in the thesis.

Quantitative data collection tools are mostly used in the thesis. The scales are predominantly used. It is also observed that questionnaires and information forms are preferred as quantitative data collection tools. On the other hand, interviews and observation forms are frequently preferred for qualitative data collection tools. We determined that the thesis was carried out by using more than one data collection tool. Ozen-Uyar and Ormanci (2016), reached a contrary conclusion in their thematic analysis of the articles. The reason for this is probably because researchers who employ a large number of measurement tools in the thesis use limited data when reporting for the article.

Finally, it was determined that the research results were for the main themes of a significant relationship and/or difference, non-significant relationship and/or difference, positive effect, negative effect, and development/design (see Table 7). The main theme of a significant relationship and/or difference is seen as the highest with 51.94%. The research results in the first five within the scope of this main theme are sorted as determining positive attitudes between attitude towards science and scientific process skills, attitude towards science and frequency of activity use, demographic characteristics and attitude towards science, demographic characteristics, and frequency of activity use, self-efficacy, and desire/desire to teach science. The development of scientific process skills and participation in activities related to this field, especially of individuals with high attitudes towards science, can be considered as an expected situation. Many studies indicated that high attitudes toward science are similar to the results found in the current study (Eshach & Fried, 2005; Kabuklu & Kurnaz, 2019). As a similar result, there is a significant relationship between demographic characteristics and frequency of activity use. This can be interpreted that as the socio-economic level of the working group rises, the financial resources that can meet these activities come with it. High attitudes of individuals with high socioeconomic status towards science can be expressed as another reason for the stated results. The most striking result in this paper is that the effect of innovative practices employed for preschool science teaching in theses is generally positive (31%). This result has been similarly cited in many other studies on science education.

Conclusion

It is necessary to increase the number of preschool doctorate programs in Turkey. The thesis related to the preschool science education subject area is limited to status description and investigation. However, new products can be created with content and material development studies. The researchers often preferred the descriptive research method. Instead of this they should use different research methods and models and create new information and products for preschool education. The studies should be carried out for all stakeholders to reach the targeted point with preschool education. Although there are many theses made with children and teachers, two of these stakeholders, it is an important limitation that families are not the subject of studies yet. Moreover, in studies on science education, it has been reported that the participation of families in the process produces quality learning outcomes (Kucuk & Yildirim, 2021; Burkaz Ekinci et al., 2022).

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