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Assessment of Mathematics Activity Plans of Preschool Teachers

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Abstract

This study aimed to determine how preschool teachers handle mathematics learning processes in their mathematics activity plans and which contents they include. The study used the document analysis method as a descriptive research model. The study examined 200 mathematics activity plans applied by 10 preschool teachers working in preschool education institutions in the 2020-2021 Fall and Spring academic terms. The data of the study were collected with the Mathematics Activities Assessment List (AEL), which the researchers developed. The researchers analysed the data obtained in the study separately by using the coding system without specifying the teachers' names for confidentiality. As a result, the researchers determined that preschool teachers planned mathematics activities mainly in large group activities and integrated them into their activity plans. On the other hand, they also found that teachers included concepts such as number/counting and quantity more in their mathematics activity plans and they planned mathematics activity plans as classroom activity plans. In addition, they included family participation activities in mathematics activity plans.

Keywords: Preschool teacher, mathematics, activity plan

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Introduction

Mathematics is one of the areas that includes concepts and essential skills in people's daily lives and during the academic process. Children are unconsciously intertwined with mathematics by using many concepts such as numbers, shapes, time, and space in their daily lives. Through mathematics activities in the preschool period, they begin to make sense of these in their lives. Mathematical concepts and skills acquired in the early period form the basis of mathematical concepts and skills in advanced periods. Therefore, mathematics activities carried out in preschool are extremely important (Akman, 2002; Tarım & Bulut, 2006). The fact that children have a planned mathematics experience in the early period supports the children's love of mathematics and the development of a positive attitude towards mathematics (Henniger, 1987). With the mathematical experiences carried out in the preschool period, the differences in mathematical readiness between children and their peers decrease when they start school (Karakuş cited from Bowman, 2020). Preschool teachers support the development of children's mathematical concepts and skills in the early period by providing children with various concrete materials in educational environments. Preschool teachers plan daily activities suitable for children by combining children's environmental characteristics, cultural lives, mathematical ideas and learning strategies. Activities that develop children's mathematical thinking skills, help them develop positive beliefs about mathematics and themselves, and include mathematical experiences in which children actively participate are planned (Clements, 2001).

Children acquire skills such as classification, pairing comparison, sorting, problem-solving, measurement, etc., in many activities they carry out in daily life and learn the basics of mathematics (Kandır & Orçan, 2010; Aktaş-Arnas, 2013). The mathematics activities provided in the preschool period contribute to acquiring and developing these skills. Mathematics activities in the preschool period aim to contribute to children's cognitive development and develop a positive attitude towards mathematics. It also seeks to help children establish a connection between their pre-learning and newly learned conceptual knowledge and to help them understand where, why, and how to use mathematical concepts and skills. Thanks to the mathematics activities carried out in the preschool period, children can recognise and maintain the patterns in their environment, develop and test assumptions, solve problems, and communicate using mathematical concepts (MoNE, 2013). Teachers who are responsible for planning and implementing activities to support children's mathematical thinking skills in the preschool period are expected to shape their learning environments using appropriate methods and techniques (Kandır, Can Yaşar, Yazıcı, Türkoğlu, & Baydar, 2016). Preschool teachers should prepare and implement activities in a way that allows children to explore them throughout the learning process. Children should be included in mathematical activity practices that will enable them to interact with the world around them, not only in the form of plans for mathematical activities limited to paper and pencil (Tarım, 2015; Erdoğan, 2016). For this reason, teachers should create problem-solving encouraging learning situations in mathematics activities and include practices to support important skills such as establishing cause-effect relationships by creating connections. To implement these practices, it is also important that teachers, who are the practitioners of the program, have sufficient field knowledge about mathematical concepts and learning-teacher processes. Studies show that teachers enrich and strengthen their mathematical meanings as children try to understand the structure of mathematical ideas (Haylock & Cockburn, 2014). In the literature, there are studies examining the opinions and attitudes of preschool teachers about mathematics teaching (Tarım & Bulut, 2006; Thiel, 2010; Scrinzi, 2011; Anders & Rossbach, 2015;Sumpter, 2020; Çelik, 2017b; Gümüştekin Ertugay, 2019; Markovits & Patkin, 2020; Can & Gültekin Akduman, 2022; Taşkın, 2022), mathematical pedagogical content knowledge (Işıtan, 2020; Smith, 2000; Lee, 2017; argın, 2019; Bilgen, 2019; Dağlı, 2019), and the self-efficacy perceptions of preschool teachers about mathematics activities (Aksu, 2008; Bates, Latham & Kim, 2013; Chen, McCroy, Adams & Leow, 2014; Çelik, 2017a). Considering the studies, teachers' views, attitudes, and self-efficacy perceptions about mathematics education affect the mathematics activity plans and practices to be applied. For this reason, it is important for preschool teachers to prepare activities that will develop the mathematical concepts and skills necessary for children to facilitate their subsequent learning processes and present them to children at different times and in different environments. (Wortham, 2006).Preschool teachers use various materials, methods, and techniques in different activities to bring children in these concepts and skills within the scope of a specific plan. In the literature, there are studies examining the

activity plans of preschool teachers in terms of activity type (Alabay & Yağan Güder, 2015; Pekince & Avcı, 2016), family participation and assessment aspects (Kurtulmuş, 2016; Osanmaz & Akman, 2018; Kılınç, Kurtulmuş, Kaynak Ekici & Bektaş, 2021), studying styles and developmental areas (Greenes, Ginsburg & Balfanz, 2004; Clements & Sarama, 2007; Theil, 2010; Anders & Rossbach, 2015; Aydemir & Deniz, 2018; Kızıltaş, Ertör & Karademir 2018; Atıcı & Çamlıbel Çakmak, 2019; Büyüktaşkapu Soydan, 2019).

In light of these studies, it was obvious that there were a limited number of studies examining the practices of preschool teachers regarding mathematics activities. In this context, this study aimed to analyze the mathematics activity plans of preschool teachers to determine how they handle mathematics learning processes and what contents they include in their mathematics activity plans.

Method

Research Model

The study used the document analysis method, one of the descriptive research models and systematically examined the records or documents obtained as a data source (Karasar, 2011). It also employed a case study pattern as one of the qualitative research methods to determine the content of preschool teachers' mathematics activities. Additionally, the study examined the mathematics activity plans of preschool teachers working at independent kindergartens and primary-secondary schools affiliated with the Ministry of National Education. While selecting the study group, non-probability and convenience sampling, which is a type of this sampling method was preferred. In the easily accessible situation sampling, the researcher decides from whom the sample will be selected and chooses the most appropriate sample suitable for the study (Balcı, 2016). Within this scope, the research examined a total of 200 mathematics activity plans voluntarily applied by 10 preschool teachers working at Ministry of National Education institutions in the 2020-2021 Fall and Spring academic year.

Data Collection Tools

The research collected data with the Mathematics Activities Assessment List (MAAL) developed by the researchers. In the MAAL development process, the researchers used the content analysis method, defined as the technique of collecting and analysing information in text contents (Karasar, 2011). Moreover, it examined the types of activities and assessment processes in the MoNE (2013) Preschool Education Program, the status chart of including the concepts in the education program in the monthly education plans, and the standards determined by organisations such as the National Council of Teachers of Mathematics (NCTM) and the National Association for Education of Young Children (NAEYC). Three field experts examined the MAAL and put it into final form, which was used in the study. The final version of the Mathematics Activities Evaluation List (MEDL) consisted of a form that helps examine mathematics activities in terms of how they are planned (individual, large-small group activity, integrated activity) and the activity in which they are integrated. In the examination of mathematic activities, there were also some issues to be paid attention to, such as their inclusion of mathematics concepts, the environment of the activities, and the inclusion of family participation. Additionally, the inclusion of the NCTM process and content standards and activity evaluation questions were significant issues.

Data Analysis

In this study, the data obtained by the document analysis method, which includes the analysis of written materials containing various information about the intended subjects, were analysed (Yıldırım & Şimşek, 2021). The document analysis method involves collecting data from various documents, reviewing, and analysing them by questioning. (Sak, Sak, Şendil & Nas, 2021). In the research, the names of the teachers were not specified for confidentiality, they were specified T1, T2, T3...T10 with the coding system. In addition, the mathematics activity plans prepared by each teacher were numbered as A1, A2, A3...A20 in his/her activity group. The researchers coded these mathematics activity plans prepared by the teachers separately and obtained similar results.

Findings

The results obtained in this study, which examined the mathematics activity plans applied by preschool teachers, are presented below.

Table 1
Preschool Teachers' Inclusion of Activity Types in Mathematics Activity Plans

Activity Types	Individual Activity		Small Group Activity		Large Group Activity		Total
	N	%	N	%	N	%	N
T.1.	-	-	-	-	20	100	20
T.2.	-	-	-	-	20	100	20
T.3.	1	-	-	-	19	95	20
T.4.	-	-	-	-	20	100	20
T.5.	-	-	-	-	20	100	20
T.6.	2	10	-	-	18	90	20
T.7.	1	5	-	-	19	95	20
T.8.	-	-	-	-	20	100	20
T.9.	2	10	-	-	18	90	20
T.10.	1	5	-	-	19	95	20
Total	7	3.5	-	-	193	96.5	200

Table 1 shows the status and numerical distribution of the mathematics activity plans discussed within the scope of the research. Within the scope of mathematics activity plans, the research examined 200 mathematics activities and determined that 193 of these activities (96.5%) were planned as large group activities and 7 (3.5%) as individual activities. Besides, all teachers included large group activities in their mathematics activity plans. While T3, T6, T7, T9, and T10 teachers included individual mathematics activity plans in their activity plans, they didn't include small group activities in their activity plans.

Table 2.
How Preschool Teachers Plan Mathematics Activity Plans

Activity Types	Mathematics Activity		Integrated Mathematics Activity		Total
	N	%	N	%	N
T.1.	4	20	16	80	20
T.2.	4	20	16	80	20
T.3.	-	-	20	100	20
T.4.	-	-	20	100	20
T.5.	-	-	20	100	20
T.6.	1	5	19	95	20
T.7.	2	10	18	90	20
T.8.	1	5	19	95	20
T.9.	3	15	17	85	20

Table 2 continuing

T.10.	3	15	17	15	20
Total	18	9	182	91	200

Table 2 shows the planning methods and numerical distributions of the mathematics activity plans discussed within the scope of the research. According to the data, 18 mathematics activity plans were planned only as a mathematics activity plan, and 182 were integrated with other activities.

Table 3.
How Preschool Teachers Plan Mathematics Activity Plans and the Types of Activities They Integrate

Activity Types	MA		MA-LPA		MA-AA:		MA-TLA		MA-GA		MA-MuA		MA-SA		MA-MoA		MA-DA		Total
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N
T.1.	4	20	2	10	8	40	1	5	3	15	1	5	-	-	1	5	-	-	20
T.2.	4	20	1	5	2	10	4	20	4	20	-	-	5	25	-	-	-	-	20
T.3.	-	-	1	5	3	15	2	10	9	45	2	10	1	5	-	-	2	10	20
T.4.	-	-	1	5	3	15	2	10	9	45	1	5	4	20	-	-	-	-	20
T.5.	-	-	3	15	5	25	3	15	3	15	1	5	5	25	-	-	-	-	20
T.6.	1	5	2	10	3	15	4	20	6	30	2	10	2	10	-	-	-	-	20
T.7.	2	10	2	10	6	30	5	25	4	20	1	5	-	-	-	-	-	-	20
T.8.	1	5	2	10	4	20	4	20	3	15	1	5	4	20	-	-	1	-	20
T.9.	3	15	3	15	2	10	1	5	4	20	2	10	4	20	1	5	-	-	20
T.10.	3	15	1	5	2	10	6	30	4	20	2	10	2	10					20
Total	18	9	18	9	38	19	32	16	49	24.5	13	6.5	27	13.5	2	1	3	1.5	200

*MA: Mathematics Activity, MA-LPA: Mathematics Activity-Literacy Preparation Activity, MA-AA: Mathematics Activity-Art Activity, MA-TLA: Mathematics Activity-Turkish Language Activity, MA-GA: Mathematics Activity-Game Activity, MA-MuA: Mathematics Activity- Music Activity, MA-SA: Mathematics Activity-Science Activity, MA-MoA: Mathematics Activity- Motion Activity, MA-DA: Mathematics Activity-Drama Activity

Table 3 shows the types and numerical distributions of the activities integrated with the mathematics activity plans discussed within the scope of the research. In the mathematics activity plans, 49 (24.5%) of them were integrated with a game activity, 38 (19%) with an art activity, 32 (16%) with Turkish language activity, 27 (13.5%) with a science activity, 18 (9%) with literacy preparation activity, 13 (6.5%) with music activity, 3 (1.5%) with drama activity, and 2 (1%) with motion activity. In accordance with the data, 18 (9%) mathematics activity plans were not integrated with any activity but were planned as direct mathematics activities.

Table 4.
Preschool Teachers' Inclusion of Concepts in Mathematics Activity Plans

Categories	Geometric Shapes		Dimension		Quantity		Location		Counting		Total
	N	%	N	%	N	%	N	%	N	%	N
T.1.	4	20	2	10	4	20	-	-	10	50	20
T.2.	5	25	1	5	7	35	2	10	5	25	20
T.3.	4	20	3	15	3	15	2	10	8	40	20
T.4.	4	20	2	10	7	35	-	-	7	35	20
T.5.	2	10	2	10	9	45	2	10	5	25	20
T.6.	6	30	2	10	3	15	-	-	9	45	20
T.7.	4	20	1	5	6	30	1	5	8	40	20
T.8.	7	35	2	10	3	15	1	5	7	35	20
T.9.	3	15	4	20	5	25	2	10	6	30	20
T.10.	4	20	2	10	6	30	3	15	5	25	20

Table 4 continuing

Total	43	21.5	21	10.5	53	26.5	13	6.5	70	35	200

Table 4 shows the status of including mathematics concepts and their numerical distribution in the mathematics activity plans discussed within the scope of the research. According to the data in Table 4, 70 (35%) of the mathematics activity plans included concepts in counting, 53 (26.5%) in quantity, 43 (21.5%) in geometric shapes, 21 (10.5%) in dimension, and 13 (6.5%) in location categories.

Table 5.
Areas Where Activities Take Place in Preschool Teachers' Mathematics Activity Plans

	In-Class Activities		Non-Class Activities		Total
	N	%	N	%	N
T.1.	20	100	-	-	20
T.2.	18	90	2	10	20
T.3.	20	100	-	-	20
T.4.	16	80	4	20	20
T.5.	18	90	2	10	20
T.6.	19	95	1	5	20
T.7.	19	95	1	5	20
T.8.	17	85	3	15	20
T.9.	20	100	-	-	20
T.10.	18	90	2	10	20
Total	185	92.5	15	7.5	200

Table 5 shows the status and numerical distribution of the mathematics activity plans discussed within the scope of the research. According to the data in Table 5, 185 (92.5%) of the mathematics activities were planned as in-class activities and 15 (7.5%) as non-class activities.

Table 6.
Preschool Teachers' Inclusion of Family Participation in Mathematics Activity Plans

Family Participation Statuses	Family Participation Included		Family Participation Excluded		Total
	N	%	N	%	N
T.1.	11	55	9	45	20
T.2.	15	75	5	25	20
T.3.	8	40	12	60	20
T.4.	13	65	7	35	20
T.5.	12	60	8	40	20
T.6.	4	20	16	80	20
T.7.	12	60	8	40	20
T.8.	13	65	7	35	20
T.9.	11	55	9	45	20
T.10.	17	85	3	15	20
Total	116	58	84	42	200

Table 6 shows the family participation statuses and numerical distribution of family participation activities in the mathematics activity plans discussed within the scope of the research. Following the data, 116 (58%) of the mathematics activity plans included family participation activities, while 84 (42%) did not include family participation activities.

Table 7.
Preschool Teachers' Inclusion of NCTM Process-Oriented (Thinking) Standards in Mathematics Activity Plans

Categories	Problem Solving		Reasoning and proof		Associations		Contact		Representation	
	N	%	N	%	N	%	N	%	N	%
T.1.	2	10	5	25	4	20	5	25	4	20
T.2.	3	15	5	25	8	40	6	30	5	25
T.3.	6	30	5	25	3	15	3	15	3	15
T.4.	1	5	6	30	2	10	4	20	4	20
T.5.	4	20	8	40	4	20	4	20	4	20
T.6.	1	5	4	20	5	25	5	25	3	15
T.7.	2	10	4	20	5	25	6	30	4	20
T.8.	7	35	7	35	6	30	5	25	2	10
T.9.	6	30	6	30	9	45	4	20	4	20
T.10.	9	45	8	40	8	40	7	35	7	35
Total	41	20.5	58	29	54	27	49	24.5	40	20

Table 7 shows the inclusion of NCTM standards for the process and their numerical distribution in the mathematics activity plans discussed within the scope of the research. Of the mathematics activity plans, 41 (20.5%) included problem-solving skills, 58 (29%) included reasoning and proofing skills, 54 (27%) included connection skills, 49 (24.5%) included communication skills, and 40 (20%) included representation skills.

Table 8.
Preschool Teachers' Inclusion of NCTM Content Standards in Mathematics Activity Plans

Categories	Number and operations		Algebra		Geometry		Measurement		Data analysis and probability	
	N	%	N	%	N	%	N	%	N	%
T.1.	12	60	1	5	4	20	4	20	4	20
T.2.	6	30	3	15	6	30	7	35	4	20
T.3.	12	60	1	5	5	25	3	15	3	15
T.4.	7	35	3	15	4	20	2	10	5	25
T.5.	6	30	3	15	3	15	4	20	4	20
T.6.	9	45	1	5	6	30	2	10	3	15
T.7.	8	40	2	10	7	35	1	5	4	20
T.8.	7	35	4	20	8	40	5	25	2	10
T.9.	11	55	3	15	5	25	4	20	4	20
T.10.	11	55	4	20	7	35	5	25	7	35
Total	89	44.5	25	12.5	55	27.5	37	18.5	40	20

Table 8 shows the inclusion status and numerical distribution of NCTM content standards in the mathematics activity plans discussed within the scope of the research. According to the data in Table 8, 89 (44.5%) of the mathematics activity plans included numbers and operations, 25 (12.5%) included algebra, 55 (27.5%) included geometry, 37 (18.5%) included measurement, 40 (20%) included data analysis and probability content standards.

Table 9.
Preschool Teachers' Inclusion of Activity Types in Mathematics Activity Plans

Activity Assessment Question Types	Descriptive Questions		Affective Questions		Questions for Achievements		Associating with Life Questions	
	N	%	N	%	N	%	N	%

Table 9 continuing

T.1.	17	85	16	90	17	85	4	20
T.2.	19	95	5	25	16	80	17	85
T.3.	20	100	13	65	20	100	9	45
T.4.	18	90	6	30	16	80	7	35
T.5.	18	90	7	35	14	70	10	50
T.6.	19	95	15	75	14	70	8	40
T.7.	19	95	10	50	19	95	9	45
T.8.	16	80	15	75	13	65	12	60
T.9.	18	90	14	70	16	80	14	70
T.10.	20	100	15	75	17	85	9	45
Total	184	92	116	58	162	81	99	49.5

Table 9 shows the inclusion of activity assessment questions in the mathematics activity plans discussed within the scope of the research and their numerical distribution. Following the data, 184 (92%) of the mathematics activity plans included descriptive questions, 116 (58%) included affective questions, 162 (81%) included questions for achievements, and 99 (49.5%) included questions about associating with life.

Discussion, Conclusion, and Recommendations

This study, examining the mathematics activities of preschool teachers, provided some descriptive information about the mathematics education process of teachers. For preschool children to successfully gain mathematics concepts and skills, it is necessary to organise the education environment effectively, for teachers to be sufficient in terms of professional-personal qualifications , and to implement an effective education program. The harmony and effectiveness of these three essential elements will enable children to develop a positive attitude towards mathematics in the following years and succeed in this field (Aktaş-Arnas, 2013). Uyanık and Kandır (2010) considered mathematics skills as early academic skills. They emphasised that it was essential to organise the educational environment and choose appropriate methods and techniques in the activity plans to develop mathematics skills. MoNE (2013) emphasises that the achievements and indicators supporting the multi-faceted development of children should be included in the activity plans in a balanced way. It also states that the activities should be balanced in their implementation (large group, small group and individual activities). In the mathematics activity plans examined within the scope of the study, teachers did not take this fundamental feature of the MoNE (2013) program into consideration, and they planned mathematics activities as large group activities at a high rate. In the study of Büyüktaşkapu Soydan (2019), mathematics activities were mostly planned as large group activities, followed by individual activities, and at least as small group activities. In their research, Sadık and Dikici Sığırtmaç (2016) found that preschool teachers did not conduct small group activities because they had difficulties in implementing small group activities. However, small group activities effectively develop literacy and mathematics skills (Clements & Sarama, 2007). In the study of Atıcı and Çamlıbel Çakmak (2019), according to their interviews and observations with nine teachers, the majority of teachers preferred large group activities, while individual and small group activities were not preferred much. The research findings are similar to other studies in planning mathematics activity plans in the form of large group activities. Large group activities were preferred more because of the thought that classroom dominance authority was difficult in small group and individual activities. Based on the idea that large group activities were easier to plan and implement for teachers, it was thought that teachers preferred large group activities. Since teachers mostly prefer large group activities, children could ignore individual interests, needs, and abilities, which might be inadequate in supporting the potential development of children.

In preschool education, more than one activity could be planned as an integrated activity by combining it with appropriate transitions. In a learning process, in the preschool curriculum, the back ordering of the activities is not an integrated activity (MoNE, 2013). In the mathematics activity plans examined within the scope of the study, teachers preferred to integrate mathematics activities mostly with game

and art activities. In the literature, some studies revealed that mathematics activities were integrated with different types of activities when appropriate transitions were provided (Alabay & Yağan Güder, 2015; Atıcı & Çamlıbel Çakmak, 2019; Yazlık & Öngören, 2018). Similar to the results of this study, which analysed mathematics activity plans, some studies revealed that mathematics activities were mostly integrated with game and art activities (Anders & Rossbach, 2015; Yazlık & Öngören, 2018; Atıcı & Çamlıbel Çakmak, 2019; Can & Gültekin Akduman, 2022). Considering the developmental characteristics of preschool children, play-based learning is the most appropriate learning method. Since playing was seen as the child's most important job in this period, teachers preferred to integrate mathematics activity plans with play activities

Since the preschool period, mathematical concepts and skills have developed in children and the knowledge and skills gained in this period form the basis of mathematics education in the future. It is crucial to provide children with mathematical concepts and skills in preschool (Clements & Sarama, 2007; Akman, 2019). Gaining these concepts and skills within a program and plan supports becoming more systematic and practical. In the study, while teachers included mostly counting concepts in the mathematics activity plans analysed within the scope of this study, they included fewer concepts related to location. Preschool teachers mainly included numbers and geometric shapes in mathematics activities in their studies by Yazlık and Öngören (2018). The study by Tarım and Bulut (2006) examined the perceptions and attitudes of preschool teachers towards mathematics teaching. They determined that most teachers' perceptions of mathematics activities were numbers and shape studies. In the studies of Atıcı and Çamlıbel Çakmak (2019), teachers primarily focused on number studies in mathematics activities. In the same study, numerical studies were followed by mathematical skills, pattern, graphics, process, and measurement studies. Moreover, the study of Can and Gültekin Akduman (2022) observed that while the mathematical skills that teachers mostly included in their activities were recognizing numbers, rhythmic counting back and forth, operations and geometric shapes, they gave less place to mathematical concepts and skills such as measurement, graphics, time, and location in space. In this study, examining mathematics activity plans, teachers were similar to other studies in terms of including mathematics concepts in mathematics activities. This was because teachers focused on certain concepts in a narrower scope due to the weak pedagogical content knowledge and attitudes towards mathematics education. For mathematics activities in early childhood to be successful, teachers must first have sufficient knowledge in this area. The teacher's experience, communication with the child, and the teacher's belief in the process affect mathematics education (Jung & Reifel, 2011). In the interviews conducted with the teachers in the studies of Atıcı and Çamlıbel Çakmak (2019), the fact that many teachers stated that they did not find themselves sufficient and they had difficulties during the application support this idea.

In preschool education, it is essential for teachers to include sufficient and regular outdoor activities in terms of both raising children in a healthy way and raising them as individuals who love and protect nature by enabling children to interact with nature (Alat, Akgümüş & Cavalı, 2012). As stated in the balance feature of the preschool education program, activities are expected to be balanced in terms of indoor and outdoor activities (MoNE, 2013). This study found that most mathematics activities were planned as classroom activities. Alabay and Yağan Güder (2015) stated in their research that most of them were planned indoors (in-class). In their research, Sadık and Dikici Sığırtmaç (2016) found that teachers rarely gave place to non-class learning activities due to possible risks (falling, injury, sickness due to weather conditions) and procedures (permission, transportation, etc.). In the study conducted by Alat, Akgümüş and Cavalı (2012) to reveal the thoughts, attitudes and practices of preschool teachers about outdoor activities, teachers did not include outdoor activities enough for similar reasons. In this study, most of the activities were similar to other studies in terms of planning them as in-class activities. The reason why teachers planned their mathematics activity plans in the form of indoor activities, in general, may be due to the thought that teachers would have difficulty in carrying out the learning process outside, carrying the activity materials to the outside environment, and that classroom authority would be more difficult in the external environment. The studies conducted also support this idea (Alat, Akgümüş & Cavalı, 2012; Sadık & Dikici Sığırtmaç, 2016).

The participation of parents in the education process in preschool education supports the academic achievement, language development, and social development of children (Ekinci-Vural, 2006).

Effective family participation can support these developments and become permanent (Temel, 2008). With the family's participation in the education process, continuity between school and home is ensured, and the knowledge, skills, and attitudes gained in the school environment are supported in the home environment and become permanent (MoNE, 2013). In addition to the preschool education program, "Family Support Education Guide Integrated with the Education Program (EBADER)" and "Family Support Education Guide Integrated with the Preschool Education Program (OBADER)" were prepared to present different methods and techniques to improve family participation to teachers. These guidebooks include studies and suggestions on how teachers can involve families in the education process. The activity plan format of the preschool education program also includes the "Family Participation" dimension. In this part of the activity plans, parents are offered activities at home to support their learning at school. In the preschool education program, family participation can also be supported by family participation in cases where family participation is not mandatory for each activity planned in the school environment (MoNE, 2013). In his study, Kurtulmuş (2016) stated that family participation studies included in the activity plans would effectively ensure the permanence of learning by bringing what the child learned in the school environment to the home environment and strengthening family-child communication. In the study, more than half of the teachers' activities included family participation. Alabay and Yağan Güder (2013) found that teachers included family participation activities at a low rate during or after the learning process. In his study, Kurtulmuş (2016) found that only 28 of the 60 mathematics activity plans included family participation activities. The family participation study included in the mathematics activity plans was planned as activities to support classroom learning and their association with life. Bartan and Aydemir Özalp (2019) found that most teacher candidates did not include the family participation dimension in their activity plans. Of the 286 activity plans examined in the study, only 34 mathematics activity plans included family participation studies. In the study of Ünüvar (2010), 23 of the 30 teachers fully included families in the activities, and seven partially included families in the activities. In their study, Atıcı and Çamlıbel Çakmak (2019) stated that six teachers out of nine teachers preferred to include family participation studies in mathematics practices. In the study of Güzelyurt, Birge and Ökten (2019), 19 of 36 teachers included family participation activities in the classroom. In the study of Kılınç, Kurtulmuş, Kaynak Ekici and Bektaş (2021), teachers planned activities in a home environment that supports in-class learning as a family participation study in their activity plans. The research findings are similar to other studies in terms of including family participation studies in more than half of the mathematics activity plans. Considering data, teachers included family participation in activities based on the fact that the family was an important stakeholder in the child's education process. Additionally, they mastered the idea that learning would be more permanent when learning in the school environment was supported in the home environment. In their study, Gömleksiz and Serhatlıoğlu (2013) revealed that the teachers' high self-efficacy beliefs about family participation studies were positively affected by family participation studies and supported this idea.

Children's mathematical thinking, problem-solving and reasoning skills, interest in mathematical applications and questioning skills can be developed and supported with mathematical applications offered to children (Kandır, Can Yaşar, Türkoğlu, Yaman-Baydar & Yazıcı, 2016). The American National Council of Teachers of Mathematics (NCTM) explains the concepts and skills in mathematics education in preschool education in the light of specific standards. Taking these standards into account in the mathematics learning process can provide more accurate and permanent mathematics learning (NCTM, 2000). The standards determined by NCTM are divided into two content and process. Content standards are numbers and operations, algebra, geometry, measurement, and data analysis-probability, while process standards are problem-solving, reasoning and proof, connections, communication, and representation (Sperry-Smith, 2016; Argın, 2020). In this study, the activity plans included mostly reasoning and proof skills from the process standards, including NCTM process and content standards. It was followed by activities like association, problem-solving, contact, and representation skills. In the study, activities were mostly comprised of numbers and operations, and it was followed by geometry, data analysis and probability, measurement, and algebra. In the literature, similar results were achieved regarding including NCTM process and content standards. Besides, teachers generally prefered including number and digit content in mathematics learning processes (Pekince & Avcı, 2016; Yazlık & Öngören, 2018; Atıcı & Çamlıbel Çakmak, 2019).

Since the process is essential, not the result, in preschool education, the multi-faceted assessment of the process comes to the fore in the program. Activities in preschool education are prepared by taking into account the gains and indicators in the program. It is essential to regularly assess the level of learning situations expected to occur in children during and as a result of the education process. Descriptive, affective, achievement-oriented questions, and life-related questions can be directed in the discussions held at the end of the activity to assess the activity (MEB, 2013; Işıkoğlu Erdoğan et al., 2021). The assessment questions of the mathematics activities discussed within the scope of the research included descriptive questions supporting what was done in the activity process, and questions about the achievements and indicators discussed in the activity to a large extent. The activity process rarely included the affective questions that enable us to get information about what emotions children experience and the questions of associating with life, which enable them to establish a relationship between their experiences and their own experiences during the activity process. Kandır, Özbey and İnal (2009) stated in their study that preschool teachers had difficulty in the assessment process while preparing daily plans. As a result of the observations and interviews made in his study, Özkan (2015) stated that teachers mostly preferred observation, question-answer, and chat methods in the assessment process. In their study, Tükel (2017) indicated that 73 of 90 preschool teachers stated that using questions about achievements, 70 stated that using descriptive questions, 61 stated that using questions about associating with life, and 52 stated that using affective questions would be helpful in the activity assessment process. In a similar result, Özsırkıntı, Akay and Yılmaz Bolat (2014) stated in their study that it would be helpful to rank descriptive, affective, achievement-oriented and life-related associations in the assessment process. In the studies of Kılınç, Kurtulmuş, Kaynak Ekici and Bektaş (2021), the most affective questions were included in the activity assessment questions, while it was followed by descriptive questions that revisited the activity process. The research findings differed in including more descriptive and achievement questions in mathematics activity plans. In different studies, although teachers stated that using different question types in activity assessment was significant, including all questions in the activities in a balanced way also had importance.

As a result, this study determined that teachers mostly included activities in their mathematics activity plans as large group activities. While mathematics activities were more integrated with games and art activities, they were less integrated with drama and movement activities. On the other hand, teachers mostly included the concepts of numbers and counting in mathematics activities but concepts such as dimension and location in space were less. Additionally, they planned mathematics activities more in the form of in-class activities and gave less space to mathematics activity plans in out-of-class environments. In general, they included family participation studies in their mathematics activity plans. Besides, they included NCTM process-oriented (thought) standards in the activities in a balanced way and included number and transaction contents more in terms of NCTM content standards. It was determined that mathematics activity plans included more descriptive and affective questions than activity evaluation questions in the evaluation process.

In light of the research findings and literature data, it is recommended to conduct the following studies;

- First, informative studies can be carried out for preschool teachers to include individual and small group activities more in their activity plans.
- They should include more individual and small group activities considering children's differences and supporting their potential development.
- In-service training can be given to preschool teachers to support them in having full knowledge of mathematics concepts and skills in activity plans and practices.
- Supportive in-service training can be given to teachers to include outdoor activities in a balanced way in the planning and practice of activities.
- Studies can be done that support teachers' awareness and qualifications of family participation activities in mathematics activity plans and practices.
- During the activity assessment process, teachers should be encouraged to use alternative assessment methods in assessing the process and the child, and in-service training should be carried out for these assessment methods.

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