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DIFFICULTIES OF EARLY CHILDHOOD EDUCATION TEACHERS' IN MATHEMATICS ACTIVITIES

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Abstract: In this study, it was aimed to identify the difficulties experienced by early childhood education teachers in planning, implementation and evaluation processes of in-class and out-of-class mathematics activities and parent involvement in such activities. The answers of the teachers to the questions on the interview form were recorded via a voice recorder and transcribed into written form by the researcher. In the direction of the findings, those who think that they have some difficulty in planning the in-class mathematics activities showed the causes as the idea of difficulty of mathematics, the lack of professional experience, failure to know the child well, the difficulties in adaptation, the lack of budget and resources. The difficulties in implementing in-class math activities were indicated as children's mobility, distraction, having different levels of readiness and learning at different speed, having a multitude of children with special needs in the class and the lack of assistant staff. The reasons like children's inability to write numbers, difficulties in counting on fingers, identifying numbers, subtracting, etc. were also reported as difficulties. Teachers mentioned the difficulties in planning out-of-class math activities, such as quick distraction of children's attention, transportation problems, noisy places, physical conditions, the absence of independent garden. The difficulties experienced in the implication process of out-of-class math activities were distraction, safety of children, absence of auxiliary personnel, and inadequacies in physical conditions.

Key words: early childhood education, early childhood mathematics education, mathematical difficulties, qualitative research**.**

1. Introduction

In recent researches, the idea of how early mathematical thinking development occurs has significantly changed (Sarama and Clements, 2009; Starkey, Klein and Wakeley, 2004; Wilson and Cooney, 2002). When the development of mathematical thinking from past to the present is examined, it seems that there are different opinions. For instance; traditional learning theorists argue that the development of mathematical knowledge of children only begins with formal education however, Piaget (1952) argued that children should be guided for the development of mathematical knowledge prior to formal education. For years, children have been afraid of mathematics because they faced with developmentally inappropriate teaching experiences. Nowadays, it has been emphasized that how children acquire and develop mathematical knowledge is more important in education and the importance of providing rich mathematical activities is mentioned (Balfanz,2004).

Researchers suggest that early mathematical achievement of children constitutes an infrastructure for their academic success in the future (Duncan et.al. 2007; Watts, Duncan, Clements and Sarama, 2017). In addition, researchers emphasize that the mathematical concepts presented to children in preschool period have a critical role in the more complex concepts they will learn in the future (Van Luit ve Schopman,2000). The quality of pre-school mathematics education, including support for education and motivation, directly affects children's learning experiences and mathematical achievements (Sarama ve Clements, 2004).

There are many factors that need to be carefully considered for the quality development of basic mathematical skills in the pre-school period for children. The most important of these factors is the teacher. According to Einarsdottir (2003), teachers' ideas and beliefs significantly influence their teaching. The determinant of the quality of mathematics teaching is hidden in teacher development,

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because teacher development is defined as an important part of successful school reform (Dossey, 2007; Remillard and Bryans, 2004; Hu, Fuentes, Ma, Ye and Roberts, 2017). Teachers should endeavor to improve themselves in terms of mathematics so that they can contribute to mathematical thinking skills of children. Teachers' focus on children's thinking processes by knowing when and how to increase the level of task difficulty will also help encourage mathematical processes in children (Dooley, Dunphy, Shiel, O'Connor and Travers, 2014).

Preschool teachers need to be sensitive and conscious about the issue of not having difficulties in mathematics education. Identifying the challenges faced by teachers in the current conditions and taking steps within these difficulties is seen as important in terms of producing solutions. According to Dunphy (2009), however, research on the views of teachers is relatively new. There are very few information on the problems and difficulties experienced by teachers in matters such as young children's mathematical skills, mathematical perceptions, attitudes towards mathematics, although many studies were conducted on how to apply appropriate and effective educational strategies in early childhood learning environments. In this study; determining the difficulties which pre-school teachers have experienced in planning, implementation and evaluation of in-class and out-of-class mathematical activities and family participation in mathematical activities was aimed.

2. Method

The qualitative research design was used in the study. Phenomenology method was used for the study, in which the difficulties experienced in the mathematical activities applied by pre-school teachers were examined in depth. Phenomenology focuses on phenomena that we are aware of but do not fully understand or do not have an in-depth and detailed understanding (Yıldırım and Şimşek, 2011).

Participants of the Study

The participants of the research were 10 (9 female, 1 male) preschool teachers who were working in different cities and different types of pre-school education institutions. The teachers who participated in the research were selected on the basis of volunteerism and all the participating teachers were informed that the study would be conducted in accordance with ethical principles. Participants of the study were selected by using snowball sampling which is one of the purposive sampling methods. In the snowball sampling, the first participant is selected. The second participant is decided with the help of the first participant. The third participant is selected with the help of the second participant, in a way that the sample size is expanded like a snowball. After reaching the participants, they are asked to reach other and the snowball is enlarged, thus new situations to provide information are arisen (Patton, 2014).

The demographic characteristics of the participants are shown in the table below.

Table 1. *The demographic characteristics of the participants*

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10
Gender	F	F	F	F	F	F	F	F	M	F
Institution	P	P	P	P	S	S	S	S	S	S
Experience (year)	8	8	10	3	10	15	12	4	10	7
Graduation	AS	AS	B	B	B	B	B	M	B	M
Work city	Ist	Ist	Ist	Ist.	Afyon	Batman	Ankara	Çankırı	Ist	Ist
Work year	5	7	6	3	1	5	4	3	2	2

Class size (student#)	15	16	16	10	12	18	20	10	13	20

T: Teacher P: Private School S: State School AS: Associate's degree B: Bachelor's degree M: Master's degree

According to Table 1, nine of the participants were female, one was male (T9). It was seen that six participants were working in state school and four in private school and they had 3 to 15 years of professional experience. Two of the participants had an associate degree, six had bachelor, and two had master's degrees. The participants' work cities were; Istanbul (6 teachers), Afyon, Çankırı, Ankara and Batman. Teachers' work year at the current schools varied from 1 to 8 years. The classes of participant teachers were composed of between 10 and 20 students. In addition, some of the teachers mentioned that they had students with special needs in their classes during the interview (T9 had three students with special needs; T10 had two students with special needs).

Data Collection Tools

Personal Information Form

The Personal Information Form consisted of 8 questions; the gender of the teacher, the type of institution (state school-private school), how many years they had worked as professional, the city they were currently working in, their educational status, their work year at the current school, and the number of students in the class.

Interview form

In the research, *A Semi-Structured Interview Form to Determine the Difficulties Related with the Planning, Implementation and Evaluation Process of Pre-School Teachers' Mathematical Activities* that has been developed by researchers as a qualitative data collection tool was used. The questions on the interview form were divided into three sections. There were questions to determine the teachers' difficulties during the period of planning, implementation, and evaluation stages of in-class mathematics activities in the first part, the difficulties experienced in the planning, application and evaluation stages of the out-class math activities in the second part and the difficulties experienced in the family cooperation in the mathematics activities in the third part. Before the Interview Form was used by the researchers as a measurement tool, it was rearranged by consulting two different experts. Afterwards, the interview form was finalized by piloting with one person.

Collection of Data

Meet before the interview

The teacher, being the first participant of the research, was a pre-school teacher one of the researchers has already known. Teacher was asked whether he wanted to participate in the research after expressing the purpose of the study. After the teacher's approval, it is noted that ethical rules would be followed; thus, she would be able to express her opinions about the subject without any hesitation. It was also stated that the next participant candidate would be a teacher she recommended. The process occurred in the same way for all other participant teachers.

Besides, the researcher informed the participant about the fact that their voices would be recorded with the aim of collecting data and preventing data loss and verbal approvals of the participants was received. In addition, teachers were informed that the questions about their personal and professional information would be asked, and they were provided with the choices that they could give such information based on their wishes either during the interview or after the interview via e-mail. Four of the participant teachers preferred to fill in the mail form, while the other six participants shared this information with the researcher during the telephone interview process.

Interview Calendar

After the first pilot application (07.07.2017) was made by the researchers, they came together for the revisions. After the final form was created, the first interview was held on 10.07.2017. The interviews with the participant teachers took place between 10.07.2017-15.08.2017. Each interview lasted 30-45 minutes on average.

Interviews

The researchers decided that the interviews should take place without any changes in the sequence of the interview questions. In addition, during the interviews, special care was taken not to ask any leading questions. During the phone interviews, the researcher called the participants with their own names. However, they were informed that each would be codenamed in the content analysis process. After each interview, the participant was given a code name. At the end of each interview, participants were appreciated for their involvement in the interview, and the name and phone number of the other teacher who was suggested were requested.

Data Analysis

Pre-Analysis Studies: Since the participants were chosen by snowball sampling, the teachers were given nicknames in a way specifying their order before analyzing the opinions of the teachers. (such as T1, T2: the teacher recommended by T1, T3: the teacher recommended by T2).

The data in voice recordings were transferred into text as the speech was heard during the recordings of the records without correction. In order to control the accuracy of the data, the voice recordings were listened once more, and the data transferred to the papers were read at the same time and the correctness of the data was confirmed.

Creating the categories and codes: In the creation of the categories, interview questions were taken into account first. For example, teachers' difficulties in the implementation process of in-class math activities were asked to interviewees for detailed explanations. Based on the answers of all participant teachers, common answers were determined, and codes were formed.

Afterwards, categorization was done by grouping the statements that are similar in the answers of the teachers. The groupings were compared after this process was done separately by the researchers. In cases where there is a difference, researchers have reached a common resolution by eyeing the answers together.

Once the codes and categories were established, the researchers reached a consensus to finalize the themes. Participant confirmation was used for some categories. The data for the participant teachers' difficulties in planning, implementation and evaluation processes of in-class and out-of-class mathematics activities and the parent involvement in such activities was primarily coded with content analysis and it was categorized. Findings were constructed by referring the participants' opinions under these categories. The findings were presented in seven main titles.

3. Results

The following tables includes the findings regarding the pre-school teachers' difficulties experienced during planning, implementation, evaluation processes of in-class and out-of-class math activities and the difficulties experienced with parent's in math activities.

Findings Regarding the Difficulties in Planning In-Class Mathematics Activities

Participants were asked whether they had difficulty in planning in-class mathematics activities for pre-school children. The answers given to this question were presented in Table 3 in two main parts as having and not having difficulties in planning the in-class mathematics activities.

Table 2. *Difficulties in Planning Process of In-class Mathematics Activity*

Theme	**Code**	**Explanation**
Not having difficulties	No, Readymade plan Group	(T1, T3) indicated generally having not difficulty in the planning phase of in-class math activities.
Having difficulties	Yes, Difficult First years Different children	(T4, T5, T6, T7, T8, T9 and T10) indicated generally partially having difficulty in the planning phase of in-class math activities.
* The idea that mathematics is difficult	Children Adults	T2 stated that some children have troubles due to the idea of the difficulty of mathematics. T5 stated having difficulty in beliefs regarding difficulty of mathematics for both children and adults.
* Professional inexperience	First years Experience First tries	T4 stated that the planning phase of mathematics activities were partially difficult in the first months of their occupation, but this situation diminished as they got to know the children well.
* Insufficiency in recognition of children	Different region Different level of development	T5, T6 and T7 stated that they had difficulty in planning mathematic activities if they had insufficient knowledge about the children being where they were appointed.
* Difficulties in adaptation	Autism Different languages Special needs	Teachers (T9 and T10) expressed difficulties in planning mathematics activities. In terms of making adaptations of children with special needs.
* Resource and budget problems	Lack of book Budget Cost	T8-T9 stated facing budget problems despite the fact that they wanted to purchase different materials for the activities in the planning phase.
* Inter-semester registration	Inter-semester additional registration	She stated that she had problems with the children starting the school between the semesters (T8).

According to Table 2, when the responses of the pre-school teachers who participated in the research were examined, it was found that only two of the teachers (T1, T3) didn't have difficulty in the planning process of mathematical activities, and the other participants (T2, T4, T5, T6, T7, T8, T9 and T10) partially struggled with planning the process. It was recognized that participants who thought having difficulty in planning in-class mathematics activities were gathered on the theme of difficult mathematics, lack of professional inexperience, lack of definition of child, lack of adaptation, resource and budget problem and inter-semester registration themes. Examples of difficulties experienced by participating teachers in the mathematical activity planning process include:

The idea that mathematics is difficult: *"I want to demolish the children's perceptions of difficulty of math. Because they cannot be involved in mathematics because of children's fears before the activity*

begins (T2).” “Since learning mathematics as both a child and an adult is a more difficult and challenging lesson, you need to make your math a little softer and include it in its most enjoyable moments. The ‘it is hard, I cannot do’ labels on their minds make me have difficulty, I would like to break them (T5). "

Difficulties in adaptation: *"The creation of children with special needs is causing math activity to be difficult to plan, even to organize activities in general. Because when he's next to you, he can do things. Since there is not always an intern, I have difficulty in designing an activity for everyone (T9).” "Here the priorities are very different, our priority is to teach Turkish here. Even the inspector warned us that your language is your priority. I am having difficulties in planning math activities because children do not understand Turkish (T6)”*

Insufficiency in recognition of children: *I may have difficulty for a short period of time since I discover children’s learning speed. I am having difficulty in bringing together fast-learning and slow-learning children, especially at the beginning of the term. This can be reflected in my plans. But in a short time, this situation is over (T7).*

Professional inexperience: *Designing math activities in a school that adopts alternative approaches was very difficult at the beginning. Not having much experience with children and not knowing how to plan in accordance with needs demolished me in my first year. But as the days went by and I found the needs of the children, I began to overcome this difficulty (T4).*

Resource and budget problem: *The administration does not buy what they need to buy at the beginning of the year. They state that they spent the collected money on school repair and renovation work and allocate the budget belonging to kindergarten to the whole school. There are many different educational materials to be bought for children. They say that there is no financial source. The books given to us are not enough. We are not given any budget so that we can prepare something for the mothers even on Mother’s Day. We always pay from our pocket. No problem, I do it for the children, but the budget should be used. For this reason, I have to design activities by abandoning or curtailing some activities (T9).*

The inability of some families to provide material support can sometimes become a problem. There are parents who even bought pastel paints two months later, which is also a serious problem (T8).

Findings Related to the Difficulties in Implementing Classroom Mathematical Activities

Participants were asked whether they had difficulty in implementing process of the in-class mathematical activity for pre-school children. Findings of participants' difficulties in implementing in-class math activities are listed in Table 3.

Table 3. *Difficulties Related to the Implementation Process of In-Class Mathematical Activity*

Theme	Code	Explanation
Mobility	Movement Being energetic	T3 stated that sometimes she had difficulties in table activities due to the children’s mobility.
Distraction of attention	Movement Noise Short attention span	T1 indicated that children were not paying attention to some mathematical activities. T8 stated that children's attention was not long enough, and that their attention quickly distracted when mathematical activities take a long time. T5, however, stated that children making noise or being vigorous distracted the others.
Readiness level	Different levels Fine muscle development	T2, T4, T5 and T7 stated that they had difficulty in the activities because the level of readiness of the children was different.

A multitude of children with special needs	Special need Too much children	T9 and T10 indicated that existence of more than one and different kind of special needs children in their classes causes serious disruptions of the implementing the activities.
Lack of assistant staff	Intern teacher Intern student Assistant staff	T9 and T10 pointed out that they had less difficulty in implementing activities when they had assistant personnel for special needs students in their classes and even this situation improved even days when trainee teachers were present.
Learning speed	Different speed	T8 stated that she had difficulty in implementation process of activities because children had different learning speeds.
Inability in writing numbers	Inverse writing (in shape) Cannot writing the number	T4 indicated that children who had not learned the numerical values had difficulties in writing the numbers; T5 stated that she had difficulty due to the children's inverse writing of the numbers.
Counting on fingers	Counting on fingers Addition Subtraction	T1 stated that children benefited from counting on fingers in subtraction and summation studies, and that children had difficulty when their fingers were not enough.
Inability in recognizing numbers	Failure in distinguishing the number of 6-9 Not knowing the numbers Inability in writing numbers	T4 stated that she had difficulty with children who did not learned the number values. T8 stated difficulties in describing the numbers of 6-9, especially in the symbol of 6.
Difficulties in subtraction	Operation Subtraction	She stated that she did not have any problems in number recognition and addition, but she had difficulties in subtraction process (T8).
Inter-semester registration	Inter-semester Additional registration	She stated that she had problems with the children coming between the semesters (T8).
Not speaking native language	Not speaking Turkish	T6 stated that there were a lot of children who do not speak Turkish in the school she worked and therefore she had difficulty in mathematical activities due to language problems. T8, on the other hand, stated that she had difficulty in her old school because of the older children's inability to perform activities due to language differences.

According to Table 3, the pre-school teachers participating in the research had a variety of difficulties in the implementation of in-class mathematical activities. It was seen that participant teachers had difficulties in the theme of mobility, distracting attention, level of readiness, a multitude of children with special needs, lack of assistant personnel, inability in writing number, counting on fingers, number recognition, subtraction, learning speed, inter-semester registration, not speaking native language. Examples of difficulties experienced by the participating teachers in the implementation process of mathematical activity were given below:

Mobility: *At table activities, I can have difficulty because of the children's mobility. They can get bored quickly (T3).*

Distraction of attention: *Children should not be distracted because math activities have more cognitive development activities. But some kids are very energetic. He/she can distract others. Then the whole class is distracted (T1).*

Readiness level: *Some of the children are bored because they know it and the ones who do not know can get upset and withdrawn ... He/she also need to learn to lose. He/she do not need to win in any case... I say try to enjoy it (T9).*

A multitude of children with special needs: *My classroom has 13 people, in fact they look very nice in number, but I have 3 students with special needs. One of my children is at a very severe level, the other two are partly better than him. One's mother is very interested; sometimes I get support from her. One keeps escaping all the time, I lock the door not to let the kid run out, I cannot find any other solution just. All the responsibility is over me if he run away without notice to my class. Believe me, some of my activities are left half finished (T9).*

Inability in writing numbers: *"The difficulties I have experienced in mathematics studies are writing the numbers reversed. Especially when applying the activities for giving the objects based on the specified number, especially large numbers are missed (T4). "*

Inability in recognizing numbers: *The small age group, 4-5 years group in our school, can have difficulty in recognition of the numbers. When he/she recognizes the number, we have convenience in operations. For example, they have difficulty in identifying the symbol of 6. I introduced it to them as the one with belly. Although I narrate I saw that they had difficulties (T8).*

Difficulties in subtraction: *The group of five-six years old easily learns the addition but has difficulty in subtraction (T8).*

Inter-semester registration: *Although it is very rare to register between semesters, this year I experienced this situation. I have had a lot of difficulty with my child during the period. It has become more difficult to adapt him to the school. It was more difficult to make friends. At the same time, I had to repeat some things to him because he could not catch up with what the other children had learned before. This was a big challenge (T8).*

Findings Related to the Difficulties in In-Class Mathematical Activities Evaluation

Preschool teachers participating in the study were asked whether they had difficulty in in-class mathematics activities evaluation. Participants stated that they did not have difficulties in the evaluation stage of the in-class math activities. However, they pointed out that they used the table activities papers in the classroom to assess the children in-class mathematical activities or they assess by asking questions about the activities. In the following table, the teachers report regarding the evaluation of in-class mathematics activities were transformed into tables grouping into a single category.

Table 4. *Difficulties in the in-Class Mathematical Activity Evaluation Process*

Theme	Code	Explanation
Not having difficulties	Activity paper Table work Question-answer	They stated that they did not have difficulty in assessing the children either because they gave them activity papers at the desk or because they made the evaluation by question-answer method (T1-T2-T3-T7-T8).
Having difficulties	Heterogeneity of the class Class size Question-answer	T6 indicated that it was difficult to assess the presence of children with a large monthly age difference in the same class. T9 stated that the presence of the class more than 15 children partially makes it difficult to assess. T10, the existence of children with special needs makes it difficult to assess. T4-T5, the question-

		and-answer method of the evaluation is sometimes boring for children, so it is sometimes difficult to assess.

Examples of the statements of participant teachers' mathematical activity evaluation processes were given below:

Not having difficulties: *I do not have difficulty in class management because I assess what we do by giving children the activity paper at the table (T8). Evaluating math with activity papers is more effective and faster (T2). Activity papers help us to determine if the activity we are doing is understood by children (T3).*

Having difficulties: *The fact that the children with the large age difference, monthly, are together in the class due to the inadequacy of can make the evaluation difficult. I may have difficulty in observing and deciding the developmental levels of different age groups (T6). The situations of my children in my class are really hard. Having more than one special needs children in my classroom and the largeness of the class size also cause difficulties to assess (T9).*

Findings Related to the Challenges Facing the Planning of Out-of-Class Mathematics Activities

Participants were asked whether they had difficulty in planning out-of-class mathematical activities of pre-school children. Participants' responses to this question were given in the table below gathering in two main themes as having and not having difficulty.

Table 5. *Difficulties Related to the Process of Planning Out-of-Class Mathematical Activities*

Theme	**Code**	**Explanation**
Not having difficulties	No Did not have any difficulty *Non-preference	T1, T2, T3 and T5 had indicated that they generally had no difficulty in planning out-of-class math activities.
• **Non-preference**	Preference Priority Choice	They stated that they preferred less mathematical activities because they planned different activities outside the classroom (T5-T6-T8)
Having difficulties	*Transporting problem *Being noisy *Physical conditions *Absence independent garden *Income status of family	
• **Transportation problem**	Transportation School service	She pointed out that it was a problem to go if service arrangements were made for the field trips (T9).
• **Being noisy**	Noise Loud noise Quietness	They stated that quiet environments were necessary for an effective mathematical activity and that they had difficulty in other places (T5-T7).
• **Physical condition**	Indoor playground	They stated having difficulties because the school was located on the main street and

	Closeness to the road Danger Location of the school	there was only indoor playground facility (T8).
• **Absence of independent garden**	Garden Shared spaces	They stated that they had difficulties with the use of the garden due to the fact that the classes were connected to elementary school or secondary school (T8-T9-T10).
• **Income status of family**	Poor Lack of finance Financial trouble	They stated that they had difficulties in activities because of the families' financial troubles' reflections to the activities (T6, T7, T8, T9, T10).

According to Table 5, the participants' situation of having difficulty in the out-of-class math activity planning process was gathered in two main groups. The category of non-preference is added to the subcategory of those not thinking that they had difficulty in the planning process of out-of-class math activity planning. The reason for adding this category was that it was considered that there would be a lack of qualification for having difficulty in an activity that teachers did not prefer to apply. It was observed that the difficulties experienced by the participants in the planning stage of the out-of-class math activities were related to many variables which were under the themes of transportation problem, non-preference, noisy places, physical conditions, absence of independent garden, and income status of families. In addition to these themes, not believing in applicability category, indicated by the asterisk, was not labeled by participants as difficulties but it was labeled as difficulties in mathematical activities by researchers. The reason for this could be that teachers' perceptions, attitudes and beliefs regarding the application to mathematical activities can be stated as difficulties in applying the activities. Examples of statements of difficulties experienced by participating teachers in the planning process out-of-class mathematical activity were listed below:

Non-preference: *Obviously, in out-of-class activities, I give more importance to activities other than mathematical activities. But there are partially mathematics in the activities that I have applied (T8).*

Physical conditions: *Because our school is at the side of the road, the open area is not enough and not safe. There is no playground on the outside; there is just an indoor playground (T8).*

The absence of an independent garden: *When we are doing activities with children, we are actually having difficulties due to the physical conditions of the school. Because we are united with elementary school, the school is separated based on the levels. Yet, the garden should be suitable for children's ages. When the upper classes go out, it becomes chaos. Other children can mistakenly push the little children, so it is difficult to control (P9).*

The income status of the family: *The fact that the family have financial trouble puts us very hard situation, sometimes children cannot go to the field trips sometimes the children cannot buy the clothes because of lack of finance to buy clothes. This also makes the events difficult for us to do (T9).*

Findings Related to Difficulties in the Implementation Process of Out-of-Class Mathematical Activities

Participants were asked whether they had difficulties with the implementation process of out-of-class mathematical activities of children. The answers given to this question were given in the table below.

Table 6. *Difficulties Related to the Application Process of Out-of-Class Mathematical Activity*

Theme	**Code**	**Explanation**
Distraction of attention	Attention	Most of the teachers (T3, T4, T5, T7, T8) stated that children cannot concentrate their attention to out-of-class activities and therefore they had difficulties in

	Getting bored Inability to focus	all activities outside of the class.
Child security	Special need Child Security Danger	Teachers stated that they were worried about not being able to protect security in implementing out-of-class mathematical activities together with special needs children alone, and thus stated that they had difficulty in implementing the activities (T9-T10).
lack of assistant staff	Staff Intern Assistant	T9 and T10 stated that they had difficulty in securing special needs children in out-of-class activities due to insufficient staff.
Inadequacy of physical condition	Garden field Playground	T5, T9 and T10 stated that they had difficulty related with being obliged to apply their activities less at the outside of the class due to the insufficient physical conditions of the school (garden, playground).
Weather condition	Hot Rainy	They reported that having the weather rainy is a challenge for the activities to be done. (T8-T10).
Region climate	Region climate	There were difficulties in implementing activities with children because of difficult winter conditions (T8).

According to Table 6, it was observed that participant pre-school teachers had difficulties in the implementation process of out-of-class mathematics activities in the categories of dispersion attention, child safety, lack of assistant staff, inadequacy in physical condition, weather condition, and regional climate. Examples of difficulties experienced by participating teachers in the implementing process for out-of-class mathematical activities were given below:

Dispersion of attention: *It can be difficult to made children to focus on outside of the classroom, generally I try to make them to feel the moment by applying opportunity activities (T3). The field trip might be done, for example, when we go to the picnic, but the kids are more focused on playing games. They play ball games, I cannot catch attention. Also I cannot say that I am doing much of out-class activities (P8). I have difficulty when my special needs children distract attention (P10).*

Region Climate: *Now, the climate of the region changes everything. The climate is important so that you can follow the plan you designed. Here, the children come to the school in tough winter conditions. It is very difficult to implement the activity of children outside (P8).*

Findings Related to the Difficulties in the Evaluation Process of Out-of-Class Mathematical Activities

Participants were asked whether they were experiencing difficulties in out-of-class mathematics activity evaluation process of pre-school children. The answers given to this question were given in the table below.

Table 7. *Difficulties in Out-of-Class Mathematical Activity Evaluation Process*

Theme	**Code**	**Explanation**
To be boring	Boring Unnecessary repetition	Some of the teachers (T6, T8) stated that they rarely had trouble in evaluation because children thought it was boring due to repetition of mathematics activities during the evaluation process.

Not attracting interest	Interest Attention Excessive stimulus	T5, T8 and T9, stated that children did not listen to them because of factors such as excessive stimulus during the time they were out of the class and thus they had difficulty in evaluation. They even pointed out that they had shifted the evaluation phase into the classroom.

According to Table 7, there are categories of being boring and not attracting interest in out-of-class math activities evaluation. Examples of difficulties experienced by the participating teachers regarding the non-class mathematics activities evaluation process were given below:

Not attracting interest: *"Children are exposed to so many stimuli outside so they can have difficulty in listening to me. In fact, they usually ask me if we can play in the playground, and I am moving the evaluation into the classroom, so I can easily assess (T5). "*

Findings Related Difficulty Experienced for Family Involvement in Mathematics Activities

Participants were asked whether they had difficulty in math activities with family involvement. The answers given by the participants were gathered in two main themes, the absence of family involvement in mathematical activity implementation and having the difficulty. The answers given by the participants were given in the table below.

Table 8. *Difficulties in Family Involvement in Mathematics Activities*

Theme	Code	Explanation
No implementation	Not having difficulty Family involvement Not implementing	T4 and T5 stated that family involvement studies were not included in their schools.
Having difficulty	Not willing Indifference Incorrect information Attitude Fear Cooperation problem	
• Refusing of family cooperation	Family No involvement Not willing	T1 stated that families should not involve in mathematics activities. The reason for this is the fact that children are kept everything taught at their ages in mind and that it is very difficult to correct something wrong.
• uninterested	uninterested indifferent disinterested	T9 and T10 stated that the families were uninterested with the events and they had difficulties because of this reason.
• Incorrect information from family	Family Incorrect information	T1 stated that she experienced difficulty because families taught some concepts wrongly to children.
• Dislike of mathematic	Family Dislike Displeasure	T3 stated that they did not like mathematics activities at family involvement events.

• Not knowing mathematics	Not knowing Difficulty	T9 stated that some families had difficulty in implying mathematics activities due to lack of knowledge about mathematics.
• Fear of mathematic	Fear Uneasiness	T2 stated that families had difficulty in performing mathematical activities due to their fear of mathematics and therefore teachers had also difficulty.
• Cooperation problem	Explanation in detail Homeworks	T1 and T2 stated that even they had tried to prevent wrong teaching in homework mathematics activities by detailed explanations, still they had difficulties in doing this.

According to Table 8, difficulties experienced in mathematics activities with family involvement were seen as categories of avoidance of cooperation with family, indifference, incorrect information given by family, dislike of mathematics, not knowing mathematics, fear of mathematics, cooperation problems. In addition, it was seen that there were teachers working in schools which did not have family involvement study application in Table-7. Examples of difficulties experienced by teachers in family involvement in mathematics activities are listed below:

Refusing of family cooperation: *"I think families should not involve in mathematics activities because this age group is an age group that takes everything, and everything being taught remains in their brains and it is very difficult to correct T1)."*

Indifference: *"The child shows change in supportive families. On the other hand, there is no improvement in the children in indifferent families (T9). "*

Dislike of mathematic: *"Our families do not like math activity in general. I suppose they think it is boring (T3)"*

4. Discussion

In this study; determining the difficulties that pre-school teachers experienced in planning, implementation and evaluation of in-class and out-of-class mathematical activities and family participation in mathematical activities was aimed. The findings obtained suggest that pre-school teachers had various difficulties in this context. The discussion on difficulties was given below:

Difficulties experienced by preschool teachers during planning stage of classroom math activities; the idea of difficulty of mathematics, the lack of adaptation, the lack of professional experience, failure to know the child well, the lack of budget and resources. When these problems were examined, it was seen that preschool teachers had partially lack of knowledge about the field. Researchers think that teachers' knowledge and skills in teaching mathematics are effective in learning mathematics for the children. Aubrey (2003) mentions that teachers have problems with curriculum planning and organizing in terms of mathematics education (as cited in Dunphy, 2009). Although the concretization of abstract thinking facilitates teaching mathematics, it makes children diverge from mathematics, which is pointed as the reason of the difficulty of teaching mathematics (Umay,1996). This information also overlaps with research findings.

It was not surprising that teachers working in state school (T8, T9) talked about resource and budget problems at this stage. In this period, however, the use of concrete materials in children's learning is extremely important (Early Mathematics Collaborative, 2014; Barrody and Wilkins, 2004). Some teachers working in private schools (T1 and T3) stated that they had difficulties because they used the readymade plans of the institution. Although teachers feel that this is not a problem, using such plans is a problem for the teacher to develop himself.

Teachers identified the difficulties in implementing in-class math activities; children's mobility, distraction, having levels of readiness and the learning at different speed, and lack of assistant staff. It

is thought-provoking that pre-school teachers perceive the developmental characteristics of children, such as children's mobility, the individual differences, and short attention span, as difficulties. These difficulties may arise from the teacher (child development, pre-school education, special education, classroom management, inadequate knowledge and inadequate experience in teaching principles and methods), or school management (crowded classes, multitude of children with special needs). Teachers have expressed that they have difficulties because of multitude of children with special needs, which is extremely normal. It is a fact that there has been still problems in-class practices in the integration of children with special needs in our country. One of the factors affecting the success level of preschool education is the competence of teachers in inclusive education (Aküzüm and Altunhan, 2017). These findings support the results of the research.

Teachers talked about some difficulties, such as children having difficulties in recognizing and subtracting numbers, which are already the achievements that should be developed for this age group child and should not be considered a problem. It was surprising that teachers see difficulties in writing numbers, writing inversions, counting on the fingers, as a problem. That is why, neither there is such objectives in the program of the Ministry of National Education, nor inverse writing of the numbers is not developmentally normal for children in this period. In this study, a significant number of teachers concentrated on the difficulties related to the number and process in implementing mathematical activities. In the study conducted by Tarım and Bulut (2006) and Çelik (2017) the majority of the teachers perceived mathematical concepts as only numbers. However, researchers advise teachers to check whether they are ready to learn numbers before teaching them to children (Shane, 2004).

A teacher stated that he/she had difficulty in implementation because of existence of the children not knowing Turkish at school. In Dunphy's study (2009), pre-school teachers also stated that they had experienced serious problems in mathematics when working with children whose mother tongue was other than the language the school used.

They pointed out that some of their pre-school teachers did not have difficulty in evaluation of in-class mathematics activities. In Dunphy's study (2009), the vast majority of pre-school teachers expressed a problem in this issue. According to the findings obtained, it was determined that pre-school teachers used the activity papers and asking questions to assess the mathematical activities. Activity papers and asking questions are generally accepted as a method of assessing mathematical activities, but the question of whether the teachers are making a correct evaluation or whether alternative evaluation methods are being used had raised. The evaluation should support learning and provide useful information to both teachers and students (NCTM, 2000, p.22).

At the planning stage of out-of-class math activities, it was observed that some of the teachers did not prefer out-of-class math activities. The difficulties experienced by the teachers during the planning stage of out-of-class mathematical activity were defined by the categories of the service problem, noisy environment, physical conditions, not having independent garden, income status of the family. When these categories were analyzed, it was determined that there were more difficulties resulting from external factors (income status of the family, physical structure). However, the out-of-class area provides many resources that support children's mathematical thinking. Moving learning out of the classroom offers unique learning experiences in terms of learning opportunities through rich stimulants in a real and natural environment (Basile, 2004; Tarım, 2015). Failure of children to take advantage of out-of-class activities due to school's physical conditions or its budget problems is perceived as negativity.

In the implementation stage of out-of-class mathematical activities, the difficulties that pre- school teacher experienced were defined by the categories of attention deficit, child safety, personnel insufficiency, physical conditions, weather, regional climate. Also, in the research conducted by Baki and Hacısalihoğlu-Karadeniz (2013), the results of the teachers' lack of infrastructure (physical conditions, crowded classes, lack of master trainers, lack of materials, etc.) in the implications of preschool education program supported the research's result. The fact that climate was seen as a challenge was an important negativity. It is known that although children are taken out every season in different countries, there is a practice in our country to prevent them from going out in cold weathers, especially when it is snowy.

The difficulties that pre-school teachers had in the evaluation stage of out-of-class math activities were as the way that children found the evaluation boring and they shifted the evaluation into the classroom because they cannot grasp attention of the children. Teachers described distractions of the students' attention in applying and evaluating math activities outside the classroom as difficulty. It is known that the attention span of children is short and the attention period may vary in different areas. The frequency of using out-of-class activities by teacher can also be indicated as a reason for quick distraction of children's attention.

The challenges faced by teachers in mathematics activities with family involvement are categorized as; seeing the cooperation with the family unnecessary, the indifference of families, giving wrong information to the child by family, the dislike of mathematical activities or the family's fear of mathematics, and the difficulties experienced in the cooperation. It was seen that most of the teachers did not benefit enough from family participation studies in mathematics activities. In his study, Kuryel (2011) stated that mathematics has emerged as a criterion of intelligence and has led to mathematics concern due to classifying people according to their mathematical understanding. As a result, mathematics anxiety has become a social characteristic. This result supports the research's finding.

Examining the whole of the research, it has been determined that pre-school teachers differ in terms of defining difficulties depending on the type of the institution (state-private) in which they work. Teachers who work in public schools had difficulties related with economic reasons; teachers in the private school had more difficulties in situations such as distraction, readiness level, speed of learning, and so on. Within this study, limited information on this topic was obtained.

5. Conclusion and Suggestions

In the light of this study, the following suggestions have been made in order to lead to future studies.

- Difficulties with preschool teachers' implementation process of the curriculum can be supported by more extensive and quantitative research.
- It may be advisable to conduct an in-depth study aiming to understand teachers experiences of the kind of difficulties resulting from themselves during the mathematics education (i.e. not being able to master the subjects of mathematics, not knowing how to teach them, or having difficulties in selecting and preparing educational materials).
- It has been seen that teachers had some incorrect and incomplete knowledge (using fingers, inverse writing, etc.) of teaching mathematical concepts and skills. In-service trainings can solve this inadequacies and inaccurate information.
- In the study, it was observed that the presence of children with special needs in classrooms caused difficulties in the planning and implementing stages of mathematics activities. Odom (2000) noted that preschool teachers need training in applying early intervention programs in order to make better use of the educational environment for children with special needs, whose numbers increasing day by day in the preschool education institutions. This seems to be a necessity for our country as well.
- Einarsdottir (2003) also mentioned that there is a discrepancy between teacher beliefs (i.e. mathematics is hard) and their practice (as cited in Dunphy, 2009). For example; the beliefs of preschool teachers vary according to whether they work at the schools where children from low socio-economic status or at the schools where children from middle socio-economic status. There is also a need for more extensive studies with teachers in this regard.
- In the United States, on the other hand, mathematicians, mathematics educators, researchers, program developers, teachers and educational politicians came together to set standards for early childhood mathematics education, considering the need for pedagogical guidance in teaching mathematics in early childhood (Clements, Sarama and DiBiase, 2004. As cited in Dunphy, 2009). Equality in mathematics education is not an issue as much as its importance (Padron, 2004). However, this issue is extremely important. Indeed, it is true that children especially from low socio-economic status receive education at different levels. In our

country, it is necessary to study interdisciplinary studies and to set some standards in this direction for an effective mathematics education.

- For effective assessment, teacher needs to understand mathematics well and be well aware of how the child thinks (Copley, 2004). Assessment gives an idea to the teacher about the development of the child and it is also important for the assessment of the program. It was thought that there were some shortcomings in the evaluation of teachers in the data obtained from this study. Also, this can be overcome by in-service trainings for teachers.
- It may be suggested in the direction of the findings obtained that teachers should apply more out-of-class mathematics activities.
- Teachers can inform families and raise their awareness for mathematics education. In this direction, it may be expected from schools that they can give more place to family involvement activities in order to increase their cooperation with families.
- The fact that parents' attitudes towards mathematics will be reflected to their children and that a negative view will prevent children from learning mathematics should be explained to families. On the other hand, educational support given by the family to children at home can significantly increase their mathematical success (Oktay and Güven, 1998). It may be suggested to raise the awareness of the family in this regard.

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