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Investigation of Mathematical Skills of 60-72 Months Old Children Attending Preschool Education in Terms of Some Variables

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Abstract

The aim of this study is to determine mathematical skills of 60-72 months old children attending preschool education and whether these skills make a significant difference in terms of gender, mother education, father education, number of siblings, duration of preschool education and socio-economic status of family. The research was designed with descriptive scanning model. The sample of the study consisted of 372 children, 60-72 months of age, who were randomly selected from each of official independent kindergartens of Ministry of National Education in Battalgazi and Yeşilyurt districts of Malatya in 2018-2019 academic year. Early Childhood Mathematics Education Content Standards Scale was used as data collection tool. The data obtained from data collection tool were analyzed by using Mann-Whitney U and Kruskal Wallis-H tests. As a result of research; It was found that mathematical skill levels of 60-72 months old children attending pre-school education institutions were above average. However, mathematical skill levels of children did not show a significant difference according to gender variable; it was found that the educational level of mother, father education status, number of siblings, pre-school education period and socio-economic level of the family were significantly different according to the variables.

Okul Öncesi Eğitim Kurumuna Devam Eden 60-72 Aylık Çocukların Matematiksel Becerilerinin Bazı Değişkenler Açısından İncelenmesi

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Öz

Bu araştırma ile okul öncesi eğitim kurumuna devam eden 60-72 aylık çocukların matematiksel becerileri ve bu becerilerin; cinsiyet, anne eğitim durumu, baba eğitim durumu, kardeş sayısı, okul öncesi eğitim süresi ve ailenin sosyo-ekonomik durumu açısından anlamlı bir farklılık oluşturup oluşturmadığının belirlenmesi amaçlanmıştır. Araştırma betimsel tarama modelinde tasarlanmıştır. Araştırmanın örneklemini, 2018-2019 eğitim öğretim yılında Malatya ili Battalgazi ve Yeşilyurt ilçelerindeki MEB'e bağlı resmi bağımsız anaokullarının her birinden tesadüfî olarak seçilen bir sınıfındaki okul öncesi eğitime devam eden 60-72 aylık çocuklar olmak üzere toplamda 372 çocuk oluşturmaktadır. Veri toplama aracı olarak "Erken Çocukluk Dönemi Matematik Eğitimi İçerik Standartları Ölçeği" kullanılmıştır. Veri toplama aracından elde edilen veriler, Mann-Whitney U ve Kruskal Wallis-H testleri kullanılarak analiz edilmiştir. Araştırma sonucunda; okul öncesi eğitim kurumuna devam eden 60-72 aylık çocukların matematiksel beceri düzeylerinin ortalamanın üzerinde olduğu bulunmuştur. Bununla birlikte çocukların matematiksel beceri düzeyleri, cinsiyet değişkenine göre anlamlı bir farklılık göstermezken; anne eğitim durumu, baba eğitim durumu, kardeş sayısı, önceden alınan okul öncesi eğitim süresi ve ailenin sosyo-ekonomik düzeyi değişkenlerine göre anlamlı olarak farklılaştığı bulunmuştur.

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Introduction

Early childhood is the framework of life. In the process of forming the basic framework of the lives of children, they want to know everything that is around them with a sense of innate curiosity. This will lead them search, explore and to curb their curiosity. As a result of curiosity and discovery tendencies, they begin to gain first experience, knowledge and skills. Therefore, early childhood has a critical importance in gaining the basic concepts, skills and habits that will play an active role in the construction and maintenance of life (Akman, Üstün & Güler, 2003; Çelik, 2012; Ölçer, 2017; Taştepe, 2012). In this context, early childhood is the main component that constitutes the basis of the gains that lead to the shaping of life.

The process of acquiring scientific concepts starts from infancy. Learning efforts begin by smelling, tasting, watching, listening and touching (Akman et al., 2003). Children try to arouse their curiosity with sound-silent objects, tools, machines, containers, boxes and toys (Şentürk, 2017). Early childhood is a process in which children learn basic process skills and actively use basic concepts (Charlesworth & Lind, 2010). In this learning process, the learning content of children should be focused at rather than learning content (Büyüktaşkapu, 2010) When this process of action is supported and developed, there is no doubt a solid foundation for science, mathematics and literacy in the future (Ölçer, 2017). Therefore, by enabling children to be autonomous from an early stage, learning efforts should be promoted and non-intrusive directions should be made.

Children interact with the environment firstly physical, then cognitive, after that begin to gain practical mathematical experience (Yıldız, 2016). When children start school, they continue to learn by adding systematic learning to their previous experience and skills (Akman, 2002). Children's interest in mathematics can be more effective and easier in terms of understanding mathematical concepts and relationships through play in early childhood (Tural, 2005). In this respect, children start to take their first steps in mathematics by playing, asking and trying (Nunes & Brgant, 2008). Based on the fact that the most important task of the child is the game, the early mathematical activities must be integrated with the games in order to learn while the child is having fun through play.

Mathematical learning that is started in early childhood continues in adulthood. While shopping, walking the path at a certain distance or feeding on a certain amount of food, every moment of life, mathematics is an indispensable element of life. The important point here is that, from the early childhood onwards, mathematical skills are acquired correctly and systematically to children. Mislearned or inadequate mathematical knowledge of children is associated with educators or education program responsible for early childhood education (Arias-de Sanchez, 2010). In this respect, the importance of early childhood period is seen as the main factor in the fact that the concepts learned in childhood and the acquired skills constitute the basis of learning in adulthood and any missing or wrong learning in these periods will affect the whole structure.

The pre-school education program includes basic knowledge and skills that children should acquire, the methods and techniques that will carry out them to these knowledge and skills, and various activities that will enable them to reach the goals through these tools. The contents of mathematics education and the standard of these contents may vary according to the age and level of children. For example; In pre-school mathematics education, different mathematical content standards may be formed for 3-4-5 age groups. Each semester supports each other as a spiral and provides the basis for pre-learning (Taştepe, 2012).

Preschool mathematics education has four basic elements. These are: child, teacher, mathematics and program. In the process of mathematics education, these four elements interact with each other. Naturally, the greatest task and responsibility in this interaction falls to the teacher (Baki & Hacısalihoğlu-Karadeniz, 2013). Teachers need to know and use methods that make children willing to think, explore, question and explore freely. (Çelik, 2012). Therefore, for a mathematics education with high quality and high standards, teachers who are the main factors in this process should have comprehensive pedagogical field knowledge (Aksu & Kul, 2017). Basically, pedagogical field knowledge is a part of the teacher's knowledge base that combines both a comprehensive understanding of what to teach and how to teach them (Mccray, 2008). In this context, teachers, who are the strategic elements of education, should be able to enable children to acquire the highest level of skills by revealing their existing talents and potentials by keeping their feelings of curiosity alive, investigating, questioning and problem solving.

Beginning from early childhood; matching, comparison, classification and ranking skills are preliminary skills that will form the basis of children's mathematics education. With the acquisition of these skills, the development

of mathematical skills such as number / counting process awareness, measurement awareness, geometry and spatial logic awareness, data collection and statistical awareness will be supported (Taştepe, 2012).

In the studies, it is stated that preschool mathematics skills are affected by various variables. In the research, mathematical skill levels of 60-72 months old children attending preschool education institution were examined in terms of various variables such as gender, (Aktaş-Arnas et al., 2003; Avci, 2015; Bulut-Pedük, 2007; Dağlı, 2007; Demir & Dere-Çiftçi, 2018; Karaman, 2012; Polat-Unutkan, 2007; Sezer, 2008; Taşkın, 2013), number of siblings,(Aslanargun, Bozkurt & Sarıoğlu, 2016; Avci, 2015), duration of preschool education, (Avci, 2015; Dağlı, 2007; Polat-Unutkan, 2007), parental education status, (Avci, 2015; Bulut-Pedük, 2007; Dağlı, 2007) and socio-economic status of the family (Kandır & Koçak-Tümer, 2013; Starkey & Klein, 2000). In some of the studies, it was determined that mathematics skills changed according to variables such as gender, number of siblings, duration of pre-school education, parental education status and socio-economic status of the family, while some studies did not. In this context, it is important to determine the mathematical skills in preschool period for the mathematical achievements of children in their learning stages. It is important to examine mathematical skills according to variables such as gender, number of siblings, duration of preschool education, parental education status and socio-economic status of the family. Therefore, in this study, it was aimed to determine whether the early mathematical skill levels of 60-72 months old children attending preschool education institutions make a significant difference in terms of gender, mother education status, father education status, number of siblings, duration of pre-school education and socio-economic status of the family. As a result of the research, it is expected to contribute to the education system in general and the possible solution suggestions to the problems in pre-school mathematics education in particular. In addition, it is stated that the mathematical skills of preschool children need to be supported and there is a need for further studies in this field (Çelik, 2015; Karaman & İvrendi, 2015). Therefore, this research problem, which is intended to provide these contributions, is further divided into the following sub-problems:

a) What is the level of mathematical skills of 60-72 months old children attending pre-school education institutions?
b) Do the mathematical skills of the 60-72 month old children attending the pre-school education differ significantly by gender?
c) Do the mathematical skills of the 60-72 month old children attending the pre-school education differ significantly according to the mother's educational status?
d) Do the mathematical skills of 60-72 months old children attending pre-school education differ significantly according to the education level of the father?
e) Do the mathematical skills of the 60-72 month old children attending the pre-school education differ significantly according to the number of siblings?
f) Do the mathematical skills of 60-72 months old children attending preschool education show a significant difference according to the pre-school period of the child?
g) Do the mathematical skills of the 60-72 month old children attending pre-school education differ significantly according to the socio-economic status of the family?

Method

Research Design

The aim of this study is to determine the mathematical skills of 60-72 months old children attending pre-school education institutions and whether these skills make a significant difference in terms of independent variables. For this purpose, survey research model, one of the quantitative research methods, was used. The survey research model aims to describe a present or past situation as it is. The individuals in the research are evaluated as they are in their own conditions. Descriptive research is generally a survey research (Karasar, 2015). They are usually made in order to determine the various characteristics of large groups in social sciences (Can, 2018). In order to determine the mathematical skills of preschool children, the research was designed in a descriptive survey model that aims to define a situation as it exists.

Population and Sample

The population of the study consists of all children aged 60-72 months (N: 9395) attending pre-school education in official independent kindergartens affiliated to MEB in Malatya province in the 2018-2019 academic year. The sample of the study can be taken as 370 children according to the 95% reliability rate according to the sample calculation over the universe. In this context the sample of the study consists of 372 children, 60-72 months of age, who were randomly selected from each of the official independent kindergartens in the Battalgazi and Yeşilyurt districts of Malatya province in the 2018-2019 academic year. Sample size table (Yazıcıoğlu & Erdoğan, 2007: 72) was used for $\alpha = 0.05$ when determining the sample size.

Table 1. Frequency Distribution of Demographic Information Related to the Sample of the Study

Variable	Group	Frequency(n)	Percent (%)
Child's gender	Girl	188	50.5
	Boy	184	49.5
Educational level of the child's mother	Literate- Elementary School	39	10.5
	Secondary School	37	9.9
	High school	169	45.4
	University	127	34.1
Educational level of the child's father	Literate- Elementary School	30	8.1
	Secondary School	35	9.4
	High school	136	36.6
	University	171	46.0
Number of siblings	Single child	37	9.9
	1 siblings	177	47.6
	2 siblings	104	28.0
	3 and more siblings	54	14.5
Pre-school education period of the child	No	199	53.5
	1 year	139	37.4
	2 years and more	34	9.1
Socio-economic level of child's family	Low	48	12.9
	Middle	295	79.3
	High	29	7.8
Total		372	100

When the frequency distribution according to gender was examined, it was found that 188 (50.5%) of the sample children were girls and 184 (49.5%) were boys. It was seen that 39 (10.5%) of the mothers' education level were literate, 37 (9.9%) were secondary school, 169 (45.4%) were high school and 127 (34.1%) were university level. The fathers' education level is 30% (8.1%) literate, 35 (9.4%) secondary, 136 (36.6%) high school and 171 (46%) university level. 37 children (9.9%) had one child, 177 (47.6%) had 1 sibling, 104 (28%) had 2 siblings and 54 (14.5%) had 3 siblings. It was determined that 199 (53.5%) of the children had not received pre-school education before, 139 (37.4%) had 1 year pre-school education and 34 (9.1%) had 2 years or more pre-school education. It is seen that 48 (12.9%) of the families of the children are at low socio-economic level, 295 (79.3%) are at medium socio-economic level and 29 (7.8%) are at high socio-economic level.

Data Collection Tools

In the first part, "Child Personal Information Form" was used as the data collection tool. In the second part, "Early Childhood Mathematics Education Content Standards Scale" which was developed by Taştepe and Temel (2013) was used (to be filled in by teachers). The scale provides the opportunity for the teachers to evaluate the mathematical skills of the children in terms of development, and to make developmental predictions about the competence of the applications and whether the children acquire the skills related to the mathematics content in determining the mathematical skill level of the children (Taştepe & Temel, 2013).

Mathematics education content standards scale consists of 4 dimensions and 27 items in total. These are Number / Counting Process Awareness (9 items), Measurement Awareness (5 items), Geometry and Spatial Reasoning Awareness (7 items) and Data Acquisition and Statistical Awareness (6 items). The scale is a five-point Likert type that is in the range of "Always", "Mostly", "Sometimes", "Rarely" and "Never". The lowest score that can be obtained from the Number / Counting Process Awareness dimension of the scale is 9 and the highest score is 45 points. The lowest score that can be obtained from the Measurement Awareness dimension is 5 and the highest score is 25 points. The lowest score that can be obtained from the Geometry and Spatial Logic Awareness dimension is 7 and the highest is 35 points. The lowest score that can be obtained from the Data Collection and Statistical Awareness dimension is 6 and the highest 30 points.

The Cronbach's alpha coefficients for the reliability of the test were .95 for Number / Counting Process Awareness, .85 for Measurement Awareness, .94 for Geometry and Spatial Awareness, and .94 for Data Collection and Statistical Awareness. The Cronbach's alpha coefficients for the reliability of the test were calculated as .96 for Number / Counting Process Awareness, .88 for Measurement Awareness, .95 for Geometry and Spatial Reasoning Awareness, and .94 for Data Collection and Statistical Awareness. This result shows that the scale can be used as a reliable measurement tool.

Table 2. Matematics Education Content Standards Scale, Size Items, Item Numbers and Reliability Coefficient

Dimensions	Substances	Number of items	Cronbach Alpha Coefficient
Number / Counting Process Awareness	1,2,3,4,5,6,7,8,9	9	.96
Measurement Awareness	10,11,12,13,14	5	.88
Geometry and Spatial Reasoning Awareness	15,16,17,18,19,20,21	7	.95
Data Acquisition and Statistical Awareness	22,23,24,25,26,27	6	.93

Data Collection

In order to collect data, the teachers of the children included in the sampling were interviewed and the forms were distributed to the teachers. As a result of the data collection stage, 389 forms were reached. With the controls performed on the obtained forms, 17 forms were considered invalid due to incorrect filling of forms and entering incomplete data and a total of 372 forms were included in the research.

Data Analysis

In line with the data obtained from the scales, incorrect or incomplete data checks were performed. In the data set, the distribution of extreme values and normality of the distribution were investigated. The Skewness value was calculated as -884 and the kurtosis value was .518. Although the skewness and kurtosis scores were between -1 and +1, the Kolmogorov-Smirnov test was calculated as 0.00 ($p < .05$), and the Histogram graph showed a left skewed structure and when the Q-Q Plot and Box plot graphs were analyzed it is observed that distribution is not normal. The data obtained were summarized with percentage and frequency tables and calculated and evaluated by using SPSS statistical package program. Mann-Whitney U test and Kruskal Wallis-H test were used for non-parametric test groups in cases where normal distribution was not provided for the data. The error level is accepted as .05.

In the analysis of the data, the Mann-Whitney U test was used to determine whether the math skills of 60-72 months old children showed a significant difference according to the gender, the educational status of the child's mother, the educational status of the father, the number of siblings, the state of pre-school education and the Kruskal Wallis H test was applied to determine whether there is a significant difference according to the socio-economic situation.

Findings

Findings for First Sub-Problem

The first sub-problem of the research is expressed as "What are the mathematical skills of 60-72 months old children attending pre-school education institutions?". In order to find an answer to this sub-problem, the scores obtained from the mathematics education content standards scale, the arithmetic mean and standard deviation values and the dimensions of the scale were calculated on the whole scale and shown in the table in Table 3.

Table 3. Descriptive Analysis Results of the Scores of Children in Mathematics Education Content Standards Scale

Scale / Dimensions	Size Number of Items	$\bar{x}^*$	sd
Number / Counting Process Awareness	9	36.73[4.08]	8.36
Measurement Awareness	5	16.78[3.35]	4.36
Geometry and Spatial Reasoning Awareness	7	28.82[4.11]	6.05
Data Acquisition and Statistical Awareness	6	20.97[3.49]	5.92
All Scale	27	103.31[3.82]	22.54

* Average brackets in square are the average scores which are translated into 5-score Likert-type scale by dividing the total scores obtained from the scale by the number of items.

When the table is examined, it was found out that the lowest score obtained in the number / counting process awareness dimension was 9, the highest score was 45, and the arithmetic average was = 36.73 (sd = 8.36). In the answers given to the scale items in the Number / Counting Process Awareness dimension, it can be stated that the skill level of children is between "Most of Time" and "Always". The lowest score obtained in the measurement awareness dimension was 5, the highest score was 25 and the mean was 16.78 (sd = 4.36). In the responses given to the scale items in the Measurement Awareness dimension, the skill level of children can be said to be between Sometimes and Most of the time. Geometry and Spatial Reasoning Awareness has the lowest score of 7, the highest score is 35 and the arithmetic average was = 28.82 (sd = 6.05). In the answers given to the scale items in the dimension of Geometry and Spatial Reasoning Awareness, it can be said that the skill level of children is between Most of Time and Always. The lowest score obtained in Data Awareness and Statistical Awareness dimension was 6, and the highest score was 30 and arithmetic mean was = 20.97 (sd = 5.92). In the responses given to the scale items in the dimension of Data Acquisition and Statistical Awareness, it can be said that the skill level of children is between Sometimes and Most of the time. The lowest score obtained from all scale was 27 highest score 135, and arithmetic mean was= 103.31 (sd = 22.54). In the responses to all scale items, the skill level of children can be said to be between Sometimes and Most of the time.

Findings and Comments Related to the Second Sub-Problem

The second sub-problem of the research is expressed as "Do the mathematical skills of the 60-72 month old children attending preschool education differ significantly by gender?". In order to find an answer to this sub-problem, Mann Whitney U test was applied to the obtained data. The results are shown in Table 4.

Table 4. Analysis of Mathematical Skills of 60-72 Months Old Children Attending to Preschool Education by Gender

	Gender	N	Mean Rank	Sum of Ranks	U	P
Number / Counting Process Awareness	1) Girl	188	187.98	35340.50	17017.500	.787
	2) Boy	184	184.99	34037.50		
	Total	372				
Measurement Awareness	1) Girl	188	186.27	35019.50	17253.500	.967
	2) Boy	184	186.73	34358.50		
	Total	372				
Geometry and Spatial Reasoning Awareness	1) Girl	188	187.28	35208.50	17149.500	.887
	2) Boy	184	185.70	34169.50		
	Total	372				
Data Acquisition and Statistical Awareness	1) Girl	188	186.43	35049.50	17283.500	.990
	2) Boy	184	186.57	34328.50		
	Total	372				
Total Mathematical Skill Level	1) Girl	188	187.19	35192.50	17165.500	.900
	2) Boy	184	185.79	34185.50		
	Total	372				

* $p < .05$

When the table is examined, the mathematical skill levels of 60-72 months old children who attend preschool education do not show a significant difference according to gender. [U:17165.50; p>05]. In this context, it can be said that 60-72 months old children attending pre-school education have similar mathematical skill scores in terms of boys and girls.

Findings Related to the Third Sub-Problem

The third sub-problem of the study is expressed as "Do the mathematical skills of the 60-72 month old children attending the pre-school education institution differ significantly according to the mother's education level?". Kruskal Wallis-H test was used to find the answer to this sub-problem. The results are shown in table 5.

Table 5. Results of the Analysis of Mathematical Skills of 60-72 Months Old Children Attending to Preschool Education According to Mother Education Status

	Mother education level	**N**	**Mean Rank**	**df**	χ^2	**P**	**Difference**
Number/ Counting Process Awareness	1) Literate-Elementary School	39	115.19	3	51.129	.000*	1-3, 1-4
	2)Secondary School	37	147.49				2-4, 3-4
	3)High school	169	174.70				
	4)University	127	235.47				
	Total	372					
Measurement Awareness	1) Literate-Elementary School	39	115.29	3	49.597	.000*	1-3, 1-4
	2) Secondary School	37	149.01				2-4, 3-4
	3)High school	169	174.76				
	4)University	127	234.91				
	Total	372					
Geometry and Spatial Reasoning Awareness	1) Literate-Elementary School	39	119.72	3	48.972	.000*	1-2
	2) Secondary School	37	174.36				1-3, 1-4
	3)High school	169	167.18				2-4, 3-4
	4)University	127	236.25				
	Total	372					
Data Acquisition and Statistical Awareness	1) Literate-Elementary School	39	104.19	3	46.883	.000*	1-2
	2) Secondary School	37	165.35				1-3, 1-4
	3)High school	169	177.14				2-4, 3-4
	4)University	127	230.39				
	Total	372					
Total Mathematical Skill Level	1) Literate-Elementary School	39	104.27	3	59.924	.000*	1-2
	2)Secondary School	37	152.35				1-3, 1-4
	3)High school	169	173.18				2-4, 3-4
	4)University	127	239.43				
	Total	372					

* p< .05

When the table is examined, the mathematical skill score of the 60-72 months old children who attend pre-school education show a significant difference according to their mothers' educational status. [χ2 (df=3, n=372)=59.92; p<.05].

In order to understand the source of the difference, Mann Whitney U test was applied between each group and total mathematical skill level. At the end of the study, a significant difference was found between the education level of the mother, the level of literate-primary education, and the level of secondary school, high school and

university education, between the secondary education level and the university education level, and between the level of high school education and university education level. The differences were in favor of those with higher education levels in each group.

Findings Related to the Fourth Sub-Problem

The fourth sub-problem of the research is expressed as "Do the mathematical skills of 60-72 months old children attending pre-school education differ significantly according to their father's education level?". Kruskal Wallis-H test was used to find the answer to this sub-problem. The results are shown in Table 6.

Table 6. Results of the Analysis of the Mathematical Skills of 60-72 Months Old Children Attending to PreSchool Education According to Father's Education Status

	Father education level	**N**	**Mean Rank**	**df**	χ^2	**P**	**Difference**
Number/ Counting Process Awareness	1) Literate-Elementary School	30	106.95	3	47.265	.000*	1-3, 1-4
	2) Secondary School	35	131.24				2-4, 3-4
	3)High school	136	173.33				2-3
	4)University	171	222.24				
	Total	372					
Measurement Awareness	1) Literate-Elementary School	30	113.62	3	39.116	.000*	1-3, 1-4
	2)Secondary School	35	148.44				2-4, 3-4
	3)High school	136	169.36				
	4)University	171	220.71				
	Total	372					
Geometry and Spatial Reasoning Awareness	1) Literate-Elementary School	30	123.30	3	45.268	.000*	1-3, 1-4
	2) Secondary School	35	137.40				2-4, 3-4
	3)High school	136	165.15				
	4)University	171	224.62				
	Total	372					
Data Acquisition and Statistical Awareness	1) Literate-Elementary School	30	100.72	3	46.556	.000*	1-3, 1-4
	2) Secondary School	35	139.20				2-4, 3-4
	3)High school	136	173.19				
	4)University	171	221.82				
	Total	372					
Total Mathematical Skill Level	1) Literate-Elementary School	30	104.20	3	52.969	.000*	1-3, 1-4
	2) Secondary School	35	130.86				2-4, 3-4
	3)High school	136	169.72				
	4)University	171	225.67				
	Total	372					

* p< .05

When the table is examined, the mathematical skill score of the 60-72 months old children who attend pre-school education show a significant difference according to their fathers' educational status. [χ2 (df=3, n=372)=52.96; p<.05].

In order to understand the source of the difference, Mann Whitney U test was applied between each group and total mathematical skill level. At the end of the study, a significant difference was found between the educational level of father, literate-primary education level, high school and university education levels, between secondary education level and university education level and between high school education level and university education level. The differences were in favor of those with higher education levels in each group.

Findings Related to Fifth Sub-Problem

The fifth sub-problem of the research is expressed as "Do the mathematical skills of the 60-72 month-old children attending pre-school education differ significantly according to the number of siblings?". Kruskal Wallis-H test was used to find the answer to this sub-problem. The results are shown in Table 7.

Table 7. Results of the Analysis of Mathematical Skills of 60-72 Months Old Children Attending to Preschool Education According to the Number of Siblings

	Number of siblings	N	Mean Rank	df	χ^2	P	Difference
Number/Counting Process Awareness	1)Single child	37	189.23	3	34.153	.000*	1-4, 2-3
	2)1 siblings	177	215.13				2-4, 3-4
	3)2 siblings	104	169.47				
	4)3 and more	54	123.58				
	Total	372					
Measurement Awareness	1)Single child	37	188.46	3	25.929	.000*	1-4, 2-3
	2)1 siblings	177	211.73				2-4, 3-4
	3)2 siblings	104	171.25				
	4)3 and more	54	131.83				
	Total	372					
Geometry and Spatial Reasoning Awareness	1)Single child	37	204.88	3	16.328	.001*	1-4, 2-4
	2)1 siblings	177	202.29				3-4
	3)2 siblings	104	177.67				
	4)3 and more	54	139.18				
	Total	372					
Data Acquisition and Statistical Awareness	1)Single child	37	203.77	3	23.509	.000*	1-4, 2-3
	2)1 siblings	177	205.99				2-4, 3-4
	3)2 siblings	104	177.51				
	4)3 and more	54	128.09				
	Total	372					
Total Mathematical Skill Level	1)Single child	37	199.24	3	29.555	.000*	1-4, 2-3
	2)1 siblings	177	211.15				2-4, 3-4
	3)2 siblings	104	172.14				
	4)3 and more	54	124.64				
	Total	372					

* p< .05

When the table is examined, the mathematical skill score of the 60-72 months old children who attend preschool education show a significant difference according to their siblings' numbers. [χ2 (df=3, n=372)=29.55; p<.05].

In order to understand the source of the difference, Mann Whitney U test was applied between each group and total mathematical skill level. As a result of the application, the number of siblings, between one child and 3 and more siblings are significant differences in favor of one child, between 1 sibling and 2 or 3 siblings are in favor of one sibling, between 2 siblings and 3 or more siblings are in favor of 2 siblings.

Findings Related to Sixth Sub-Problem

The sixth sub-problem of the research is expressed as "Do the mathematical skills of the 60-72 month old children attending the pre-school education differ significantly according to the pre-school education period of the child?". Kruskal Wallis-H test was used to find the answer to this sub-problem. The results are shown in Table 8.

Table 8. Results of the Analysis of Mathematical Skills of 60-72 Months Old Children Attending Preschool Education Institutions According to Their Past Preschool Education Time

	Education period of the child	N	Mean Rank	df	χ^2	P	Difference
Number/Counting Process Awareness	1)No	199	143.21	2	75.547	.000*	1-2, 1-3
	2)1 year	139	227.17				2-3
	3)2 years and more	34	273.65				
	Total	372					
Measurement Awareness	1)No	199	140.31	2	80.977	.000*	1-2, 1-3
	2)1 year	139	234.48				
	3)2 years and more	34	260.71				
	Total	372					
Geometry and Spatial Reasoning Awareness	1)No	199	143.15	2	75.753	.000*	1-2, 1-3
	2)1 year	139	227.36				2-3
	3)2 years and more	34	273.16				
	Total	372					
Data Acquisition and Statistical Awareness	1)No	199	142.04	2	75.030	.000*	1-2, 1-3
	2)1 year	139	232.49				
	3)2 years and more	34	258.71				
	Total	372					
Total Mathematical Skill Level	1)No	199	136.50	2	96.757	.000*	1-2, 1-3
	2)1 year	139	235.72				2-3
	3)2 years and more	34	277.91				
	Total	372					

* p< .05

When the table is examined, the mathematical skill score of the 60-72 months old children who attend preschool education show a significant difference according to the preschool education period. [χ2 (df=2, n=372)=96.75; p<.05].

In order to understand the source of the difference, Mann Whitney U test was applied between each group and total mathematical skill level. At the end of the application, there is a significant difference between the years of pre-school education, between 0 and1or 2 years, between 1 year and 2 or more years. Differences have been in favor of those with higher education levels.

Findings and Comments Related to Seventh Sub-Problem

The seventh sub-problem of the research "Do the mathematical skills of the 60-72 months old children attending the pre-school education differ significantly according to the socio-economic status of the family?" is expressed as. Kruskal Wallis-H test was used to find the answer to this sub-problem. The results are shown in table 9.

Table 9. Results of the Analysis of the Mathematical Skills of 60-72 Months Old Children Attending to Preschool Education According to Their Socio-Economic Status of Family

	Socio-Economic stuation	N	Mean Rank	df	χ^2	P	Difference
Number/Counting Process Awareness	1) Low	48	81.21	2	64.667	.000*	1-2, 1-3
	2) Medium	295	195.91				2-3
	3) High	29	265.02				
	Total	372					
Measurement Awareness	1) Low	48	107.55	2	40.178	.000*	1-2, 1-3
	2) Medium	295	192.19				2-3
	3) High	29	259.28				

	Total	372					
Geometry and Spatial Reasoning Awareness	1) Low	48	110.38	2	34.538	.000*	1-2, 1-3
	2) Medium	295	193.06				2-3
	3) High	29	245.76				
	Total	372					
Data Acquisition and Statistical Awareness	1) Low	48	90.39	2	56.506	.000*	1-2, 1-3
	2) Medium	295	194.18				2-3
	3) High	29	267.50				
	Total	372					
Total Mathematical Skill level	1) Low	48	86.35	2	61.625	.000*	1-2, 1-3
	2) Medium	295	194.38				2-3
	3) High	29	272.12				
	Total	372					

* p< .05

When the table is examined, the mathematical skill score of the 60-72 months old children who attend preschool education show a significant difference according to the socio-economic status of the child's family. [$\chi 2$ (df=2, n=372)=61.62; p<.05].

In order to understand the source of the difference, Mann Whitney U test was applied between each group and total mathematical skill level. As a result of the application, there is a significant difference between the socio-economic status of the family, the low socio-economic status and the medium or high socio-economic status, the middle socio-economic situation and the high socio-economic situation**.** The differences were in favor of their higher socio-economic situation.

Discussion and Conclusion

In this section, the mathematical skill levels of the 60-72 months old children attending a preschool education institution which constitutes the study group of the research and their skill levels; gender, mother education status, father education status, number of siblings, previous education period and socio-economic level of the family were examined according to the variables; all dimensions of mathematical skills are discussed according to the sub-problems appropriate for the purpose of research.

The mathematical skill levels of 60-72 months old children attending pre-school education institutions are generally closer to “Most of the Time” between “Sometimes” and “Most of the Time”. In this respect, we can say that the general mathematical skill levels of the children are above average. As the mathematical skill level of the children is the sub-dimension, Geometry and Spatial Reasoning Awareness is the sub-dimension that they get the highest score, followed by Number / Counting Process Awareness sub-dimension and Data Acquisition and Statistical Awareness sub-dimension respectively. The sub-dimension where children get the lowest score as mathematical skill level is Measurement Awareness. While the highest mathematical skill level was the 6th item (Counts rhythm one by one forward from 1 to 10) as the scale items, the lowest mathematical skill level as the scale items was determined as the 10th item (The penny shows coins of 10 cents, 25 cents, 50 cents, 1 liras and says that these coins have different values). In this context, it can be said that rhythmic counting from 1 to 10 is achieved significantly before the children start preschool education and almost all of the children show this skill. The results of the study on the mathematical skills performed by Ertürk-Kara (2017) found that children's mathematics skill scores were generally high. However, the reason for the low level of skills related to the concept of money is that the studies on the concept of money in pre-school education institutions are either insufficient or the level of achieving the goals is low.

The mathematical skill levels of 60-72 months old children attending pre-school education; number / counting process awareness, measurement awareness, geometry and spatial reasoning awareness, data collection and statistical awareness and scores from the whole scale do not show a significant difference according to gender. In other words, the mathematical skill scores of 60-72 months old children who attend pre-school education are similar in terms of boys and girls. In the researches (Aktaş-Arnas, Deretarla-Gül & Sığırtmaç, 2003; Avci, 2015; Bulut Pedük, 2007; Dağlı, 2007; Demir & Dere Çiftçi, 2018; Karaman, 2012; Polat-Unutkan, 2007; Sezer, 2008;

Taşkın, 2013), there was no significant relationship or difference between the mathematical skills levels and genders of the children attending pre-school education as a result of relationship and difference analysis. In this context, it can be said that gender variable is not a factor affecting mathematical ability / skill. The reason for this can be stated that mathematical ability can be affected first by genetic factors and then by environmental factors (Turan, 2013).

The mathematical skill levels of 60-72 months old children attending pre-school education; number / counting process awareness, measurement awareness, geometry and spatial reasoning awareness, data collection and statistical awareness, and scores obtained from all scale differ significantly according to mother education level. When the rank averages are considered, it is seen that the highest level of mathematical skills is that mothers have university-level learning. It is seen that those who have the highest rank average and whose mothers have high school education and then secondary education level. The lowest mathematical skill scores are observed in the children of mothers with literacy and primary school levels. The reason for this may be explained that the higher the education level of the mothers, the higher their academic knowledge, knowledge and support (Yenilmez & Özbey, 2006), the better they can reflect their increasing potential to their children and become more knowledgeable about mathematical concepts at the cognitive development level. It is stated that the mother with a certain level of education cannot provide cognitive and other developmental support to her child by another person or practice (Aslanargun et al, 2016). When the results of the related research are examined there is a significant difference between the educational level of mothers and the mathematical skill levels of their children. In the study conducted by Karaman (2012), no significant difference was found between the educational level of parents and their children's mathematical skill levels.

The mathematical skill levels of 60-72 months old children attending preschool education; number / counting process awareness, measurement awareness, geometry and spatial reasoning awareness, data collection and statistical awareness, and scores obtained from all scale differ significantly according to father education level. In terms of rank averages, it is seen that the highest level of mathematical skills are fathers with university level education. Then, the ones having the highest order average, respectively, have the fathers' education at high school and secondary school level. The lowest mathematical skill scores are those of fathers who are at the level of literacy and primary school. This may be explained by the fact that as fathers' educational levels increase, they can support their children cognitively, form a positive mathematical perspective (Yenilmez & Özbey, 2006), increase their father's educational roles with increasing educational level, guide their children instructively and guide their children as well as teaching (Hortaçsu, 1995; akt. Aslanargun et al., 2016). In the literature, similar results were obtained in the studies examining the relationship between mathematical skills of the children and the level of father education. In a study by Dağlı (2007), a significant difference was found between the mathematics achievement scores of the fathers according to their education level. The difference in achievement between the children whose father was a primary school graduate and whose father was a high school or university graduate was significant. In addition, the achievement scores among the fathers of middle and high school graduates are also significant. In the study conducted by Bulut Pedük (2007), it was seen that pre-test and post-test math scores of the children differ according to the level of father education. In a study conducted by Avci (2015), it is observed that children generally have a high mathematics talent score as their fathers' educational level increases.

The mathematical skill levels of 60-72 months old children attending pre-school education; number / counting process awareness, measurement awareness, geometry and spatial reasoning awareness, data collection and statistical awareness, and scores from the whole scale differ significantly according to the number of siblings. Looking at the averages, it is seen that the mathematical skill levels of the children who have 1 sibling are higher than the other groups. One child with one sibling is followed by one child, and then there are 2 siblings, 3 and more siblings respectively. In general, as the number of siblings increases, the level of mathematics skills decreases. However, contrary to this situation; The ones with the highest mathematical skill level are the children with 1 sibling and not the single child. The reason for this finding is that peer-sibling learning of children with 1 sibling or a sample of the instructional behaviors of the sibling may lead to an increase in mathematical skill level. The reason for the decrease in the mathematical skill level with the increase of the number of siblings can be explained as the increase in the number of siblings, which can shorten the time for parents of each child, and can offer less educational materials by dividing the opportunities for each child. In the literature, similar results were obtained in the studies examining the relationship between mathematical skills of children and the number of siblings and the difference, and different results were obtained. In a study conducted by Avci (2015), it is observed

that the children of the families with 2 children tend to get higher scores, followed by the children of the families with one child and 4 children, and the siblings of the families with 3 children are the lowest. In the study conducted by Aslanargun et al (2016), no significant relationship was found between academic achievement and the number of siblings, whereas two siblings were found to be more successful than single children and more siblings. In the study conducted by Sezer (2008), it was observed that success in the number and operation concepts did not differ significantly according to the sibling presence as a result of the training given to children.

The mathematical skill levels of 60-72 months old children attending pre-school education; number / counting process awareness, measurement awareness, geometry and spatial reasoning awareness, data collection and statistical awareness, and scores from the whole scale differ significantly according to the previous training period. In terms of rank averages, the highest mathematical skill level scores were taken by children who preschool education for 2 years or more, followed by 1 year of preschool education. The lowest mathematical skill level score was taken by children who have never taken preschool education. Based on this finding, it is clear that there is a true proportion of mathematical skill levels between the participation of children in preschool education. In this context, as the pre-school education period of children increases, so does the mathematical skill level. The reason for this is that children can improve their mathematical skills through the education they receive, and that they can improve their cognitive development through better connections between learning and mathematical concepts. The results of the research in this context (Dağlı, 2007; Polat-Unutkan, 2007; Avci, 2015) support the current research findings. Aunola, Leskinen, Lerkkanen and Nurmi (2004) states that the increase in mathematics competence is more rapid especially in preschoolers with more mathematics education.

The mathematical skill levels of 60-72 months old children attending pre-school education; number / counting process awareness, measurement awareness, geometry and spatial reasoning awareness, data collection and statistical awareness, and scores obtained from the whole scale differ significantly from the socio-economic level of the family. In terms of rank averages, the highest level of mathematical skill is at the high socio-economic level of the child's family and follows the middle socio-economic level. The lowest level of mathematical success is seen in the low socio-economic level of the family. In other words, it can be said that as the socio-economic level of the family increases, the child's mathematical skill scores increase. The reason for this can be explained by the increasing income situation, the academic and social opportunities given to the child may be more and more diverse (Aslanargun et al, 2016), the access to mathematical educational materials more, the availability of technological devices such as computers and tablets at home and the provision of environments where they can improve their mathematical skills. In the study conducted by Kandır and Koçak-Tümer (2013), the parents of 5-6 year-old children attending pre-school education have higher early learning skills than those in the upper income group compared to the middle and lower income group, and the children of the parents in the middle income group compared to the lower-income groupIn a study by Starkey and Klein (2000), he created a developmental gap between the low-income pre-school and middle-class peers in terms of the scope of their numerical knowledge. It was found that the children of low-income families had lower mathematical skills.

This study is limited to the data obtained from 372 children aged 60-72 months in the official independent kindergarten in Battalgazi and Yeşilyurt districts of Malatya province in 2018-2019 academic year.

Based on the research findings, recommendations for parents;

- Parents with low educational level can contribute to the development of their own and therefore their children by attending courses, panels, seminars and conferences on subjects such as child development, child rearing and child education e.t.c.
- Families with one child can offer their children more opportunities to spend time with their peers and friends, considering that their children can gain quicker and lasting skills through peer interaction.
- Parents can further support their children in preschool education to help them gain more systematic and accurate information, to follow their progress regularly, and to develop mathematical skills such as problem solving, cause-effect relationship, analytical thinking.
- Parallelism between the socio-economic level of the family and the child's mathematical skill level highlights the environmental factors in the child's learning. Families can facilitate learning of children by providing the presence of concepts enriched with stimulants and by enabling concretization of concepts. In this respect, parents can contribute to the development of mathematical skills of their

children with qualified and various educational materials, technologic tools such as computers and tablets.

Suggestions for teachers;

- Number and type of measurement activities for children can be increased.
- An abstract concept, such as the concept of time, can be associated with concrete objects and situations to increase the level of skill in this field.

Suggestions for researchers;

- The research can be conducted using a wider sample and different independent variables.
- In addition to the quantitative research method, in-depth knowledge can be obtained by using qualitative research methods and suggestions can be made to improve the mathematical skills of children.

References

Akman, B. (2002). Okul öncesi dönemde matematik [Mathematics in preschool]. *Hacettepe University Faculty of Education Journal, 23*, 244-248.

Akman, B. Üstün, E., & Güler, T. (2003). 6 yaş çocuklarının bilim süreçlerini kullanma yetenekleri [Using science process skills in 6 years old children]. *Hacettepe University Faculty of Education Journal, 24*, 11-14.

Aksu, Z., & Kul, Ü. (2017). Turkish adaptation of the survey of pedagogical content knowledge in early childhood mathematics education. *International Journal of Eurasia Social Sciences, 8*(30), 1832-1848.

Aktas-Arnas, Y., Deretarla-Gül, E., & Sığırtmaç, A. (2003). 48 86 ay çocuklar için Sayı ve İşlem Kavramları Testi 'nin geçerlilik ve güvenirlik çalışması [The validity and reliability study of the Number and Operation Concepts Test for children aged 48 86 months]. *Çukurova University Institute of Social Sciences Journal, 12* (12), 147-157.

Arias-de Sanchez, G.(2010). *Young children representing numbers: Implications for teaching* (Master's Thesis). Proquest Dıssertatıons & Theses Global obtained from the database. (Accession No: MR64460).

Aslanargun, E., Bozkurt, S., & Sarıoğlu, S. (2016). Sosyo ekonomik değişkenlerin öğrencilerin akademik başarısı üzerine etkileri [The ımpacts of socioeconomic variables on the academic success of the students]. *Uşak University Journal of Social Sciences, 9*(3), 214-234.

Aunola, K., Leskinen, E., Lerkkanen, M. K., & Nurmi, J. E. (2004). Developmental dynamics of math performance from preschool to grade 2. *Journal of Educational Psychology*, *96*(4), 699-713. doi:10.1037/0022-0663.96.4.699

Avci, K. (2015). *Okul öncesi eğitimi alan 48-66 aylık çocukların matematik becerilerinin bazı değişkenler açısından incelenmesi* [*An ınvestigation of early mathematics abilities among 48-66-month-old preschool children in relation to some variables*]. (Master's thesis). YÖK National Thesis Center is obtained from the database. (Thesis No: 381204).

Baki, A., & Hacısalihoğlu-Karadeniz, M. (2013). Okul öncesi eğitim programının matematik uygulama sürecinden yansımalar [Reflections from in-class mathematics applications in pre-school educational curriculum]. *Kastamonu Education Journal, 21* (2), 619-636.

Bulut-Pedük, Ş. (2007). *Altı yaş grubundaki çocuklara çoklu zekâ kuramına dayalı olarak verilen matematik eğitiminin matematik yeteneğine etkisinin incelenmesi* [*A study on the effect of mathematics education given based on multiple intelligence theory to six years old children's mathematics ability*]. (Doctoral dissertation). YÖK National Thesis Center is obtained from the database. (Thesis No: 196491).

Büyüktaşkapu, S. (2010). *6 yaş çocuklarının bilimsel süreç becerilerini geliştirmeye yönelik yapılandırmacı yaklaşıma dayalı bir bilim öğretim programı önerisi* [*A science teaching program proposal based on constructivistm science education to develop 6 year-old children's scientific processing skills*]. (Doctoral dissertation). YÖK National Thesis Center is obtained from the database. (Thesis No: 261059).

Can, A. (2018). *Spss ile bilimsel araştırma sürecinde nicel veri analizi* (6. bs.) [*Quantitative data analysis in the process of scientific research with Spss* (6th edition)]. Ankara: Pegem Academy Publishing.

Charlesworth, R., & Lind, K. K. (2010). *Math & science for young children*. (6th edition). USA: Wadsworth/Cengage Learning.

Çelik, M. (2012). *61-72 aylık çocukların matematik gelişimine "küçük çocuklar için büyük matematik eğitim programının etkisi* [*The effect of "Big Maths For Little Kids" educational program on the mathematical development of children aged 61-72 months old*]. (Doctoral dissertation). YÖK National Thesis Center is obtained from the database. (Thesis No: 311044).

Çelik, M. (2015). Anasınıfına devam eden 60-72 aylık çocukların matematiksel gelişimlerinin bazı değişkenler açısından incelenmesi [Examine the mathematical development of the 60-72 months children, attending to kindergarten ın terms of some variables]. *Dicle University Journal of Ziya Gökalp Faculty of Education, 24,* 1-18.

Dağlı, A. (2007). *Okul öncesi eğitimi alan ve almayan ilköğretim birinci sınıf öğrencilerinin Türkçe ve matematik derslerindeki akademik başarılarının karşılaştırılması* [*Comparison of the academic achievement of primary and first grade students in Turkish and mathematics courses*]. (Master's thesis). YÖK National Thesis Center is obtained from the database. (Thesis No: 217492).

Demir, E., & Dere-Çiftçi, H. (2018). 5-6 yaş çocuklarına sayı kavramını kazandırmada drama çalışmalarının etkisinin incelenmesi [Investigating the effect of drama studies on gain the concept of number for 5-6 year old children]. *Journal of Early Childhood Studies, 2* (2), 309-333. doi: 10.24130 / eccd-jecs.196720182263

Ertürk-Kara, G. (2017). Çocukların davranışsal becerilerinin erken akademik becerilerini yordamadaki rolü [The role of children's behavioral skills in predicting early academic skills]. *The Journal of International Social Research, 10* (49), 432-441.

Kandır, A., & Koçak-Tümer, N. B. (2013). Farklı sosyo-ekonomik düzeydeki beş-altı yaş çocuklarının erken öğrenme becerilerinin incelenmesi [To examine the early learning skills of five-six year-olds at different socio-economic levels]. *Journal of Social Policy Studies, 7* (30), 45-60.

Karaman, S. (2012). *Okul öncesi eğitim kurumuna devam eden 6 yaş çocuklarının matematik becerileri ile sosyodramatik oyunun boyutları arasındaki ilişkinin incelenmesi* [*Investıgation on the relationship between the mathematical skills and sociodramatic play of 6 years old preschool children*]. (Master's thesis). YÖK National Thesis Center is obtained from the database. (Thesis No: 384158).

Karaman, S., & İvrendi, A. (2015). Okul öncesi dönem çocuklarının matematik becerileri ile onların sosyo-demografik özellikleri ve sosyo-dramatik oyunları arasındaki ilişki [Relationship among preschool period children's mathematical skills, socio-demographic characteristics and socio-dramatic play]. *Education and Science, 40*(177), 313-326.

Karasar, N. (2015). *Bilimsel Araştırma Yöntemi* (28. bs.) [*Scientific Research Method* (28th Edition)]. Ankara: Nobel Akademi Publishing.

Mccray, J. S. (2008). *Pedagogical content knowledge for preschool mathematics: relationships to teaching practices and child outcomes* (Doctoral dissertation). Proquest Dıssertatıons & Theses Global obtained from the database. (Accession No: 3313155).

Nunes, T., & Brgant, P. (2008). *Çocuklar ve matematik* (Çev. S.Koçak). [*Children and mathematics* (Translated by S. Koçak)]. İstanbul: Doruk Publishing.

Ölçer, S. (2017). Science content knowledge of 5–6 year old preschool children. *Internatıonal Journal of Envıronmental & Scıence Educatıon, 12* (2), 143-175.

Polat-Unutkan, Ö. (2007). Okul öncesi dönem çocuklarının matematik becerileri açısından ilköğretime hazır bulunuşluğunun incelenmesi [A study of pre-school children's school readiness related to skills of mathematics]. *Hacettepe University Faculty of Education Journal, 32*, 243-254.

Sezer, T. (2008). *Okul öncesi eğitimi alan beş yaş grubu çocuklara sayı ve işlem kavramlarını kazandırmada drama yönteminin etkisinin incelenmesi* [*An ınvestigation of the effect of the drama method on acquisition of number and operation concepts by five-year old children enrolled at preschool education*]. (Master's thesis). YÖK National Thesis Center is obtained from the database. (Thesis No: 216941).

Starkey, P., & Klein, A. (2000). *Fostering parental support for children's mathematical development: an intervention with head start families, 11*(5), 659-678. doi: 10.1207/s15566935eed1105_7

Şentürk, C. (2017). Science literacy in early childhood. *IOSR Journal of Research & Method in Education (IOSR-JRME), 7* (1), 51-62.

Taşkın, N. (2013). *Okul öncesi dönemde matematik ile dil arasındaki ilişki üzerine bir inceleme [An investigation on the relation between language and mathematics during preschool*]. (Doctoral dissertation). YÖK National Thesis Center is obtained from the database. (Thesis No: 307624).

Taştepe, T. (2012). *Erken çocukluk dönemi fen ve matematik eğitimi içerik standartları değerlendirme araçlarının geliştirilmesi* [*Developing assessment instruments of early childhood science and mathematics education content standards*]. (Master's thesis). YÖK National Thesis Center is obtained from the database. (Thesis No: 331670).

Taştepe, T., & Temel, Z. F. (2013). Erken çocukluk dönemi fen ve matematik eğitimi içerik standartları değerlendirme araçlarının geliştirilmesi (geçerlik ve güvenirlik çalışmaları). [Development of tools for assessing standards of science and mathematics education in early childhood (validity and reliability studies)]. *Kastamonu Education Journal, 21* (4), 1625-1640.

Tural, H. (2005). *İlköğretim matematik öğretiminde oyun ve etkinliklerle öğretimin erişi ve tutuma etkisi.* [*The effects of teaching mathematics in elemantary school by games and activities on achievement and attitude*]. (Master's thesis). YÖK National Thesis Center is obtained from the database. (Thesis No: 186560).

Turan, S. B. (2013). *60-77 aylar arasındaki okul öncesi eğitim alan ve almayan çocukların matematik yeteneği ile sosyal becerilerinin incelenmesi.* [An examination of the mathematics ability and social skills among 60-77 month-old children who received preschool education versus those who did not] (Master's thesis). YÖK National Thesis Center is obtained from the database. (Thesis No: 347504).

Yazıcıoğlu, Y., & Erdoğan, S. (2007). *Spss uygulamalı bilimsel araştırma yöntemleri* (2. bs.) [*Spss applied scientific research methods* (2nd edition)]. Ankara: Detay Publishing.

Yenilmez, K., & Özbey, N. (2006). Özel okul ve devlet okulu öğrencilerinin matematik kaygı düzeyleri üzerine bir araştırma. [A research on math anxiety levels of private and public school students.] *Journal of Uludağ University Faculty of Education, 19*(2), 431-448.

Yıldız, B. (2016). *Okul öncesi matematik öğretiminde drama yönteminin etkililiğinin öğretmen görüşlerine göre değerlendirilmesi (Kayseri ili örneği)* [*The evaluation of effectiveness of drama method according to opinions of teachers in pre school math teaching (sample of Kayseri)*]. (Master's thesis). YÖK National Thesis Center is obtained from the database. (Thesis No: 446353).