



Examination of parents' opinions regarding the acquisition of mathematical skills in preschool period

Okul öncesi dönemde matematik becerilerinin kazanımına ilişkin ebeveyn görüşlerinin incelenmesi

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ABSTRACT

Aim: In the study, it has been aimed to reveal the views of parents on the role of parents in supporting preschool children's mathematical skills.

Methods: The data has been collected through a semi-structured interview form with the permissions obtained from the ethics committee, provincial national directorate, and parents. Content analysis approach has been used in the evaluation of the data.

Results: It has been determined that parents are aware of the importance of mathematics and its place in daily life. Parents emphasized that mathematics makes life easier and is necessary throughout life. In addition, it has been found that parents support the development of their children's mathematical skills by using both materials and technology at home with their children. In addition, it has been concluded that parents are aware that they play a reinforcing role in supporting their children's mathematical skills.

Conclusion: It has been determined that parents are aware of the importance of mathematics and its place in daily life. Parents emphasized that mathematics makes life easier and is necessary throughout life. In addition, it has been found that parents support the development of their children's mathematical skills by using both materials and technology at home with their children. In addition, it has been concluded that parents are aware that they play a reinforcing role in supporting their children's mathematical skills.

Keywords: family; mathematics; parental behavior; preschool

ÖZET

Amaç: Araştırmada, okul öncesi dönem çocuklarının matematik becerilerinin desteklenmesinde ebeveynlerin rolüne ilişkin ebeveyn görüşlerinin ortaya konulması amaçlanmıştır.

Yöntem: Çalışmada nitel araştırma yöntemlerinden durum çalışması deseni kullanılmıştır. Çalışma grubunu, Bilecik İl Millî Eğitim Müdürlüğü'ne bağlı özel bir okul öncesi eğitim kurumunun aralarında ikiz kardeşlerin de bulunduğu bir sınıfında eğitim gören 10 çocuğun 9 kadın ebeveyni oluşturmaktadır. Verilerin toplanması için etik kurul, Bilecik İl Millî Müdürlüğü'nden araştırmaya katılmaya gönüllü ebeveynlerden gerekli izinler alınmış ve verilerin toplanmasında yarı yapılandırılmış görüşme formu ile toplanmıştır.

Bulgular: Araştırma sonucunda ebeveynlerin matematiğin önemi ve günlük yaşamdaki yerinin farkında oldukları tespit edilmiştir. Ebeveynler, matematiğin hayatı kolaylaştırdığı ve hayat boyu gerekli olduğunu vurgulamışlardır. Ayrıca, ebeveynlerin evde çocuklarıyla birlikte hem materyal kullanarak hem de teknolojiyen faydalanarak çocuklarının matematik becerilerinin gelişimine destek oldukları bulunmuştur. Ek olarak, ebeveynlerin çocuklarının matematik becerilerinin desteklenmesinde pekiştirici bir rol üstlendiklerinin bilincinde oldukları sonucuna ulaşılmıştır.

Sonuçlar: Ebeveynler matematiğin günlük hayatta önemli olduğuna, hayatı kolaylaştırdığına, yaşam için gerekli olduğuna, bilişsel gelişimi desteklediğine ve bu bağlamda pekiştirici görevlere sahip olduğuna inanmakta, çocuklarının matematik becerilerini evde materyal ve teknoloji ile desteklemektedirler.

Anahtar kelimeler: aile; matematik; ebeveyn davranışı; okul öncesi

Introduction

Mathematic is a need to understand the world. Many objects and events in nature can be explained with mathematic. Many objects and events in nature can be explained with mathematic. Therefore, it is possible to define mathematic as a language used to read nature. In this direction, mathematic is a branch of science that defines and analyzes problems and classifies information (Bilginer & Özel, 2019).

According to National Council of Teachers of Mathematics (NCTM, 2000), the need to use mathematics in daily and business life is increasing day by day. In this context, mathematics teaching in early childhood, which is the basis of education, becomes even more valuable (Clements & Sarama, 2014). Another reason that increases the importance of mathematics education given in the preschool period is the finding in many studies that children's mathematic skills in this

period predict their mathematic achievement in their future education life. It has been found that general mathematic knowledge measured at the time of entry to the preschool institution highly predicted the mathematic achievement measured in the third grade. In this context, it has been determined that children with poor counting skills tend to have difficulties in mathematics later (Clements & Sarama, 2011). Children's knowledge of mathematic in their primary school years is also a strong predictor of mathematic and reading skills, which are extremely important for their future education life and compulsory for future academic success (Watts, Duncan, Siegler & Davis-Kean, 2014).

The National Council of Mathematics Teachers states that engaging, accessible, and high-quality mathematics education for children aged three to six is a foundation for their later mathematic learning (NCTM, 2000). Moreover, in its report on mathematics learning in early childhood, the National

Research Council states that mathematics has a powerful key task to make sense of and analyze the world. However, it is stated that mathematical ways of describing and representing, shapes, quantities, space, and patterns help people organize their insights and thoughts about the world in systematic ways (National Research Council, 2009).

For children, there are factors in their lives that affect the learning of mathematics, which is necessary for reading the world and for advanced mathematics and other academic skills. To know these factors is important for children's school success (Hooper, Roberts, Sideris, Burchinal & Zeisel, 2010). According to the bioecological theory of Bronfenbrenner (1979), these factors are the child's interactions with parents, teachers, and other adults. Before starting school, the people with whom the child communicates most frequently are undoubtedly their parents. This interaction is related to the child's structural characteristics as well as environmental factors such as the home environment (Morrison, 2009). Therefore, family is an important factor for children to acquire academic skills. Burchinal, Peisner-Feinberg, Pianta and Howes (2002) state that teachers, families, and the child's experiences with these skills are effective in children's acquisition of early academic skills. Yan and Lin (2005) assert that parent involvement has an important role in the academic success of the child in the future. There are study findings that children learn many mathematical concepts in the family environment before they even start school and the family plays an active role in this learning process (Anders et al., 2012). Studies show that families provide support for math skills such as counting objects together in the context of the math environment at home (Lefevre et al., 2009). In addition, it has been determined that parents' perspectives on mathematics and the quality of the mathematics activities they do with their children also contribute to the development of children's mathematical skills (Clements & Sarama, 2007).

On the other hand, when the roles of families in the development of children's mathematics skills and their attitudes towards mathematics are considered, a limited number of studies have been found that examine the views of parents on the acquisition of mathematics skills of preschool children at the national level. Considering the acquisition of children's early mathematics skills and their environment, it is important to investigate the thoughts of the family, which is the first learning environment, about the importance of mathematics, the role of children in acquiring mathematics skills and what they do in this context. In this context, it is aimed to examine:

- What parents think the importance of mathematics
- The role of parents in the acquisition of mathematics skills
- What parents do at home with their children.

Methods

Model of the research

In this research, case study design from qualitative research methods and semi-structured interview form from interview techniques were used. Creswell (2013) defines case study as a research design in which the researcher analyzes a situation, mostly a program, action, process, or one or more individuals in depth. Interviewing is a powerful data collection method, as there is interaction between the researcher and the data source, and it allows the researcher to control, explain and elaborate on the collected data (Yıldırım & Şimşek, 2013). Semi-structured interview forms do not have limitations as in questionnaires, but they also allow researchers the opportunity

to obtain in-depth information, as they are flexible (Yıldırım & Şimşek, 2003).

Study group

The study group of this research consists of the parents of 60-72 months old children attending a private preschool education institution in Bilecik. Nine parents were included in the study with the purposeful sampling method. Qualitative studies are mostly carried out with groups selected with purposive sampling. Qualitative studies are mostly carried out with groups selected with purposive sampling. Parents were selected through an easily accessible sampling method and voluntarily participated in the research. Demographic information of the parents is given in Table 1.

Table 1. Demographic information of parents

Personal information	Variables	n	%
Mother age	25-30 years	4	40
	31-40 years	4	40
	41 years and older	2	20
Father age	31-40 years	5	50
	41-50 years	4	40
	51 years and older	1	10
Mother's educational level	High school	7	70
	Undergraduate	2	20
	Graduate degree	1	10
Father's educational level	High school	4	40
	Associates degree	2	20
	Undergraduate	4	40

When the ages of the parents are examined in Table 1, 40% of the mothers participating in the study are 25-30 years old, 40% are in the 31-40 age range, and 20% are 41 years old and over; it is determined that 50% of the fathers are in the age range of 31-40, 40% of them are in the age range of 41-50, and 10% of them are aged 51 and over.

When the educational status of the parents is analyzed, 70% of the mothers participating in the study are high school graduates, 20% undergraduate and 10% graduate; it is determined that 40% of the fathers are high school graduates, 20% are associate degree graduates and 40% have undergraduate degrees.

Data collection instrument

A semi-structured interview form was used, which provided in-depth information from the participants (Büyüköztürk et al., 2018). In line with the purpose of the research, draft questions were prepared and presented to the opinions of experts in the field. In line with the comments received, the questions were edited, and the interview form took its final form. Individual interviews were conducted after obtaining permission from the participants. The general question titles in the interview form are given below.

1. Why is mathematics important for children? What do you think about the place of mathematics in daily life

activities/routines? Where and how does your child use mathematics in daily life?

2. What do you do at home to improve your child's math skills? What resources do you use to support your child's math skills?

3. What are the roles of parents or other family members in supporting your child's development, especially math skills?

Analysis of data

Content analysis technique was used to analyze the research data. The reason why content analysis is preferred is to enable the establishment of conceptual connections in explaining the relationship between the collected data and the objectives (Büyükoztürk, 2013). In this context, three dimensions in the questionnaire were determined as the level of analysis. The findings were discussed and interpreted within the framework of the literature. Creswell (2003) finds it appropriate to specify one or more of the methods of credibility, reliability, confirmability, and transferability to check the accuracy of the findings in studies. To increase the reliability of the study, more than one investigator should examine the process and results (Guba & Lincoln, 1982). Internal validity and objective were ensured by reducing researcher biases and making researcher triangulation. To ensure objectivity by reducing researcher prejudices and to show the confirmability of the study, the participants' own statements were included in the findings, not the researcher's biases or opinions (Lincoln & Guba, 1985; cited in Başkale, 2016). Multiple researchers were involved in the collection, analysis, and interpretation of data for researcher triangulation. To ensure external validity, the study group was selected with a purposeful sample, and the environment and participants were introduced in detail (Houser, 2015). One of the ways to ensure credibility is expert opinion (Creswell, 2003). In this study, experts in the field examined the interview questions. As a result of the examinations, the questions took their final form in accordance with the purpose of the research. Before the interview, three themes were determined: the importance of mathematics and its place in daily life, what is done about mathematics at home, and the role of parents in this matter. As a result of the interviews with the parents, categories for these themes emerged. To better understand the findings of parents' views on the importance of mathematics for children and place in daily life, what is done at home, and parents' roles, the themes, categories and frequencies that emerged are shown in Table 2.

When Table 2 is examined, it is seen that parents expressed 47 opinions belonging to 12 categories under three themes: their importance and place in daily life, what is done at home, and the role of parents. About mathematics place and its importance in daily life, it has been determined that parents think that mathematics facilitate the life, and it is necessary throughout life. It has been determined that parents engage in activities with their children at home with materials such as chickpeas, beans, or toys to improve their children's mathematical skills, and they also benefit from technology. All the parents participating in the study stated that they have a reinforcement role in supporting children's mathematical skills.

Table 2. Parents' views about the importance of mathematics for children, what is done at home, and their roles

Themes	Categories	f
Importance and place in daily life	Facilitating the life	7
	Lifetime necessity	6
	Early learning	3
	Cognitive development	2
What is done at home	Using materials (such as chickpeas, beans, toys)	6
	Using online education pages	4
	Turning daily life activities into learning opportunities	3
	Using journals	3
The role of parents	Doing activities	2
	Reinforcement	9
	Single parent role	1
	Older sibling role	1

Ethical aspect of research

Individual interviews were conducted after obtaining permission from the participants. Ethics committee approval was obtained from Gazi University (Approval no: E. 120066, Date: 10.11.2020) and research permission was obtained from Bilecik Provincial Directorate of National Education for this study.

Results

The findings of the study, which examined the views of parents on the importance of mathematics, what they do to support children's mathematical skills, and the responsibility of providing children with mathematical skills, are given under three headings.

Parents' views on the importance of mathematics, its place in daily life activities, and where and how children use mathematics in daily life

"Why is mathematics important for children? What do you think about the place of mathematics in daily life activities/routines? Where and how does your child use mathematics in daily life?" were asked to parents. In line with the answers from the parents, the categories of *facilitating life*, *lifelong necessity*, *early learning*, and *cognitive development* in Table 2 were created. Seven parents who participated in the study stated that mathematics makes life easier, six parents asserted that it is necessary for life, three parents said that it is important to teach mathematics at an early age, and one parent expressed that mathematics contributes to the cognitive development of children.

Some of the views expressed by parents on the theme of *its importance and place in daily life* are as follows:

"Math is necessary because it is always in daily life. Mathematics taught at preschool and primary school level is very important for daily life. At the same time, mathematics plays a very critical role as it develops the child's high-level skills." (E9)

"It is important because the foundation of everything depends on mathematics. Mathematics is also important and necessary in every field to make our daily life easier and sustainable." (E3)

“Children will inevitably use mathematics throughout their lives. When making equal divisions in the game, buying ice cream and toys, and measuring while cooking in the future, it will be a great convenience for them to know in all areas. Moreover, and it will be more effective if they learn it at a young age.” (E1)

“It is important for the development of children's intelligence and reasoning skills. It also improves children's problem-solving skills in daily life.” (E4)

“Even the universe has its own mathematics. It is necessary in all areas of life. When they learn it at a young age, they can think more analytically and solve problems more easily in the future.” (E5)

Activities done at home by parents to improve children's math skills

When parents were asked what they did at home and what resources they used to improve their children's math skills, the categories of *using materials*, *using online education pages*, *turning daily life activities into learning opportunities*, *using journals*, and *doing activities* emerged.

When these categories were examined, it was determined that the parents mostly made math studies with materials such as chickpeas and beans or with toys. This category was followed by *using online education pages*, and it was determined that families included technology in supporting their children's math skills. It is seen that the categories of *using the journals* and *turning the opportunity to learn about daily life experiences* are made at the same rate. The lowest rate belongs to *doing activities* category. The reason for this may be that children attend preschool education institutions and because they do activities during the day at school, they want to spend time doing other things instead of activities at home. Some of the opinions obtained in this regard are as follows:

“We started with counting toys. Collection of toys of the same type. I didn't get any resources specifically for math. Phone apps, household items, beans, sticks for now.” (E2)

“We try to make it fun by asking questions, chatting, playing mind games, taking various digital materials with the game or activity.” (E3)

“We do right-left brain development and attention exercises, lots of addition and subtraction, recognizing and making sense of numbers, coding, painting and wayfinding, puzzle and matching activities.” (E9).

Some parents stated that they benefited from technology in supporting their children's math skills as follows:

“In addition, we make use of the school's recommended journals, websites and preschool education pages.” (E3).

“We started with counting toys. Collection of toys of the same type. I didn't get any resources specifically for math. Phone apps, household items, beans, sticks for now.” (E2).

Parents' views on the responsibility of providing children with mathematical skills

When parents asked, *“What are the roles of parents or other family members in supporting your child's development, especially math skills?”*, all parents mentioned that they have reinforcement responsibilities. In addition, a parent emphasized the role of single parent, and another parent expressed the role of older sibling. The opinions obtained in this context are given below:

“As parents, we both do activities with our child. We do lots of one-to-one math, counting numbers of forwards and backwards. His father is more active because of my chore.” (E9).

“He usually tries to imitate his older sister. As parents, we take a role in supporting the process.” (E6).

“I am putting all the effort into this on my own.” (E1).

Discussion

In the study, it is aimed to examine parents' views on the importance of mathematics, what they do at home with their children, and the role of parents in the acquisition of mathematics skills. In this direction, firstly, parents' views on the importance of mathematics, its place in daily life activities, and where and how children use mathematics in daily life were taken.

Many studies prove that early childhood experiences are critical for later academic skills (Claessens & Engel, 2013; Duncan et al., 2007). In addition, Kılıç and Özcan (2020) stated in their study that parents expressed that mathematics education is important in the preschool period, that it will be effective in the future education life of the children and that it will positively affect their intelligence development. Therefore, it is seen that the views of parents obtained from the current research that mathematics is necessary for children throughout life, that it supports their cognitive development and that it is important for them to learn mathematics in the early period are like the literature.

Secondly, activities done at home by parents to improve children's math skills were examined.

It has been determined that parents support their children's mathematical skills with concrete materials, daily life experiences and technology. In similar studies on this subject, it is stated that some of the children's home experiences are directly related to their mathematical skills and some of them are embedded in daily activities. For example, while naming numbers is an activity directly related to math skills, reading storybooks about numbers, playing board and card games are activities included in daily life (Huntsinger, Jose & Luo, 2016). Therefore, activities such as counting beans and chickpeas, which parents have applied to their children at home, are examples for directly related to math activities, and chatting, mind games, etc. are also examples for activities which are embedded in daily life. Consequently, the results are parallel with the literature.

Moreover, parents stated that they benefit from technology in supporting children's math skills. Memiş (2019) says that the visuals and animations provided by digital tools create a productive learning ground for children thanks to their rapid feedback. However, how these tools are used is as important as digital tools for children. At this point, it is necessary to use digital environments effectively under the guidance of a parent, teacher, or an adult. While families are aware of this situation and contribute to their children's mathematical skills, it is seen that their children use technology-supported learning environments such as internet sites and telephone applications with their children, not alone.

Consequently, parents' views on the responsibility of providing children with mathematical skills were investigated. Many studies show that parent involvement activities, rich learning environment and experiences have contributed to children's development (Anders, Grosse, Roszbach, Ebert & Weinert, 2013; Manolitsis, Georgioub & Tziraki, 2013). Moreover, Eliason and Jenkins (2003) defines the principles of parent involvement and states that each parent is important and meaningful for the education of the child. In the study, all parents are aware of their reinforcement role in children's

education. Also, they recognize that both parents must be involved, not just one parent. Therefore, it can be concluded that the results of study are consistent with the literature.

Conclusion and Recommendations

As a result of the study carried out to examine the views of parents on the role of parents in supporting math skills in early childhood; It has been concluded that parents believe that mathematics is important in daily life, makes life easier, is necessary for life, supports cognitive development and they have reinforcing tasks in this context and, they support their children's mathematical skills with materials and technology at home.

In addition, one of the parents who participated in the study stated that only he took an active role in supporting his child's mathematical skills and expressed that he was uncomfortable with his wife's passive behavior. Unfortunately, parent involvement is perceived as only mother involvement. Even this study, family interviews were conducted only with mothers. On the other hand, fathers play an important role in the education life of children as much as mothers. Moreover, a high level and quality of father involvement is crucial for the future parenting behavior of children, especially boys (Ünlü-Çetin & Olgan, 2021).

Additionally, one parent mentioned that older sibling has a role on the child's education life. According to Bronfenbrenner (1979), the people around children affect their education process. In this context, it can be argued that other family members at home along with the mother and father are also effective in the education life of the child. In line with these results, the following suggestions were developed:

-In this study, the support of mathematics skills by parents was discussed in general. Further studies can be explored by asking math skills separately (for example, grouping skill).

-To enable fathers to take an active role in supporting children's mathematical skills, seminars for fathers can be given by educators.

-Father-attended workshops can be organized by public education centers. To increase participation, these workshops can be held in shopping centers.

-Because siblings and other family members have a role on the development of mathematics skills, booklets and brochures can be prepared for them.

Conflict of Interest

There is no conflict of interest.

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Ethics Committee Approval

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Informed Consent

Informed consent was obtained from parents who participated in this study.

Peer-review

Externally peer-reviewed.

Author Contributions

T.M.: Concept, Materials, Data Collection and/or Processing, Literature Search, Analysis and/or Interpretation, Writing Manuscript

Y.A.: Design, Supervision, Critical Review, Writing Manuscript.

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