

Parents' Involvement in Play Activities for Early Childhood Mathematics

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Abstract

The purpose of this study is to determine the extent to which parents are involved in playing with children, especially in early mathematics. A quantitative study was conducted using a survey method. This study used a questionnaire form to collect information. The sample consisted of 67 individuals, specifically parents, who were carefully selected. Descriptive analysis using frequency percentages, means, and standard deviations was used to examine the data. Overall, the study results show that parents' involvement in children's mathematics play activities is moderately high with a mean of 3.36. Furthermore, the results regarding parents' difficulties with early childhood mathematics play activities are moderately low with an overall mean of 2.94. This indicates that parents face many challenges when teaching children early mathematics through play. Lastly, parents are now more aware of how they provide education to their children within the contemporary education system. Parents should regularly encourage their children to play to help them develop. This study found that while children learn early mathematics, parents' involvement in play activities at home needs to be increased.

Keywords: Parental Involvement, Early Childhood Mathematics, Play.

Introduction

As known to the public, playing is one of the routine activities or habits carried out by a small human being known as a child (Mariani Md Nor et al., 2014). Through such routine activities, children could explore and investigate their surroundings. Currently, their curiosity also arises. They will start playing the role of a little investigator to resolve the questions that linger in their minds. Additionally, through exploration and investigation activities, children can automatically enhance their ability to imagine more creatively and critically. The imagination that is generated can indirectly produce various ideas, making their learning process meaningful in daily life. Moreover, with play activities, children have the right and freedom to explore their environment independently without relying on guidance and support from adults such as their parents.

Parents are individuals responsible for playing a crucial role in educating and nurturing their children to achieve their goals and aspirations. Along with the rapidly growing world of

education, emphasis on parental involvement has increased. The Literacy and Numeracy (PLaN) Program, emphasizing parental support and involvement, has been launched by the Ministry of Education Malaysia. This program focuses on lessons, especially Mathematics. It prioritizes parental involvement to ensure parents are engaged in their child's learning process. Parents, for instance, help and teach children to count, read, and write. The learning process for children requires parental involvement, and their role has been clearly stated. This is because parents are among the individuals closest to the child.

Unknowingly, the learning process in early mathematics begins as soon as a child starts speaking. For example, in kindergarten or preschool, teachers teach children how to introduce themselves. During these introductions, children also state their age, involving numbers. Moreover, through teaching and facilitating activities conducted by teachers, children also learn the concept of numbers through singing activities. Indirectly, mathematical processes such as counting occur (Halim, 2016). Therefore, the early mathematics learning process can occur informally, led by teachers. Additionally, it can also happen through spontaneous communication. Hence, play activities in mathematics are one medium that can significantly impact and make the learning process meaningful for children. It can hone their ability to explore, investigate, and expand their knowledge related to mathematical concepts more widely.

However, studies like Kusaeri et al (2018), found that an individual's socioeconomic status has been one of the factors influencing parental involvement. Another issue arising in children's learning is low and inactive parental involvement in teaching them. Some studies show that parents become less responsible for their children's education and prefer to let their children learn independently due to lack of time. Previous research found that parents face difficulties involving themselves in their children's learning, especially for single mothers or fathers (Irma et al., 2018).

Although most previous studies show low parental involvement, it is undeniable that teachers have the responsibility to teach children early mathematics. However, parents also have the responsibility to help their children at home, especially in early mathematics. If teachers in educational institutions can use play methods to teach children mathematics, parents can also use the same methods to teach their children mathematics. However, parents still pay little attention to how children play mathematics, especially at home, as they prioritize children's literacy development in early childhood. Therefore, it is crucial for parents to better understand what their children do while playing (Lin & Li, 2018).

Parental involvement is a crucial factor in the academic development of children, particularly in the domain of early mathematics learning. This study investigates the significance of parental engagement in play-based approaches, with the aim of enhancing children's performance in early mathematics. Research has shown that the nature of parental involvement can have a double-edged effect on children's academic outcomes. While some studies have found positive correlations between parental participation and improved mathematical achievement, others have reported negative associations, suggesting that the impact of parental involvement may be more nuanced than previously thought.

Nonetheless, the existing literature highlights the critical role of parents as primary educators in laying the foundation for their children's cognitive and social development. By engaging in educational activities at home, parents can not only improve their children's mathematical understanding but also foster their self-confidence in various aspects, such as communication, socialization, and peer interactions.

Moreover, the transition from primary to secondary education is a particularly challenging period, and parental involvement during this time can have a significant impact on children's mathematical attainment trajectories. Therefore, this study aims to explore the effectiveness of parental involvement in play-based approaches, particularly in the context of early childhood mathematics learning, and to investigate the potential impact on children's academic performance and overall development.

Methodologies such as homework and worksheets used by parents and teachers to help children learn mathematics have evolved. Homework does not improve academic performance and may affect children's mathematics learning. Research by Jay et al. (2018) shows that homework causes misunderstandings between parents and children. Therefore, parents may not be confident in helping children, especially with more challenging early mathematics lessons. According to another study, parental involvement in home learning activities focuses more on literacy skills than numeracy skills. Many play methods have been adapted by educational institutions into more structured approaches.

Without a strong parental support system, parents will not fully strive to create meaningful ways and environments for children to learn mathematics. Therefore, parents must trust and understand their children's mathematics learning process at home. Jamil (2015), stated that weak understanding and weak beliefs about mathematics make teaching mathematics ineffective. Among other things, if parents have problems with mathematics, learning mathematics at home will not be useful for children and parents (Hart et al., 2016).

In conclusion, most preschool students have relatively low capabilities and performance in mathematics. They tend to act passively and show behaviors indicating a lack of interest during teaching and facilitation sessions in class. They also quickly become sleepy and cannot pay attention or focus for long periods when the teacher is teaching in front of the class. They divert their attention to things around them.

Research Objectives

The study aims to:

1. Measure the level of parental involvement through play activities in early childhood mathematics.
2. Identify the challenges parents face while conducting play activities in early childhood mathematics.

Research Questions

This study poses several research questions to achieve its objectives, including:

1. What is the level of parental involvement through play activities in early childhood mathematics?

2. What challenges do parents face while conducting play activities in early childhood mathematics?

Literature Review

Play activities are among the essential activities in the developmental process of a child. Through play, children can involve almost all body organs to work together and assist one another to achieve maximum development. Additionally, the National Preschool Curriculum Standard (KSPK) states that learning through play is one of the approaches and methods that can be used in teaching and facilitation in the classroom. It also provides children with the opportunity to learn something freely, safely, enjoyably, and meaningfully (KPM, 2016). Therefore, children will begin to imagine more creatively and explore things they want to know while engaging in play activities. According to Nachiappan et al (2017), children are a group that should be given the right and freedom to play and explore their surroundings.

According to Maria Montessori, an expert in early childhood education, the early childhood stage, from birth to the age of 8, is easier for children to absorb and accept learning that occurs around them (Phillips, 2022). Additionally, early childhood education experts believe that a child's development cannot be forced as it will occur naturally at their own developmental stage (Briggs, Porter, Palmier-Claus, Branitsky, Mansell, Warwick & Varese, 2020).

Furthermore, Jean Piaget, another prominent figure in early childhood education, also stated that children can build an understanding of mathematical concepts through the use of tangible objects during teaching and facilitation. Among the activities that can be conducted in class during teaching and facilitation are activities such as arranging wooden blocks, understanding basic concepts in mass and shape, and solving problems involving several mathematical operations like addition, subtraction, multiplication, and division.

Moreover, there are theories related to how children learn early mathematics and how parents help them play at home. Vygotsky's constructivism theory is one of them. Vygotsky (1896) stated that the theory of constructivism includes two concepts: the Zone of Proximal Development (ZPD) and Scaffolding. The Zone of Proximal Development, or ZPD, suggests that a more knowledgeable person helps the learning process of children (Jaslinah, 2014). The concept of scaffolding is also linked to the obligation of parents to assist their child's development at home (Zainiah, 2017).

Parents play a significant role in influencing a child's development because they are the first individuals children recognize after birth. Parents also become role models for children in every activity they do. Indirectly, children will imitate what they see and emulate every action of their parents without knowing its impact. According to Joyce Einstein, a leading figure in the theory of parental involvement, parents play a crucial role in a child's academic development both at home and school. She has designed a framework focusing on schooling, communication, and family, placing children as the central individuals in the framework (Newman et al., 2019). With the cooperation of parents, early childhood education becomes more enjoyable as they provide learning materials for their children at home (Paedah, 2011).

Parental involvement in their children's learning at home is a critical component that can contribute to the children's academic success. Therefore, the complementary learning applied can indirectly help a child's academic achievement (Fauziah et al., 2014). Additionally, Rizalina (2014), also stated that strong involvement and cooperation from parents are evident when parents consistently provide encouragement and motivation to children in every activity, contributing to their academic achievement and development.

Research Methodology

Research Design

This study is a quantitative survey. According to Hamdan & Abd Rahim (2010), a large population size is suitable for survey methods and is analysed descriptively. The primary goal of this study is to systematically explain the situation by involving explanatory factors, procedures, and identifiable variables. Additionally, this method does not require efforts to control the treatment and investigates areas that have not or have not been studied. This study aims to examine the level of parental involvement through play activities focusing on early childhood mathematics.

Sample Study

The researcher used Krejcie and Morgan's (1970), chart to determine the sample size. The population in this study consists of parents of preschool students in one of the schools in Kota Belud, Sabah. According to Krejcie and Morgan (1970), 66 samples are required to analyze the data if the study population is 80. This study involves 67 parents. The study sample must answer questions in a questionnaire sent by the researcher via Google Forms regarding the level of parental involvement in play activities in preschool learning, particularly in early mathematics. A pilot study was also conducted before the questionnaire was distributed to the actual study sample. A total of 10 parents were selected as samples for the pilot study.

Research Instrument

The Google Forms questionnaire used in this study was developed by the researcher and has been validated and verified by two experts, the head of the Malay Language department and the PIBG chairperson of the involved school. Therefore, several question items related to the level of knowledge and challenges faced by parents were constructed and developed based on the study's needs. The content of the questionnaire is arranged concisely and easily understood by the respondents to avoid burdening them.

The Google Forms questionnaire is divided into three sections: A, B, and C. Section A is designed to collect respondents' demographic information, including the category of mother or father, age, employment sector, number of children, and place of residence. Next, Section B consists of questions about parents' knowledge level regarding the play approach in early childhood mathematics learning. Finally, Section C consists of the challenges faced in handling the play approach in early childhood mathematics learning. A Likert scale is used for responses in sections B and C, where 1 indicates strongly disagree, 2 indicates disagree, 3 indicates agree, and 4 indicates strongly agree.

Validity and Reliability

The validity and reliability of the instruments used in the study are discussed in this section. Creswell (2012), states that various methods exist to test instrument reliability and validity.

The ability of an instrument to measure the intended object is called instrument validity (Wiersma & Jurs, 2009). Additionally, when each measurement is conducted consistently and stably, the instrument's reliability is associated with the obtained results (Creswell, 2012; Jackson, 2003). According to Sumarni Lapammu and Zamri Mahamod (2018), a pilot study is essential for determining the validity and reliability of the instruments used. Thus, the developed questionnaire in this research has been validated by two expert evaluators, the Head of the Mathematics Department and the Head of the Malay Language Department in one of the schools in Kota Belud, Sabah.

Data Collection Procedure

The data collection procedure is a crucial element in conducting a study. It aims to obtain and gather complete data and information to achieve the study's objectives and answer research questions. The construction of the questionnaire items was developed based on the study's needs and suitability. The items were also modified from the original form.

After obtaining validity and reliability from experts, the questionnaire was distributed by the researcher to the involved sample for completion. Google Forms was used to distribute the questionnaire to the parents of preschool children randomly at one of the preschools in Kota Belud. This application was chosen to make it easier for parents to answer the questionnaire and for the researcher to collect and gather data and information.

The final data collection procedure involves the researcher analysing the completed questionnaires from the study respondents, who are the parents of the involved preschool children. The researcher will collect and gather data based on the questionnaire responses and then translate them into a detailed quantitative form using the Statistical Package for the Social Sciences (SPSS).

Data Analysis Method

To statistically analyse the study data, the Statistical Package for Social Sciences, also known as SPSS, is used. The data collected from the questionnaire needs to be described through this application. The question items determine the frequency of the mean for both research objectives. Descriptive data analysis is used to answer research questions about parents' knowledge of early childhood mathematics learning at home for preschool children.

Findings

The profile of the 67 parents involved in this study consists of 20 fathers and 47 mothers. The largest age group of parents is those aged 41 to 50 years, with 38 individuals representing 56.7%, while the smallest group is parents aged 51 to 60 years, with 8 individuals representing 11.9%. Regarding employment, most parents are unemployed, representing 27%, while the smallest group is parents working in the public sector, with 3 individuals representing 4.5%. Furthermore, 42 parents have fewer than five children, representing 63.7%, while the remaining parents have more than five children, representing 37.3%. Lastly, in terms of time allocation with their children, 48 parents spend more than one hour with their children, representing 71.6%, while only 19 parents spend less than one hour with their children, representing 28.4%. The results of the analysis are shown in Table 4.1.

Section	Element	Frequency	Percentage
Category	Father	20	29.9
	Mother	47	70.1
Age	31 – 40 years	21	31.3
	41 – 50 years	38	56.7
	51 – 60 years	8	11.9
Employment	Public sector	3	4.5
	Private sector	16	23.9
	Self-employed	21	31.3
	Unemployed	27	40.3
Number of children	Less than 5	42	62.7
	More than 5	25	37.3
Time allocation	Less than one hour	19	28.4
with children	More than one hour	48	71.6

The researcher has measured the level and frequency of respondents in this study. Therefore, the study's findings have been interpreted using descriptive statistics. Descriptive statistics interpret frequency, percentage, mean score, and standard deviation. This data will be processed using the SPSS 29 statistical program. Additionally, the results are organized in terms of frequency and percentage.

The frequency, percentage, mean, and standard deviation values for items related to parents' knowledge of the play approach in early childhood mathematics learning are shown in Table 4.2. According to Weiss (2004), the researcher uses the interpretation of mean scores, as shown in Table 4.2, to answer the research question regarding parents' knowledge of the play approach in early childhood mathematics learning.

Table 4.2

Interpretation of Mean Scores

Mean Score	Interpretation
1.0 – 1.50	Very Low
1.51 – 2.50	Low
2.51 – 3.50	Moderate
3.51 – 4.00	High

Measuring the Level of Parental Involvement Through Play Activities in Early Childhood Mathematics

The purpose of this study is to determine the extent of parental involvement in early childhood mathematics play activities. The results show the frequency, percentage, mean, and standard deviation values. The findings are presented in Table 4.3.

Table 4.3

Frequency, Percentage, Mean, and Standard Deviation for the Level of Parental Involvement Through Play Activities in Early Childhood Mathematics

Item	Description	Mean Score	Standard Deviation
B1	I invite my child to play number cards together.	3.07	0.91
B2	I invite my child to play with magnetic numbers together.	2.99	1.05
B3	I invite my child to categorize objects by shape, color, and size together.	3.72	0.60
B4	I teach my child addition and subtraction using Legos or other objects.	3.54	0.70
B5	I invite my child to read number storybooks together.	3.43	0.61
B6	I invite my child to learn and sing songs related to mathematics together.	3.40	0.78
Overall Mean	3.36	0.36	

Parental involvement through play activities in early childhood mathematics is at a moderately high level, with the mean value for all items in Section B being 3.36 and the standard deviation being 0.36. The study results show that all items have mean values ranging between 2 and 3, indicating a moderately low level, and between 3 and 4, indicating a moderately high level.

Among all items, item B3, which states, "I invite my child to categorize objects by shape, color, and size together," has the highest mean score of 3.72 with a standard deviation of 0.60. The lowest mean score, 2.99 with a standard deviation of 1.05, is for item B2, which states, "I invite my child to play with magnetic numbers together."

The results indicate that parents frequently engage in activities with their children, such as playing with blocks and Legos using a play approach in early childhood mathematics. However, parents still need to more frequently engage in activities at home with their children that can help their mathematics development, such as drawing building plans or using an abacus to further enhance the children's development, especially in early mathematics.

Identifying Challenges Faced by Parents When Conducting Play Activities in Early Childhood Mathematics

Table 4.4 shows the mean and standard deviation values to illustrate the challenges parents face when conducting play activities to teach early childhood mathematics. The study results show that all items have mean values between 2 and 3, indicating a moderately low level, and between 3 and 4, indicating a moderately high level. The overall mean value for the challenges parents face when using play strategies in early childhood mathematics learning is 2.94, which is a moderately low level.

Table 4.4

Frequency, Percentage, Mean, and Standard Deviation for the Challenges Faced by Parents When Conducting Play Activities in Early Childhood Mathematics

Item	Description	Mean Score	Standard Deviation
C1	I am too busy at work to engage in play activities with my child.	2.39	0.90
C2	I do not provide suitable toys for my child to play with.	3.03	0.60
C3	I do not successfully control my child during play.	2.54	0.94
C4	I cannot provide a suitable space for my child to play.	3.33	0.64
C5	I do not know how to teach my child early mathematics using the play approach.	3.16	0.57
C6	I do not know play activities suitable for early mathematics for my child.	3.16	0.57
Overall Mean	2.94	0.31	

Additionally, based on the study's findings, the highest mean value is 3.33 with a standard deviation of 0.64 for item C4, which states, "I cannot provide a suitable space for my child to play." Meanwhile, item C1, which states, "I am too busy at work to engage in play activities with my child," has the lowest mean value of 2.39 with a standard deviation of 0.90.

The results indicate that there are several unrelated issues faced by parents when using the play approach in early childhood mathematics learning, as shown in the second research question. Most parents disagree with the idea that there are challenges faced by parents and their children, especially regarding providing a suitable place for their children to play.

Discussion

The purpose of this study is to determine the extent of parental involvement in play activities related to early childhood mathematics. As is well known, parents play a crucial role in the early learning of children's mathematics, especially when they are at home. This is because children spend more time with their parents at home than with their teachers. Therefore, parents can indirectly plan more engaging early mathematics activities using a play approach to be carried out with their children. With knowledge of the play approach in early childhood mathematics learning, parents can plan play activities that are appropriate for their children's developmental stages.

Furthermore, renowned early childhood education figure Maria Montessori stated that children in the early stages, from birth until eight years old, are more receptive and absorb everything around them more easily (Phillips, 2022). This statement also proves that parental involvement in early childhood mathematics learning through play, especially at home, can indirectly enhance a child's understanding of what has been learned. Additionally,

parents can better understand preschool programs and the activities their children are learning. Therefore, learning will continue both at school and at home, implemented by two different groups: parents and teachers. Other early childhood education figures, such as Briggs, Porter, Palmier Clauss, Bratnisky, Mansell, Warwick, and Varese (2020), describe that children's development occurs naturally and is not forced.

In addition, parental involvement in children's learning, especially in early childhood mathematics through play, also contributes to a child's learning achievements. The level of parental knowledge regarding the play approach in early childhood mathematics learning is also one of the important factors in ensuring the level of early childhood mathematics achievement. This is in line with the statement made by Fauziah et al. (2014), who emphasized that the concept of complementary learning is very important and should be instilled in a family institution involving children when they are with their parents at home. Therefore, indirectly, with the presence of such learning concepts, the achievement of all forms of children's academic needs and success, especially in early childhood mathematics, can be enhanced.

In conclusion, the study shows that the level of parental knowledge about the play approach in early childhood mathematics learning is high. Parents can plan learning activities through the play approach by providing suitable play materials related to early mathematics at home for their children. Additionally, parents are also involved in play activities with their children. The findings also show that most parents agree that children's academic achievements, especially in early childhood mathematics learning, can be improved through play activities. This study aligns with the findings of Missall et al. (2017), who stated that parents who are involved in their children's learning prefer to interact in fun situations, especially in early mathematics learning.

Moreover, parents face challenges when using play strategies in children's mathematics learning at a moderately high level. These obstacles stem from the difficulty parents have in engaging their children in early mathematics play activities. Parents face problems with time, energy, and money. Therefore, parents need to take additional actions to overcome these obstacles. The results show that parents may have issues providing play materials, space, and time to play with their children. However, children can still engage with their parents in activities such as playing with gadgets, trading with money, playing with wooden blocks, and so on. For example, rulers and measuring tapes can be used as tools to perform early mathematics activities involving topics such as height, width, and depth of an object. Consequently, the researcher found that parents do not realize that the home environment can help them teach their children early mathematics concepts. This conclusion can be supported by research conducted by Fenton et al. (2016). Daily activities of children enhance their mathematics learning. This fact may not be known to some parents and early childhood educators.

Based on this study, the researcher found several implications that can serve as contributions aimed at increasing and strengthening parental involvement in children's learning processes through the play approach, especially in early childhood mathematics. Furthermore, this study also impacts several categories, such as parents, children, and the school. Among them, parents will be more aware of the concept of play, particularly in early

childhood mathematics learning, to more easily educate and apply it with their children at home. Children will also feel more excited and motivated when engaging in play activities planned by their parents at home. Such activities can indirectly strengthen the family bond between parents and their children at home. This is because children will spend more time with their parents than using electronic devices. The school, also known as the teacher, is responsible for conveying concepts and play activities suitable for children's developmental stages to parents to be used at home.

Additionally, the researcher believes that there are several additional factors influencing parental involvement in children's learning that require further explanation. Therefore, to implement further improvements in the future, it is necessary to study the relationships and elements involved. This is because parents are among the role models who play a crucial role in enhancing children's academic achievements based on their developmental stages. Thus, indirectly, studies related to parents and early childhood mathematics learning can be explored more deeply.

Conclusion

Based on the discussion and results of the study conducted by the researcher, the level of parental involvement through play activities to help children learn early mathematics is a crucial component in ensuring parents' involvement in children's learning. Parents can provide tools or materials that are suitable for their child's developmental stage if they are knowledgeable about these matters. Furthermore, parents have the opportunity to decide on the best methods to interact with their children. This, in turn, helps parents become more aware of their children's learning indirectly.

Parental involvement in children's learning, especially in early mathematics, can contribute to their academic success. Children will be more enthusiastic about engaging in activities with their parents. By participating in their children's education, parents not only support their children's academic achievements but also strengthen the parent-child bond through shared activities. This active involvement can foster a positive learning environment at home, enhancing the child's overall educational experience and motivation to learn.

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