INTERNATIONAL JOURNAL OF ACADEMIC RESEARCH IN PROGRESSIVE EDUCATION & DEVELOPMENT

OPEN ACCESS JOURNAL

Vol 13, Issue 4, (2024) E-ISSN: 2226-6348

The Impact of Implementing the Learning through Play Method on Fostering Interest, Participation, and Achievement among Preschoolers in Early Mathematics: The Topic of Money Value

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To Link this Article: http://dx.doi.org/10.6007/IJARPED/v13-i4/23642 DOI:10.6007/IJARPED/v13-i4/23642

Published Online: 14 November 2024

Abstract

This concept paper discusses the impact of implementing the learning-through-play method on fostering interest, engagement and achievement among preschoolers for the topic of money value in Early Mathematics. Since 2010, the transformation of the preschool curriculum in Malaysia has resulted in the National Preschool Curriculum Standard (KSPK), which focuses on a child-centered curriculum. Developmentally Appropriate Practices (DAP) are an important aspect emphasized in the KSPK. Based on DAP, the child-centered teaching and learning process, such as learning through play, is one of the main focuses of the KSPK. Therefore, this concept paper aims to explore the efficacy of the learning-through-play method in fostering the interest, engagement and achievement of preschoolers in learning early mathematics for "Money Value". Previous studies indicate that most teachers have used the learning-through-play method in teaching various subjects. Their purpose in using the learning-through-play method is to attract pupils' interest in learning and improve achievement performance in different subjects. Some researchers use the learning-through-play method to enhance pupils' performance in early mathematics, especially on the topic of pre-numbers. However, previous studies also show that preschool teachers still use traditional teaching approaches and worksheets only nowadays. To address the issue of pupils losing interest in learning and lack of participation and engagement in the teaching and learning process, it is suggested that preschool teachers should intensify efforts and implement the learning-through-play method in teaching preschoolers.

Keywords: Money Value Concept, Learning-through-Play Method, Interest, Participation and Engagement, Achievement

Introduction

In 2017, the National Preschool Curriculum Standard (KSPK) incorporated early mathematics into the preschool curriculum. The knowledge of early mathematics is related to pre-numbers, number operations, number concepts, time concepts, the value of money and the concepts of shape and space will be learned by preschoolers. Preschoolers need the knowledge and basic

skills contained in the early mathematics content as preparation before enrolling in primary school. However, preschoolers find it difficult to understand mathematical concepts and may lose interest in early mathematics. Therefore, preschool teachers need to select and use teaching approaches that are appropriate to the developmental level of the children so that the teaching and learning process is effective and the knowledge delivered can be understood and mastered by the children.

Literature Review

Early Mathematics

Mathematics is a field of knowledge concerning patterns, relationships, representations, symbols, abstraction and generalization. Many cognitive psychologists based on Constructivist Theory, such as Piaget, Vygotsky, Bruner and Dienes, have all made significant contributions to the teaching and learning of mathematics. They believed that knowledge is actively constructed by children rather than passively received. Piaget (1967) believed that learning mathematics is an active process, not just through the physical manipulation of concrete materials but also through acting on existing knowledge to construct new meanings. Dienes (1967) emphasized that the early stages of learning mathematics focus on free play and the investigation and exploration of materials before moving on to more abstract thought processes (Marianne Knaus, 2013).

Emergent Mathematics is the earliest phase of the development of children's mathematical and spatial concepts. Emergent Mathematics encompasses the skills and attitudes developed by children related to mathematical concepts throughout early childhood. Learning basic mathematical skills is not optional; children need them for future success (Janet Stramel, 2021).

To help preschoolers prepare for further learning in mathematics at primary school, the 2017 National Preschool Standard Curriculum (KSPK) has incorporated early mathematics into the preschool curriculum. The time allocation for early mathematics at the preschool is 40 minutes per week. Through early mathematics learning at the preschool level, preschoolers can foster an interest in mathematics through various activities and daily experiences. Children can master basic mathematical concepts and their thinking and problem-solving skills can also be enhanced (KSPK, 2017).

The National Council of Teachers of Mathematics (NCTM) and the National Association for the Education of Young Children (NAEYC) affirm that high-quality, challenging and accessible mathematics education for children aged three to six is a crucial foundation for future mathematics learning. Children tend to explore the mathematical dimensions with their own understanding and develop their understanding of numbers, spatial concepts (shape, measurement), and the ability to organize, classify, and solve problems. Mathematics helps children understand their world beyond the school setting and helps them build a solid foundation for succeeding in further learning at primary school. Hence, preschool teachers play an important role in supporting children's cognitive development by offering opportunities and planned activities for children to acquire various mathematical skills (NAEYC, 2010).

According to Douglas (2001), the preschool stage is an appropriate time for children to become interested in counting, organizing, building shapes, finding patterns, measuring, and estimating. Quality preschool mathematics is not basic arithmetic given to children. Instead, it invites children to experience mathematics as they play, describe and think about their world.

The mathematical knowledge for children at the preschool level includes early mathematical concepts and skills built by the mathematics curriculum, such as understanding size, shape and patterns, the ability to count verbally in ascending and descending order, recognizing numbers, matching and identifying larger quantities (Bowman et al., 2001). Byington et al., (2013), stated that teachers can promote mathematics in preschool classrooms by integrating children's daily activities. Preschool mathematics is about fun exploration and meaningful experiences. Using readily available materials in the classroom and at home, such as manipulatives, measuring tapes, scales and rulers, can encourage children's mathematical thinking. Children will be interested in mathematics by engaging in hands-on experiences. It is also important for children to hear language focused on mathematical concepts. Engaging in Mathematical experiences helps children acquire the ability to make predictions, solve problems, think, reason and relate to their world.

Value of Money

Money is a universally accepted medium of exchange within society. The characteristics of money include being widely accepted, durable, having a limited supply, being uniform in shape and value, easily divisible, portable and easily recognizable. The value of money refers to its purchasing power, i.e., the ability to buy goods and services with money. The value of money is influenced by the general price level, when the general price level rises, the value of money decreases and vice versa. The functions of money include serving as a measure of value and unit of account, a medium of exchange, a store of value, and a standard of deferred payment (Rime Sisal, 2012).

In the National Preschool Standard Curriculum (KSPK), the concept of money is incorporated into early mathematics for preschoolers. Recognizing money is crucial as it is a skill used in daily life. We use money to buy daily necessities, such as food and drinks, pay for accommodation, transportation fares, and services like haircuts. According to the KSPK syllabus, the content standard related to the concept of money is recognizing and using money of different values. For children aged at 4+, the learning standard is to recognize Malaysian currency in the form of coins and banknotes. Meanwhile, for children aged 5+, the learning standard is to arrange money values in order and use money in various activities (KSPK, 2017).

In the Performance Standard for the topic "value of money" in early mathematics KSPK, preschoolers who can only recognize and know the value of money will achieve mastery level 1, while preschoolers who can arrange money according to its different values will achieve mastery level 2 and mastery level 3 is given to preschoolers who know the value of money and use it in various activities.

Theories Related to the Learning through Play Method

Several theories and learning methods emphasize play activities in children's learning, such as Cognitive Developmental Theory of Constructivism by Piaget and Vygotsky's Theory.

The Constructivist Theory emphasizes that children actively construct their knowledge through interactions with their environment. In this method, children are allowed to explore, experiment and develop their understanding through play experiences (Nordin Mamat, 2023).

Piaget's Cognitive Development Theory emphasizes the importance of direct experiences and interactions with physical objects in children's learning. In the learning-through-play method, children engage in physical activities and exercises that help them build concepts and cognitive skills through manipulation and interaction with real objects. During play, children go through the processes of assimilation, accommodation and equilibrium, understanding new things by using their existing knowledge and experiences (Suppiah Nachiappan, 2021). Jean Piaget's constructivism theory is a learning approach that emphasizes that knowledge can be actively constructed by individuals through their interactions with the environment.
Here are some key concepts from Piaget's constructivism theory:

i. Schemas
Piaget argued that individuals organize their knowledge in mental structures called schemas. Schemas are frameworks or patterns of thought that help someone understand and build new experiences. When individuals encounter new information, they can assimilate or accommodate that information into their existing schemas.

ii. Assimilation
Assimilation is the process by which new information is integrated into existing schemas without altering the structure of those schemas.

iii. Accommodation
Accommodation, on the other hand, is the process of modifying existing schemas or creating new ones to fit new information.
Piaget also identified children's cognitive development into four main stages:

1. Sensorimotor Stage (0-2 years)
At this stage, infants and young children learn through direct interaction with their environment using their senses and motor movements. They begin to develop the concept of object permanence, which is the understanding that objects continue to exist even when they are not seen.

2. Preoperational Stage (2-7 years)
Children begin to use symbols, such as words and images, to represent objects and events. They tend to be egocentric, meaning they have difficulty seeing the world from other people's perspectives. Their thinking is intuitive and not yet logical.

3. Concrete Operational Stage (7-12 years)
Children start to think logically about concrete events. They can understand the concept of conservation, which is the understanding that the quantity of an object does not change even if its shape or physical appearance changes and they can categorize objects into different categories.

4.Formal Operational Stage (12 years onward)
Adolescents begin to think abstractly, logically and systematically. They can make hypotheses, think about future possibilities and solve complex problems through deductive reasoning.

Zone of Proximal Development (ZPD) Theory by Lev Vygotsky
Lev Vygotsky introduced the Zone of Proximal Development Theory within the context of cognitive development and education. ZPD refers to the actual developmental level that a pupil can achieve independently and the potential developmental level that children can achieve with the assistance of someone more skilled (Sharifah, N.P & Aliza, A. 2013).

Among the key aspects of ZPD are social interaction, scaffolding, student-centered learning, cognitive development, and the role of the teacher. Vygotsky emphasized that learning is a social process. Children can develop new skills and knowledge through interactions with adults or peers. Scaffolding refers to temporary support provided by teachers or peers to help pupils understand concepts or complete tasks initially beyond their ability. As pupils master skills, this support is gradually reduced.

ZPD underscores the importance of adjusting teaching to match pupils' developmental levels. Learning activities should be within pupils' ZPD to maximize learning effectiveness. Through interactions within the ZPD, students not only learn to complete specific tasks but also develop more complex cognitive processes that can aid them in future learning. Teachers should identify each pupil's ZPD and provide appropriate guidance to move them from their current level to their potential level.

Vygotsky (1962) stated that "Play helps in the development of language and thought. The brain's structure is formed with symbols and tools and play assists in this formation. Play also gives children the freedom to express pressures in dealing with the real world. In this way, children are allowed to acquire higher-order thinking processes through play" (Spodek et al. 1987).

The Importance of Learning through Play Method in Preschool Children's Learning Process
Play is inherent in children's daily lives. They learn about themselves and their environment through exploration, questioning and discovery to gain natural firsthand experiences. Through play activities that fulfill cognitive, psychomotor and affective needs, children's overall development can be enhanced.

Learning through play enhances various aspects of children's development, including psychomotor skills, hand-eye coordination and physical fitness (PERMATA, 2013). According to Nordin Mamat (2015c), the play-based approach is emphasized in preschool education because play is an intrinsic and natural behavior for children. This approach is structured to provide children with opportunities to learn in a joyful, free, safe and meaningful environment. Through learning while playing, children gain direct and natural experiences through exploration and discovery. Physical, social, emotional, cognitive and language development of children can be maximized to their fullest potential.

Mariani (2009), states that the benefits of play in the teaching and learning process for children occur directly and indirectly. Playing in the teaching and learning process is crucial

because it enhances the physical development, socio-emotional development and cognitive development of children. From a physical development aspect, there is a close relationship between children's play activities and their motor skills development, including gross and fine motor skills and body awareness. Gross motor skills are developed through activities such as jumping, kicking, lifting, running, climbing, throwing and more. Meanwhile, fine motor skills are developed through activities like puzzles, bead threading, tying ribbons, crafting, playing with playdough and others. Children feel joyous and enthusiastic when they actively engage their body parts in exercise. As these skills are developed and improved, children gain confidence, feel safer and become more independent.

Learning through play also enhances socio-emotional development in children. Through play, children can interact with their environment, including peers and teachers. While playing with others, children can adjust their behaviors to match others, accept opinions and views from peers, respect others' rights, express their own opinions, compromise and practice patience. For instance, through role-playing activities, children gain rich experiences to enhance social skills, emotional regulation, self-control and sensitivity to others' values and needs and learn to cooperate with others to achieve group goals.

Furthermore, learning-through-play can also enhance children's cognitive development, such as identifying, sequencing, comparing, predicting, categorizing and summarizing. Activities like puzzles, building blocks, board games and others can help children develop language skills and logical thinking in subjects like Mathematics and Science.

According to Abdul Rasid and Zulkafli (2008), many preschool teachers still use traditional teaching approaches, such as chalkboard and lecture-based teaching. This often leads to preschoolers' lack of focus and engagement in the learning process. A unidirectional traditional teaching approach, which is teacher-centered and less enjoyable, often hinders preschoolers' mastery of basic skills.

In a study by Diar Resti Kustia and Maria Melita Rahardjo (2020), titled "Play-Based Approach to Increase Early Childhood Learning Interest," they found that early childhood education has long utilized teacher-centered teaching methods that children are required to follow instructions to participate in provided activities, limiting and neglecting children's interest in learning. By applying a play-based learning approach aligned with school learning themes among four and five-year-old children, they successfully increased 81% of pupils' interest in learning.

Although preschool teachers in Malaysia recognize the importance of the play-based learning approach, studies show that many still prioritize direct teaching approaches or teacher-centered approaches. Most preschool teachers still do not use the play-based learning approach in the teaching and learning process (Aliza, Sharifah & Zamri, 2012; Fonny, Mardziah & Mariana, 2021; Leong & Kamariah, 2021). The Curriculum Development Division of the Ministry of Education Malaysia also states that preschool teachers in Malaysia do not prioritize the play-based learning method and often prefer direct teaching methods (Curriculum Development Division, 2008).

Education reform figures such as Rousseau, Comenius, Frobel and Pestalozzi, as well as modern educators, have realized that play is educationally suitable for children, aligning with their interests and developmental stages. Therefore, the play-based learning method has been one of the main focuses of the National Preschool Curriculum Standard (KSPK) after the transformation of the preschool education curriculum in Malaysia in 2010. This method is structured to provide children with opportunities to learn in a joyful, happy, free, safe and meaningful environment (Ministry of Education Malaysia, 2017). However, this method needs to be implemented by the content standards and learning standards listed in the KSPK. The teaching and learning process should also be based on Basic Modules and Thematic Modules. Teachers need to conduct teaching and learning activities according to the components based on Basic Modules. Meanwhile, Thematic Modules activities can be carried out by integrating all aspects of the six pillars and an integrated manner.

Marianne Knaus (2013), states that play methods are used as pedagogical methods. Through play, children can gain a fundamental understanding of mathematics. Various play experiences can be provided for children to learn Mathematics. These include sensory play, block play, construction play, dramatic play, outdoor play, music and movement, cognitive games and creative play. Tucker (2010), recommends that during play, quality interaction between educators and children is necessary to enhance and support children's mastery of Mathematics.

From the perspective of domain development, play is crucial because it ensures children's well-being from all developmental aspects, including language, cognitive, physical, social and emotional aspects (Sharifah & Aliza Ali, 2013). Therefore, the play-based learning method has fulfilled the requirements of the National Preschool Curriculum Standard (KSPK), aiming to comprehensively and integratively develop the potential of four to six-year-old children in physical, emotional, spiritual, intellectual and social aspects.

Effectiveness of Attracting Interest and Engagement of Pupils Using the Play-Based Learning Method in Teaching and Learning Process

The play-based learning method is student-centered, where pupils enjoy learning without realizing they are learning. Therefore, children do not feel pressured as they might in the teacher-centered method. Learning becomes more effective in a conducive learning environment. For example, children can indirectly memorize vocabulary through the play-based learning method. Children are more motivated and active with this approach because they strive to win in engaging games that capture their attention.

Researchers have conducted studies on the effectiveness of attracting interest and student engagement using the play-based learning method in the teaching and learning process. During the COVID-19 pandemic, remote learning and home education caused children to lose interest in learning. The use of play-based learning methods in the learning process implemented by Mughniatul Ilma and Riska Aprilia Nurhidayati (2022), successfully increased pupils' interest and enthusiasm in the learning process. Additionally, online gaming habits among pupils were reduced.

Findings from the study by Ramuna Abdul Raffar and Mohd Mokhtar Tahar (2022), showed that the use of the play-based learning approach successfully attracted the interest of special

education pupils and provided enjoyable learning experiences. The pupils learned the Malay language willingly without feeling difficult, fearful, or pressured. Throughout the teaching and learning sessions, they actively cooperated with teachers and classmates, showing increased participation in all activities. Te Bee Yong (2012), stated that using the play-based learning method increased fifth-grade pupils' interest in the topic "Chemical Properties of Alkaline and Acidic Substances." Pupils' engagement was also more active when the play-based learning method was applied in teaching "Chemical Properties of Alkaline and Acidic Substances."

Action research conducted by Idris and Fathin Nabihah in 2023 demonstrated that using the "Memory Game" play-based learning method successfully increased interest and motivation among Year 3 Orang Asli pupils at SK Ulu Geruntum, Gopeng, Perak in mastering the Present Continuous Tense for learning English.

In Linah's 2009 study on remedial pupils who struggled with reading, spelling and writing skills, it was found that these pupils showed disinterest and laziness in learning and disregarded their teachers. After implementing the play-based learning method, various game activities such as role-playing, wheel of fortune, puzzles, syllable blending, toxic box, singing and others were conducted in class. Linah found that Grade 3 remedial pupils showed increased interest in learning.

The findings of "The Use of Play Method in Modifying Attitudes and Interests in Learning Among Preschool Children" conducted by Low Sin Yee in 2018 successfully demonstrated that using the play-based learning method modified attitudes and increased interest among preschoolers in learning. Six Science teachers at SK Sungai Melut (A) Sepang, Selangor, who were respondents in the study titled "The Use of Play in Enhancing Orang Asli Pupils' Interest in Science" by Haslinda et al (2015), provided feedback that the implementation of the Science Adventure Module successfully sparked the interest of Orang Asli pupils in learning Science. The respondents stated that Orang Asli pupils were more inclined towards entertaining activities and appeared happier and more cheerful during the Science Adventure Module. Therefore, Orang Asli pupils seemed earnest and completed all activities given throughout this Science adventure program.

Mala, and Zhagan, study (2024), stated that the use of the play-based learning method in early science exploration teaching at the preschool level can satisfy children's curiosity and attract children's interest in science in the future. They found that children showed a high level of interest when using the play-based learning method in the teaching and learning process.

Considering that most past studies have successfully shown that the use of the play-based learning method effectively attracts pupils' interest and engagement in learning, researchers also aim to further enhance the interest and engagement of preschoolers with the play-based learning method in teaching and learning activities on the topic "value of money" in early preschool mathematics.

Effectiveness of Play-Based Learning Method in Enhancing Student Achievement

Many past studies indicate that the play-based learning method is effective in enhancing knowledge and mastery skills among preschoolers. Debary et al (2009), demonstrated that the play-based learning method is effective in improving academic achievement among

children. The study found that academically weaker children initially showed significant improvement in mathematical and literacy skills after implementing the play-based learning method.

Research by Zakiah, Azlina, & Jiar, in (2013), which studied the effectiveness of learning modules through play on preschool children's understanding of pre-number experiences, indicated a significant difference between the experimental and control groups. Their findings proved that the understanding level of pre-number experiences among preschoolers in the experimental group using the play-based learning module was higher compared to the control group that did not use the module.

Naldo Janius et al (2023), showed that an effective teaching method to help preschoolers recognize colors is through the play-based learning method using Basic Shape and Color Paper Games. Haslinda, Lilia, & Zanaton, study (2015), titled "Play Method in Enhancing Orang Asli Pupils' Interest in Science," stated that the play-based learning method not only changed the attitudes of Orang Asli pupils toward learning Science but also increased their knowledge, skills and academic achievement in Science, reducing absenteeism among Orang Asli pupils.

Nur, (2018) study, titled "Effectiveness of Play-Based Learning Method on Number Concept Achievement and Prosocial Behavior of Preschoolers," involved 49 preschoolers from a school in the Kuala Muda/Yan district as study participants during an experimental study. In their study, researchers randomly assigned participants from two classes into two groups: the treatment group undergoing the play-based learning method and the control group undergoing conventional methods for the Number Concept topic. The study results indicated that achievement in both the treatment and control groups improved. However, the treatment group using the play-based learning method showed significantly higher achievement improvement compared to the control group using conventional methods for the Number Concept topic.

Zaharah Kamaruddin and Suziyani Mohamed's 2019 study on the effectiveness of the play method in letter recognition skills through language games among preschool children showed substantial improvement in student achievement after implementing the play-based learning process in letter recognition learning.

In 2023, Idris and Fathin Nabihah conducted a study exploring the effectiveness of using the Memory Game method, a type of play-based learning method, to help improve mastery of the Present Continuous Tense in English among Year 3 Orang Asli pupils at SK Ulu Geruntum, Gopeng, Perak. The study findings indicated that the experimental group using the play-based learning method performed better and significantly compared to the control group using only traditional learning methods.

Farah Najwa Osman and Suziyani Mohamed's study in 2023 indicated that many teachers implement play-based approaches in teaching and learning Early Mathematics. The study's findings imply that teachers should plan the use of the play-based learning method in Early Mathematics teaching and learning.

Considering these past studies that have consistently shown that the play-based learning method has helped improve children's achievement in various subjects, the researcher aims to apply the play-based learning method in teaching and learning activities on the topic of "Value of Money" in early preschool mathematics. This approach aims to assist preschoolers in mastering the "Value of Money" topic in early preschool mathematics more effectively.

Conclusion

Based on these past studies, the researcher found that most teachers have utilized the play-based method in teaching various subjects. Their goal in using the play-based learning method is to stimulate pupils' interest in learning and enhance their academic achievement in different subjects. Researchers have also employed the play-based learning method to improve pupils' performance in Early Mathematics, particularly in pre-number topics.

Learning through play can enhance children's learning motivation. Enjoyable and interactive activities tend to attract children's interest in engaging in the learning process. They become more motivated to try new things and gain a better understanding of the concepts being taught. Learning-through-play also involves social interaction among children. They learn to cooperate and communicate with their peers. This helps develop social skills and the ability to interact within a group.

The learning-through-play method actively involves children in the learning process. They engage in physical, cognitive and emotional activities that aid their brain development. This active learning can improve understanding and retention of the knowledge acquired. Learning-through-play method brings many benefits to children's development. Through this approach, learning becomes more effective, enjoyable and relevant to the needs and interests of children.

Learning through play method brings many benefits to preschoolers. Therefore, this concept paper is produced to explore the efficacy of application using the learning-through-play method to foster the interest, engagement, and achievement of preschoolers in early mathematics learning for the topic of "Money Value."

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