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Implementation of Snakes and Ladders Game to Stimulate Early Childhood Numeracy Development

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Abstract

One type of traditional game is the Snakes and Ladders game, which can significantly impact early childhood numeracy development. This research aimed to explore the implications of the Snakes and Ladders game in stimulating numeracy skills in preschool children. The type of research was descriptive qualitative with the research site at RA Al-Fattah Jangga Baru, and the subjects in this study were group B children, totaling 17 children. Data collection was done through observation, interviews, and documentation. The data analysis was conducted through data reduction, data display, and conclusion formulation. This study identified how elements of the Snakes and Ladders game, such as number recognition, step counting, and understanding the concept of sequence, can support the development of children's basic maths skills. The results proved that the Snakes and Ladders game not only teaches numbers and sequences but also develops cognitive skills such as planning and problem-solving, enhancing the intellectual development of children. In addition, the social interactions during the game enrich children's learning experience, improve communication skills, and strengthen the understanding of numerical concepts. The results suggest that the Snakes and Ladders game can improve children's numeracy skills and that the game can also be powerfully incorporated into the early childhood education curriculum as a tool that makes maths more fun and interactive.

Keywords: early childhood, numeracy, snakes and ladders game

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A. Introduction

Early childhood is the most crucial starting point in a person's life, where children tend to imitate many things (Ratnasari, 2020). Education should include the ability to create knowledge, skills, and exceptional human resources (Halean et al., 2021). As an educational institution, schools are expected to implement good learning strategies for each of their students to create excellent students, have strong characters, and be able to compete (Hairuddin, 2020). Numeracy education has a vital role in early life, building a solid foundation for further understanding of numeracy concepts in the future. One of the fundamental elements in early childhood mathematical development is their introduction to numeracy, including number concepts, counting skills, and understanding of space and position. Currently, numeracy literacy learning is the focus of government attention to improve school quality. Children in Indonesia need to be strengthened in literacy and numeracy.

The ability to understand mathematics and use it to solve problems and explain how to use it is known as numeracy literacy (Maulidina, 2019). Children's numeracy skills show how numeracy learning is done at school. Teachers must understand the concept of numeracy well to them from early childhood to higher levels (Hartatik & Nafiah, 2020). Muhammad Hasbi believes that early childhood educators should emphasize numeracy literacy to lay a strong foundation for reading and numeracy performance in secondary education (Eko, 2021). Therefore, it is hoped that preparing children for literacy and numeracy from an early age will help raise the PISA scores, which assesses learners' skills worldwide in reading and maths.

According to the 2022 Programme for International Student Assessment (PISA) results, Indonesia's arithmetic scores are below average. The average PISA mathematics score for the Organisation for Economic Cooperation and Development (OECD) section is 489, but Indonesia's score is around 375. Considering several PISA exams conducted in Indonesia, they reached 360 in 2003 and increased to 391 in 2006. In 2009, Indonesia's score decreased again to 371, but it increased to 375 in 2012. In 2015, it increased by 386; in 2018, it again reduced by 379. 2022, the PISA score was 366, the lowest since 2006 (Jauhari, 2023).

Numeracy development is significant to start teaching at a young age to avoid mathematical errors in the future. Based on the findings of research conducted at RA Al-Fattah Jangga Baru, it is found that there are still children who are lacking in counting skills, and children still cannot mention and take numbers correctly. Monotonous learning methods can be one of the causes of these low abilities. Stimulation through tasks on children's worksheets (LKA) can quickly make children bored. Learning becomes unpleasant if the atmosphere makes children feel depressed, threatened, scared, helpless, not excited, lazy / not interested, or bored; in a monotonous learning atmosphere, learning does not attract children. Children at an early age need a lot of activities to encourage them to follow the lesson to the end because their focus time is only five to ten minutes (Fadli, 2023). Children are expected to participate more actively but are less pressured in learning. One of the methods children can use to learn numbers more actively is playing games.

Games are a practical approach to facilitate learning in early childhood because they are fun and interactive and can increase children’s intrinsic motivation towards mathematics. One game that has been shown to have great potential in improving numeracy is the Snakes and Ladders game. The game is fun and contributes indirectly to practically teaching mathematical concepts. The Snakes and Ladders game gives children hands-on experience interacting with numbers and numeracy. They learn

to identify and sort the numbers on the game board, an essential first step in building a basic understanding of numbers (Jean, 2020). In addition to recognising numbers, the game involves simple arithmetic skills. Children must count the steps they need to take to progress to the next square or go backward when they trip on the snake (Jones, 2022).

The Snakes and Ladders game also helps develop spatial skills and understand the concept of space. Children learn about forward, backward, left, and right directions as they move along the game board, which is essential for developing mathematical understanding (Smith, 2023). The competitive and fun characteristics of the game can increase children's intrinsic motivation towards learning maths. They actively solve problems and make strategic decisions during the game, contributing to their cognitive development (Brown, 2021). Previous research shows that Snakes and Ladders games are fun and can improve numeracy skills in early childhood. Garcia's research (Garcia, 2024) underlines the importance of social interactions during the game in supporting children's cognitive development. These findings illustrate that Snakes and Ladders games not only educate numeracy directly but also facilitate social and emotional aspects of children's learning experiences. Snakes and ladders games can support children in early childhood education to develop confidence (Fransisca et al., 2020) and maths skills (Chayati et al., 2021). However, this study differs from previous studies in terms of the way the Snakes and Ladders game was modified to help children aged 4-6 years who have difficulty understanding number concepts. Notably, the factors used differ from the variables found in previous studies (Rahayu et al., 2018). This study aimed to explore the implementation of the Snake and Ladder game in fostering early childhood numeracy skills, where the game can make children interested and not bored with the teaching. This modification of the Snakes and Ladders game can also help with early childhood numeracy development.

B. Literature Review

Two or more players use dice and drawings of snakes and stairs on boxes to play the game Snakes and Ladders (Wati, 2021). Snakes and Ladders learning tools can create engaging and delightful learning environments. Children will become more eager to learn and motivated to study (Mujtahidin et al., 2024). Snakes and Ladders game media can help the learning process in learning numeracy and provide direct experience in learning while playing. Children do not feel bored in the learning process because they learn while playing (Mujtahidin et al., 2024).

Previous researchers have used the Snakes and Ladders game to assist children's learning. The game improves children's knowledge and attitudes towards healthy lifestyles (Medan, 2021). The snakes and ladders game has also been used by previous studies in learning maths in primary schools (Miza Anniza et al., 2024). In early childhood, snakes and ladders games improve children's self-confidence (Fransisca et al., 2020) and maths skills (Chayati et al., 2021). Furthermore, using the ATIK (observe, imitate, do) paradigm, the enormous snakes and ladders game teaches kids math while having fun. It can enhance early childhood numeracy literacy (Kurniasih & Watini, 2022). In addition, snakes and ladders learning media can improve children's literacy and numeracy abilities and attract children's attention. Because the learning is given as a fun game, children are not bored or tired during the learning process (Jafar et al., 2023). Furthermore, snakes and ladders media also significantly improve the focus and learning outcomes of calculation operations in

early childhood. So, it is recommended that it be used as a tool in learning at the early childhood education level (Saefullah, 2024). The Snakes and Ladders game can also help children more effectively follow the learning process. It can help children be more active and solve any problems that occur in the learning process so that they will have more interest and motivation to learn (Boro, 2024).

Another study examined the improvement of the understanding of numbers in English through snakes and ladders games (Sulistiyaningsih et al., 2023). The results showed increased children's ability to understand numbers in English. In addition, snakes and ladders game media can also affect children's self-confidence. This is consistent with Zelvira's research, which indicates that the N-gain result is 0.406 medium and that the alternative hypothesis (Ha) is accepted due to a significant difference (sig.2-tailed: 0.00 <0.05) found in the Mann-Whitney test hypothesis testing. Therefore, children between the ages of five and six benefit from the enormous snakes and ladders game in terms of their growth of self-confidence (Berta, 2024). Furthermore, the development of early childhood numeracy can also be done by utilising traditional games, including crankle, songkok, and marbles, because many traditional games can be used in developing numeracy in early childhood. Through these traditional games, children can recognise patterns, numbers, geometry, measurement, and data analysis (Arvy, 2024).

Previous research shows the development of the Snakes and Ladders games as literacy and numeracy learning through application software. Based on the validation results, it was declared valid, and based on the readability test, the media was declared practical. Therefore, the Snakes and Ladders game media is suitable for integrated literacy and numeracy learning (Sulistyorini & Sumajaya, 2024).

C. Method

This research was conducted using a qualitative approach. According to Moleong (2004), the purpose of the qualitative approach is to thoroughly reveal phenomena related to attitudes, actions, and research objectives. The research location was RA AL-Fattah Jangga Baru. The numeracy skills of some children were still low, and the monotonous teaching methods used by teachers were one of the reasons for the low skills. The research subjects were 17 children in class B and the class B teacher. Data collection techniques include interviews, observation, and documentation (Septiana & Syafrudin, 2022). Observation was carried out by observing every activity of children and teachers when carrying out the learning process in and outside the classroom. Interviews were conducted with teachers regarding the media used during learning. Documentation is a supporting document, such as photos of activities. The four categories used to characterise the observation data are developing very well (BSB), developing as expected (BSH), starting to develop (MB), and not yet developing (BB). The Snakes and Ladders game was utilised in this study to improve counting skills. The daily learning implementation plan (RPPH) became the foundation. The data analysis approach was based on the interactive analysis model created by Milas and Huberman and began with data display, data reduction, and conclusion formulation (Nurjayanti et al., 2020).

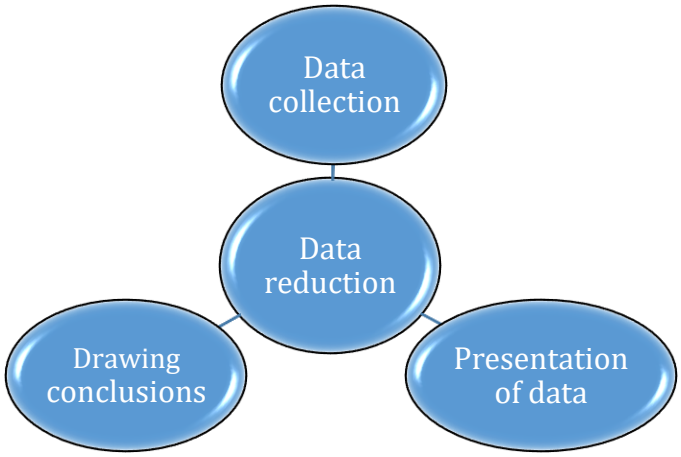

Figure 1. Interactive Data Analysis Technique (Miles and Huberman)

D. Findings and Discussion

1. Learning Media for Snakes and Ladders Game (Theme: Jambi Culture)

Snakes and ladders games are a medium that makes children more interested in learning. Introducing early numeracy itself requires the ability to count in the game. The ability to count is an early part of cognitive development, especially in numeracy, which needs to be stimulated in every child. The Snakes and Ladders game that children play will hone children's counting skills and the ability to understand each step that occurs in each Snakes and Ladders plot. In addition, children will see each picture on the box and answer the commands in the Snakes and Ladders box (Winkel, 2004). Snakes and ladders originated in India (Sheth, 2014). According to Warburton & Madge (1994), 'because each child has an equal chance of receiving good or bad practice, snakes and ladders are also a game of chance'. Snakes and Ladders is a game consisting of a board divided into squares(Istiqomah, 2018). The Snakes and Ladders game involves two or more players. Suit or mutual agreement can be used to determine the order of throwing the dice; then, the children play snakes and ladders in rotation. In this research, each snake and ladder box contains images of Jambi culture and guesses that can train children's numeracy and knowledge of the culture, especially those in the Jambi area. Children will go to the next box through the stairs if they stop at a box with stairs. If they stop at the box with the snake head, they will go down to the box with the snake tail. If the child stops at the guessing box, the child will answer the guesses given by the teacher. The snakes and ladders media are made from banner material of 2m x 2m; the dice are made from dice cushions. Here is the design of the Snakes and Ladders game:

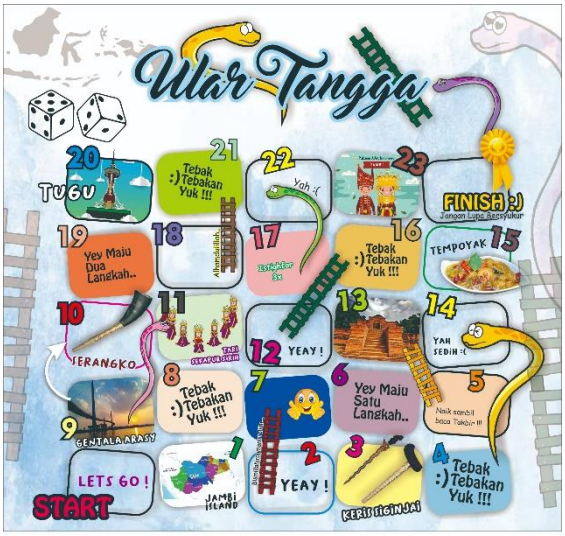

Figure 2. Snakes and Ladders Game Design

2. Learning Implementation of Snakes and Ladders Game to Stimulate Early Childhood Numeracy Development

The observations and interviews show that RA Al-Fattah Jangga Baru teachers make learning plans that include initial, core, rest, and final activities. Teachers also make anecdotes and conduct evaluations daily to identify children's development. Learning is given to children every day from 08.00 to 11.00. The learning objectives of using the Snakes and Ladders game are to stimulate children's numeracy development. When using the Snakes and Ladders game, there is a flow of implementing activities with Snakes and Ladders media, namely the preparation, observation, imitation, and working stages.

The teacher prepares snakes and ladders media and supporting equipment in the preparation stage. The teacher gives instructions on the rules of the game to be played. First, the stage of observing and imitating is a stage that is characteristic of early childhood. If the environment responds well or even provides a reward, imitation will become a habit and be done regularly. After observing, the child will usually imitate an ability based on the observations made by the child; in the process of imitating, the child is reflecting on what he learned at the observation stage. At this stage, the children listen to what the teacher does, and then they are invited to imitate what the teacher has done. Second, the children do what the teacher has modeled in the doing stage. At the same time, the teacher observes the activities carried out by the children. When children play, there will be stimulation without any negative pressures. This stimulation can make children develop numeracy skills quickly.

Figure 3. Child rolling the dice

During play, teachers monitor all aspects of children's development, including their numeracy development. There are four scales used: MB (beginning to develop) indicates that the child starts to complete the task despite repeated reminders; BSH (developing as expected) suggests that the child consistently meets expectations; BB (not yet developed) indicates that the child needs help from the teacher to complete the task. It is said to develop very well (BSB) when a child helps their classmates and often complete the work themself (Kemendikbud, 2018).

Table 1. Assessment Scale

Assessment	Score	Value	Description
76-100	4	BSB	Developing very well
51-75	3	BSH	Developing as expected
26-50	2	MB	Starting to develop
0-15	1	BB	Not yet developed

The evaluation results of utilising Snakes and Ladders game media to improve early childhood numeracy skills are shown in the following table and diagrams:

Table 2. Results of Research on the Ability of Numeracy Development in Children

No	Child's Name (initials)	Assessment Indicators					Description
		A	B	C	D	E	
1	AK	3	3	2	2	1	BSH
2	AMA	4	2	2	3	2	BSB
3	ANN	3	3	2	2	1	BSH
4	AA	4	2	3	2	2	BSB
5	ARN	3	4	2	2	1	BSH
6	DA	2	1	1	2	1	MB
7	DS	3	3	2	2	2	BSH
8	ERF	4	2	3	2	1	BSH
9	JAS	3	4	2	3	1	BSH
10	KFA	2	2	1	1	1	MB
11	KAA	3	2	4	3	2	BSB
12	MAM	2	1	2	1	1	MB

13	MRS	3	3	4	2	1	BSB
14	MAA	3	4	2	2	2	BSB
15	RBA	4	1	2	2	2	BSH
16	SZF	3	1	1	2	1	MB
17	ZAZ	3	3	1	2	3	BSH

Description:

A. The child is able to mention the number
B. The child is able to show the number symbol
C. The child is able to mention the number sequence
D. The child is able to count by pointing to objects
E. The child is able to write numbers correctly

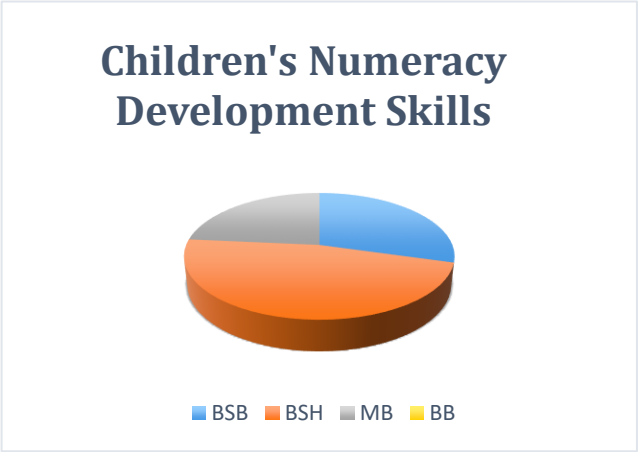

Figure 4. Diagram of Children's Numeracy Development Ability

Based on Table 2 and Figure 4, children seem to understand the play activities when they mention numbers, point to number symbols, mention number sequences, count by pointing to objects, and children are able to write numbers correctly. Children enjoy their games and practise their patience while waiting for their turn by listening to the teacher's instructions. The children play snakes and ladders by jumping over the snakes and ladder boxes. As they jumped over the boxes, they had to follow the commands written inside. The teacher revealed that most of the children observed were developing as expected. The observation shows that the Snakes and Ladders game works well and has the ability to foster children's numeracy skills.

Using snakes and ladders as learning media is one alternative that teachers can use. Media can help to channel lessons to satisfy and arouse kids' emotions, minds, focus, and capacities (Indriawati, 2023). Variations of the Snakes and Ladders game are made so that children are directly involved as pawns so that the introduction of numbers can be clearly illustrated in the child's mind. The numbers introduced to children range from 1-10 according to the child's ability. The concept of numbers introduced is adjusted to the needs and stages of child development (Suryana, 2021). Furthermore, mathematics-related games can support the growth of children's numeracy abilities (Cohrssen, 2019). The quality of numeracy learning will not significantly improve without media support. Therefore, in Snakes and Ladders, one tactic for game-based learning activities is to use game media.

Using media related to the game of snakes and ladders occurs in learning activities and by teachers. The Snakes and Ladders game provides an exciting and interactive learning adventure, which is very suitable for the characteristics of early childhood development. Children gain knowledge through play, and by utilizing the Snakes and Ladders game, children can learn basic numeracy concepts such as recognizing numbers, naming number symbols, and writing numbers correctly. In addition, media from the Snakes and Ladders game makes children more interested and active in the teaching stage. This aligns with the findings of Yelland, who reported that game-based learning can foster children's learning motivation and engagement in learning mathematics (Yelland, 2018). Children also enjoy learning and do not feel pressured or bored due to the fun learning method (Smmadmin, 2023). In addition to numeracy, this snakes and ladders game can also help expose children's social skills, such as cooperation, taking, and accepting defeat sportingly (Inayah, 2020). This is endorsed by findings conducted by Jones and Dockett, which showed that group games can help children expose social skills, such as collaboration and the ability to appreciate differences (Theobald et al., 2015). This is also in addition to Vygotsky's theory (Mantzicopoilos, 2018), which emphasizes the importance of social context in learning. Using the Snakes and Ladders game also allows teachers to teach numeracy more contextually and meaningfully, where children can see a direct connection between the numbers they learn and their activities. In addition, it involves physical aspects such as rolling the dice and jumping or stepping to move to the next box (Ikhwani, 2019).

The Snakes and Ladders game allows educators to customize education to suit children's requirements and skills. Teachers can modify the rules or difficulty of the game to challenge more advanced children or provide additional support to children in need. This aligns with Tomlinson's opinion that teaching is tailored to children's individual learning needs (Tomlinson, 2017). It is essential to ensure that each child can learn at a pace and difficulty level that suits them. In addition, using snakes and ladders games can also positively affect teachers' pedagogical skills. Teachers become more creative in designing engaging lessons and can adapt teaching methods to the needs of individual children. This is related to a study conducted by Sarama and Clements, which emphasised the importance of teacher training in applying game-based learning strategies (Clements, 2020).

E. Conclusion

The application of Snakes and Ladders game media has been proven effective in stimulating early childhood numeracy development. This game improves children's numeracy skills, increases their interest in learning, and develops social skills. In addition, the Snakes and Ladders game can be used as an alternative to learning to motivate children to be actively involved in learning. Teachers need learning strategies so that children are not quickly bored. Hence, the Snakes and Ladders game can be chosen as one of the innovative and fun numeracy teaching methods in early childhood education. The ramifications of this study's findings can be utilised as a substitute for PAUD teachers when introducing numbers to children. The limitation of this study was the absence of interview data on children's feelings during the Snakes and Ladders game. It is recommended that future research can explore this area further.

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