

The Effect of Maze Media on the Ability to Recognize Numbers 1-20 in 5-6 Year-Old Children

Ainnun Ibrahim Hamid¹ ✉, Yeni Rachmawati², Badru Zaman³

Universitas Pendidikan Indonesia, Jawa Barat, Indonesia^(1,2,3)

DOI: [10.31004/aulad.v9i2.850](https://doi.org/10.31004/aulad.v9i2.850)

✉ Corresponding author:

[\[ainnunhamid@upi.edu\]](mailto:ainnunhamid@upi.edu)

Abstract

Early childhood numeracy is a fundamental ability that supports later mathematical learning, yet many children still experience difficulties in recognizing numbers. This study aims to examine the effect of labyrinth (maze) learning media on the number recognition ability of children aged 5–6 years. The research employed a quantitative pre-experimental method involving 12 children in group B selected through purposive sampling. Data were collected using observation sheets measuring children's ability to recognize numbers 1–20. Data analysis was conducted using the non-parametric Wilcoxon Signed Rank Test. The results showed an Asymp. Sig. (2-tailed) value of 0.002 ($p < 0.05$), indicating a significant effect of labyrinth media on children's number recognition ability. These findings imply that labyrinth media can be an effective and engaging learning tool to enhance early childhood numeracy skills in early education settings.

Keywords: *Maze-based Learning Media; number recognition ability; early childhood education*

Article Info

Copyright (c) 2026 Ainnun Ibrahim Hamid, Yeni Rachmawati, Badru Zaman
Received 27 November 2024, Accepted 20 June 2026, Published 06 August 2026

1. INTRODUCTION

Number recognition ability is a fundamental component of early childhood cognitive development, particularly within the domain of symbolic thinking. This ability includes recognizing number symbols, sequencing numbers, matching quantities with numerals, and applying numerical concepts in simple daily activities (Khadijah, 2016; Rosyadi, 2020). According to the Indonesian Early Childhood Development Achievement Standards (Permendikbud No. 137 of 2014), children aged 5–6 years are expected to demonstrate these competencies as part of their readiness for formal education. Early numeracy skills play a crucial role in supporting children's future academic success, as they contribute to the development of logical reasoning, problem-solving abilities, and mathematical understanding (Duncan et al., 2007; Clements & Sarama, 2014; Mena & Eyer, 2009).

Despite its importance, empirical studies indicate that number recognition skills among early childhood learners are often underdeveloped. Children frequently experience difficulties in ordering numbers, matching number symbols with quantities, and understanding numerical concepts, which are commonly associated with teacher-centered instruction, limited use of concrete learning media, and insufficient play-based learning approaches (Sriwahyuni & Nofialdi, 2017; Maghfiroh et al., 2017; Syukri, 2021; Aunio & Räsänen, 2016). In addition, young children's limited attention span reduces

the effectiveness of monotonous learning activities, leading to low engagement and superficial understanding of number concepts (Hurlock, 1987; Syukri, 2021).

These challenges are also evident in the learning context of RA Aisyiyah. Preliminary observations show that children aged 5–6 years are generally able to verbally recite numbers from 1 to 20 but still struggle to sequence numbers correctly, match numerals with quantities, and connect numbers to concrete objects. This condition reflects a gap between rote counting ability and conceptual understanding of numbers, as reported in previous studies on early numeracy development (Purpura & Lonigan, 2015; Clements & Sarama, 2014). To address these issues, learning activities were designed using engaging and play-based instructional strategies that align with children's developmental characteristics.

One learning medium that has been widely recommended to support early numeracy development is maze media. Maze media is a game-based learning tool consisting of winding paths that encourage children to explore, think critically, and solve problems actively. When integrated with number learning activities, number maze media enables children to count objects, recognize number symbols, and match quantities with numerals through hands-on and enjoyable experiences. Previous research has shown that maze-based activities can enhance children's cognitive development, concentration, creativity, and problem-solving skills (Constantina & Hasibuan, 2015; Hariantoko, 2014; Maghfiroh et al., 2017).

Although prior studies have demonstrated the potential benefits of maze-based learning media, several limitations remain in the existing literature. Most research has focused on two-dimensional maze activities or worksheet-based games that provide limited sensory and manipulative experiences for young children. Furthermore, many studies emphasize general cognitive or motor outcomes rather than specifically examining number recognition skills within a defined numerical range, particularly numbers 1–20. Empirical evidence using quantitative pre-experimental designs with non-parametric statistical analysis to evaluate the effectiveness of three-dimensional number maze media in early childhood education—especially within Islamic early childhood institutions—remains limited. This gap highlights the need for further research that provides empirical evidence on innovative learning media to improve early numeracy skills. Accordingly, the purpose of this study is to examine how using three-dimensional number maze media affects children's number recognition abilities between the ages of five and six. The results of this study are anticipated to have practical consequences for early childhood educators in improving number recognition skills and to aid in the creation of successful play-based learning methodologies.

3. METHODS

The study proceeded by identifying the issue, which was children between the ages of 5–6 having poor number recognition abilities. Based on this issue, the study's goal was to investigate how number maze media might enhance kids' ability to recognise numbers. The study used a pre-experimental one-group pretest–posttest design in a quantitative manner to accomplish this goal. This design was used to assess how children's number recognition abilities changed both before and after the number maze media was introduced to the same group. 12 children from Group B, ages 5 to 6, were chosen through purposive sampling according to pre-established standards for number recognition readiness.

Data collection was conducted over six days. A pretest was administered on the first day to assess the children's initial number recognition skills. This was followed by four treatment sessions using the number maze media from the second to the fifth day. On the sixth day, a posttest was conducted to evaluate the children's number recognition skills after the intervention. Data were obtained through an observation-based assessment instrument that measured The capacity of children to identify numerical symbols (1–20), arrange numbers in sequence, match quantities with numerals, and count objects accurately.

The collected data were analyzed using the Wilcoxon Signed Rank Test, a non-parametric statistical test appropriate for paired data and small sample sizes. Hypothesis testing was conducted at a 0.05 significance level, where the null hypothesis was rejected if the Asymp. Sig. (2-tailed) value was less than 0.05. Finally, the results were used to determine whether the number maze media had

a significant effect on improving the number recognition skills of children aged 5–6 years, and conclusions were drawn based on the statistical findings.



Figure 1. Logical flow

4. RESULT AND DISCUSSION

Comparative Description of Pretest and Posttest Results of Number Recognition Ability

The difference in *pretest* and *posttest* scores on the twelve subjects regarding the ability to recognize numbers in group B children of RA Aisiyah can be depicted on data in the form of a graph. This is because it can make it easier to understand the results of the research obtained by researchers. The graph of the difference between the scores that have been obtained before and after the treatment is as in Figure 1.

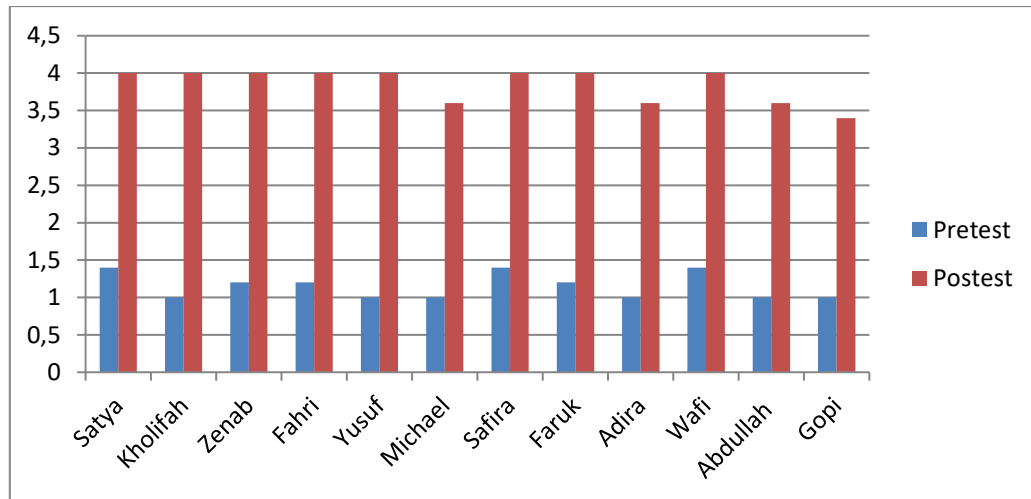


Figure 2. Graph of *Pretest* and *Posttest* Score Recapitulation Results

The graph above shows the differences obtained from 12 research subjects before and after being given *treatment* in the form of number *maze* media in improving the ability to recognize numbers of children aged 5-6 years in group B RA Aisyiyah. In the graph, it shows that the ability to recognize numbers in children before being given *treatment* gets a score of 1 as the lowest score, while the highest score is 1.4. The results obtained by researchers after the *treatment* using the number *Maze* media were very satisfying, this happened because the results obtained by researchers in the field experienced a development with a score of 3.4 as the lowest score and a score of 4 as the highest score.

Wilcoxon Signed Rank Test

Data analysis in this study was carried out by looking at the results of the ability to recognize numbers before and after *treatment*. In this analysis using the *Wilcoxon Signed Rank Test* is used to determine whether or not there is an effect caused by the provision of *maze* media learning on the ability to recognize numbers in children by using the hypothesis H_a if there is an increase and H_o if there is no increase in the ability to recognize numbers after being given *treatment* with *maze* media at RA Aisyiyah. The following hypothesis testing results from the *Wilcoxon Signed Rank Test* using the IBM SPSS 25 program can be seen in the Table 1.

Table 1. Hasil Pengujian Wilcoxon Signed Rank Test

		N	Mean Rank	Sum of Ranks
Post-Test - Pre-Test	Negative Ranks	0 ^a	,00	,00
	Positive Ranks	12 ^b	6,50	78,00
	Ties	0 ^c		
	Total	12		
a. Post-Test < Pre-Test				
b. Post-Test > Pre-Test				
c. Post-Test = Pre-Test				

Test Statistics^a

Post Test - Pre Test	
Z	-3,108 ^b
Asymp. Sig. (2-tailed)	,002

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

Table 1. Hasil Pengujian Wilcoxon Signed Rank Test

Based on the results of data analysis and the wilcoxon signed rank test, the *Asymp sig (2-tailed)* value of 0.002 is obtained here, the probability is below 0.05 or $p < 0.05$, so H_0 is rejected. This is based on probability decision making: if the probability (*Asymp.sig*) < 0.05 then H_0 is rejected and H_a is accepted, while if the probability (*Asymp.sig*) > 0.05 then H_0 is accepted and H_a is rejected. The average pre-test value for children aged 5-6 years was 1.3, and the average post-test value for children aged 5-6 years was 3.4. The results indicated that there was a difference between pretest and post-test scores for the ability to recognise numbers of children aged 5-6 years. The Wilcoxon test's pre-test and post-test findings change, indicating that consuming maze media has an impact on children's capacity to identify numbers of children between the ages of 5 and 6.

The results of this study indicate that the use of maze media has a significant effect on improving the number recognition ability of children aged 5–6 years. Based on the Wilcoxon Signed Rank Test, the *Asymp. Sig. (2-tailed)* value of 0.02 ($p < 0.05$) confirms that the alternative hypothesis (H_a) is accepted. This finding demonstrates that maze-based learning media effectively enhances children's ability to recognize numbers 1–20. The effectiveness of maze media lies in its play-based and interactive nature, which aligns with early childhood learning characteristics. Learning through play enables children to actively engage with numerical concepts, such as identifying number symbols, sequencing numbers, and matching numbers with quantities. Khadijah (2016) emphasizes that learning media can stimulate children's attention and cognitive processes, making abstract concepts easier to understand. Similarly, Constantina and Hasibuan (2015) argue that maze games support number recognition by encouraging exploration and problem-solving in a playful context.

These results align with earlier research showing that interactive and concrete learning activities contribute significantly to early numeracy development. Dianmarta and Sulthoni (2017) explain that maze-based activities help children understand number concepts through hands-on experiences, which are more effective than conventional worksheet-based instruction. Moreover, Clements and Sarama (2014) highlight that meaningful early mathematics learning occurs when children interact directly with learning materials rather than passively receiving instruction. Compared to traditional teaching methods, such as writing numbers on the board or completing worksheets, maze media provides a more engaging and meaningful learning experience. Children not only learn to mention numbers but also develop a deeper understanding of number order, symbol recognition, and quantity concepts. However, this study also found that the use of maze media requires clear teacher guidance and modeling. Without proper instruction, some children may experience difficulties in navigating the maze and connecting numbers with corresponding images. Overall, this study confirms that maze media is an effective alternative learning medium for improving early number recognition skills. Children's motivation, focus, and cognitive development can all be improved by incorporating play-based media into early childhood education, especially when it comes to early numeracy learning.

Results of the Influence of Number Recognition Ability with Maze Media for Children aged 5-6 years

Learning activities with maze media carried out aim to improve children's ability to recognize numbers 1-20. Children aged 5-6 years initially demonstrated low number recognition abilities, particularly in identifying number symbols, sequencing numbers from 1 to 20, and matching numbers with corresponding quantities. These difficulties indicate that early numeracy skills had not yet developed optimally, one possible reason is that conventional learning activities provide limited opportunities for children to interact directly with number concepts (Purpura & Lonigan, 2015). In contrast, number maze media encourages active exploration, repeated practice, visual discrimination, and problem-solving through play, allowing children to connect abstract number symbols with concrete learning experiences. Such play-based and interactive learning activities increase children's engagement and facilitate a deeper understanding of number concepts, thereby improving number recognition skills (Fatmaini & Jaya, 2018; Porras & Caliba, 2025).



Figure 3. Learning with Maze-base Media

The intervention was conducted through a series of structured learning activities, including a pretest, four treatment sessions using maze media, and a posttest. During the early stages of implementation, some children required guidance to navigate the maze and correctly connect numbers with the corresponding images. This limitation reflects children's initial lack of familiarity with number concepts and symbolic representation. However, as the learning activities progressed and the maze media was used repeatedly, children gradually demonstrated improvements in recognizing number symbols, sequencing numbers, and matching numbers with quantities. The results of the Wilcoxon Signed Rank Test showed a significant increase in posttest scores compared to pretest scores, indicating that maze media had a positive effect on children's number recognition abilities. This finding supports the view that play-based and concrete learning experiences are effective in facilitating early mathematical understanding (Clements & Sarama, 2014). Maze activities allow children to actively engage in problem-solving processes, thereby strengthening their mathematical-logical thinking and number sense.

Furthermore, learning activities using maze media created a positive emotional learning environment. Children appeared more enthusiastic, relaxed, and motivated during the learning process. This condition supports the argument that enjoyable learning experiences enhance children's attention and cognitive engagement, which are essential factors in early numeracy development (Hirsh-Pasek et al., 2009). According to Musfiroh (as cited in Destia, 2020), maze media contributes to children's visual-spatial development and mathematical-logical intelligence, particularly in managing numbers and understanding numerical relationships. Compared to traditional methods such as writing numbers on the board or using worksheets, maze media offers a more meaningful and interactive learning experience. Through maze-based activities, children are encouraged to explore, experiment, and learn independently with appropriate guidance from

teachers. As a result, maze media can be considered an effective learning tool to support the development of number recognition skills in early childhood education.

5. CONCLUSION

The use of *maze* media in children aged 5-6 years can improve the ability to recognize numbers 1-20 as evidenced by hypothesis testing through the *Wilcoxon* test with the sig value = $0.002 < p 0.05$, so that these results are decided to reject H_0 . And from the data obtained above, it can be concluded that there is an effect of *maze* media users on the ability to recognize numbers of children aged 5-6 years. When children between the ages of five and six are treated with maze media, their capacity to recognise numbers may be considered to be still low or undeveloped. As a result, their ability to recognise numbers is gradually improving via meeting learning activities in the classroom. Teachers and parents should pay close attention to students' enthusiasm for learning because it affects how children develop their ability to recognise numbers. The number maze media demonstrates that the twelve research subjects' post-test scores were higher than their pre-test scores. This is in accordance with the results of the *pre-test* obtained by the researcher which shows that the average child is still unable to mention the numbers 1-20 in order or randomly according to the order with an average pretest value of 1.7, while connecting the numbers and the corresponding images obtained a pretest value of 1.2, but after being given *treatment* or *treatment* with *maze* media, the ability to recognize numbers in children has experienced significant changes, the ability to mention numbers 1-20 in order or randomly according to orders has increased with an average *posttest* value of 3.8 while the ability to connect numbers and corresponding images obtained a *posttest* value of 3.4. Ability improvement

6. ACKNOWLEDGEMENT

The authors would like to express their sincere gratitude to all individuals and institutions who contributed to the completion of this research. Special appreciation is extended to Universitas Pendidikan Indonesia for its academic support throughout this study. The authors are also deeply grateful to the principal, teachers, children, and parents of RA Aisyiyah for their cooperation and participation during the research process. Finally, the authors sincerely thank all reviewers and editors for their valuable comments and constructive suggestions, which have significantly improved the quality of this manuscript.

7. REFERENCE

- Aunio, P., & Räsänen, P. (2016). Core numerical skills for learning mathematics in children aged five to eight years – A working model for educators. *European Early Childhood Education Research Journal*, 24(5), 684–704. <https://doi.org/10.1080/1350293X.2014.996424>
- Clements, D. H., & Sarama, J. (2014). Learning and teaching early math: The learning trajectories approach (2nd ed.). Routledge.
- Constantina, A., & Hasibuan, R. (2015). Permainan maze sebagai media pembelajaran dalam mengenalkan konsep bilangan pada anak usia dini. *Jurnal Pendidikan Anak Usia Dini*, 9(2), 123–132.
- Constantina, E. L., & Hasibuan, R. (2015). Pengaruh permainan maze angka terhadap kemampuan mengenal lambang bilangan 1-10 pada anak kelompok A. *E-Journal Unesa*, 04(02), 68–69.
- Destia, S. (2020). Penerapan Permainan Maze Angka Dalam Mengembangkan Kecerdasan Logika Matematika Anak Usia Dini di Paud Alamanda Kecamatan Tanjung Bintang. *Undergraduate*, UIN Raden Intan Lampung.
- Dianmarta, A., & Sulthoni. (2017). Media maze angka untuk meningkatkan kemampuan mengenal bilangan siswa Tunagrahita. *Jurnal Ortopedagogia*, 3(1), 1–4.
- Dr. Hj. Khadijah, M. A. (2015). *Media Pembelajaran Anak Usia Dini* (S. dan A. Grafika, Ed.; Pertama). Perdana Publishing.
- Dr. Hj. Khadijah, M. A. (2016). *Perkembangan Kognitif Anak Usia Dini* (Samsidar dan Aulia, Ed.; pertama). Perdana Publishing.
- Dr. Sandu Siyoto, SKM., M. K., & M. Ali Sodik, M. A. (2015). *Dasar Metodologi Penelitian* (Ayub, Ed.; Pertama). Literasi Media Publishing.

- Duncan, G. J., Dowsett, C. J., Claessens, A., Magnuson, K., Huston, A. C., Klebanov, P., Pagani, L. S., Feinstein, L., Engel, M., Brooks-Gunn, J., Sexton, H., Duckworth, K., & Japel, C. (2007). School readiness and later achievement. *Developmental Psychology*, 43(6), 1428–1446. <https://doi.org/10.1037/0012-1649.43.6.1428>
- Fatmaini, S. (2018). Pengaruh aktivitas bermain media maze angka terhadap perkembangan mengenal lambang bilangan anak usia 5–6 tahun. *Fakultas Keguruan dan Ilmu Pendidikan, Universitas Lampung*.
- Hariantoko, A. (2014). Maze games as learning media for early childhood development. *Jurnal Pendidikan Usia Dini*, 8(1), 45–54.
- Hirsh-Pasek, K., Golinkoff, R. M., Berk, L. E., & Singer, D. (2009). *A mandate for playful learning in preschool*. Oxford University Press.
- Hurlock, E. B. (1987). *Child development* (6th ed.). McGraw-Hill.
- Ibda, F. (2015). Perkembangan kognitif: Teori Jean Piaget. *Intelektualita*, 3(1), 27–38.
- Karmini. (2020). *Statistika Non Paramtrik* (pertama). Mulawarman University PRESS.
- KBBI. (2016). *Kamus Besar Bahasa Indonesia (KBBI)*. Online.
- Kementrian Pendidikan Nasional. (2014). *Permendikbud No 137 Tahun 2014*.
- Khadijah. (2016). *Media pembelajaran anak usia dini*. Perdana Publishing.
- Maghfiroh, L., Suyadi, & Mulyani, S. (2017). Maze game as a learning medium to improve cognitive abilities in early childhood. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 1(1), 1–10.
- Maghfiroh, S., Abidin, R., & Suweleh, W. (2017). Pengaruh permainan maze angka terhadap kemampuan berhitung anak kelompok B. *Jurnal Anak Usia Dini Dan Pendidikan Anak Usia Dini*, 3(1), 29–39.
- Mena, J., & Eyer, D. W. (2009). *Infants, toddlers, and caregivers: A curriculum of respectful, responsive, relationship-based care and education* (8th ed.). McGraw-Hill.
- Muhyatul Huliyah. (2016). Hakikat pendidikan anak usia dini jalur pendidikan informal. *Pendidikan Guru Raudlatul Athfal*, 1(1), 61–62.
- Musfiroh, T. (2012). *Pengembangan kecerdasan majemuk anak usia dini*. Universitas Terbuka.
- Porras, S. M. A., & Caliba, I. G. (2025). Play-based approach in teaching number recognition among the kindergarten learners. *Psychology and Education: A Multidisciplinary Journal*, 33(3), 401–418. <https://doi.org/10.70838/pemj.330310>
- Purpura, D. J., & Lonigan, C. J. (2015). Early numeracy assessment: The development of the preschool early numeracy skills test. *Early Childhood Research Quarterly*, 33, 44–59. <https://doi.org/10.1080/10409289.2015.991084>
- Rosidah, L. (2014). Peningkatan kecerdasan visual spasial anak usia dini melalui permainan maze. *Jurnal Pendidikan Usia Dini*, 8(2), 281–290.
- Rosyadi, M. I. (2020). Pengembangan kognitif pada anak usia dini melalui media bermain. *Al-Hikmah Way Kanan*, 01(01), 1–6.
- Sriwahyuni, E., & Nofialdi. (2017). Metode pembelajaran yang digunakan PAUD (pendidikan anak usia dini) Permata Bunda. *ThufuLA: Jurnal Inovasi Pendidikan Guru Raudhatul Athfal*, 4(1), 44. <https://journal.iainkudus.ac.id/index.php/thufula/article/view/2010>
- Sriwahyuni, R., & Nofialdi. (2017). Development of symbolic thinking abilities in early childhood. *Jurnal Pendidikan Anak Usia Dini*, 11(1), 55–63.
- Syukri, M. (2021). Learning media and concentration ability in early childhood. *Jurnal PAUD*, 5(2), 101–110.
- Wahyuni, S., & Setiawan, D. (2019). Game-based learning media for early numeracy skills. *Jurnal Pendidikan Anak Usia Dini*, 13(2), 211–220.