

The Effect of Marbel Angka Educational Games on The Ability to Recognize Numbers of Children Aged 4-5 Years

Dewi Andika Putri^{1,*}, Zulkarnaen²

Faculty of Teacher Training and Education, Universitas Muhammadiyah Surakarta, Indonesia

Abstract

Purpose: This study examines the use of Marbel Angka educational games on the ability of 4-5 year old children to recognize numbers at Al A'raaf Islamic Kindergarten. The objective is to determine the effect of the Marbel Angka educational game on the ability of 4-5 year old children to recognize numbers.

Methodology: The research method used a quantitative approach with a pre-experimental One Group Pretest–Posttest Design method. Data analyzed using SPSS 25 for Windows inferential statistics, namely performing normality tests with the Shapiro-Wilk test, homogeneity tests using Levene's test, and hypothesis tests using paired sample t-tests. Hypothesis testing using the paired t-test.

Results: The results show that the Marbel Angka educational game has a positive effect on the number recognition abilities of children aged 4-5 years based on hypothesis testing, showing a significance value of $p < 0.05$, namely 0.000.

Applications/Originality/Value: This is reinforced by findings that children interact with symbols and visual images, number marble games as digital scaffolding, and children can explore and experiment within the game. It can be concluded that the Marbel Angka educational game has an effect on the ability to recognize numbers in children aged 4-5 years at Al A'raaf Islamic Kindergarten.

Keywords: Children Aged 4-5 Years Old, Marbel Angka Educational Game, Number Recognition Skills.

Introduction Section

Preschool age is a crucial period for exploring and developing children's abilities or potential, one of which is cognitive development. Cognitive development is an aspect of early childhood development related to knowledge, namely everything related to the psychological process when individuals learn about and think about their environment (Hyde et al., 2021). Vygotsky, in an article by Wardani et al. (2023), argues that cognitive abilities help solve problems, make it easier to carry out activities, expanding capabilities, and doing things with natural capacity. According to Vygotsky, cognition is the ability to think and observe, as well as the way each person acquires knowledge or behaves. One area of development in children's cognitive development is learning to solve problems, think logically, and think symbolically (Amrina et al., 2020). Symbolic thinking activities include counting objects from one to ten, recognizing number concepts, and recognizing numbers (Mutia & Hambali, 2025).

Initial observations conducted at Al A'raaf Islamic Kindergarten showed that the ability to recognize numbers among children aged 4-5 years had not developed well. This can be seen when children are asked to count; many children are still unable to name the number symbols. Another supporting factor is that the learning method used at Al A'raaf Islamic Kindergarten is conventional learning. The medium used for counting is the abacus, which is familiar to children. The teaching methods used make children less interested and quickly bored. Therefore, to develop counting skills in group A2 at Al A'raaf Islamic Kindergarten, the researcher will apply the Marbel Angka educational game, which is expected to be the right medium for developing number recognition skills at Al A'raaf Islamic Kindergarten. The method that will be used is playing Marbel Angka educational game. Marbel Angka is a type of educational game that can be downloaded through the Play Store app. Marbel is an abbreviation for “*Mari Belajar*”. This application is specifically designed to assist in number recognition through enjoyable activities (Fitrah & Sartika, 2025).

Marbel Angka is one of the Marbel series educational games that children can use to help learn many things, such as numbers, pictures, colors, and other objects (Janah & Ariyani, 2022). Marbel Angka is an educational Android game

* Corresponding author: daputri1989@gmail.com

that can be used by young children to develop their number recognition skills. Marbel Angka is an interactive educational app designed specifically for young children, primarily to help them learn and recognize numbers from 0 to 100.

Researchers chose to use the Marbel Angka educational game, reinforced by previous research references. The novelty of this research differs from previous studies that used conventional media such as number cards, number boards, and worksheets. The Marbel number game is already well-known among parents as a play application, but it has not been widely tested as a formal learning medium for early childhood education (PAUD). Research by Rahmayanti & Safitri (2021) also found that digital deduction games can improve children's number recognition skills. This study also emphasizes the importance of education using digital technology in children's education. This study shows that digital technology-based educational games demonstrate significant progress in improving number recognition. Based on previous research findings, the educational game called Marbel Angka, which is used as a tool to introduce numbers to young children in Karangnanas Village, shows that learning using the Marbel Angka educational game yields higher average results than learning conducted previously without using the Marbel Angka educational game (Janah & Ariyani, 2022). This is further reinforced by research conducted by Fitrah & Sartika (2025) the use of Marbel Angka game contributes positively to number recognition skills because children can take a fun, interactive approach using Marbel Angka games.

Based on the background of this issue, the purpose of this study is to determine the effect of the Marbel Angka educational game on the ability to recognize numbers in children aged 4-5 years at Al A'raaf Islamic Kindergarten. This study can answer how the use of educational Marbel Angka game can have a positive effect on the ability of 4-5 year old children to recognize numbers. This study is expected to provide practical contributions to early childhood education institutions and optimize the use of digital technology applied to learning. Thus, the results of this study can serve as a basis for other educators in planning more interesting and innovative learning activities or programs for early childhood.

Research Method

This study uses a quantitative approach with a pre-experimental method because it only involves one group of subjects without a control group for comparison. This design aims to describe the effect of a treatment on the dependent variable under limited but controlled conditions (Creswell & Creswell, 2018; Sugiyono, 2019). This study focused on determining there or not the effect of using the Marbel Angka educational game on the ability to recognize numbers in children aged 4–5 years at Al A'raaf Islamic Kindergarten.

The design used was a One Group Pretest–Posttest Design, in which one group of children was given a pretest (O_1) to measure their ability to recognize numbers, then given treatment (X) in the form of learning using the Marbel Angka educational game, and finally given a posttest (O_2) to measure the results after treatment. This design is widely used in early childhood education research to identify changes in abilities after technology-based interventions (Campbell & Stanley, 2015; Hyde et al., 2021). The conceptual model of this study is visualized in Figure 1 below:

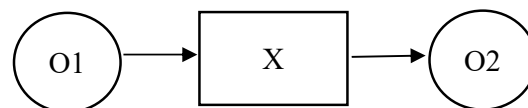


Figure 1. One Group Pretest–Posttest Design

The research population consisted of all children in Group A at Al A'raaf Islamic Kindergarten, while the research sample was taken using purposive sampling, which is the selection of subjects based on certain considerations in accordance with the research objectives (Etikan et al., 2016). The research sample consisted of 25 children aged 4–5 years in group A2 who, based on initial observations, had suboptimal number recognition skills. The researcher chose this sampling technique because class A2 has criteria that match the research needs, namely a class that has stable learning conditions, teachers who are willing to cooperate, and a schedule that allows for research to be conducted using the Marble Numbers game.

Data was collected using a number recognition test, which was compiled based on cognitive development indicators for children aged 4–5 years as stated in Permendikbud No. 137 of 2014 concerning National Standards for Early Childhood Education, and the researchers decided to use the indicators in Table 1 below:

Table 1. Indicators of Number Recognition Ability in Children Age 4-5 Years

No.	Cognitive Development Aspect	Specific Indicators Measured	Form of Activity / Test Item	Indicator Code (Permendikbud 137/2014)
1	Mentioning things	many Children can correctly name objects numbered 1–10.	Counting concrete objects (blocks, pictures, dolls)	4.3.1
2	Recognizing numeric symbols	Children can identify and name the symbols for numbers 1–10.	Matching number symbols with the number of objects	4.3.2

This instrument was validated by two early childhood education experts and one kindergarten practitioner to ensure content validity and suitability for the children's age group. The test was administered twice, namely a pretest (before treatment) and a posttest (after treatment). Each test item was scored 1 for a correct answer and 0 for an incorrect answer, then processed quantitatively.

This study consisted of five main stages. First, preparation, which included developing instruments, conducting preliminary observations, and determining the research sample. Second, a pretest to measure the children's initial ability to recognize numbers. Third, treatment, which is learning using the Marbel Angka educational game during four meetings with a variety of games, namely Belajar Angka 1–10 (Learning Numbers 1–10), Balon Angka (Number Balloons), Cepat Tepat (Fast and Accurate), and Puzzle Angka (Number Puzzles). Fourth, a posttest, which is conducted to remeasure the children's abilities after treatment. Fifth, data analysis, aimed at comparing pretest and posttest scores to determine the effect of using the Marbel Angka educational game on children's ability to recognize numbers.

Data analysis was performed using inferential statistics with SPSS 25 for Windows software. The first step was to test the normality of the data using the Shapiro–Wilk test to ensure normal distribution, followed by testing the homogeneity of variance using Levene's test. Once the assumptions were met, hypothesis testing was performed using the Paired Sample t-test at a significance level of $\alpha = 0.05$ (Ghasemi & Zahediasl, 2012). If the p-value was < 0.05 , there was a significant difference between the pretest and posttest, which meant that the treatment had an effect on children's number recognition abilities. The results of the homogeneity test in this study showed a significance value of 0.334 in the pretest and 0.440 in the posttest. These results indicate that the data are normally distributed because the significance value is greater than 0.05. The homogeneity test showed a significance result of 0.588 and stated that the data had variance or were homogeneous.

To strengthen the interpretation, the t-test results can also be accompanied by effect size calculations (Cohen's *d*) to describe the practical impact of the treatment (Cohen, 1988). A *d* value > 0.8 indicates large effect; 0.5 indicates a moderate effect; and 0.2 indicates a small effect.

The validity and reliability of the instruments were tested systematically. Content validity was assessed by early childhood education experts to evaluate the suitability of the indicators with the developmental competencies of young children. Internal reliability was calculated using Cronbach's Alpha, with a value of > 0.70 as the criterion for acceptable consistency (Nunnally & Bernstein, 1994).

In addition, this study pays attention to internal validity by ensuring consistency in conditions during treatment implementation, direct supervision by researchers, and the use of the same instruments in pre-tests and post-tests. Meanwhile, external validity is maintained by explicitly stating the population limitations and subject characteristics, so that the results can be carefully generalized to the context of 4-5-year-old children in a learning environment.

The pre-experimental design used, despite not involving a control group, still provides a valid empirical picture of the influence of digital media on children's early numeracy development (Fraenkel et al., 2020). The results are expected to serve as a conceptual and empirical basis for the development of interactive technology-based numeracy learning models in early childhood education institutions. This approach not only stimulates cognitive aspects but also strengthens children's engagement through enjoyable, meaningful, and contextual learning experience.

Result and Discussion

Result

The results of research conducted at Al A'raaf Islamic Kindergarten with 50 children, The researchers selected 25 children as research subjects. In this study, only one group was sampled, consisting of 25 children from group A2. The

pretest results of 25 children in group A2 showed that the highest score was 7 and the lowest score was 1. With an average score of 3.84, a standard deviation of 1.519, and a variance of 2.307.

Meanwhile, the posttest results showed significant results. The difference was quite noticeable when a pretest was conducted, followed by treatment, and then a posttest with 25 children. In the post-test results, the children's average score was 6.96. The highest score was 10 and the lowest score was 7, and the total score for the children was 781.25 with a standard deviation of 1.837 and a variation score of 3.374. Table 2 below is a summary of the results of the pretest and posttest of children's number recognition abilities. The pretest and posttest are presented to compare the changes after the research stage was completed.

Table 2. Pre-test dan Post-test Results

Variable	Pre-Test	Post- Test
N	25	25
Highest score	7	10
Lowest score	1	7
Total	96	174
Average	3,84	6,96
SD	1,519	1,837
SD ²	2,307	3,374

The results of the hypothesis test analysis used the paired t-test technique. The results of the hypothesis test analysis can be seen in Table 3 below:

Table 3. Result of the Hypothesis

	t	df	Sig. (2-tailed)	Description
<i>Pretest – Posttest</i>	-8,117	24	0,000	Significant (p < 0,05)

The significance value obtained is 0.000, which meets the requirement for Ha to be accepted because $0.000 < 0.05$, then H0 can be rejected. Based on the test results presented in Table 3, it can be interpreted that the Marbel Angka educational game has an effect on the ability to recognize numbers in children aged 4-5 years.

After treatment, a post-test was administered to determine the final results after treatment. The results of the posttest showed that there was a significant difference in the average ability to recognize numbers because the significance value was $p < 0.05$, which was 0.000. It can be interpreted that H0 is rejected and Ha is accepted.

Based on the results of the data analysis that has been obtained, these results provide evidence that there is a difference in the average number recognition ability of children who use the Marbel Angka educational game and those who do not use the Marbel Angka educational game. From the explanation above, it can be stated that the Marbel Angka educational game has an effect on the ability to recognize numbers in children aged 4-5 years.

Discussion

The results showed that the use of the Marbel Angka educational game had a significant effect on improving the number recognition skills of 4–5-year-old children at Al A'raaf Islamic Kindergarten. The average score increased from

3.84 on the pretest to 6.96 on the posttest, with a significance value of 0.000 ($p < 0.05$) and an effect size of 0.84, which is classified as large (Cohen, 1988). This shows that digital game-based learning can effectively stimulate children's numeracy development in the context of early childhood education.

This finding is consistent with Piaget (1970) theory of the preoperational stage, where children learn through symbolic activities and concrete experiences. Through the Marbel Angka educational game, children interact with number symbols and visual images that represent quantities, helping them to conceptualize numbers through meaningful play experiences (Veryawan & Hasibuan, 2020). This medium facilitates children in converting concrete experiences into symbolic representations, which is the core of early numeracy learning (Rozi et al., 2021).

In addition, the results of the study also support (Lev Vygotsky, (1978) view of the Zone of Proximal Development (ZPD) and the importance of scaffolding in early childhood learning. In the context of this study, Marbel Angka acts as digital scaffolding that provides immediate feedback and tiered challenges, as well as visual and auditory support according to the child's abilities. This interactive process helps children move from their actual ability zone to their potential development zone.

From the perspective of digital constructivism (Papert, 1993), digital media is not merely a tool, but a learning environment that enables children to actively construct meaning. Through exploration and experimentation within the game, children learn to discover relationships between numbers, quantities, and sequences, fostering conceptual and reflective understanding. Therefore, Marbel Angka serves as a constructive digital learning environment that is in line with the principles of developmentally appropriate practice (DAP) in Early Childhood Education.

The results of this study reinforce previous findings showing that the use of interactive digital media, particularly educational games, has a positive impact on early numeracy skills in young children. Research by Janah dan Ariyani (2022) found that the Marbel Angka app was able to significantly improve kindergarten children's number recognition skills through an interactive and fun play-based approach. In line with this, a study by Pangarti & Yaswinda (2023) also proves that interactive digital media can improve children's basic cognitive abilities, including recognizing number symbols and understanding numerical concepts.

These findings are also consistent with international research. Ferrara dan Ferrari (2023) in the journal *Digital Experiences in Mathematics Education* revealed that digital experience-based learning can accelerate the development of symbolic reasoning and numerical fluency in kindergarten children. The same results were obtained by Hyde et al. (2021), who confirmed that digital symbolic representations play an important role in building an understanding of number concepts in preschool children. Furthermore, Park et al. (2022) in *Early Childhood Research Quarterly* emphasize that educational digital games contribute significantly to improving executive function and numeracy skills, especially when accompanied by active interaction between children and teachers.

In terms of motivation and learning engagement, Ferraro, et al. (2021) in *Computers & Education* highlight that game-based learning improves children's focus and persistence in solving simple numerical problems, meanwhile, Chen dan Tsai (2019) emphasize that the effectiveness of educational games is largely determined by the quality of media design and teacher assistance in the learning process. However, there are also different views that need to be considered. Hsin dan Wu (2019) warn that the use of digital devices without supervision can reduce children's social interaction and attention to their surroundings. However, this study shows different results because the Marbel Angka method was implemented under the direct supervision of teachers for a measured duration, thereby minimizing these negative effects.

Thus, the results of this study not only reinforce the consistency of previous positive findings, but also emphasize the importance of the context of targeted, interactive, and educator-guided use of digital media. The use of Marbel Angka in this study proved to be able to integrate numeracy learning with a fun and meaningful play experience for children. This expands the empirical evidence that digital media can be an integral part of modern Early Childhood Education learning, throughout its use, the principles of child development and appropriate pedagogical ethics must be taken into consideration.

Although the majority of studies show positive results, there are also findings that indicate the potential risks of inappropriate use of digital media. Hsin dan Wu (2019) found that the use of digital devices without adult supervision can reduce children's social interactions and hinder language development. Cordes & Miller (2020) also warn that excessive digital exposure can cause attention disorders if not properly controlled.

However, this study successfully overcame these potential negatives through an active mentoring-based pedagogical strategy. The treatment was conducted in a guided manner with a measured duration of play and direct supervision by the teacher. This is in line with the recommendations of the Hill et al. (2016), which emphasizes the importance of limited, interactive, and adult-supervised use of high-quality media. Thus, digital media in this study serves not as a substitute for social interaction, but as a tool for targeted cognitive stimulation.

The significant improvement in number recognition skills shows that Marbel Angka is effective as a numeracy learning medium that is in line with the developmental characteristics of early childhood. Children learn through multiple senses—seeing, hearing, touching, and trying—making the learning process meaningful. This reinforces the concepts of learning by doing and learning through play, which are the main principles of early childhood education (Piaget, 1970; NAEYC, 2020).

The practical implications of this study are as follows:

1. Teachers can integrate educational digital media such as Marbel Angka into guided thematic numeracy learning.
2. The use of digital media can increase children's motivation and active participation in the learning process.
3. Digital game-based learning activities can strengthen the dimensions of the Pancasila Student Pr file, particularly in terms of critical thinking, creativity, and independence.

This study contributes conceptually to the strengthening of the theory of Digital Constructivism, which positions technology as a cognitive tool in early childhood learning. Marbel Angka has been proven to not only improve cognitive scores, but also strengthen children's metacognitive engagement in understanding the symbolic relationship between numbers and quantities.

From a practical standpoint, this research supports the innovation of interactive technology-based numeracy learning in Indonesian Early Childhood Education institutions. However, to broaden the generalization, further research using quasi-experimental or mixed methods designs is recommended in order to analyze the cause-and-effect relationship more comprehensively and explore the long-term social-emotional impact of digital media use.

Conclusion

The conclusion that can be drawn from this study is that the Marbel Angka educational game can have a positive effect on the ability to recognize numbers in children aged 4-5 years at Al A'raaf Islamic Kindergarten. A positive effect was shown in the data processing results, which indicated a significant difference when treatment was given using the Marbel Angka educational game. The average score obtained in the post-test improved after being given stimuli using the Marbel Angka educational game. Thus, it can be concluded that the Marbel Angka educational game has an effect on the ability to recognize numbers in children aged 4-5 years at Al A'raaf Islamic Kindergarten.

The suggestion given for further research is to use the Marbel Angka educational game with other skill areas so that the Marbel Angka game can be used not only to learn numbers but also to provide many other benefits and can be developed using a stronger approach. Researchers advise parents to supervise their children when they use the Marbel Angka educational game at home.

References

- Amrina, Q., Prasetyawati, D., & Karmila, M. (2020). Pengaruh penggunaan media pop-up terhadap kemampuan konsep bilangan pada anak usia 4-5 tahun di Tk. *PAUDIA: Jurnal Penelitian Dalam Bidang Pendidikan Anak Usia Dini*, 09(02), 130–136. <https://doi.org/10.26877/paudia.v9i1.7023>
- BERA. (2018). *British Educational Research Association-BERA*. British Educational Research Association. The British Educational Research Association. <http://www.bera.ac.uk/publications>
- Campbell, D. T., & Stanley, J. C. (2025). *Experimental and quasi-experimental designs for research*. Houghton Mifflin.
- Chen, C. H., & Tsai, C. C. (2019). The impact of educational games on young children's learning performance and engagement. *Educational Technology & Society*, 22(3), 70–81.
- Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences (2nd ed.)*. Routledge.
- Cohrssen, C., Fielding, J., & Bird, J. (2025). Informal assessment of preschool children's concepts of zero. *Early Childhood Education Journal*, 53(3), 891–902. <https://doi.org/10.1007/s10643-024-01634-8>
- Cordes, S., & Miller, H. E. (2020). Digital media and cognitive development: Balancing opportunities and risks. *Developmental Review*, 58, 100940.

- Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches*. Sage.
- de Chambrier, A. F., Baye, A., Tinnes-Vigne, M., Tazouti, Y., Vlassis, J., Poncelet, D., Giauque, N., Fagnant, A., Luxembourgger, C., Auquière, A., Kerger, S., & Dierendonck, C. (2021). Enhancing children's numerical skills through a play-based intervention at kindergarten and at home: a quasi-experimental study. *Early Childhood Research Quarterly*, *54*, 164–178. <https://doi.org/10.1016/j.ecresq.2020.09.003>
- Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics*, *5*(1), 1–4. <https://doi.org/10.11648/j.ajtas.20160501.11>
- Ferrara, F., & Ferrari, G. (2023). Kindergarten children and early learning of number: embodied and material encounters within the classroom. *Digital Experiences in Mathematics Education*, *9*(3), 401–419. <https://doi.org/10.1007/s40751-022-00117-y>
- Ferraro, F. Giani, S., & Rossi. (2021). Interactive game-based learning for preschool numeracy. *Computers & Education*, *174*, 104314.
- Fitrah, E. Z., & Sartika, I. D. (2025). Pengaruh penggunaan game marbel terhadap kemampuan mengenal angka pada anak usia dini. *Sindoro CENDIKIA PENDIDIKAN*, *17*(7), 1–9. <https://doi.org/10.9644/sindoro.v3i9.267>
- Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2020). *How to Design and Evaluate Research in Education (10th ed.)*. McGraw-Hill.
- Ghasemi, A., & Zahediasl, S. (2012). Normality tests for statistical analysis: A guide for non-statisticians. *International Journal of Endocrinology and Metabolism*, *10*(2), 486–489. <https://doi.org/10.5812/ijem.3505>
- Hill, D., Ameenuddin, N., Chassiakos, Y. R., Cross, C., Radesky, J., Hutchinson, J., Boyd, R., Mendelson, R., Moreno, M. A., Smith, J., & Swanson, W. S. (2016). Media and young minds. *Pediatrics*, *138*(5). <https://doi.org/10.1542/peds.2016-2591>
- Hsin, C. T., & Wu, H. C. (2019). The impact of digital games on preschool children's learning and social interaction. *Early Child Development and Care*, *189*(13), 2080–2094.
- Hyde, D. C., Mou, Y., Berteletti, I., Spelke, E. S., Dehaene, S., & Piazza, M. (2021). Testing the role of symbols in preschool numeracy: An experimental computer-based intervention study. *PLoS ONE*, *16*(11 November), 1–27. <https://doi.org/10.1371/journal.pone.0259775>
- Janah, S. M., & Ariyani, D. (2022). Marbel Angka" berbasis Android sebagai media pengenalan angka pada anak usia dini. *Yaa Bunayya : Jurnal Pendidikan Anak Usia Dini*, *6*(2), 24–32. <https://doi.org/10.24853/yby.6.2.24-32>
- Kementerian Pendidikan dan Kebudayaan. (2014). *Peraturan menteri pendidikandan kebudayaan Republik Indonesia nomor 137 tahun 2014 tentang standar nasional pendidikan anak usia dini*. Jakarta: Kementerian Pendidikan dan Kebudayaan.
- Kementerian Pendidikan dan Kebudayaan. (2014). *Peraturan menteri pendidikandan kebudayaan Republik Indonesia nomor 146 tahun 2014 tentang kurikulum 2013 pendidikan anak usia dini*. Jakarta: Kementerian Pendidikan dan Kebudayaan.
- Mutiara, S., & Hambali, H. (2025). Kemampuan membilang 1-10 pada anak usia 5-6 tahun melalui tabung angka di TK Wijaya Kusuma Pagedangan. *Jurnal Pendidikan Tambusai*, *9*(1), 7397–7402. <https://doi.org/10.31004/jptam.v9i1.25674>
- Nunnally, J. C., & Bernstein, I. H. (1994). *Psychometric Theory (3rd ed.)*. McGraw-Hill.
- Pangarti, W. M., & Yaswinda. (2023). Pembelajaran berbasis multimedia untuk meningkatkan kemampuan kognitif anak

usia dini. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, 7(3), 2589–2599.
<https://doi.org/10.31004/obsesi.v7i3.4407>

Papert, S. (1993). *The Children's Machine: Rethinking School in the Age of the Computer*. Basic Books.

Park, H., Lee, J., & Kim, S. (2022). Game-based digital learning for preschoolers: Effects on executive functions and numeracy. *Early Childhood Research Quarterly*, 59, 216–227.

Piaget, J. (1970). *The Child's Conception of Number*. Routledge & Kegan Paul.

Rahmayanti, N., & Safitri, A. (2021). *Politeknik negeri samarinda, jurusan teknologi informasi 2021 1*.

Rozi, F., Mubarak, A. F., & Humaidah. (2021). Penggunaan media permainan bola angka terhadap kemampuan mengenalkan konsep bilangan 1-10 pada anak. *PAUDIA: Jurnal Penelitian Dalam Bidang Pendidikan Anak Usia Dini*, 10(2), 266–277. <https://doi.org/10.26877/paudia.v9i1.8339>

Sugiyono. (2010). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: PT.Alfabeta.

Sugiyono. (2019). *Metode Penelitian Kuantitatif, Kualitatif, dan R&D*. Bandung: PT.Alfabeta.

Tucker, S. I., & Johnson, T. N. (2022). Developing number sense with Fingu: a preschooler's embodied mathematics during interactions with a multi-touch digital game. *Mathematics Education Research Journal*, 34(2), 393–417. <https://doi.org/10.1007/s13394-020-00349-4>

Veryawan, & Hasibuan, M. (2020). Penggunaan media kartu angka dalam upaya meningkatkan kemampuan mengenal angka pada anak usia dini. *PAUDIA: Jurnal Penelitian Dalam Bidang Pendidikan Anak Usia Dini*, 09(02), 62–70. <https://doi.org/10.26877/paudia.v9i1.6736>

Wardani, I. R., Putri Zuani, M. I., & Kholis, N. (2023). Teori belajar perkembangan kognitiv Lev Vygotsky dan implikasinya dalam pembelajaran. *DIMAR: Jurnal Pendidikan Islam*, 4(2), 332–346. <https://doi.org/10.58577/dimar.v4i2.92>