

# Implementation Of Mathematics Learning Through Number Fishing Games To Improve Early Childhood Number Recognition Learning Outcomes

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## Abstract

*This study aimed to improve early childhood learning outcomes, specifically in number recognition, through the number fishing game method. Mathematics learning in early childhood is often considered difficult if delivered using conventional methods; thus, interactive, visual, and kinesthetic approaches are necessary. This study employed a Classroom Action Research (CAR) method using the Kemmis and McTaggart design, which includes planning, acting, observing, and reflecting. The subjects were 17 children aged 5-6 years (Group B1) at TKN Serikandi. Data collection was conducted through observation, interviews, and documentation, analyzed using descriptive quantitative and qualitative methods. The results showed a significant improvement from the pre-cycle to cycle II. In the pre-cycle, classical completeness was only 17.65% (3 children met expectations). After implementing the number fishing game in cycle I, completeness increased to 64.70% (11 children). In cycle II, the learning outcomes reached an optimal completeness of 88.23% (15 children developed very well). The number fishing game proved effective in facilitating children to recognize numbers, identify the often-confused number symbols 6 and 9, and count objects accurately and joyfully.*

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## 1. INTRODUCTION

Early Childhood Education (PAUD) is a crucial educational level that lays the foundation for a child's future cognitive, affective, and psychomotor development. During this golden age, brain tissue development is rapid, so targeted and educational stimulation is essential. One important stimulation that must be introduced early is problem-solving and logical thinking skills through basic mathematics (Rahmawati & Susanto, 2021). According to Khadijah (2021), children's cognitive abilities, including deductive reasoning, abstract concept recognition, and problem-solving, develop intensively at this age. These abilities will help children gather information and actively participate in social life.

Mathematics is inseparable from human life. According to Warmansyah (in Nur Ainul Lubis & Ali Umar, 2022), mathematics is a variety of fundamental knowledge applied in daily routines. In early childhood, mathematics learning should not be carried out in a way that is burdensome or emphasizes dry memorization. Instead, this learning must be tailored to the child's characteristics, namely learning through play (Play while learning). A contextual approach, using the surrounding environment and real objects, makes mathematics easier to understand. According to Marina, T.R.G et al. (2024), mastery of essential mathematics such as number recognition,

sequence, and quantity is closely related to children's routines, for example when they have to identify time or distinguish the number of objects (Siti Saniah, 2026).

However, based on the results of observations conducted in class B1 TKN Serikandi during the pre-action, problems were found in mathematics learning outcomes. Most children still experience difficulties in recognizing numbers. Of the 17 children, the majority were unable to consistently state the sequence of numbers, had difficulty matching number symbols with the correct number of objects, and often confused the difference between numbers that have similar visual forms, such as the numbers 6 and 9. Learning activities that have been implemented tend to be conventional, monotonous, and centered on Student Worksheets (LKPD) or the blackboard. This has resulted in a drastic decline in the level of participation and enthusiasm of children, thus impacting the low classical learning outcomes, which only reached 17.65%.

Addressing this problem, interactive learning media and methods are needed that accommodate children's visual and kinesthetic learning styles. According to Lestari and Nurhayati (2024), the goal of mathematics in early childhood education (PAUD) is not only related to the concept of numeracy, but also to developing a positive attitude towards mathematics, so that children are motivated, not afraid to try, and confident. One relevant method is the "Number Fishing Game." Based on a study conducted by Rani Nur Lidiawati (2024), this game was modified from a fishing activity to a game of collecting fish that have been labeled with numbers and magnets. According to Lisda E.S.P. (2023), this game not only facilitates motor coordination but also accustoms children to logical and mathematical thinking (Purba et al., 2026). This is consistent with a broader body of research specifically on early childhood numeracy games: Delfia and Mayar (2020) found that a fruit-piece matching game effectively instilled basic counting concepts in young children, while Duana Fera Risina and Aghtilana Indah Jannati (2025) showed that concrete "math world" learning media significantly improved young children's introduction to mathematical concepts, reinforcing the rationale for using a concrete, play-based medium such as the number fishing game rather than abstract instruction.

The number fishing game has many advantages. According to Irawati (in Lisda E.S.P., 2023), this game improves memory, fosters motivation, trains patience, and facilitates children in matching the number of objects with their numerical symbols (Purba et al., 2026). Children are trained to associate the number of fish caught with the number listed concretely (Istiqomah & Maemonah, 2021). Several previous studies, such as those conducted by Nidia Triwulandari & Sri Setyowati (2022) and Nur Hayati Yusuf et al. (2022), also demonstrated that the fish fishing game can significantly boost understanding of number symbols (Raudatul Zannah et al., 2024; Ayu Rikiana Pasaribu et al., 2023).

Based on this background, this study aims to comprehensively describe the application of mathematics learning through the number fishing game method to improve number recognition learning outcomes in 5–6-year-old children in Group B1 of Serikandi Kindergarten. This research is expected to provide theoretical and practical implications for early childhood education educators in designing engaging, contextual, and meaningful numeracy learning strategies (Bahrum et al., 2023; Onoshakpokaiye, 2023).

## 2. RESEARCH METHOD

This study uses a Classroom Action Research (CAR) approach. According to Daryanto (2014), CAR is a form of collaborative reflective inquiry conducted by teachers in the classroom to improve the quality of learning practices and address specific problems experienced by students.

This study adopts the cycle model from Kemmis and McTaggart, which consists of four continuous stages: (1) Planning, (2) Action, (3) Observation, and (4) Reflection (Ijar Salna & Ajeng Ninda Uminar, 2024; Sufa & Setiawan, 2021). In the Planning stage, the researcher and the collaborating teacher jointly designed the RPPH for the cycle, prepared the number fishing game media, and agreed on the observation and assessment instruments to be used. In the Action stage, the collaborating teacher implemented the planned RPPH in the classroom exactly as designed, leading the number fishing game activity with the students while the researcher acted as a non-participant observer recording the process using the Teacher Observation Sheet and the Child Learning Outcomes Assessment Sheet; the Observation stage was thus carried out simultaneously with the Action stage rather than as a separate step, capturing both teacher fidelity to the RPPH and each child's performance on the three number-recognition indicators in real time. In the Reflection stage, held immediately after each cycle's final meeting, the researcher and the collaborating teacher jointly reviewed the observation results and assessment scores, discussed specific obstacles encountered during the Action stage (such as students' compliance with turn-taking rules or their focus on the numbers rather than the physical activity), and used this joint reflection to decide whether the 80% classical completion success indicator had been met or whether the RPPH needed to be revised and carried forward into a subsequent cycle. This planning-action-observation-reflection sequence was repeated identically for Cycle II, with the specific revisions made during the Cycle I reflection stage detailed in Section 3.3 below.

This research was conducted at TKN Serikandi located in Karang Bajo Hamlet, Karang Bajo Village, Bayan District, North Lombok Regency, NTB. The implementation was carried out in the even semester of the 2025/2026 Academic Year, precisely during June 2026. The subjects in this research were group B1 students who were in the age range of 5-6 years. The total number of subjects was 17 children, with details of 6 boys and 11 girls.

The data sources in this study are divided into two categories: primary and secondary. Primary data were collected directly through student involvement in the number fishing game intervention, which was observed through observation sheets of children's activities. Furthermore, data on students' learning success rates (recognizing number symbols 1-10, sequencing numbers, and distinguishing between 6 and 9) were collected through a performance assessment rubric. Secondary data included interviews with collaborating teachers, photographic documentation of learning implementation, and document review in the form of Daily Learning Implementation Plans (RPPH).

The instruments used in data collection included (a) a Teacher Observation Sheet to assess the level of conformity of teacher actions with the RPPH scenario; (b) a Child Learning Outcomes Assessment Sheet based on four achievement levels: Not Yet Developing (BB), Beginning to Develop (MB), Developing as Expected (BSH), and Developing Very Well (BSB); (c) a semi-structured Interview Guide; and (d) a visual documentation tool (Kurniasih & Rahimah, 2021). The four achievement levels were operationally determined based on the child's performance on three indicators observed during the number fishing game: (1) naming the number symbol on the fish caught, (2) sequencing the caught numbers correctly, and (3) matching the number of fish caught with the correct quantity, including correctly distinguishing the numbers 6 and 9. A child was scored BB (Not Yet Developing) if they could not perform any of the three indicators even with full teacher assistance; MB (Beginning to Develop) if they could perform at least one indicator, but only with repeated prompting or direct assistance from the teacher; BSH (Developing as Expected) if they could perform all three indicators independently, although still

inconsistently or slowly, such as occasionally needing a moment to recall a number's sequence; and BSB (Developing Very Well) if they could perform all three indicators independently, quickly, and consistently across repeated attempts, including correctly and confidently distinguishing 6 from 9 without hesitation. This rubric was applied consistently by the teacher and researcher for every child at the end of each cycle, and cross-checked between the two assessors as part of the technical triangulation described below, so that the classification could be replicated by other observers using the same three indicators.

The data analysis techniques applied were quantitative and qualitative descriptive analysis. Qualitative data in the form of interview transcripts and field notes regarding children's enthusiasm were analyzed descriptively to provide a narrative overview of the learning process. Quantitative data in the form of children's performance scores were analyzed using the percentage completion formula. The success indicator (minimum completion criteria) established in this study was if at least 80% of the total children achieved the criteria for Developing According to Expectations (BSH) or Developing Very Well (BSB), or if the classical score reached at least 80% (Mahesya, A.A. et al., 2023).

### 3. RESULTS AND DISCUSSION

#### 3.1 Initial Conditions (Pre-Cycle)

Before the implementation of the "fishing for numbers" game, mathematics instruction in class B1 at Serikandi Kindergarten (TKN Serikandi) focused on worksheets and repetitive writing of numbers on the board. This resulted in monotonous learning and lost the essence of "play" that underpins early childhood education. Based on pre-action data, the performance of 17 students in identifying, sequencing, and understanding number symbols was very poor.

Quantitatively, the results of the initial ability assessment showed that 3 children (17.65%) were in the Not Yet Developing (BB) category, 11 children (64.70%) were in the Starting to Develop (MB) category, 3 children (17.65%) had reached the Developing According to Expectations (BSH) category, and not a single child (0%) had reached the Very Well Developing (BSB) category. The required classical completion level is for children to achieve BSH and BSB. At this phase, classical completion has only reached 17.65%, far below the established success threshold of 80%. The dominant problems faced by children include difficulty naming numbers spontaneously, errors in determining quantities (one-to-one correspondence), and a massive inability to distinguish curves in the number symbols 6 and 9.

#### 3.2 Implementation and Results of Cycle I

In response to the low percentage of pre-cycle completion, researchers and teachers designed an RPPH by incorporating a number fishing game method with the theme "Sea Animals". Cycle I was implemented in two meetings. The teacher prepared media in the form of a small bamboo fishing rod set, magnets, and cardboard fish labeled with numbers (1-10), which were spread in an artificial "pond" on the classroom floor.

During the implementation phase, the children responded to the media with great curiosity. The learning process began with an apperception about fish as God's creation and an introduction to the English word "Fish" (One Day One Word). The children were then divided into two groups (containing 8 and 9 children) and guided in turns to fish. After catching a fish, the children were asked to name the number listed and calculate their total catch. However, from observing student activities, it was found that some children still did

not comply with the turn rules, resulting in pile-ups and fighting over fishing equipment. Some children were also distracted because they were too focused on the physical activity of fishing rather than identifying the number labels on the fish's bodies.

Based on the assessment at the end of Cycle I, there was an improvement. Of the 17 children, 0 were in the Not Yet Developing (BB) category, the number of children in the Starting to Develop (MB) category decreased to 6 children, and children who reached the Developing According to Expectations (BSH) category shot up to 11 children (64.70%). Unfortunately, no children had yet achieved Very Good Development (BSB). Although classical completion jumped to 64.70%, this percentage was still below the target success indicator of 80%. Reflection on Cycle I emphasized that teachers need to instill a clearer understanding of the rules before playing, as well as add a variety of activities to strengthen cognition of number shapes so that children do not just play physically.

### 3.3 Implementation and Results of Cycle II

Based on the reflections from Cycle I, Cycle II was implemented with substantial improvements. Instead of simply using a floor-level pool, the teacher modified the area by adding replicas of coral reefs and fishing boats, and provided each child with an empty aquarium as a drawing medium. The rules of the game were reinforced through modeling (live demonstration) before the game began. Groups were spaced sufficiently apart to minimize competition for the media.

In the core activity of Cycle II, after the children catch the fish labeled with numbers, they are not only asked to name them, but also to stick the fish in their respective "aquarium" media, and bold or copy the numbers using markers (fine motor involvement). This variation successfully focuses the children's concentration on the morphological form of numbers. The confirmation of the curved shape below for the number 6 and the curved shape above for the number 9 is done interactively and repeatedly through cheerful questions and answers.

The assessment results at the end of Cycle II showed a significant increase in success. A total of 15 children (88.23%) successfully reached the Very Well Developed (BSB) category, demonstrating full mastery in recognizing number symbols, distinguishing similar numbers (6 and 9), and correspondence in counting objects. Only 2 children (11.76%) remained at the Developing According to Expectations (BSH) level, and no children were left behind in the MB or BB categories. With classical completeness of 88.23%, the success indicator (80%) had been well exceeded, so the study was stopped in this cycle.

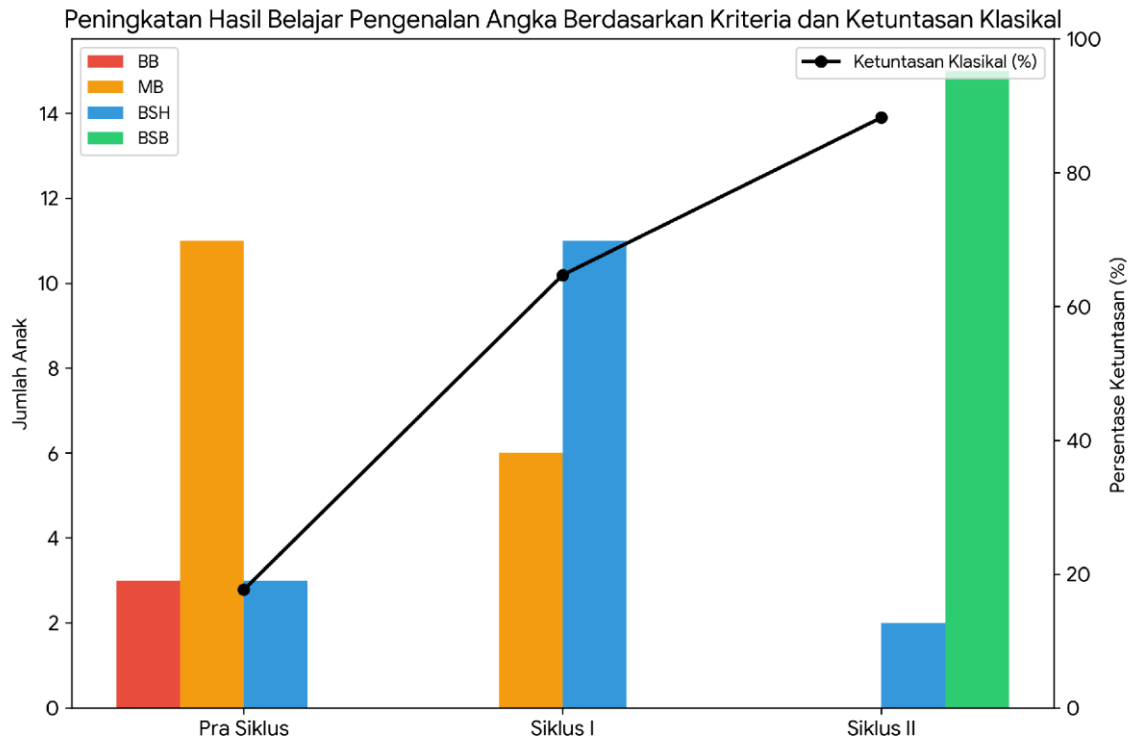
### 3.4 Inter-Cycle Discussion

Improved learning outcomes from Pre-Cycle, Cycle I, to Cycle II provide empirical evidence that learning methods involving sensory and motor activity have a significant impact on early childhood (Sufa & Setiawan, 2021). The following is a data visualization and tabulation of the recapitulation of student achievement across the three observation stages.

| Evaluation Criteria | Information | Pre Cycle   | Cycle I     | Cycle II   | Trend       |
|---------------------|-------------|-------------|-------------|------------|-------------|
| Not Yet Developed   | BB          | 3 (17,65%)  | 0 (0%)      | 0 (0%)     | Down        |
| Starting to Grow    | MB          | 11 (64,70%) | 6 (35,30%)  | 0 (0%)     | Down        |
| As expected,        | BSH         | 3 (17,65%)  | 11 (64,70%) | 2 (11,76%) | Fluctuating |

|                      |              |        |        |             |                      |
|----------------------|--------------|--------|--------|-------------|----------------------|
| Very Good            | BSB          | 0 (0%) | 0 (0%) | 15 (88,23%) | Significant Increase |
| Classical Completion | KK (BSH+BSB) | 17,65% | 64,70% | 88,23%      | Significant Increase |

Graph 1. Distribution of Classical Completion Criteria and Improvement of Classical Completion



Source: Researcher Processed Data, 2026

The graph above clearly depicts the shift in children's abilities. The drastic decline in the red (BB) and orange (MB) bar graphs aligns with the surge in the blue (BSH) bar graph in cycle I and the green (BSB) bar graph in cycle II. The black trend line shows the classical completion graph, which progressively climbed from 17.65% to 88.23%. The success of this intervention aligns with the opinion of Agustin & Mas'udah (in Lisda E.S.P., 2023), who emphasized that the use of nature-themed attributes wrapped in everyday game mechanisms will bridge abstract number concepts into concrete ones. Fishing not only requires hand-eye coordination, but labeling numbers on fish media transforms children's sensory focus into mathematical cognitive input.

Furthermore, children's adaptation to the form of numbers that often lead to misconceptions (numbers 6 and 9) can be resolved in cycle II through the integration of sticking activities into the aquarium (sorting activities) and independent copying. Citing the findings of Nur Hayati Yusuf et al. (2022), multi-sensory stimulation where children see, touch (hold fish caught), and categorize objects has been proven to minimize basic numerical dyslexia in the 5–6-year age range. Therefore, educational games consistently emphasize their position not only as a means of entertainment, but as a central medium supporting the independent curriculum in PAUD (Marina, T.R.G, et al., 2024).

#### 4. CONCLUSION

Based on the research cycle that has been carried out at TKN Serikandi, it can be concluded that the application of the learning method through the "Number Fishing Game" was effective in improving number recognition skills, basic mathematical intelligence, and learning outcomes of the 17 children aged 5-6 years who participated in this classroom action research, as measured by the rise in classical completion against the 80% success indicator. As this conclusion is drawn from a single-class Classroom Action Research design rather than an experimental study with a control group, the term "valid" is used here only in the sense that the observed improvement was consistently confirmed across the Teacher Observation Sheet, the Child Learning Outcomes Assessment Sheet, and the semi-structured interviews through source and technical triangulation, and should not be read as statistical validity in the psychometric sense. The dynamics of improvement are empirically proven through the escalation of the classical completion percentage, which started at the pre-cycle condition of 17.65%, then moved up moderately to 64.70% in cycle I as the game became a habit, and finally skyrocketed to reach the ideal figure of 88.23% (where 15 out of 17 children reached the Very Well-Developed category) at the peak of cycle II.

Learning modifications that combine motoric activities with cognitive tasks (counting, naming, and attaching to supporting media) successfully break conventional boredom, stimulate previously biased focus, and correct children's visual memory errors (especially for the numbers 6 and 9). Early childhood educators are advised to continue implementing pedagogical innovations based on concrete environments and materials such as this game. For further research, modifications to the complexity of numbers and basic mathematical operations, such as simple addition or subtraction, are recommended to be explored using more challenging game mechanics (gamification).

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