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Development of Treasures Number Learning Media to Develop Early Childhood Numeracy Skills 4-5 Years Old

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Abstract

This study aims to develop Number Treasure learning media made from plywood and test its effectiveness in improving numeracy skills of children aged 4-5 years at TK Arsya Bunda Bandar Mataram, Central Lampung. The research used Research and Development (R&D) method with 4D model (Define, Design, Develop, Disseminate). The subjects were 15 children aged 4-5 years. Data collection used observation, expert validation questionnaires, interviews, and documentation. Data analysis used quantitative techniques with Likert scale and qualitative descriptive. Media expert validation results obtained "Eligible" category and material expert "Eligible". Product trial showed significant improvement in children's numeracy skills, from 9 children (60%) in Undeveloped category to 10 children (67%) Developing as Expected and 3 children (20%) Developing Very Well. This media effectively trains five numeracy indicators: counting objects 1-10, understanding number concepts, recognizing number symbols, matching number symbols, and reciting numbers 1-10. Number Treasure media is a learning innovation that combines treasure hunt games with numeracy concepts using environmentally friendly plywood materials, easy to make, and attractive for early childhood.

Keywords: *Early Childhood, Numeracy, Number Treasure, Learning Media, Research And Development*

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INTRODUCTION

Early Childhood Education (PAUD) is the main foundation in character formation and holistic development of children's potential. Early childhood is often referred to as the *golden age*, which is a period when the child's brain's ability to absorb information is at its highest point (Hasanah & Fajri, 2022). In the age range of 0-6 years, children's brains develop rapidly to reach 80% of the adult brain capacity, so proper stimulation is needed to optimize all aspects of child development, including cognitive aspects (Adatul'aisy et al., 2023). The cognitive aspect is one of the crucial developmental dimensions to be stimulated from an early age because it has a direct impact on children's readiness to face the next level of education. In the cognitive realm, *numeracy* skills are fundamental abilities that need to be developed because they are the basis for mastering various fields of science (Annisa et al., 2024). Numeracy skills in early childhood are not intended to provide an academic

burden, but rather to build basic understanding naturally through fun play experiences (Malapata & Wijayaningsih, 2019).

Based on Piaget's theory of cognitive development, children aged 4-5 years are in a pre-operational stage characterized by the ability to think symbolically and learn through active interaction with the surrounding environment (Suryana, 2025). At this stage, children begin to be able to distinguish colors, shapes, sizes, and understand cause-and-effect relationships through real experiences. Piaget emphasized that children learn by actively interacting with the environment, so concrete learning media is needed to help understand abstract concepts such as numbers (Suryana, 2025).

In addition to Piaget, Vygotsky's theory also provides an important foundation for the role of social interaction in children's cognitive development. Vygotsky emphasized the importance of *scaffolding* or help from teachers/adults to help children achieve new abilities that are in the *Zone of Proximal Development* (ZPD) (Saputra & Suryandi, 2016). In the context of numeracy learning, children will more easily develop their abilities when the teacher provides appropriate challenges and the right guidance. The Montessori approach that emphasizes learning through direct experience with concrete objects is also relevant to the development of this medium (Febrianti et al., 2024).

The results of initial observations made by researchers on July 20, 2025 at Arsya Bunda Kindergarten, Bandar Mataram, Central Lampung, show that the use of interactive and interesting learning media is still limited. Teachers often use conventional methods such as counting using fingers or number posters pasted on the wall. This condition causes children to get bored quickly and less motivated in participating in numeracy learning activities. Based on interviews with classroom teachers, plywood media has never been used as an innovative learning tool, even though the material is easy to obtain and can be processed into interesting media (Nurrahman, 2019). Pre-survey data on the numeracy ability of children aged 4-5 years at Arsya Bunda Kindergarten collected on August 27, 2025 showed worrying results. Of the 15 children, there are 9 children (60%) in the Undeveloped (BB) category and 6 children (40%) in the Starting Development (MB) category. None of the children achieved the Performing Well Expected (BSH) or Performing Very Good (BSB) categories. The most difficult indicator for children to master is recognizing number symbols and adjusting the number symbols to the number of objects. These findings are in line with the research of Mujtahidin et al. (2024) which reported that early childhood numeracy skills, especially in understanding the concept of numbers, are still at low levels in various PAUD institutions.

Relevant research supporting the development of numeracy learning media has been conducted by several experts. Andria, Zulkifli, and Risma (2018) proved that the game "treasure hunting" had a positive impact on the numeracy skills of children aged 4-5 years with an increase in performance of 63.16%. Setiawan (2018) found that the use of mathematics learning media was effective in improving the numeracy skills of group A children in RA Ma'arif 1 Metro City. Malapata and Wijayaningsih (2019) confirmed that the counting barn media is able to significantly improve the counting skills of children aged 4-5 years. However, most of the existing research still uses media that is less environmentally friendly or requires high production costs. In addition, the available media have not fully integrated the aspect of the treasure hunting game that children love very much with the concept of systematic counting (Nafisah, Mulyana, & Giyartini, 2021). The gap in this research lies in the lack of development of plywood-based learning media that combines elements of exploratory games (treasure hunting) with structured numeracy exercises for children aged 4-5 years.

The novelty of this research lies in the development of Harta Karun Numbers media which has unique specifications: (1) made of plywood material that is environmentally friendly, easy to obtain, and durable; (2) designed with bright colors and attractive designs that suit the characteristics of early childhood (Hikrawati, 2022); (3) integrating the

treasure hunting game with the gold/silver coin counting system; (4) train five indicators of calculating ability simultaneously; and (5) can be used in groups so as to develop children's social skills. The use of plywood as a learning medium has economic and environmentally friendly advantages. Hikrawati (2022) emphasized the importance of using simple materials for PAUD learning media because not all institutions have enough resources to provide complete and modern media. Plywood that is surface smoothed and painted in bright colors becomes a safe, durable and attractive medium. This is in line with the principle of sustainable education which emphasizes the use of *reusable* materials (Fatimah et al., 2023).

This study also confirms the importance of group play in early childhood learning. Nafisah et al. (2021) explained that treasure hunting games carried out in groups encourage children to work together, communicate, and share information with each other. In this study, children were divided into 2 groups that competed with each other in a healthy way, so that in addition to numeracy skills, the social-emotional aspects of children were also stimulated. Based on this background, this study aims to: (1) develop the Treasure of Numbers learning media for children aged 4-5 years at Arsya Bunda Bandar Mataram Kindergarten, and (2) test the effectiveness of the media in improving children's numeracy skills. This research is expected to contribute to the development of innovative, environmentally friendly, and effective early childhood learning media in stimulating early childhood numeracy skills.

RESEARCH METHODS

This study uses *the Research and Development* (R&D) method with the 4D development model proposed by Thiagarajan, Semmel, and Semmel (1974). The 4D model consists of four main stages, namely *Define* (definition), *Design* (design), *Develop* (development), and *Disseminate* (Sugiyono, 2017). The selection of this model is based on its suitability with systematic procedures in developing learning media products for early childhood, from needs analysis to product trials. The *Define* stage includes *front-end analysis*, concept analysis, task analysis, and the formulation of learning objectives. The *Design stage* includes the selection of teaching materials, the selection of media formats, and the initial design of the product. The *Develop* stage includes expert validation, product revision, limited trial, and field trial (Sutarti & Irawan, 2017).

The product trial subjects in this study consist of: (1) media experts, namely lecturers who have master's education qualifications and experience in the field of learning media; (2) material experts, namely lecturers who have expertise in the field of Early Childhood Education; (3) 15 children aged 4-5 years at Arsya Bunda Kindergarten Bandar Mataram; and (4) classroom teachers as media users. The criteria for selecting validators refer to Sukmawati et al. (2022) which require educators to have a minimum master's degree with a minimum of four years of teaching experience.

The data collection techniques used include observation, questionnaires, interviews, and documentation. The research instruments developed include observation sheets on children's numeracy ability (5 indicators), media expert validation questionnaires (7 aspects), material expert validation questionnaires (7 aspects), and interview guidelines for teachers. The validation data were analyzed using a Likert scale with a score of 1-4 (Less Feasible, Quite Feasible, Feasible, Very Feasible). The average score of the assessment is converted into the eligibility category with the criteria: $3.26 < \bar{x} \leq 4.00$ (Very Eligible); $2.51 < \bar{x} \leq 3.26$ (Eligible); $1.75 < \bar{x} \leq 2.51$ (Moderately Feasible); $1.00 < \bar{x} \leq 1.75$ (Less Feasible) (Masykur et al., 2017).

Table 1. Research Instrument Grid

Yes	Instruments	Purpose	Source	Time
1	Media validation questionnaire	Assess the feasibility of learning media design	Media members	During the study
2	Material validation questionnaire	Evaluate the suitability of learning materials	Material Expert	During the study
3	Observation sheet	Measuring a child's numeracy ability	Children aged 4-5 years	Pre-test & post-test
4	Teacher's response questionnaire	Collecting media effectiveness assessments	Classroom teacher	After the trial
5	Interview Guidelines	Knowing learning needs and constraints	Teacher	Beginning of research

RESEARCH RESULTS

Research on the development of Harta Karun Nomor media was carried out at Arsya Bunda Kindergarten which is located in Mataram Udik Village, Bandar Mataram District, Central Lampung Regency. This school was established in 2018 with "B" accreditation from BAN PAUD and PNF. The media development procedure follows the 4D model described below.

The Definition stage begins with *a front-end analysis* through interviews with teachers who reveal that plywood media has never been used in learning, even though it can be an interesting teaching medium to develop numeracy skills. Observations show that children still have difficulty mentioning numbers on posters and need teachers' help when counting. The concept analysis resulted in the identification of five indicators of numeracy ability that will be developed in accordance with Permendikbud No. 137 of 2014: (1) counting objects 1-10, (2) understanding the concept of numbers, (3) recognizing number symbols, (4) matching number symbols, and (5) reciting numbers 1-10 (Widowati et al., 2022). The task analysis identified specific skills that the child must master, while the formulation of learning objectives resulted in a minimum achievement target of "Develop Accordingly" (BSH).

The Design stage includes the selection of teaching materials in the form of plywood measuring 100×100 cm, colorful wood paint, sandpaper, glue, wood for the frame, and hinges. The selection of media formats is designed with specifications: the treasure board can be folded into 4 parts, equipped with images and numbers 1-20, 50 pieces of gold coin in the shape of a circle with a diameter of 5 cm, 3 pieces of 10 cm diameter number coins, and a treasure box of 20×10×5 cm. The initial design of the media is depicted on a sketch before being realized into a product.

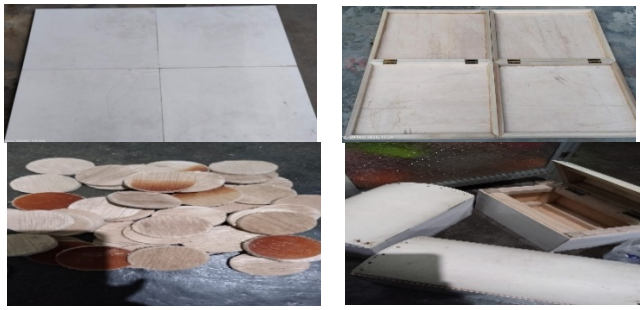

Figure 1. Initial Design of Number Treasure Media

(Source: Researcher Documentation, 2026)

The Development stage begins with validation by media experts and material experts. The results of the validation of media experts showed that the media obtained the "Feasible" category with aspects of material quality, ease of use, innovation, design suitability, and media feasibility assessed as "Excellent". The advice from media experts is to add gold coins and silver coins to make them more attractive. The results of the validation of the material experts also showed the category of "Feasible" with aspects of suitability of the material with the research objectives, integration with developmental aspects, clarity of concept, and the effectiveness of practicing arithmetic was considered "Very Good".

Figure 2. Media Before and After Revision

(Source: Researcher Documentation, 2026)

After revision based on expert advice, the media was tested on 15 children aged 4-5 years in 3 meetings. The trial showed that children were very enthusiastic and enthusiastic about participating in learning with the Harta Karun Numbers media. Children can follow the game according to the steps implemented without significant obstacles. The final product of the Treasure of Number media is ready to use after it is declared valid and does not require a retry.

Figure 3. End Products Treasure Media Numbers

(Source: Researcher Documentation, 2026)

The Disseminate stage is carried out by implementing media at Arsya Bunda Kindergarten in Bandar Mataram. Pre-test data (January 19, 2026) shows that children's numeracy skills are still low: 9 children (60%) in the Undeveloped (BB) category and 6 children (40%) in the Starting Development (MB) category. After one month of media implementation (19 January - 19 February 2026), post-test data showed a significant increase: 2 children (13%) Started to Develop (MB), 10 children (67%) Developed as Expected (BSH), and 3 children (20%) Developed Very Well (BSB). There are no more children in the Undeveloped category.

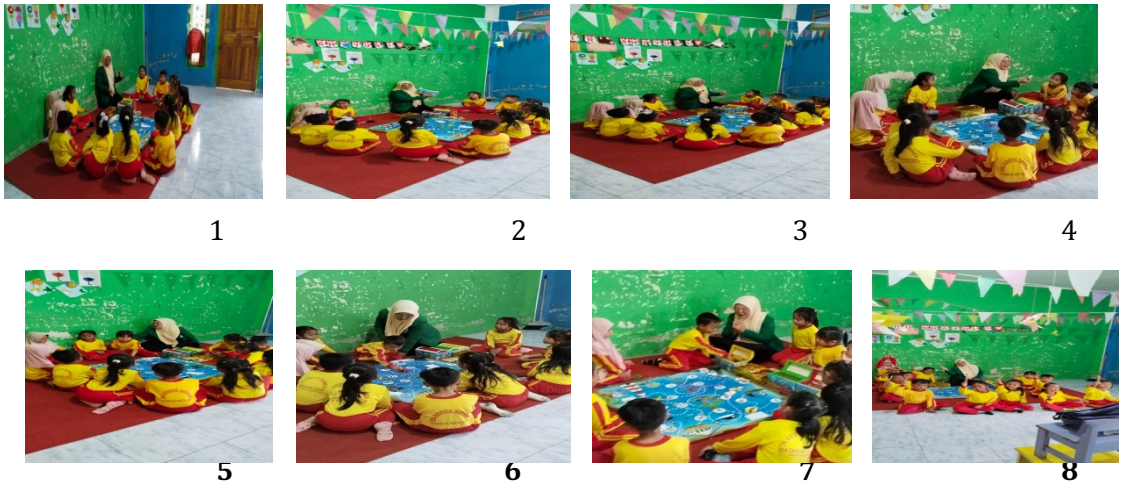

Figure 4. Implementation of Number Treasure Media in the Classroom
(Source: Researcher Documentation, 2026)

The learning process with the Treasure of Numbers media is carried out in steps: (1) the teacher prepares the media and room, (2) introduces the media to the child, (3) explains the functions and rules of the game, (4) divides the child into 2 groups, (5) the child throws a number coin and runs a character doll according to the number of numbers, (6) the child opens the treasure envelope and counts the gold/silver picture, (7) The child puts coins into the treasure box according to the amount, and (8) the child counts the total coins and gets the reward.

Table 2. Comparison of Pre-Test and Post-Test Results of Children's Numeracy Ability

Category	Pre-Test (19 Jan 2026)	Post-Test (19 Feb 2026)
Not Yet Developed (BB)	9 children (60%)	0 children (0%)
Start Growing (MB)	6 children (40%)	2 children (13%)
Growing Up With Expectations (BSH)	0 children (0%)	10 children (67%)
Very Well Developed (BSB)	0 children (0%)	3 children (20%)
Total	15 children (100%)	15 children (100%)

DISCUSSION

The results of the study show that the Harta Karun Numbers media has been successfully developed through a 4D model and has been proven to be effective in improving the numeracy skills of children aged 4-5 years. These findings are in line with Piaget's theory of cognitive development which states that pre-operational children (2-7 years old) learn through active interaction with the environment and concrete experiences (Suryana, 2025). Number Treasure Media provides a concrete experience through the manipulation of gold coins, number coins, and game boards that children can touch and move. This is in accordance with the opinion of Fauziddin and Elyana (2018) that the use of concrete object media in learning can improve children's cognitive abilities, especially in counting activities.

This media also implements the *scaffolding principle* from Vygotsky which emphasizes the importance of teacher assistance in helping children achieve new abilities (Saputra & Suryandi, 2016). In its application, the teacher provides guidance as the child

throws a number coin, counts the number of steps, and puts the coin into the treasure box. With the right help, children who were initially in ZPD can achieve higher numeracy skills, as evidenced by the increase in achievement from the BB/MB category to BSH/BSB. The Montessori approach that emphasizes learning through direct experience with concrete objects is also reflected in this medium (Febrianti et al., 2024).

The results of this study reinforce the findings of Andria, Zulkifli, and Risma (2018) that treasure hunting games have a positive impact on children's numeracy skills. However, this study provides novelty by using more environmentally friendly plywood materials and a more structured design with five measurable counting indicators. The increase in achievement in this study was higher, with 87% of children reaching the BSH/BSB category. Setiawan's (2018) research using mathematics learning media at RA Ma'arif 1 Metro City also proves the effectiveness of media in improving children's numeracy skills. This research complements the findings by providing a more interactive and game-based media.

Malapata and Wijayaningsih (2019) confirmed that the counting barn media is effective in improving the numeracy skills of children aged 4-5 years. This research is in line but with a different approach. The counting barn media focuses more on simple counting operations, whereas the Treasure of Numbers integrates five counting indicators at once in one more complex and engaging game. Maryam (2019) explained that numeracy learning in early childhood takes place through three stages: the concept stage (learning with concrete objects), the transition stage (symbol recognition), and the symbol stage (the use of number symbols). The Number Treasure Media accommodates all three levels systematically.

From the aspect of learning media, this finding supports the statement of Arsyad (2019) that learning media functions as a tool that clarifies learning messages and overcomes the limitations of verbal communication. Media Harta Karun Numbers has succeeded in overcoming children's boredom that often arises when teachers only use the lecture method or number posters. Bright colors, attractive shapes, and game elements successfully focus children's attention during learning. The function of media attention stated by Nurfadhillah et al. (2020) is proven in this study. Number Treasure Media is able to attract, direct, and focus children's attention on counting materials.

The affective function of media is also seen from the enthusiasm and enthusiasm of children when participating in learning. Nurrahman (2019) emphasized that a fun learning atmosphere is very important at the PAUD level because children learn more easily when they feel happy. The Numbers Treasure Media creates a fun learning atmosphere through game elements, healthy competitions between groups, and *rewards* at the end of the game. In terms of cognitive function, this media helps children understand abstract concepts of numbers to be more concrete. Hafiza, Fitriani, and Mariyani (2024) explain that early childhood needs visual media and real objects to understand concepts.

The compensatory function of the media also plays an important role for children who have difficulty understanding the teacher's verbal explanation. Visual media and physical activity in games help compensate for these limitations, so that each child can still participate in learning according to his or her abilities (Wahid, 2018). The characteristics of interactive media proposed by Munir (2012) are also fulfilled by this media. The Treasure Numbers media is convergent (combining audio, visual, and physical activity), interactive (the child can respond directly), and independent (the child can learn by controlling himself).

The use of plywood as a learning medium has economic and environmentally friendly advantages. Hikrawati (2022) emphasized the importance of using used or simple materials for PAUD learning media because not all institutions have enough resources to provide complete and modern media. Plywood that is surface smoothed and painted in bright colors becomes a safe, durable and attractive medium. This is in line with the research of Fatimah et al. (2023) on educational game tools as a source of early childhood learning.

This study also confirms the importance of group play in early childhood learning. Nafisah, Mulyana, and Giyartini (2021) explained that treasure hunting games carried out in groups encourage children to work together, communicate, and share information with each other. In this study, children were divided into 2 groups that competed with each other in a healthy way, so that in addition to numeracy skills, the social-emotional aspects of children were also stimulated.

In terms of numeracy skills, this study succeeded in training five indicators at once. Widowati et al. (2022) emphasized that the indicator of counting many objects 1-10, understanding the concept of numbers, recognizing number symbols, matching number symbols, and reciting numbers 1-10 are developmental achievements that must be mastered by children aged 4-5 years based on Permendikbud No. 137 of 2014. The Treasure Media of Numbers plans each level of the game to train the indicators systematically.

Larasati, Hafidah, and Dewi (2023) added that early childhood numeracy skills are an important foundation for the elementary school level. With the achievement of 87% of children in the BSH/BSB category, the Harta Karun Angka media has succeeded in preparing children to enter basic education with adequate numeracy skills. This achievement exceeded the initial target of the study which only expected the BSH category.

The limitations of this study include: (1) the trial was only conducted in one school with a limited number of subjects (15 children), so the generalization of the results needed to be tested further; (2) the implementation time is relatively short (1 month), so it is not possible to measure the retention of numeracy skills in the long term; (3) the cost of making media is relatively expensive if using high-quality materials; and (4) the number of media is only one so that learning is carried out in turns between groups. Further research is recommended to test the media in more schools, with a longer duration, and to develop more economical but still quality versions of the media.

CONCLUSION

Based on the results of the research and development that has been carried out, it can be concluded that the Harta Karun Número learning media has been successfully developed using a 4D model (Define, Design, Develop, Disseminate). Development steps include: needs analysis through interviews and observations, design of media designs made of plywood with bright colors and game components (boards, number coins, gold/silver coins, treasure boxes), validation by media experts and material experts who declare the "Feasible" category, product trials to 15 children aged 4-5 years, and distribution of final products at Arsya Bunda Bandar Mataram Kindergarten.

Number Treasure Media has been proven to be effective in improving the numeracy skills of children aged 4-5 years. The post-test results showed a significant improvement from the pre-test, with 10 children (67%) achieving the Performing Well (BSH) category and 3 children (20%) achieving Performing Very Well (BSB). This media effectively trained five indicators of numeracy skills at once, namely: counting objects 1-10, understanding the concept of numbers, recognizing number symbols, matching number symbols, and reciting numbers 1-10. This media is recommended to be used regularly in learning in kindergarten, with modifications according to the needs of children, as well as attention to safety aspects due to the use of plywood materials.

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