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"RUMAH BERHITUNG" AS A TOOL TO STIMULATE NUMERACY SKILLS IN CHILDREN AGED 5-6 YEARS

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Abstract

Basic math skills are one of the competencies whose development is very important in childhood. Cultivating these skills in children aged 5 to 6 years requires practical, interactive, and engaging learning opportunities, so that they can understand math concepts through activities that are appropriate to their development. The purpose of this research is to develop a learning tool called "Rumah Berhitung", which is an educational game-based learning media designed to stimulate basic math skills in children aged 5 to 6 years. Abilities that can be stimulated through this game are counting 1 to 20, matching number symbols with objects, counting objects, addition, subtraction, and quantity. The ball serves as a tactile object that can be actively manipulated during learning activities, allowing children to gain hands-on experience with math tasks. This research uses a research and development approach based on the ADDIE model which consists of the Analysis, Design, Development, Implementation, and Evaluation phases. Participants included experts in the field of early childhood cognition, media experts, and children aged 5 to 6 years from El-Mu'jizah Kindergarten. The data collection instrument used expert validation sheets, observation sheets on children's cognitive abilities, and documentation. The next analysis uses quantitative and qualitative-descriptive methods. The validation results showed that 92.5% of subject matter experts and 86% of media experts considered the learning tools valid. In a trial involving a larger group of 10 children, an overall score of 95.83% was achieved, Children demonstrated 100% mastery of skills such as counting (1–20), matching symbols to objects, counting items, and performing simple addition and subtraction. The ability to compare quantities reaches the level of 75%. The results show that the "Rumah Berhitung" meets the suitability criteria and can be used as a concrete, interactive, and game-based learning tool to foster basic math skills in children aged 5 to 6 years.

Keywords: Early Childhood, home arithmetic, arithmetic skills.

1. Introduction

Early childhood is an important phase in a person's life, which is a period of rapid learning and cognitive development. This encourages lifelong learning and growth. Numeracy skills at an early age are a vital component in a child's development, which optimally prepares the child for school. These skills include basic math skills such as number recognition, associating numbers with objects, comparing quantities, and calculating. Studies show that children's understanding of numbers at an early age is a key indicator of their academic success later in life, especially in mathematics and problem-solving (Salminen et al., 2021; Soto-Calvo et al., 2022). Therefore, providing age-appropriate and meaningful learning activities for early childhood is essential. This encourages their brain development and lays the foundation for improving math skills later in life.

Although numeracy skills are a fundamental competency that must be developed from an early age, their implementation continues to face various obstacles. Previous studies have shown that early childhood mathematics teaching is still dominated by conventional methods

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such as storytelling, play-based learning, worksheets, whiteboards, and textbooks, thus lacking in providing a concrete and meaningful learning experience for children. As a result, some children have difficulty recognizing number symbols and solving simple arithmetic problems, while monotonous learning leads to low interest in learning. Furthermore, teachers face limitations in providing creative and innovative learning materials that are in accordance with the characteristics of early childhood learning (Jelita & Sitorus, 2025). In line with this, Astuti et al. (2024) emphasized that literacy and numeracy education for early childhood must be carried out through fun play-based activities, integrating various learning resources and familiar symbols in children's daily lives. Many teachers still need support in creating effective learning materials to stimulate children's literacy and numeracy development. Therefore, it is necessary to use innovative and interactive learning media to provide a meaningful learning experience through play-based activities, so that children can actively participate and their numeracy skills can develop optimally.

The use of learning media is one of the effective strategies to support the development of early numeracy skills in early childhood. According to Piaget's theory of cognitive development, children aged 5 to 6 years are more likely to understand mathematical concepts when they interact directly with real objects, rather than through abstract explanations (Habsy et al., 2024). Furthermore, Vygotsky's sociocultural theory explains that children's cognitive development is influenced by social interaction and guidance from adults or peers who are more capable through the Proximal Development Zone (Wardani et al., 2023). Therefore, interactive learning materials not only help children understand the concepts of early math, but also encourage them to actively participate in the learning process. This approach is in line with the principle of learning through play, which is a key feature of early childhood education.

Many studies have developed innovative learning materials to improve early childhood numeracy skills. The Wordwall based "Kebiasaan Berhitung" program effectively improves logical thinking and numeracy skills in children aged 5–6 years. In addition, research by Rohmah and Waluyo (2025) and Safitri et al. (2023) shows that an Android-based game called GESIT, has been proven to be effective in stimulating addition and subtraction abilities through interactive visual and audio features. Wulandari and Ambara (2021) developed an interactive multimedia based UNO card game to help children learn number symbols and numeracy skills. In addition, Rifmasari et al. (2022) emphasized that audiovisual media is more effective than traditional number cards in helping children associate number symbols with the number of objects. Other studies have also developed tools such as the Counting Bunny Board (Jelita & Sitorus, 2025) and Number Lights (Mustofa & Suarjana, 2024), both of which have made a positive contribution to improving children's counting skills. Overall, research shows that interactive and engaging learning materials play an important role in helping early childhood develop their numeracy skills.

Although many studies have shown that educational media can improve numeracy skills in early childhood, there are still some limitations. Most of the media that has been developed focuses on specific aspects of numeracy skills, such as number symbols, number sequences, or simple arithmetic operations, and has been developed in a variety of learning formats and approaches. Therefore, there is still an opportunity to develop educational media that can integrate various counting activities into one learning, interactive, and game-based media that is in accordance with the developmental characteristics of children aged 5-6 years. Based on these conditions, this study developed "Rumah Berhitung" as an innovative educational platform that combines various counting activities into one platform. It is hoped that this

media can provide a more comprehensive arithmetic stimulus while increasing children's involvement in the learning process.

Based on previous research, there is still a need for learning materials that provide concrete, interesting, and interactive experiences in numeracy for preschoolers. To answer this need, this research developed the "Rumah Berhitung", a house-shaped learning tool with a series of addition and subtraction that uses small balls as learning objects. Children are expected to develop their understanding of the concepts of addition and subtraction through direct and meaningful experiences, such as rolling a ball, observing its movement along the track, and counting the results. The "Rumah Berhitung" is designed as an innovative learning tool that aligns with the developmental characteristics of children aged 5 to 6 years and encourages the development of early arithmetic skills through a concrete and fun learning experience. This study investigates the potential of the "Rumah Berhitung" as a learning tool to encourage the development of numeracy skills in children aged 5 to 6 years .

2. Method

This research uses the Research and Development (R&D) methodology with the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model, as proposed by Branch (2009). The ADDIE model was chosen because it has a systematic and structured development process, making it suitable for creating valid, practical, and suitable educational media for use in the learning process. The ADDIE model consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. In this study, the ADDIE model was used to develop an educational medium "Rumah Berhitung", a learning tool in the form of a home designed to help children aged 5 to 6 years improve their numeracy skills through fun, interactive, and hands-on play activities.

Participants in this study included one subject matter expert, one media expert, and children aged 5 to 6 years. Content and media experts evaluate a learning medium called "Rumah Berhitung" to test its validity based on aspects such as content, design, display, and ease of use. Field testing was carried out at El-Mu'jizah Kindergarten involving children aged 5 to 6 years from class B. Small group trials involved 5 children, including 5 from class B. After revising based on the results of the small group trials, large group trials were conducted involving 10 children, with 10 children from class B. Participants were selected using sampling techniques with the aim of, taking into account the appropriate age of the child and the purpose of the media developed.

The instruments used in this study included expert validation questionnaire sheets, observation sheets on children's cognitive abilities, and documentation materials. Experts use validation questionnaires to assess the suitability of the materials and media developed. Observation sheets were used during trials with larger groups to record children's participation levels and their proficiency in using the "Rumah Berhitung" medium. Photos from the practice location and notes serve as additional data during the development and implementation process.

Data analysis was carried out using quantitative and qualitative descriptive methods. Quantitative analysis was used to evaluate the results of expert validation and children's observations, The score obtained was compared to the maximum score converted into a percentage. This percentage-based analytical approach has also been used in research on the development of learning materials for early childhood mathematics education (Jelita & Sitorus, 2025; Mustofa & Suarjana, 2024). Qualitative data consisting of comments, suggestions, and

field notes is collected during the development and implementation process and is used as the basis for product optimization. Furthermore, this combination of quantitative and qualitative analysis methods is in line with the research and development conducted by Rahmi and Astuti (2026).

3. Results and Discussion

3.1 Result

3.1.1 Stages of Analysis

At this stage of analysis, the main objective of this medium is to identify learning needs related to early numeracy skills in children aged 5 to 6 years. The focus is on the characteristics of children in this age group and their need for a number involved learning experience designed to be concrete, motivating, and interactive. The analysis shows the need for learning materials that allow children to gain hands-on experience with numbers and basic arithmetic operations through fun activities. These findings became the basis for the development of the "Rumah Berhitung", a concrete and interactive learning tool designed to foster early numeracy skills in children aged 5 to 6 years.

3.1.2 Design Stage

The design phase is focused on the development of the concept and physical structure of the "Rumah Berhitung" learning media. This tool is designed as an educational play device in the form of a three dimensional house, with an attractive and child-friendly aesthetic. The design includes a roof, windows, doors, balconies, and garden areas to create a familiar and engaging environment for children. This house is equipped with a learning track for addition and subtraction problems that are integrated on the right and left walls. The bekel ball serves as a real element that children move along the track while counting the answers to each math problem. This design emphasizes direct interaction, ease of use, and fun learning, making it suitable for children aged 5 to 6 years.

Table 1. Product Photo "Rumah Berhitung"

Before Revised	After Revision
	


Sirkuit
Penjumlahan


Sirkuit
Penjumlahan
Sirkuit
Pengurangan







	

3.1.3 Development Stage

The development process involves the creation of learning materials for the "Rumah Berhitung" media based on the plan formulated in the previous phase. The completed prototype is then validated by subject matter experts and media experts to assess its suitability for children. The field of study validation includes 16 items that are assessed on a five-point scale, while the media validation consists of 20 items that are assessed on the same scale. The results of this validation are used to determine product suitability and identify aspects that require further improvement.

Table 2. Expert Validation Results

Validator	Item	Score obtained	Score Maximum	Percentage
Material Specialist	16	74	80	92,5%
Media Expert	20	86	100	86%

Based on Table 2, a score of 92.5% was obtained from experts in the field of cognitive materials and 86% from media experts. These results show that the developed “Rumah Berhitung” media has met the set eligibility criteria and is ready to enter the implementation stage after the necessary improvements. In addition, the validators also provide suggestions for optimizing the product. Media experts recommend adding decorative elements such as pictures or objects to make this media more appealing to children. Meanwhile, experts in the field of study suggest including thought-provoking questions aimed at fostering high-level thinking skills (HOTS) to encourage children to reflect and respond during learning activities. This recommendation is the basis for revising the "Rumah Berhitung" learning resource before the trial.

Table 3. Suggestions and Revisions of "Rumah Berhitung" Media

Validator	Suggestions	Revision
Media Expert	Add characters or decorative objects.	Additional decorative elements have been added.
Materials expert	Add HOTS-oriented hints (Higher Order Thinking Skills).	Drive-oriented questions (HOTS) are added.

3.1.4 Implementation Stage

The implementation stage aims to test the use of the "Rumah Berhitung" learning tool in children aged 5 to 6 years. This implementation is divided into two stages: small group trials and large group trials. The small group trial involved five children from Class B and served as a preliminary trial to observe the applicability of the tool and identify aspects that may need improvement before the next phase of testing.

Table 4. Results of Children's Observations in Small Group Trials

Indicator	Score obtained	Score Maximum	Presentase
Count 1-20	20	20	100%
Compatibility between symbols and objects	20	20	100%
Counting objects	20	20	100%
Simple additions	20	20	100%
Simple subtraction	19	40	100%
Comparing quantities	18	40	100%
Overall	**117**	**120**	**97,5%**

The results of a small group trial of 5 children showed an overall achievement of 97.5% with the Very Good Development (BSB) category. Five indicators, namely counting sequences 1–20, synchronizing symbols and objects, counting the number of objects, and simple summation, reached 100%. Simple subtraction achieves 95%, while comparing numbers achieves 90%. These results show the initial implementation of the "Rumah Berhitung" media in supporting numeracy activities of children aged 5-6 years and providing a basis for the implementation of large group trials.

After the initial trial, a larger group trial was conducted with ten children from Class B. These children participated in math activities using simple addition and subtraction problems, which were part of the "Rumah Berhitung" learning tool. Throughout the learning process, children's activities and participation were documented using observation sheets. The results of these observations were analyzed to gain insight into the level of participation and skills demonstrated by children when using the tools that have been developed.

Table 5. Results of Children's Observations in Large Group Trials

Indicator	Score obtained	Score Maximum	Presentase
Count 1-20	40	40	100%

Compatibility between symbols and objects	40	40	100%
Counting objects	40	40	100%
Simple additions	40	40	100%
Simple subtraction	40	40	100%
Comparing quantities	30	40	100%
Overall	**230**	**240**	**95,83%**

The results of the group test showed that 10 children achieved a total score of 230 out of a maximum of 240 points, which is equivalent to an overall score of 95.83%. The best performance is recorded on counts from 1 to 20, matching symbols to objects, counting objects, and simple addition and subtraction tasks. The success rate in this field reaches 100%. However, at the same time, it was noted that 75% indicated that this aspect required further practice. Overall, the observational findings showed that the children had excellent skills in using the "Rumah Berhitung" learning medium.

3.1.5 Evaluation Stage

The evaluation stage aims to determine the final suitability of the "Rumah Berhitung" learning media based on the skills acquired during the development and implementation stages. This process considers the results of expert validation, revisions made in response to expert recommendations, and results observed during large-group testing. The results of expert validation confirm that the learning materials meet the conformity criteria that have been set. The initial evaluation was carried out through a small group trial involving 5 children aged 5 to 6 years from class B. The results of the observation showed that the media obtained a score of 97.5% with the category of Very Good Development (BSB). These results show that media can be used in numeracy activities and provide an overview of the implementation of media use in small groups.

The results of the small group trial were then used as a basis for improving the "Rumah Berhitung" media before continuing to the next stage of implementation. After the refinement process, the "Rumah Berhitung" media was continued in a large group trial to obtain data on media use in a larger number of children. In the test, the large group produced an overall score of 95.83%. These findings became the basis for establishing the "Rumah Berhitung" learning material as a tool designed to foster early math skills in children aged 5 to 6 years.

3.2 Discussion

The validation results showed that the learning media "Rumah Berhitung" met the criteria for use in early mathematics learning activities for children aged 5 to 6 years. Material and media experts provide positive evaluations of this media in terms of content, design, presentation, and ease of use. These findings confirm that the learning media developed meets the requirements as the right learning tool to support children's counting activities. These results are consistent with the findings of Fitri, Adhani, and Nazarullail (2024), which show that interactive learning media is needed to facilitate children's understanding of the concept of arithmetic. Furthermore, this study emphasizes that numeracy activities for early childhood students are more effective when taught using concrete materials related to children's direct experiences.

The characteristics of the "Rumah Berhitung" media that allow children to practice counting directly with real objects support this principle. Thus, the suitability of learning

media depends not only on expert judgment, but also on its characteristics that offer a direct and engaging learning experience adapted to the characteristics of early childhood development. Direct experience through interaction with concrete objects helps children build a more meaningful understanding of numeracy concepts (Nauratuddini & Christianti, 2026). This statement is in accordance with the results of a small group trial that obtained a percentage of 97.5% in the Very Good Developed (BSB) category, with the highest achievement in the ability to count, match symbols with objects, count the number of objects, and simple summation. The preliminary results provide an idea that the concrete and interactive characteristics of the "Rumah Berhitung" media have supported children's involvement in numeracy activities before continuing in large group trials. Furthermore, a large group trial showed that children achieved an overall success rate of 95.83% when using the "Rumah Berhitung" learning tool. These findings show that children are able to participate very well in numeracy activities using the developed tools. This applies to five indicators, namely counting from 1 to 20, matching symbols to objects, counting objects, and simple addition and subtraction tasks that each achieve a 100% success rate. In contrast, the ability to compare the number of objects only reaches 75%, therefore, this aspect requires further support and practice.

The positive results observed during the use of the "Rumah Berhitung" can be attributed to the characteristics of the media that allow the child to practice counting directly using concrete objects. Children not only recognize number symbols, but also manipulate objects when completing addition and subtraction activities. The activity provides children with the opportunity to build relationships between the number of objects, number symbols, and mathematical operations through hands-on experience. This view is in line with the perspective of constructivism which views mathematics learning as a process of building knowledge through activities and relationships developed by children. The use of manipulatives can support such processes when activities are designed to encourage children to think and build mathematical relationships. Research by Nauratuddini and Christianti (2026) also shows that concrete manipulative games in children aged 5–6 years support the understanding of numeracy concepts through direct interaction with familiar objects and play activities. Thus, the use of balls in the "Rumah Berhitung" provides a concrete, active, and consistent learning experience in accordance with the characteristics of numeracy learning in early childhood.

The learning tool "Rumah Berhitung" is a concrete and practical medium that allows children to be actively involved in initial counting activities. The house shaped design and movable parts provide children with the opportunity to learn through direct interaction with objects. Children can add and subtract by manipulating objects contained in the media. The use of manipulative objects in math learning provides an opportunity for children to relate physical experiences to the math concepts being learned. This is in line with the perspective of constructivism and embodied cognition which views physical activity and interaction with the environment as part of the process of forming a child's understanding. Byrne et al. (2023) Through a scoping review of 102 studies, it was found that physical manipulatives are widely used in preschool-age learning, with the most promising results in the mathematics domain. The use of concrete objects also encourages active involvement of children in direct learning activities.

These characteristics make the "Rumah Berhitung" have a broader learning function than the recognition of number symbols. Children gain the opportunity to understand the relationship between numbers, the number of objects, and counting operations through the

activities of holding, moving, counting, and observing objects. The findings of Nauratuddini and Christianti (2026) in children aged 5 to 6 years in Indonesian kindergartens show that games using concrete objects help children develop an understanding of numeracy concepts through hands-on engagement, including one-on-one correspondence, quantity, classification, serialization, and number symbols. The research also emphasizes the importance of the use of familiar objects, play environments, and teacher assistance in helping children build mathematical understanding from real experience to symbolic representation.

The uniqueness of the "Rumah Berhitung" media lies in the combination of household materials and mathematical exercises that involve direct interaction with physical objects. The tool integrates various activities, such as counting, matching symbols to objects, addition, and subtraction. The use of manipulative objects allows the child to actively engage in hands-on practical activities and build an understanding of mathematical concepts through concrete experiences. This is in line with Nauratuddini and Christianti (2026) who stated that games using concrete objects support the development of numeracy concepts for children aged 5 to 6 years, including quantity, number symbols, and comparative relationships.

The findings of this study have implications for educational practices for children aged 5 to 6 years, especially regarding the provision of concrete and engaging mathematics experiences. Educators can use the "Rumah Berhitung" as an alternative tool to encourage counting activities through a fun approach and the use of physical objects. However, the results of this study should be interpreted with caution, given the limited number of participants and the absence of an experimental research design. This allows for the measurement of children's skill improvement before and after using this medium. Therefore, further research can involve a larger group of participants and use a design that allows for more accurate measurement of the development of basic mathematical competencies.

4. Conclusion

Based on the findings of the research and by utilizing the ADDIE model which consists of the stages of analysis, design, development, implementation, and evaluation, the "Rumah Berhitung" media was successfully developed. The media is designed as a real, interactive, and game-based resource to grow basic math skills in children aged 5 to 6 years. Its main advantage lies in the incorporation of various counting activities into a single learning tool: counting from 1 to 20, matching number symbols to objects, counting objects, performing simple addition and subtraction, and measuring quantities. In addition, the use of movable beads along the learning path offers children a hands-on experience to understand numerical quantities and arithmetic operations.

The validation results of experts in the field and media experts confirm that the "Rumah Berhitung" meets the criteria for use in the teaching of mathematics. In a small group trial involving 5 children, the media obtained a score of 97.5%. Furthermore, testing of a large group of 10 children resulted in an observation score of 95.83%. A 100% success rate is achieved in the following skills: counting from 1 to 20, matching symbols to objects, counting objects, and performing simple addition and subtraction. In contrast, the skill of comparing quantities reaches a score of 75% and requires further development.

Thus, the "Rumah Berhitung" media is suitable as a concrete learning medium to support mathematics learning activities for children aged 5 to 6 years through a game-based approach and direct interaction with objects. For further research, it is recommended to

involve more participants and choose a research design that is able to track the development of children's mathematical skills more systematically.

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