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Development of Innovative Learning Media for Number Recognition Using *"Mama Langka"* in Early Childhood

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Abstract
This study aims to develop innovative learning media through the introduction of numbers with "Mama Rare" lamp media in early childhood. In the process of learning activities, learning media greatly determines the success in mastering the material provided. One of the most important factors in developing early childhood learning media is designing learning media to be interactive and attract children's attention and encourage children to be actively involved in the learning process. This research was conducted using the R&D(Research and Development) approach. In the initial development process, researchers consulted with media experts, material experts and field experts (Early Childhood Education). The next stage was an initial trial with a sample of 20 students, followed by a final trial on 30 students and analyzed with the t test. The results showed that: 1) In the needs analysis found the need for innovative learning media Mama Langka to introduce numbers in early childhood, 2) Learning Media that is suitable for use as a means of teacher learning media is made by considering an attractive appearance so as to make learning media easier to understand, not boring, and easy to carry everywhere. 3) Mama Langka Innovative Learning Media is effectively used to introduce numbers in early childhood. This can be seen from the significance value obtained is 0.000 <0.05. The t test in the initial trial that the tcount is 12,010> t table 1.725 and the final stage of the tcount is 17,218> t table 1.725, which means that based on the pretest and posttest that has been done to 30 children at PAUD RA Chairunnisa Sukoharjo, there is a difference in the ability to recognize numbers before and after using innovative learning media *"Mama Langka"*.

Keywords: *Learning Media, Number Recognition, Early Childhood*

INTRODUCTION

Education in early childhood plays a crucial role as the foundation for further education. Early childhood education is a process of stimulating the existing potential in children to facilitate optimal development (Watini, 2019). According to The National Association for The Education of Young Children (NAEYC), the golden age period spans from the prenatal stage to 8 years of age. During this period, young children greatly benefit from environmental experiences to stimulate their growth and development for future life, thus requiring appropriate efforts tailored to ensure optimal development and growth. Young children tend to comprehend abstract concepts better when presented in concrete or tangible forms through media (Arifudin et al., 2021). Learning media serves as a platform for delivering messages and materials, with the content being the learning objectives to be achieved. Learning media consists of two components: hardware equipment and messages as software components (Susilana & Riyana, 2007). To achieve learning objectives, learning media suitable for children's developmental aspects are needed to make the learning process engaging, enjoyable, and to assist teachers in delivering knowledge to children more effectively. Ruth Lautfer believes that learning media serves as a teaching aid for teachers to deliver learning materials, enhance students' creativity, and improve their attention during the learning process (Talijaro Tafonao, 2018).

Based on observations and interviews conducted by researchers at the early childhood institution PAUD RA Chairunnisa Sukoharjo, it was found that there are issues regarding the use of learning media. There is a lack of innovative and varied learning media used by educators, resulting in a lack of motivation among children. The learning media at the institution often focuses on repetitive and less innovative activities, leading to children easily getting bored, and several aspects of children's development, particularly cognitive aspects in number recognition, remain suboptimal (Maftutah, Jannah, & Utama, 2021). According to (Nari et al, 2019), one cognitive aspect that should be developed since childhood is the ability to recognize numbers. Meanwhile, Umi (2018) suggests that number symbols should be introduced early, considering children's developmental stages and appropriate methods.

One relevant study is conducted by (Liando and Siswanto, 2018), who investigated the effectiveness of interactive android-based learning media in improving young children's understanding of mathematical concepts. The results of this study indicate that the use of such media can significantly enhance young children's understanding of mathematical concepts. Another relevant study is conducted by (Kurniawan, 2017), who developed interactive multimedia-based learning media to enhance counting skills in young children. The findings show that the use of this learning media can effectively improve young children's counting abilities. Furthermore, a study by Suryani (2016) is also relevant, which examined the influence of educational games on young children's ability to recognize numbers. The results indicate that educational games can help improve young children's number

recognition skills effectively. Another relevant study is conducted by Nurjanah (2015), who investigated the development of information and communication technology-based learning media to improve young children's understanding of mathematical concepts. The results show that the use of information and communication technology-based learning media can help improve young children's understanding of mathematical concepts.

In this study, the researchers developed innovative learning media for number recognition using Mama Langka for young children. Similar to previous studies, the emphasis was on utilizing technology to enhance young children's understanding of mathematical concepts. However, the difference lies in the approach used by the researchers, namely introducing numbers using Mama Langka, which provides a unique and different learning experience compared to previously researched approaches. Additionally, we integrated aspects of multiple intelligences into the development of our learning media, aiming to provide a more holistic learning experience for young children.

Considering the aforementioned issues, the Mama Langka learning media can help enhance children's cognitive development, especially in number recognition, as this learning media incorporates interactive and enjoyable learning experiences in number recognition using colorful light games, keeping children active and engaged in learning activities. Therefore, the researchers chose the title "Development of Innovative Learning Media for Number Recognition Using Mama Langka in Early Childhood Education." The objectives of this study are (1) to identify the needs required for developing the innovative learning media product Mama Langka in teaching number recognition to young children, (2) to assess the feasibility of Mama Langka learning media in introducing numbers to young children, and (3) to evaluate the effectiveness of the development of innovative learning media Mama Langka in introducing numbers to children at RA Chairunnisa Sukoharjo. The expected outcomes of this study are to (1) enhance innovation in improving the quality of early childhood education and potentially become learning media in Early Childhood Education Institutions, (2) serve as a tool in number recognition activities for children, (3) broaden the insights of early childhood educators in developing attractive and beneficial Educational Game Tools (APE) for children, (4) serve as a medium for activities in introducing numbers to children and as a catalyst for sparking learning interest, and (5) provide an opportunity to apply knowledge gained in college to produce research documents for further development or research.

METHODOLOGY

This type of research utilizes Research and Development conducted to introduce numbers to young children at RA Chairunnisa Sukoharjo. The study was conducted from October 2nd to October 7th, 2023. Research and development are research methods used to produce specific products and test the feasibility and effectiveness of those products (Sugiyono, 2012). Data collection methods involved observation of teachers and the process of using the Mama Langka media in teaching. The research development procedure follows Borg and Gall's theory, which consists of seven development steps. Due to time constraints, this research only progressed to the sixth step, which is the final trial. The population in this study consists of 20 children in class

A1 and 30 children in class A2. The researcher sampled 50 children to be the subjects of this study.

The tools used in developing the innovative learning media Mama Langka are:

Table 1. Mama Langka Learning Media Specifications and Components

Tool	Material
Hammer	Battery Box
Saw	Battery Socket
Drill	On Off Switch
Soldering Iron	Push Switch
Ruler	Poster Design
Pliers	Wood
Chisel	Plywood
Scissors	LED Lamp
Chisel	Running LED Kit Circuit
	Acrylic
	LED Walking Lights

Technical data analysis at the testing stage involves conducting a t-test between classes. The t-test is performed on the pretest and posttest data of the experimental and control classes using the SPSS 16.0 program.

RESULTS AND DISCUSSION

Learning media dan Pengenalan Bilangan

Learning media is a tool or instrument used to introduce or act as a mediator in the learning process. In English, media is referred to as "medium", while in Arabic, media is referred to as "wasiilah", which means a means or method. The term "wasiilah" can be found in verse 35 of Surah Al-Maidah in the Qur'an:

يٰٓاَيُّهَا الَّذِيْنَ اٰمَنُوا اتَّقُوا اللّٰهَ وَابْتَغُوْٓا اِلَيْهِ الْوَسِيْلَةَ وَجَاهِدُوْا فِيْ سَبِيْلِهٖ لَعَلَّكُمْ تُفْلِحُوْنَ

Meaning: O you who have believed, fear Allah and seek the means (of nearness) to Him and strive in His cause that you may succeed. According to Suryani (2019), media refers to anything that can be used to convey messages and stimulate the minds, spirit, attention, and abilities of children, thereby facilitating the learning process. Learning media, as defined by Gagene and Briggs (1975), are physical tools used in the teaching-learning process to deliver instructional content, including books, tape recorders, video cameras, tapes, video recorders, films, pictures, frames, graphics, photos, televisions, and computers. Learning media, according to Hamalik (1978), can enhance students' desire and interest in learning, stimulate motivation, and have psychological effects on students. Gerlach and Ely (1971) also believe that media, broadly understood, refer to human, material, or event-based constructs. More specifically, media can be understood as graphic, photographic, or electronic tools used to capture, process, and organize verbal and visual information (Arsyad:2005).

Learning media can be developed by users according to their needs. Varied learning media can increase students' interest in the teaching-learning process (Tulasih, Yussof, & Kristiawan, 2022). Magdalena (2013) categorizes learning media into 6 types, including print media, audio media, visual media, human motion projection media, and imitation objects or miniatures. According to Kemp and Dayton (1985), learning media have several benefits, including standardizing the delivery of instructional material, making the teaching-learning process more engaging and clear, increasing efficiency in time and effort, enhancing the quality of student learning outcomes, making the teaching-learning process more flexible, fostering positive attitudes toward learning materials, and transforming the role of educators to be more productive and positive. Based on the definition provided by the National Education Association (NEA), learning media is defined as devices that can be manipulated, heard, seen, read, along with instruments that can be effectively used in teaching and learning activities. Learning media can be visual, auditory, or a combination of both, known as audiovisual media (Hamid, 2020). Innovative learning media, according to Darmadi (2017), refers to learning that is designed and facilitated by teachers, whose ideas or techniques are considered new and aim to construct their own knowledge for the best behavior change depending on the potential of students.

Introduction of Numbers

Numbers are symbols or digits used to represent a numerical value. By understanding the concept of numbers, children will be able to recognize and read numbers and mathematical symbols commonly used to express a numerical value (Runtukahu, J.T., 2014). According to Slamet Suyanto, the ability to recognize numbers is the symbol of quantity. Numbers 1 to 10 represent the mathematical symbols of the quantity of objects. Therefore, the introduction of media and teaching aids in mathematics for early childhood is very important. Introducing numbers to young children through active playing activities in daily life is natural and organic. Play is the world of children, where they meet, engage, and create (Abidin, 2009). Meanwhile, recognizing numbers is a cognitive ability of children in developing mathematical logic skills (Umi, 2018). Introducing numbers needs to be provided to children from an early age, considering the stages of development in the right way, so that young children are expected to have the opportunity to develop and improve their cognitive aspects.

The results and discussions here are the development process of the Mama Langka learning media in introducing numbers to young children referring to the Borg and Gall (1983) development procedure. The following is an explanation of the research procedures carried out by the developers:

a. Needs Analysis

Based on interviews and observations, it was found that there is still a lack of innovative learning media used by educators, resulting in a lack of children's learning motivation. The learning media in the institution often focuses on activities that are less diverse and innovative, making children easily bored, and some aspects of children's development are not optimal, one of which is the cognitive aspect in recognizing numbers. To overcome this problem, innovative learning media called Mama Langka in introducing numbers to young children is needed. The innovative Mama Langka Learning Media developed in this study uses enjoyable play-based learning activities for children, thereby stimulating their ability to recognize numbers at an early age.

b. Planning

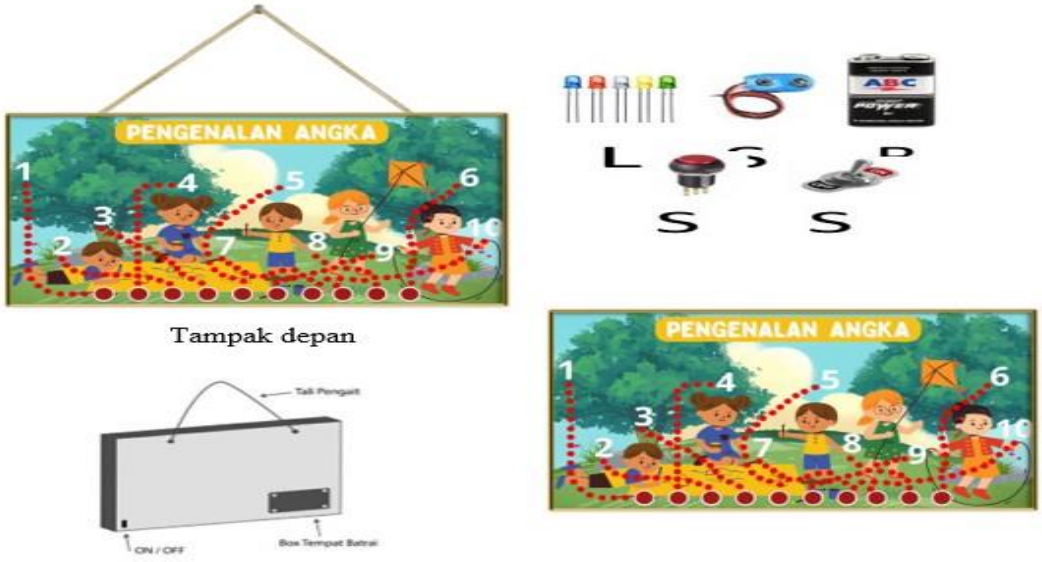
In this planning stage, theoretical studies on the innovative Mama Langka learning media and theories regarding the ability to recognize numbers for young children were

conducted. Additionally, planning was also carried out regarding the learning activities to be used in the implementation of the innovative Mama Langka learning media, lesson plans, planning for assessing children's ability to recognize numbers, and considering other necessary aspects needed for the implementation of the development of the innovative Mama Langka learning media to stimulate children's ability to recognize numbers.

c. Initial Product Design

The initial product design of the Mama Langka learning media development is as follows:

The first step is to create an attractive poster design sized 70x80cm for children using the Canva application and materials such as wooden boards and 70x80cm plywood. The second step is to prepare the specs of the Mama Langka Learning Media, which use a 9-volt battery and LED walking lights. The third step is to prepare the materials that will be assembled and used in the Mama Langka learning media, including a 9-volt battery, battery socket, acrylic, on-off switch, push switch, 3-volt LED lights (green, red, blue, yellow), Running LED Kit, and LED walking lights.



Gambar 2. Media Mama Langka

Feasibility Test and Validation

a. Media Expert

Media validation was conducted through expert assessment of the innovative Mama Langka learning media. The expert who conducted the assessment is a lecturer at the Islamic Institute of Mambaul Ulum Surakarta, namely Mrs. Iffah Mukhlisah, M.Pd. The media assessment score by the expert was 72.7%.

b. Content Expert

Material validation was conducted through expert assessment of the innovative Mama Langka learning media. The expert who conducted the assessment is a lecturer at the Islamic Institute of Mambaul Ulum Surakarta, namely Mr. Faruq Alhasbi, M.Pd. The media assessment score by the expert was 81.5%.

c. Field Expert

Field validation was conducted through expert assessment of the innovative Mama Langka learning media. The expert who conducted the assessment is a teacher

at PAUD RA Chairunnisa Sukoharjo, namely Mrs. Rina Wibowo, M.Pd. The media assessment score by the expert was 79.8%.

Based on the calculation results of the total assessment scores by media, content, and field experts, it can be concluded that the Mama Langka learning media is "feasible" to be applied to young children to improve their ability to recognize numbers.

Preliminary Testing

Preliminary testing was conducted with the aim of determining the effectiveness of the development of the innovative Mama Langka learning media to stimulate the ability to recognize numbers in young children. This preliminary test is based on the following decision-making criteria:

Using the t-test formula:

If the t-value > t-table and sig < 0.05, then there is a difference between the pretest and posttest.

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1 PRETEST - POSTTEST	-6.579	2.388	.548	-7.730	-5.428	-12.010	18	.000

Based on the data calculation using SPSS, the t-value obtained is 12.010 > t-table 1.725 with a significance value of 0.000 < 0.05. This means that based on the pretest and posttest conducted on 20 children at PAUD RA Chairunnisa Sukoharjo, there is a difference in the ability to recognize numbers in young children before and after using the innovative learning media *"Mama Langka"*.

Final Testing Phase

The final testing phase is conducted with the aim of determining the effectiveness of the innovative learning media *"Mama Langka"* in stimulating the ability to recognize numbers in young children. The final testing phase is based on the following decision-making criteria:

Paired Samples Test

	Paired Differences					t	df	Sig. (2-tailed)
				95% Confidence Interval of the Difference				
	Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1 PRETEST - POSTTEST	-6.579	2.355	.382	-7.353	-5.805	-17.218	37	.000

Based on the data calculation with SPSS, a t-value of 17.218 was obtained, which is greater than the t-table value of 1.725, with a significance value of 0.000, less than 0.05. This indicates that based on the pretest and posttest conducted on 30 children at PAUD RA Chairunnisa Sukoharjo, there is a difference in the ability to recognize numbers in young children before and after using the innovative learning media *"Mama Langka"*. This demonstrates that the use of the innovative learning media *"Mama Langka"* is effective in stimulating the ability to recognize numbers in young children.

Referring to the validity results conducted, the development of the innovative learning media *"Mama Langka"* indicates a fairly good qualification

from the assessments of media experts, material experts, field experts, and product trial results. Therefore, the Mama Langka media is considered suitable for use in the learning process.

Based on the results of the t-test assessment, the Mama Langka learning media is effective for introducing numbers to young children. This is reinforced by (Nuryatin, 2020) stating that effective media implementation will have a positive impact on learners. Even Nurhidayati (2015) states that educators control learning to be more effective. Meanwhile, Rumampuk (1998) states that innovative learning will increase children's interest to become better. Based on these statements, it can be concluded that innovative learning media is more effective when used by educators in teaching and can enhance various aspects of children's development, resulting in positive learning outcomes.

This study produces new and relevant findings in the development of innovative learning media for number recognition using Mama Langka in young children. This study successfully identifies that integrating Mama Langka into learning media can significantly improve children's understanding of number concepts in early childhood. The method of number recognition using Mama Langka has proven to be effective in providing a fun and engaging learning experience for children, making it easier for them to understand mathematical concepts intuitively. Analysis of previous research indicates that this approach is a new breakthrough in the use of Mama Langka as a learning tool, as previous research tended to focus on technology-based media without specifically utilizing the potential of Mama Langka. Thus, our research fills a gap in the literature by offering a more holistic and innovative approach to number recognition in young children, integrating Mama Langka elements to provide a more effective and enjoyable learning experience. As a result, this study positions itself as an important contribution to the development of mathematics teaching methods that are suitable for the needs and characteristics of young children.

The contribution of this research lies in the development of innovative learning media that integrates Mama Langka as a key element in number recognition in young children. This finding makes important contributions in two main aspects. First, this research successfully presents a more holistic and enjoyable learning approach for children by utilizing the uniqueness of Mama Langka as a learning tool. This approach not only helps children understand mathematical concepts better but also stimulates their curiosity and motivation to learn. Second, this research expands insights into the use of Mama Langka as an effective learning resource. By demonstrating that Mama Langka can be integrated into modern learning media for young children, we contribute to enriching the repertoire of mathematics teaching methods that are suitable for the needs and characteristics of children's development. Thus, our research contribution is not only practically relevant in improving the quality of early childhood mathematics education but also has theoretical implications in the development of culturally and locally based learning approaches.

CONCLUSION

Based on the results of the research and development of the innovative learning media *"Mama Langka"* to introduce numbers to young children, several conclusions can be drawn as follows:

1. The learning media was developed based on needs analysis encountered in the field and several researched findings. One of the identified needs was the necessity for the innovative learning media "Mama Langka," specifically designed to introduce numbers to young children.
2. The learning media deemed suitable for use as a teacher's instructional media were created considering an attractive appearance, making it easier to understand, non-boring, and portable. This aligns with the validation results from media experts and user responses, indicating that the innovative learning media *"Mama Langka"* is suitable for use.
3. The innovative learning media *"Mama Langka"* is effective for introducing numbers to young children. This can be seen from the t-test results of the initial and final trial scores. The significance value obtained is 0.000 < 0.05. The t-test in the initial trial shows that t-value 12.010 > t-table 1.725, thus it can be concluded that there is a difference in the ability to recognize numbers in young children before and after using the innovative learning media "Mama Langka." With a t-value of 17.218 > t-table 1.725 and a significance value of 0.000 < 0.05, based on the pretest and posttest conducted on 30 children at PAUD RA Chairunnisa Sukoharjo, there is a difference in the ability to recognize numbers in young children before and after using the innovative learning media "Mama Langka." This indicates that the use of the innovative learning media *"Mama Langka"* is effectively utilized to stimulate the ability to recognize numbers in young children. The results of this research have positive implications for various stakeholders involved in this study, especially teachers. The implementation of the innovative learning media *"Mama Langka"* can be used as a reference in implementing innovative instructional media for teachers.

For future research relevant to the theme of developing innovative learning media for number recognition using *"Mama Langka"* in young children, several further research steps are recommended. Firstly, it is suggested to conduct a study on the effectiveness of using *"Mama Langka"* in number recognition by directly involving a number of young children to assess the extent to which *"Mama Langka"* can help them understand and internalize number concepts. Furthermore, the development of a mobile application based on *"Mama Langka"* can be the focus of research, where this application is designed to provide an engaging and enjoyable learning experience while still being effective in facilitating the understanding of mathematical concepts. Additionally, it is important to explore the possibility of integrating *"Mama Langka"* into formal education curricula for young children, with an evaluation of its impact on their understanding and achievement in mathematics. Lastly, the development of specific teaching strategies that utilize *"Mama Langka"* as an integral part of the learning process is also recommended to support the individual learning needs of young children and maximize the potential of *"Mama Langka"* in enhancing their understanding of numbers. Through these research steps, it is hoped that further

progress will be made in the use of *"Mama Langka"* as an innovative learning tool in the early stages of child development, which can significantly contribute to improving the quality of mathematics education at a young age.

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