

The Effect of Fun Thinker's Book Media on the Mathematical Logic Intelligence of 5 - 6-Year-Old Children

Fakhita Indira Haris^{1✉}, Muhammad Yusri Bachtiar², & Muhammad Akil Musi³

^{1,2,3}Jurusan PGPAUD, Universitas Negeri Makassar, Indonesia

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✉Corresponding author:
(fakhitaindira01@gmail.com)



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Abstract:

This study aims to determine the effect of fun thinker's book media on the mathematical logic intelligence of children aged 5-6 years at Nurul Taqwa Kindergarten. The research approach used is quantitative with the type of quasi-experimental design. The research design used is A non-equivalent control group design. The population of this study is children aged 5-6 years of Nurul Taqwa Pattunggaleng Kindergarten, Gowa Regency, with 30 children. The sampling technique used was purposive sampling, so the subjects in this study were 20 children aged 5-6 years. The data collection techniques used in this study were observation, tests, and documentation. The method used is descriptive and nonparametric statistical analysis using the Wilcoxon test. The results of hypothesis testing using the SPSS application show that the data is 2.271 and the sig value. (2- tailed) of $0.023 < 0.05$, then H_1 is accepted and H_0 is rejected. The results showed an effect of fun Thinkers book media on the mathematical logic intelligence of children aged 5-6 years at Nurul Taqwa Pattunggaleng Kindergarten, Gowa Regency.

Keywords: *Fun Thinker's book media; Math logic intelligence; Early childhood*

INTRODUCTION

Early childhood experiences the most rapid physical and mental growth and development stage. So, during early childhood, the quality of one's life has tremendous meaning and influence for later life and is called the "golden age" period. During this period, educators and parents are required to provide relevant stimulation through learning activities while playing. Providing stimulation to children aged 0 to 6 years has a significant impact, especially in the early phase of life. This stimulation can be the foundation for optimizing the development of children's potential. In Permendikbudristek No. 05 of 2022 concerning the competency standards for graduates of PAUD, Basic Education, and Secondary Education in article 4 paragraph (3), and paragraph (4) point h is formulated in an integrated manner in the form of a description of developmental achievements consisting of; Having number awareness, being able to measure with non-standard units, realizing the similarities and differences in characteristics between objects, and having an awareness of space and time (Permendikbudristek, 2022).

Thinking skills affect the level of intelligence associated with how children use their senses. They can connect, evaluate, and consider various events or events experienced by

them, either directly or indirectly. This allows children to infer meaning from their experiences (Herman & Rusmayadi, 2018). The ability to think and reason more complexly is needed for children's development to solve the problems they face. This ability facilitates children in managing broader general knowledge so that they can adapt to daily social life. Thinking and reasoning are closely related to mathematical logic intelligence. Stimulation given to children for their thinking ability can encourage the development of children's mathematical logic intelligence, especially in logical thinking, processing information, and problem-solving (Sit, 2021). Every child has been born with different intelligence and characteristics among each other. Intelligence is the ability to overcome challenges, and each child has a unique way of thinking in dealing with new experiences. (Ezkanandya, et.al., 2019). Intelligence is seen from the IQ factor, and other intelligence will lead children to success (Hasmawaty & Bachtiar, 2022).

According to Gardner (Mufarizuddin, 2017), intelligence can be improved early by allowing children to solve problems and think logically. There are many types of intelligence; different types of intelligence are called multiple intelligences. Multiple intelligences recognize the uniqueness of each individual and the diverse ways of learning to reach their full potential. One aspect of intelligence that significantly affects children's lives is mathematical logic intelligence. Every educator in Early Childhood Education (ECE) institutions needs to provide special stimulation related to mathematical logic because success in stimulating this aspect has a significant influence on child development. Almost all life paths and professions are inseparable from mathematical logic intelligence. In Piaget's view, he suggests, "All knowledge, particularly with a focus on logical-mathematical understanding, fundamentally originates from one's interactions with the world." This means that knowledge, especially mathematical logic intelligence, the primary concern, grows from individual activities interacting with the surrounding world. The disclosure shows the main strength of mathematical logic intelligence (Kholida & Sutarna, 2020).

Mathematical logic intelligence can be identified through conceptual thinking skills, including number manipulation, logical problem-solving, and the ability to classify objects based on size, shape, and color. According to Armstrong, mathematical logic intelligence leads to abilities in terms of numbers and logic, such as the ability to reason, sort, think in causal patterns, create hypotheses, look for conceptual regularities or numerical patterns, and his view of life is generally rational (Apriani & Widhiastih, 2020). Ideally, for early childhood math logic intelligence, children increasingly show interest in numbers and quantity (counting, measuring, and comparing activities) and like mixing and grouping more complex objects. Nonetheless, they face the inherent difficulty of sorting multiple objects into their classifications. Stimulation of mathematical logic intelligence can show the achievement of indicators of sensitivity to numbers, counting ability, categorization, and classification objectively (Nur et al., 2019).

The results of research conducted (Wahyuni, 2021) show that in the Gowa Regency, many children have not experienced optimal development in the intelligence aspect of mathematical logic. This phenomenon can be seen from their lack of understanding of numbers. Therefore, a more in-depth approach is needed to overcome the delays that arise during the Covid-19 pandemic. In the process of child development, they develop themselves through play activities. However, conditions in the field during the Covid-19 pandemic do not reflect this approach. Teachers only rely on school material books without the help of other media/teaching aids that can support learning activities, causing children to feel bored and bored quickly and have difficulty when facing learning. This is a severe problem because it affects children's learning and growth.

Based on initial observations of children aged 5-6 years at Nurul Taqwa Pattungale-

ngang Kindergarten, Gowa Regency. 20 out of 30 children have not reached optimal development in understanding and analyzing number patterns and solving problems using their thinking skills. Children also still have difficulty classifying and comparing objects' characteristics and cannot show geometric shapes in the surrounding environment. During the learning process, the teacher has not placed early childhood as the center or still focuses on the teacher (Teacher Center), making children less active in exploring learning activities in the classroom. As educators, teachers must be able to observe children well in determining each child's needs, interests, and ways of learning. One of the efforts in solving this problem is using media that attracts children's interest and concentration in education. Puzzle media is used in Nurul Taqwa Kindergarten to stimulate mathematical logic intelligence. The use of puzzles in this activity is still easy, so children are less actively involved. One early childhood learning principle is to engage children in play activities.

Children must be involved in play activities due to their limited attention span and tend to be active unless they are engaged in something exciting or recognizable. To create this situation, creative educators need to shape an active learning environment with the support of attractive learning media (Ilyals et al. 1., 2021). One of the most exciting tools for developing logical intelligence is using Fun Thinkers Book media. The Fun Thinkers Book media helps to increase the psychological ability of both sides of the left brain in brain. It is built with the latest Match-Frame system, which creates a sense of excitement in the learning process while increasing the ability of children to think at an early age. Media such as Fun Thinkers Book is considered to have the potential to overcome obstacles in learning because the tools or media applied in the learning process not only facilitate communication but also encourage children to respond to messages efficiently. The implementation of learning through Fun Thinkers Book media has generated positive responses. This fact is confirmed through the results of various studies on children's responses, showing that the analysis of children's responses produced data where more than 70% of children gave a very positive response to the use of fun Thinkers book media in math learning process (Shalfiyalh et al. 1., 2022).

The Fun Thinkers book media used by previous researchers used a book with the five senses theme. In contrast, the fun thinker's book media used by researchers in this study is a book compiled based on indicators of mathematical logic intelligence, including number sensitivity, counting operation skills, logical thinking skills, and problem-solving skills. In addition, there is also a matching frame consisting of 4 colors in each piece. This study discusses the effect of Fun Thinkers Book media on the Mathematical Logic Intelligence of 5-6-year-old children at Nurul Taqwa Pattunggalengang Kindergarten, Gowa Regency. The purpose of this study is to see if there is an influence in the use of Fun Thinkers Book Media on the mathematical logic intelligence of children aged 5-6 years at Nurul Taqwa Kindergarten.

METHODS

The research approach used was qualitative. The type of research used was a quasi-experimental design with a nonequivocal control group design. In this design, the experimental and control groups are balanced. The group is selected in a randomized manner: the dual group is given a pre-test, then given a treatment, and finally given a post-test (Herlinal, 2020). This study uses measurements of mathematical logic intelligence, especially in understanding and analyzing numerical patterns and solving problems using their thinking skills. Children aged 5-6 years at Nurul Taqwa Kindergarten who are not optimal in mathematical logic intelligence will be netted as subjects in this study. From the initial observations showed that 20 out of 30 children showed constraints in mathematical

and logical intelligence, so they needed particular strategies. The data collection techniques used in this study are 1) observation, which is participant observation; 2) tests (pre-test, experiment, and post-test); and 3) documentation.

The population in this study were children aged 5-6 years at Nurul Taqwa Pattunggalengang Kindergarten, Gowa Regency, with 30 children. The sample in this study amounted to 20 children with ten experimental and ten control categories. The sampling process uses purposive sampling with the subject criteria of children aged 5-6 years with mathematical logic intelligence problems. In this research, the data analysis technique used is descriptive analysis and hypothesis testing through non-parametric statistical analysis using the Wilcoxon sign-rank test. Two methods are used for data analysis in research: descriptive statistical analysis and non-parametric statistical analysis. Descriptive statistical analysis will be conducted using SPSS version 22 with data completeness, including mean, minimum, maximum, standard deviation, and variance. The type of non-parametric statistical test used is the Wilcoxon Signed Rank Test. This Wilcoxon Signed Rank Test will also be performed using the SPSS application with a significance level (sig) or $\alpha = 0,05$.

RESULTS AND DISCUSSION

The research results involve 20 male and female respondents subjected to descriptive analysis and hypothesis testing using non-parametric statistical methods employing the Wilcoxon Signed Rank Test with the SPSS version 22 software. The researcher conducted a pre-test to assess logical and mathematical reasoning abilities before and after exposure to the medial fun thinker's book. The instrument used to measure the influence of the Medial Fun Thinkers book on logical and mathematical reasoning consists of 4 indicators: numerical reasoning ability, operational reasoning ability, logical thinking ability, and problem-solving ability. Each indicator has 2-3 items contributing to the overall assessment in the evaluation.

Table 1. Results of the Analysis of the Influence of the Fun Thinkers Book on Logical-Mathematical Intelligence

	<i>N</i>	<i>Min</i>	<i>Max</i>	<i>Mean</i>	<i>Std. Deviation</i>	<i>Varians</i>
<i>Pre- test Eksperimen</i>	10	18	30	25.40	3.806	13,04
<i>Post- test Eksperimen</i>	10	20	33	26.80	4.467	17,96

The Medial Fun Thinkers Book's impact on logical-mathematical intelligence in the pre-test shows an average score of 25.40. In contrast, the post-test shows an average score of 26.80. In the pre-test, the minimum score obtained was 18, and the maximum score was 30. Conversely, in the post-test, the minimum score obtained was 20, and the maximum score was 33. The standard deviation in the pre-test was 3.806, and in the post-test, it was 4.467. The variances obtained in the pre-test were 13.04, and in the post-test, they were 17.96. These data indicate a positive influence of the Medial Fun Thinkers Book on logical-mathematical intelligence. Further details on interaction quality within the learning process are provided in the accompanying analysis.

In the Wilcoxon test analysis, a p-value (Asymp Sig. 2-tailed) of 0.023, which is less than 0.05, was obtained. Therefore, the null hypothesis H_0 is rejected, and the alternative hypothesis H_1 is accepted. This indicates the presence of a significant influence from the use of the Medial Fun Thinkers Book on the development of logical-mathematical intelligence in children aged 5-6 years at TK Nurul Taqwa Patunggalengang, Kabupaten Gowa.

Table 2. Results of the Wilcoxon Signed Rank Test

<i>Test Statistics^a</i>	
	Posttest E - Pretest E
Z	-2.271 ^b
Asymp. Sig. (2-tailed)	.023

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

Fun Thinkers Book Media

The Medial Fun Thinkers Book implementation occurred over three weeks or six sessions within the experimental group, themed "My Hero, My Warrior." This activity aimed to observe the influence of the Medial Fun Thinkers Book on developing logical-mathematical intelligence in children aged 5-6 years. The use of media proved to be effective in enhancing teaching methods. In this context, media refers to tools utilized to support the learning process, ensuring efficiency and effectiveness, ultimately achieving the desired learning outcomes in the kindergarten. For teachers, using media assists in illustrating concepts and ideas, making it easier for children to comprehend the material being taught. (Syamsuardi et al., 2019).

The Fun Thinkers Book media is designed in line with early learning preferences, mainly catering to visual learners who prefer such materials. This media has diverse and engaging graphics, drawings, and illustrations that align with the learning theme. This book focuses on catering to visual learners and integrates activities for kinesthetic learners. As a result, students find it easy to arrange and manipulate blocks from the left side of the book to the right, involving them actively in the learning process while having fun and gaining a deeper understanding (Shafiyah et al., 2022)

The Fun Thinkers Book enhances a child's logical thinking skills. This media includes a book and features question sheets on both the left and right sides for answer sheets. The Fun Thinkers Book utilizes a Match Frame that can be opened and closed, making learning more enjoyable. This media is suitable for stimulating children's learning activities as it facilitates learning through play. The planned activities were explained in the first introductory session before implementing the Fun Thinkers Book. Afterward, participants were instructed to sit in rows and follow the learning activities sequentially. In the initial session, various users of the Fun Thinkers Book were observed engaging with and arranging the puzzle pieces in sequential order within the match frame to enhance numerical and operational thinking skills.

Moving to the second session, similar introductory activities were explained before implementing the Fun Thinkers Book. Afterward, participants were guided to sit in rows and follow the learning activities sequentially. In the second session, users were observed manipulating the puzzle pieces within the match frame and then opening the workbook to enhance shape recognition and connect patterns similar to the shapes presented, serving as one of the indicators of improving logical-mathematical intelligence. The results of the observations in the second session indicated an improvement in their logical thinking skills through the match-frame. In the third session, the planned activities were explained before commencing the implementation of the Medial Fun Thinkers Book. Subsequently, participants were directed to sit orderly and sequentially follow the learning activities. In the second session, users engaged with and arranged puzzle pieces within the Match Frame, then opened the workbook to enhance shape recognition and connect patterns. This facilitated grouping objects based on color, shape, and size, contributing to improving logical-

mathematical intelligence, particularly in problem-solving skills. The results of the observations in the third session indicated participants' active involvement in the experimental learning activities and demonstrated improvement in shape recognition and connecting patterns.

Logical-Mathematical Intelligence

According to Howard Gardner, logical-mathematical intelligence is a cognitive ability that involves scientific reasoning, mathematical computation, logical thinking, inductive/deductive reasoning, and abstract recognition of patterns and relationships. It also consists of the ability to solve problems that are associated with mathematical concepts as their solutions (Nur et al., 2019). Logical-mathematical intelligence is identified through indicators that distinguish it from other types of intelligence. Armstrong explains that logical-mathematical intelligence encompasses recognizing patterns and logical relationships, understanding evidence and data (both abstract and concrete), and engaging in functions and abstractions related to various fields. The processes of expressing logical-mathematical intelligence include categorization, classification, inference, generalization, calculation, and hypothesis testing. Individuals with logical-mathematical solid intelligence can create and formulate solutions applicable to their daily lives and surrounding environment (Sugiarti & Ayu 2019).

Logical-mathematical intelligence is a capability typically possessed at an early age, involving cognitive skills related to numbers and logic. Young children with logical-mathematical intelligence commonly engage in activities such as counting, grouping objects based on shape, color, and size, asking questions, exploring, and connecting various ideas. The indicators of logical-mathematical intelligence in 5-6-year-olds, used by researchers as key points in their studies, include the ability to use numerical reasoning, operational thinking, and logical reasoning. Another significant factor influencing logical-mathematical intelligence is hereditary or genetic factors, which substantially shape the individual's cognitive abilities. Each child inherits genes containing information about their cognitive development at different levels.

Furthermore, environmental factors also play a significant role in shaping logical-mathematical intelligence. As children interact with their surroundings, their active senses become increasingly engaged in the environment. Early interactions with the environment are crucial, and supportive transitions from pre-school (Early Childhood Education) to primary school (SD) are essential for the child's success in reading, writing, and arithmetic. Effective utilization of foundational skills, including letter recognition, is crucial during this transition. Moreover, children must build on other cognitive skills that require further development (Amriani et al., 2023). The third factor is the nutrients contained in food, which play a significant role in supporting the cognitive development of an individual. The quantity of nutrients must align with the body's requirements for metabolism. These nutrients may not be absorbed and utilized optimally if they exceed the required amount. Moreover, this condition has the potential to result in unintended side effects. Psychological aspects constitute the fourth point, where emotional conditions have a crucial role in forming and influencing the cognitive abilities of individuals, significantly affecting their logical-mathematical intelligence.

The fifth factor is stimulation, which consists of activities that help individuals develop their mathematical and logical reasoning skills, serving as one of the strategies to enhance their mathematical intelligence. Stimulation is associated with initiating initiatives that encourage the growth of logical-mathematical intelligence. Based on this research, it is concluded that various variables influence the development of logical-mathematical intelligence. Still, the most crucial factors for this development are stimulation and engage-

ment. The more varied the stimuli available, the more optimal the development, including mental clarity and exploration through play (Nalbighoh et al., 2022).

Educators recommend that the development of logical-mathematical intelligence in children needs to be enhanced in environments that support the use of numbers and logical-mathematical concepts. The goal is for children to recognize patterns that emerge in their daily lives, such as patterns of thinking, numbers, visual aspects, and colors. Numeracy skills acquired in early childhood education are essential for advancing further in mathematical concepts at later stages of schooling. These foundational numeracy skills include understanding concepts of numbers, counting, colors, shapes, sizes, space, and position through various forms of activities and interactive experiences. Additionally, numeracy skills are crucial for fostering logical, critical, analytical, creative, and disciplined thinking in individuals (Musi, 2016).

Results of the research conducted before the implementation of the Media Fun Thinkers Book intervention showed the level of logical-mathematical intelligence in 5-6-year-olds falling into the categories of Not Developing Yet (NDY) and Beginning to Develop (BD), with average scores of 25.40 for the experimental group and 25.50 for the control group. Furthermore, in the experimental group, participants in the Not Developing Yet (NDY) category were 2, constituting 20%; those Beginning to Develop (BD) were 2, constituting 20%; those Developing According to Age (DAA) were 4, constituting 40%, and those Developing Ahead of Age (DAA) were 2, constituting 20%. After implementing the Media Fun Thinkers Book intervention, the logical-mathematical intelligence scores for the experimental group improved, with participants now falling into the Developing Ahead of Age (DAA) category, scoring an average of 26.80. In contrast, without the Media Fun Thinkers Book intervention, the control group had participants falling into the Developing According to Age (DAA) category with an average score of 26.40. Additionally, in the experimental group, there were 3 participants (30%) in the Not Developing Yet (NDY) category, 2 participants (20%) in the Beginning to Develop (BD) category, 3 participants (30%) in the Developing According to Age (DAA) category, and 2 participants (20%) in the Developing Ahead of Age (DAA) category.

The Wilcoxon signed-rank test results indicated a significant difference in the improvement of logical-mathematical intelligence between the experimental group, which utilized the Media Fun Thinkers Book and Media Puzzle, and the control group. In statistical terms, the average scores for logical-mathematical intelligence in the experimental group were higher than in the control group. This difference suggested a positive impact of using the Media Fun Thinkers Book on enhancing logical-mathematical intelligence. The research findings further highlighted that the effectiveness of the Media Fun Thinkers Book persisted, whether used before or after learning sessions at Kindergarten.

Children at an early age preferred the Media Fun Thinkers Book due to its colorful illustrations and interactive elements, making learning more engaging. The utilization of the book encouraged kinetic learners to arrange and move puzzle pieces from the left side to the right side of the book, creating a hands-on learning experience. With the research results, it can be concluded that implementing the Media Fun Thinkers Book positively impacts the development of logical-mathematical intelligence in 5-6-year-old children at TK Nurul Talqwal Pattunggalengang, Gowa Regency.

CONCLUSION

The research results indicate a significant influence on developing logical-mathematical intelligence before and after engaging in Fun Thinkers Book media activities. In the pre-test phase, the impact of Fun Thinkers Book media on logical-mathematical

intelligence showed an average score of 25.40, while in the post-test phase, the average score increased to 26.80. The hypothesis test results using the Wilcoxon sign-rank test show that the obtained $\text{Asymp Sig (2-tailed)}$ value is $0.023 < 0.05$, thus rejecting H_0 and accepting H_1 . Based on the explanation, it can be concluded that the use of Fun Thinkers Book media has an impact on the development of logical-mathematical intelligence in children aged 5-6 years at TK Nurul Talqwal Pattunggallengang, Kabupaten Gowa. As a continuation, further research can focus on the influence of Fun Thinkers Book media on early childhood logical-mathematical intelligence, considering other variables obtained after using Fun Thinkers Book media on logical-mathematical intelligence.

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