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LITERATURE STUDY: ANALYSIS OF EFFORTS TO IMPROVE MATHEMATICAL LOGIC INTELLIGENCE IN EARLY CHILDHOOD

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ABSTRACT

This study aims to determine the increase in mathematical logic intelligence in early childhood through several efforts that can be used by teachers. This research is a literature study with a descriptive qualitative research type that seeks to describe any efforts that can improve mathematical logic intelligence in early childhood. In this study, the authors used references in the form of 10 relevant scientific articles published from various national journals. The results of the study show that mathematical logic intelligence can be improved through various forms of effort. Among them, the first is by using game methods such as snakes and ladders games, smart bottle cap games, number card games, bingo games, and numbering games. Second, by using learning media such as media relia and flannel board media. Third, by using activities such as science-based learning, fun cooking activities, and bibliotherapy for children. The conclusion in this study that there are various efforts that can be used by teachers in improving mathematical logic intelligence.

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A. Introduction

One of the main assets to carry out the learning process is intelligence (Muthmainnah Asmal, 2020). Intelligence itself is a thought that is owned by a person and is used as a basis for learning. Intelligence can also be interpreted as a person's capacity or ability to be able to think, adapt, and overcome difficulties appropriately (Nisa et al., 2019). Gardner formulates that there are nine types of intelligence including verbal linguistics, kinesthetic, musical, logical mathematical, visual spatial, interpersonal, interpersonal, naturalist, and existential (Irvaniyah et al., 2014). One of the 9 intelligences is mathematical logic intelligence.

According to Gardner, Mathematical Logic Intelligence is the ability to think logically, count, and make observations in solving problems (Niyati et al., 2016). This mathematical logic intelligence in other theories can also be interpreted as the ability to use numbers, think critically, and understand a certain pattern to deal with a problem (Mufarizuddin, 2017). Mathematical logic intelligence is the ability to process numbers and use logic (Maheasy et al., 2021). Mathematical logic intelligence is very useful to be developed for early childhood because it is closely related to the ability to think systematically so that they are interested in manipulating the environment to conduct trials and experiments because children's curiosity is very high.

Stimulus to develop the potential for intelligence in early childhood is very important, including for children who have mathematical logic intelligence. According to Sujiyono (2011) early childhood has a very rapid and fundamental development for the next life. Early childhood is a golden age, where at that time the quality of children has a very big meaning and influence for their lives (Sholihah, 2018). At this age the character and potential of children are formed. Intelligence for early childhood is a potential so it cannot develop only in a vacuum. This potential can develop if stimulated properly and correctly.

Because every child has different intelligence and potential, the ability of educators to choose and carry out various strategies, methods, and learning models to develop children's intelligence and potential, especially at an early age has a very big influence (Maheasy et al., 2021).). An appropriate and fun learning scenario will certainly be able to develop the potential and intelligence of a child. For children who have mathematical logic intelligence, an educator must be able to create many opportunities for children to be able to play with numbers and then use their logic to respond to a problem. But at this time, many mathematical logic

concepts are presented in abstract form so that it is difficult for children to understand. Under these circumstances, even children with mathematical logic intelligence cannot develop their intelligence optimally. Therefore, to be able to develop the potential of mathematical logic intelligence in children, it is necessary to have the ability of an educator who can package numbers, formulas, and several other mathematical concepts more meaningfully and pleasantly, so that the concept does not become abstract and difficult to understand by students. child. This research is a literature study research from various references regarding any efforts that can improve mathematical logic intelligence in early childhood.

B. Method

This research is a literature study. Literature study is a method of collecting data from various relevant sources related to the topic to be discussed (Habsy, 2017). Researchers analyzed 10 relevant scientific articles to be able to describe what efforts can improve mathematical logic intelligence in early childhood. The approach taken is a qualitative approach which consists of the stages of categorization, reduction, presentation, and drawing conclusions (Ni'mawati et al., 2020). Researchers initially searched for scientific articles that were most relevant to the most recent year of research. The search keyword is "efforts to improve mathematical logic intelligence in early childhood". Then the researcher reads the abstract first, then notes some important parts that are relevant to the material in the study.

B. Result and Discussion

Mathematical Logic

Intelligence Intelligence is a mind that is owned by a person and is used as a basis for learning. In addition, the intelligence possessed by a person is also useful for his environment if he has the ability to innovate. One of the intelligences that can be taught and stimulated to children is mathematical logic intelligence. This intelligence becomes very important to be taught to early childhood. This is because in the early childhood age range, the brain will develop very fast progress (golden age) where children will become reliable imitators and become more responsive to what is done and said. Meanwhile, all the information absorbed later

will be easy to make a basis in the formation of character, cognitive abilities, and personality (Rismayani, Hetilaniar, & Sari, 2022: 1164).

Mathematical logic intelligence can be interpreted as an intelligence that can relate a concept using mathematical rules and can be accepted by the mind (logic). Mathematical logic intelligence can also be interpreted as one of the parts of multiple intelligences in which the process involves a role in processing a number properly using reasoning or logic (Haryanti & Tejaningrum, 2020: 141). There are several processes in mathematical logic intelligence including classifying (classifying / grouping), the calculation process, and the process of making a conclusion using logic. Mathematical logic intelligence is closely related to logic, causal relationships, and other logics. The mathematical logic intelligence includes two abilities, namely the ability to count and the ability to solve a formula. Improving the intelligence of mathematical logic in children (especially in early childhood) is very important, because it is the basis for laying the initial foundation for children. In addition, this is because mathematics has a very large role in human life, for example someone can solve problems related to calculations such as calculating land area, calculating the price of total goods, measuring distances. By looking at some of these facts, it can be said that mathematical logic intelligence is very important in everyday life.

The Nature of Early Childhood Early

Childhood is a level where children are in the age range 0 to 6 years. In this age range, children have started to enter the golden age, in which the provision of stimulus plays an important role in the next stage. As for this golden age, there was the formation of brain nerve cells as a condition for the process of forming intelligence that continues to grow. There is a theory which states that by the age of 4 years, about 50% of intelligence has been possessed by children. While at the age of 8 years, about 80% of intelligence has been owned by children. In addition to the development of intelligence, moral, emotional, social, language, and intellectual development will also develop rapidly (Rismayani, Hetilaniar, & Sari, 2022: 1163-1164).

Children who are included in the early age category will usually receive early education through several educational institutions such as PAUD, Playgroups, Raudlatul Athfal (RA), and Child Care Parks (Wahyudin & Suhartini, 2021: 125). At an early age, it is necessary to develop its potential so that later it can develop

better at the next level of education. Every child has a different type of intelligence from one child to another. With this, of course, a method or effort is needed which can later be used as a way to develop various types of intelligence possessed by children, one of which is mathematical logic intelligence whose existence is very important to be developed.

Based on the results of a literature study on 10 scientific articles published in various national journals, it can be seen that mathematical logic intelligence can be improved through various forms of effort. The results of the analysis of scientific articles relating to efforts to improve mathematical logic intelligence in early childhood can be seen in the table of results of the analysis of literature studies as follows:

Table 1. Results of Analysis of Scientific Articles

No	Title	Researcher	Year	Result
1	Efforts to Improve Children's Logical Mathematical Intelligence through Snakes and Ladders Game at RA Bani Uthman Darma	Erik Wahyudin, Nani Suhartini	2021	The results of his research show that snakes and ladders game can improve students' mathematical logic intelligence effectively. This can be proven by the increase in learning outcomes during pre-cycle (by 20.84%), cycle I (by 31.94%), cycle II (by 55%), and cycle III (by 84.72%). Determination of mastery learning outcomes is supported by several indicators including numbering 1-20, making a sequence of numbers from numbers 1-20 using pictures of objects, and connecting pictures of numbers up to number 20.
2	Developing Mathematical Logical Intelligence Using Media Relia in Children aged 5-6 Years in TK Negeri Pembina	Ai Suminar, Alfian Ashshidiqi	2020	The results of his research show that the use of realia media can increase the intelligence of mathematical logic in students very effectively. This is evidenced by during the learning process using relia media, student responses become very enthusiastic and more creative because indirectly the media can help students develop their ideas so that later they can affect student learning outcomes. In addition, the use of relia media is easy to observe, real, relates directly to everyday life, is real, and is able to attract students' attention so that they are enthusiastic about learning so that it will foster mathematical logical intelligence in

				students. Media relia can also provide direct experience to students will see and feel the results of media relia directly.
3.	Efforts to Improve Mathematical Logical Intelligence in Children aged 5-6 Years Through the TUPTOLTAR (Smart Bottle Cap) Game at Nur Darulsalam Banyuasin II	Ocha Rismayani, Hetilaniar, Mardiana Sari	2022	game. children's mathematics, this is evidenced by an increase in learning outcomes from pre-cycle (achieved 19%), cycle I (reached 28%), and cycle II (achieved 44%). This research looks at three aspects, namely reasoning, logical thinking, and problem solving. The use of the game "TUPTOLTAR" can improve students' mathematical logic skills because they have reached the average value of understanding mathematical logic intelligence, which has increased by 44 with very good criteria.
4.	Increasing Children's Mathematical Logical Intelligence through Playing Number Cards in Group B at the Pembina Bangkinang Kindergarten,	Mufarizuddin	2017.	The results show that number card games can improve mathematical logical intelligence in students. This is evidenced by an increase in each given action. In the pre-cycle, learning completeness on mathematical logic intelligence is still low at 30%. Meanwhile, in the first cycle, the students' mathematical logic intelligence increased to 55%. Furthermore, in the second cycle there was a very significant increase in mathematical logic intelligence, which was 80%. Thus, it can be concluded that the number card game can improve the intelligence of mathematical logic in students.
5.	Improving Intelligence Logic Mathematical Fun Cooking	Desri Yanti	2018	The results obtained in the pre-study of children's mathematical logic intelligence were 36%. After the child was given action in the first cycle, the child's mathematical logic intelligence became 67%, in the second cycle it increased to79%. Thus, children's mathematicalhas increased and is at a very good level of development. It can be concluded that fun cooking can improve the ability logic mathematical the Pembina State Kindergarten.
6.	Improving Mathematical Logical Intelligence Through Science Learning	Fifih Ropiqoh, Heni Nafiqoh	2021	The results of her research prove that children's mathematical logic intelligence has increased through science learning as seen from the pre-cycle average score of 52.9, in the first cycle it rose to 60, and reached 72.14 in the second cycle. Children's learning mastery also

				increased from 28.6% to 64.3% and increased to 92.9%.
7.	Development of Flannel Board Media to Improve Mathematical Logical Intelligence in Children	Denny Rahmalia, Dadan Suryana	2021	The results obtained are Flannel board media products have high validity, namely 0.93 in the very valid category, and 88% practicality in the very practical category.
8.	Increasing Mathematical Logical Intelligence through Bingo Games	Petronela JP Suripatty, Nadiroh, Yuliani Nurani	2020	The results of his research show that the application of bingo games can improve children's mathematical logical intelligence. This can be proven by the score of children's mathematical logic intelligence in the pre-cycle (by 51.93%), cycle I (by 63.93%), and cycle II (by 74.26%). From these results, it can be implied that through bingo games can improve children's mathematical logic intelligence.
9.	Improving Logical-Mathematical Intelligence through Number Game	Desika Nurohmah	2020	The results of her research show that after learning through numbering games, logic-mathematical intelligence can increase. This can be proven by the results of observations in pre-action (children with the criteria for developing according to expectations there are 3 children or 23.7%), in the first cycle (up to 8 children or 61.5%), and in the second cycle (up 10 children or 76.9%). Steps that teachers can take in order to improve children's logical-mathematical intelligence are to prepare game media in the form of numbers and then demonstrate how to play. Thus, it can be concluded that the intelligence of mathematical logic can be increased through numbering games.
10.	Increasing Logical-Mathematical Intelligence through Bibliotherapy for Early Childhood Group A at Kober Warna Plus	Wanti Setiawati, Ema Aprianti	2018	The results of his research show that the ability of logical-mathematical intelligence for early childhood group A Kober Warna Plus can be improved very well through bibliotherapy. This can be proven by the results of research tests and observations in the first cycle (12.5% of children are developing very well, 37.5% of children are developing according to expectations, and 50% of children are starting to develop and still need

				to be stimulated. When the cycle test is carried out II.

Based on the table of analysis of scientific articles above, it can be seen that there are various efforts that can be used by teachers in improving mathematical logic intelligence. Among them, the first is by using game methods such as snakes and ladders games, smart bottle cap games, number card games, bingo games, and numbering games. Second, by using learning media such as media relia and flannel board media. Third, by using activities such as science-based learning, fun cooking activities, and bibliotherapy for children. Thus, the teacher can implement the learning process by using the various efforts that have been described as a reference in improving the mathematical logic intelligence of students.

C. Conclussion

Every child is a unique person. They are born with different characteristics and talents. Different characteristics and talents make them unique so they don't label the child that the child is stupid. Every child born has their own intelligence. Early childhood requires a stimulus to develop the potential of intelligence, one of which is mathematical logic intelligence. Therefore, appropriate efforts are needed to stimulate the potential of early childhood mathematical logic intelligence. As for the results of this literature study, it can be seen that there are various efforts that can be used by teachers in improving mathematical logic intelligence. Among them, the first is by using game methods such as snakes and ladders games, smart bottle cap games, number card games, bingo games, and numbering games. Second, by using learning media such as media relia and flannel board media. Third, by using activities such as science-based learning, fun cooking activities, and bibliotherapy for children.

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