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Increasing Aud's Mathematical Logical Intelligence through the Use of Puzzle Pipe Media

Devy Umi Subahiriyah[1], Sti Hamidahtur Rofi'ah[2]
[1] IAI Al-Qodiri Jember
[1]devyumizz@gmail.com, [2]hamidahsyauqi@gmail.com

Jalan Manggar Gebang Poreng Jember

Abstract. *Mathematical, logical intelligence in children is the ability to recognize colours and shapes effectively to improve number management skills and the ability to use logic or common sense. So, mathematical and logical intelligence is one of the intelligences that influence a child's life. Mathematical and logical intelligence has long been favoured and recognized. Many psychometric tests provide extensive space for this intelligence, and it is one of the most vital indicators in assessing students namely It can be said to be intelligent or not intelligent; every PAUD educator stimulates mathematical logic intelligence because the success of this stimulation will have a vast impact on the child's development. After all, almost all life activities cannot be separated from this intelligence. This research uses a case study type of research. Case study research is a direct research method in a natural setting and focuses on events intensively and in detail. Scientific articles are obtained from journals, books, and other similar sources. The location of this research was the Bustanul Ulum Bulugading Play Group, located in the village of Langkap Bangsalsari in Jember. The informants were determined using purpose sampling, namely a sampling technique with specific considerations; in this case, the informant researchers included the school principal, class teachers, guardians and KB Bustanul Ulum Bulugading Bangsalsari Jember students. The data collection technique uses interviews, observation and documentation. Meanwhile, data analysis in this study used the Miles and Huberman data analysis technique. The research results conclude that increasing early childhood mathematical, logical intelligence through pipe puzzle media has been proven influential in introducing mathematical concepts in a concrete and fun way to young children. It can also introduce geometric concepts, develop logical thinking, encourage mathematical reasoning, and stimulate abstract thinking in early childhood. The pipe puzzle medium can also create a pleasant atmosphere and attract children's interest in learning. Therefore, using pipe puzzle media is very helpful for educators at KB Bustanul Ulum Bangsalsari Jember to use as a learning medium.*

Keywords: *Early Childhood, Logical Mathematical, Pipe Puzzle*

Abstrak. Kecerdasan matematika dan logika pada anak adalah kemampuan untuk mengenali warna dan bentuk secara efektif untuk meningkatkan kemampuan mengelola angka dan kemampuan menggunakan logika atau akal sehat. Jadi, kecerdasan matematis-logis merupakan salah satu kecerdasan yang berpengaruh dalam kehidupan anak. Kecerdasan matematika dan logika telah lama digemari dan diakui. Banyak tes psikometri yang memberikan ruang yang luas untuk kecerdasan ini, dan menjadi salah satu indikator yang paling vital dalam menilai anak didik dapat dikatakan cerdas atau tidak cerdas, maka setiap

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** Devy Umi Subahiriyah, devyumizz@gmail.com*

pendidik PAUD menstimulasi kecerdasan logika matematika karena keberhasilan stimulasi ini akan memberikan dampak yang sangat besar bagi perkembangan anak. Bagaimanapun juga, hampir semua aktivitas kehidupan tidak lepas dari kecerdasan ini. Penelitian ini menggunakan jenis penelitian studi kasus. Penelitian studi kasus merupakan metode penelitian langsung pada latar alamiah dan memusatkan perhatian pada peristiwa secara intensif dan mendetail. Artikel ilmiah diperoleh dari jurnal, buku, dan sumber-sumber lain yang sejenis. Lokasi penelitian ini adalah Kelompok Bermain Bustanul Ulum Bulugading yang terletak di Desa Langkap Bangsalsari Jember. Informan ditentukan dengan menggunakan purpose sampling, yaitu teknik penentuan sampel dengan pertimbangan tertentu, dalam hal ini yang menjadi informan peneliti adalah kepala sekolah, guru kelas, wali murid dan peserta didik KB Bustanul Ulum Bulugading Bangsalsari Jember. Teknik pengumpulan data menggunakan wawancara, observasi dan dokumentasi. Sedangkan analisis data dalam penelitian ini menggunakan teknik analisis data Miles dan Huberman. Hasil penelitian menyimpulkan bahwa peningkatan kecerdasan logis matematis anak usia dini melalui media puzzle pipa terbukti berpengaruh dalam mengenalkan konsep matematika secara konkret dan menyenangkan kepada anak usia dini. Media ini juga dapat mengenalkan konsep geometri, mengembangkan pemikiran logis, mendorong penalaran matematis, dan menstimulasi pemikiran abstrak pada anak usia dini. Media puzzle pipa juga dapat menciptakan suasana yang menyenangkan dan menarik minat belajar anak. Oleh karena itu, penggunaan media puzzle pipa sangat membantu para pendidik di KB Bustanul Ulum Bangsalsari Jember untuk digunakan sebagai media pembelajaran.

Kata kunci: Anak Usia Dini, Logika Matematika, Puzzle Pipa

INTRODUCTION

Small children are humans who have unique characteristics that have potential that must be developed because they have characteristics that are very different from adults, who are always active, can record what is in front of them, and seem never to stop imagining. A child must develop well according to each child's developmental stages. Therefore, the development of children's education from childhood plays a huge role and is a determinant of the child's subsequent development (Wahidah dan Muniroh, 2021).

Jean Piaget stated that children would change from the sensory-motor stage, role-playing, to social games and game rules by playing. Therefore, even though playing is not the primary determinant of cognition, it will provide necessary stimulation for the development of cognition. For example, in the game played by a boy and his friend, where a symbolic transformation will occur, for example, pretending to use sand as rice; from this game, children have learned to practice the skills and imagination that they have learned previously. Therefore, the child's abilities will influence his playing activities. It can be interpreted that if an AUD has abilities below his age, playing activities are

retarded compared to other children of the same age on average (Khadijah dan Armanila, 2017).

The problem today is that they influence their desire to play games when they have yet to discover games. Children nowadays play many games, such as mobile legends (ML), fighter planes, and shooting games. Many children have also become victims of these games. So, in this way, educators and parents need to find solutions to provide games that are fun and not boring for children so that they can be saved from the technological games that are emerging at this time. A narrow area can be arranged and modified to create a pleasant atmosphere that makes them feel at home (Khadijah dan Lasma, 2020).

Playing from an educational perspective is an activity that uses educational game tools to stimulate children's cognitive, social, emotional and physical development. Therefore, the academic view of play needs educational game tools, one of which is a puzzle. Puzzle toys are one of the educational toys for AUD and are a good reason for parents or educators to provide these puzzle toys. This puzzle has many benefits for children's growth and development, one of which is encouraging children to think critically so that it helps improve children's mathematical and logical intelligence (Mahardika, 2019).

Mathematical, logical intelligence in children is the ability to recognize colours and shapes effectively to improve number management skills and the ability to use logic or common sense. So, mathematical and logical intelligence is one of the intelligences that influence a child's life. Mathematical and logical intelligence has long been favoured and recognized. Many psychometric tests provide extensive space for this intelligence, and it is one of the most vital indicators in assessing students, namely, whether they can be said to be intelligent or not intelligent; every PAUD educator stimulates mathematical logic intelligence because the success of this stimulation will have a vast impact on the child's development. After all, almost all life activities cannot be separated from this intelligence (Suhaidah, 2017).

Researchers chose the Bustanul Ulum Bulugading Bangsalsari Jember KB institution because this institution uses pipe puzzle media in learning, the impact of which is to train and stimulate children to think critically and understand the structure of

patterns. Apart from that, this media can make children happy and more interested in learning the material while playing so that children's playing activities are more meaningful. From the use of this media, learning can develop optimally. Using this pipe puzzle can also stimulate children's mathematical and logical abilities because, with this media, teachers can discover to what extent students can recognize colours and number concepts.

Learning using pipe puzzle media is believed to train concentration, accuracy and patience; train eye and hand coordination; train logic; strengthen memory; introduce children to relationships; and by looking at shapes, they can train mathematical thinking using the left brain.

At the initial observation stage carried out at KB Bustanul Ulum Bulugading Bangsalsari Jember, researchers discovered the fact that this institution was the only play group institution in Bangsalsari sub-district that used puzzle pipes as a medium for introducing initial mathematics. The Bustanul Ulum play group teacher uses pipe puzzle media to stimulate the Logical-Mathematical abilities of children aged 2-4 years. Teachers use pipe puzzles as a medium to introduce various colours and number concepts periodically and with a gradual technique. The purpose of holding this pipe puzzle media is to train children's eye and hand coordination by playing fun because children at the KB age, apart from liking to play, also have an interest in something new. Pipe puzzle is a game medium primarily intended for children, where freedom to express their thoughts and feelings is the main point. This pipe puzzle media improves children's focus and brain training skills. Apart from being fun, this pipe puzzle media can also enhance cognitive development, including mathematical logic, in children.

This media can encourage children to think critically, thereby helping improve children's cognitive abilities. This media requires intelligent and logical-mathematical thinking, where children try to combine colours, shapes, arranges, patterns, and so on. Apart from that, it also provides opportunities for children to develop cognitive abilities and problem-solving skills in children. Based on the description above, a critical understanding can be drawn that using pipe puzzle media can improve mathematical and logical intelligence in early childhood. This media is very effective and fun and highly appeals to children's focus. Therefore, researchers are interested in researching at KB

Bustanul Ulum Bulugading Bangsalsari Jember titled "Increasing Mathematical Logical Intelligence in Early Childhood Through the Use of Puzzle Pipe Media."

RESEARCH METHODS

This research uses a case study type of research. Case study research is a direct research method in a natural setting and focuses on events intensively and in detail. Scientific articles are obtained from journals, books, and other similar sources. The location of this research was the Bustanul Ulum Bulugading Play Group, located in the village of Langkap Bangsalsari in Jember. The informants were determined using purpose sampling, namely a sampling technique with specific considerations; in this case, the informant researchers included the school principal, class teachers, guardians and KB Bustanul Ulum Bulugading Bangsalsari Jember students. The data collection technique uses interviews, observation and documentation. Meanwhile, data analysis in this research uses Miles and Huberman data analysis techniques.

DISCUSSION AND ANALYSIS

Learning media is used as a tool for teaching. Learning media is used as a tool for education. This is because learning media can help teachers manage classes effectively, efficiently and in fun. At KB Bustanul Ulum Bulugading Jember, learning media manages courses to increase young children's interest and focus. Among the learning media used by KB Bustanul Ulum Bangsalsari Jember include educational videos and animations, educational games, outdoor activities that use loose parts, and so on. Exciting and interactive learning media will encourage young children to be more actively engaged in the learning process and motivate them. Using learning media, as the results of researchers' observations show, KB Bustanul Ulum Jember students are more focused and interested in the learning material.

Planning to Use Pipe Puzzle Media to Improve Children's Mathematical Logical Intelligence

Using learning media can help students understand material that is difficult to understand so that children's learning outcomes improve. Apart from that, using learning

media can influence student interaction and collaboration. At KB Bustanul Ulum Jember, teachers always use learning media through the teaching modules that have been prepared together.

Puzzle media is a media form or image included in visual media because it can be digested through the sense of sight. Puzzles are games that use pieces of an object or image to form a complete shape. In this research, learning media at KB Bustanul Ulum Jember is more about pipe puzzle learning media, the only learning media used at the KB level in Bangsalsari District, Jember Regency. The puzzle pipe used by KB Bustanul Ulum Bulugading Bangsalsari Jember is provided by the KB Bustanul Ulum Bangsalsari Jember institution so that students are more interested in learning. The puzzle pipe used by KB Bustanul Ulum Jember has an attractive shape with colourful colours that can attract students. This puzzle pipe can be used as a group game medium because its elastic and rectangular shape makes it easy to shape. Children can form the puzzle into a tunnel so that children can crawl inside the tunnel. KB Bustanul Ulum Bangsalsari Jember students made this tunnel media as a group.

Pipe puzzle media has high flexibility regarding shapes and structures that students at KB Bustanul Ulum Bangsalsari Jember can form. Apart from those mentioned above, puzzle pipe media can be formed into simple buildings such as houses, buildings, castles or towers. KB Bustanul Ulum Bulugading Jember students can use puzzle pipes to build various simple buildings; students can experiment with the arrangement of pipes to create unique shapes. KB Bustanul Ulum Bangsalsari Jember students also make different kinds of vehicles, such as cars, planes, ships or trains; in this case, the KB Bustanul Ulum Bangsalsari Jember students can use their imagination to create cars that they like.

With their creativity, KB Bustanul Ulum Bangsalsari Jember students can use puzzle pipes to make various animals, such as cats, dogs, birds, or other fantasy animals. They can add additional details such as eyes, ears, or tails to add realism. In addition, KB Bustanul Ulum Bangsalsari Jember students can use puzzle pipes to create various geometric structures, such as cubes, prisms, pyramids, or tubes. This can help KB Bustanul Ulum Bangsalsari Jember students understand geometric concepts practically.

Using pipe puzzle media is an effective learning strategy for introducing mathematical concepts in a concrete and fun way to young children. Planning for using pipe puzzle media to improve early childhood's mathematical and logical intelligence begins with determining learning outcomes/goals specific and measurable learning objectives to be achieved through pipe puzzle media. The learning objectives expected from using pipe puzzle media at KB Bustanul Ulum Bangsalsari Jember are introducing geometric concepts, developing logical thinking, encouraging mathematical reasoning, and being able to stimulate abstract thinking. This is as in Suciaty's theory that pipe puzzle media aims to introduce students to systems and relationship concepts and can train students to think mathematically.

In planning the use of pipe puzzle media at KB Bustanul Ulum Bangsalsari Jember, of course, it cannot be separated from the preparation of an annual program based on indicators of early childhood development achievement, then a semester program, after that weekly learning or Weekly Learning Implementation Plan (RPPM), and Learning Implementation Plan Daily (RPPH).

The planning carried out by the Bustanul Ulum Bangsalsari Jember KB teacher in using pipe puzzle media included: a) The teacher first prepared a strategy according to the theme so that the activity ran smoothly; b) The teacher gives information to the children what will be today's activities; c) Then the teacher begins to introduce and prepare the pipe puzzle which will be used as learning media; d) Next, the teacher gives an example to the children first of what the activity will be; e) Next, the child assembles the puzzle pipe pieces himself.

Implementation of the use of pipe puzzle media to increase children's mathematical logical intelligence

The benefit of using puzzle pipe media used by KB Bustanul Ulum Bangsalsari Jember in the learning process is that students can better understand mathematical concepts such as geometry, patterns and comparisons through the practical and direct use of puzzle pipes. Students can also learn to evaluate the solutions they find as they assemble puzzle pipes. The benefits of pipe puzzle media are that it can solve a problem because it sharpens brain cells when playing puzzles. There are several benefits of using puzzle learning media. By providing knowledge about colours and shapes, students can

also learn basic concepts about animals, the natural environment, types of objects, human body anatomy, and others.

At KB Bustanul Ulum Bangsalsari Jember, pipe puzzle media can help develop cognitive skills such as understanding, memory and problem-solving, which are essential in academic development. In addition, KB Bustanul Ulum Jember students learn about mathematical concepts such as shapes, sizes, patterns, and spatial relationships through the use of puzzle pipes, and the use of puzzle pipes helps in stimulating the development of children's logical intelligence through problem-solving, critical thinking, and analysis.

In implementing the puzzle pipe media, the KB teacher, Bustanul Ulum Bangsalsari Jember, invited students to make creations using puzzle pipe sticks. The teacher arranged puzzles that resembled the numbers demonstrated by the previous teacher, but the teacher also gave children the freedom to be creative in arranging puzzle pipes according to their wishes.

The activity is carried out after the teacher explains the pipe puzzle preparation steps. The game begins with group division. First, the teacher distributes puzzle pipe rods. Each child is assigned to make a different number, and the shapes of the numbers are made according to each child's creative abilities. To facilitate activities, teacher assistance cannot be separated. This makes monitoring easier and prevents errors. During the activity, students actively discussed with their friends and competed to complete the pipe puzzle arrangement quickly.

Evaluation of the Use of Pipe Puzzle Media to Increase Children's Mathematical Logical Intelligence

The evaluation assesses student progress towards the goals or values set in the curriculum. The purpose of learning evaluation is to measure and evaluate the effectiveness of teaching, the teaching methods implemented or carried out by educators, and the learning activities carried out by students. Evaluation of pipe puzzle media used to improve children's mathematical and logical intelligence involves a series of steps to evaluate the effectiveness of using the media in achieving the stated learning objectives. After using pipe puzzle media three times, the teacher evaluates the activities carried out

to determine the extent of the child's ability to understand the lessons that the teacher has conveyed regarding number recognition.

The steps in evaluating the use of pipe puzzle media to improve children's logical and mathematical intelligence at KB Bustanul Ulum Bangsalsari Jember are as follows:

1. Identifying Learning Objectives

   The Bustanul Ulum Bangsalsari Jember KB teacher reviews the learning objectives that have been previously set to ensure that the evaluation covers aspects that are relevant to those learning objectives. In this case, learning using puzzle media aims to improve children's mathematical logic.

2. Developing Evaluation Instruments

   Bustanul Ulum Bangsalsari Jember KB teacher prepares evaluation instruments appropriate to the learning objectives and teaching methods. The instrument used by the Bustanul Ulum Jember family planning teacher was a checklist sheet. Data collection. Data collection was carried out by KB teacher Bustanul Ulum Bangsalsari Jember through various evaluation methods, such as practical tests to measure understanding of mathematical concepts, observations to evaluate children's involvement and interactions, as well as questionnaires to collect feedback from teachers and parents.

3. Evaluation

   KB Teacher Bustanul Ulum Bangsalsari Jember reviewed student involvement and participation in learning activities using pipe puzzle media. Evaluate whether students are actively involved in learning and use the child's mathematical and logical skills. Then, the Bustanul Ulum Bangsalsari Jember KB teacher compared students' progress before and after using pipe puzzle media to see whether there was an increase in understanding mathematical concepts and mathematical logical skills.

In evaluating, teachers use a checklist for each indicator with symbols 1 to 4. Number 1 means poor, number 2 means sufficient, number 3 means good, number 4 means very good.

CONCLUTION

Based on the research results, it can be concluded that increasing the mathematical and logical intelligence of early childhood through the use of pipe puzzle media has been proven to be able to effectively introduce mathematical concepts in a concrete and fun way to young children, apart from that it can also introduce geometric concepts, develop logical thinking, encourages mathematical reasoning, and can stimulate abstract thinking in early childhood. The pipe puzzle medium can also create a pleasant atmosphere and attract children's interest in learning. Therefore, using pipe puzzle media is very helpful for KB Bustanul Ulum Bangsalsari Jember educators to use as a learning medium.

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