

# THE USE OF THE JARIMATIKA METHOD IN IMPROVING COGNITIVE DEVELOPMENT IN EARLY CHILDHOOD

Novi Cynthia Yusnita

Universitas Battuta

Email: [novicynthiay@gmail.com](mailto:novicynthiay@gmail.com)

## Abstract

### Article Info

Received: 01/08/2022

Revised: 25/08/2022

Accepted: 26/08/2022

The process of cognitive development is inseparable from a method or method used by a teacher in providing knowledge to children. This article aims to see how the use of the Jarimatika method in improving the cognitive abilities of Bimbel Calistung Alamanda children. This study uses a descriptive qualitative method that describes the situation that occurs without using calculations. The data collection used is observation, namely by observing children, interviews which are carried out to teachers of the Jarimatika method and documentation, which is carried out to take pictures of some of the children's activities. The subjects of this study were children aged 5-6 years in Bimbel Alamanda. The result of this study is that the use of this Jarimatika method can improve cognitive abilities, especially in the field of arithmetic with three stages, namely (1) the enactive stage, which introduces children to concrete objects around them, (2) the iconic stage, which is manipulating these concrete objects. into a visual form and (3) the symbolic stage in which the child transforms the image into a symbol.

Keywords: cognitive development, numeracy skills, jarimatika method.

## 1. INTRODUCTION

Cognitive is one of the important aspects of several aspects of child development that are directly related to the learning process and become one of the determinants of children's success in school. Just like other aspects of development, children's cognitive abilities are also developing step by step for the better. Not only that, the cognitive development of each child is of course also different.

Desmita (2009: 96) reveals that cognitive ability can be understood as a child's ability to think more complexly as well as the ability to reason and solve problems. Cognitive development will be easier for other adults in stimulating children's cognitive abilities, so that potential optimization will be achieved in each child. Khadijah (2016: 11) says that cognitive development shows the development of the way children think. Children's ability to coordinate various problems can be used as a measure of intelligence growth.

This is in line with the opinion of Susanto (2011: 61) which says that there are several goals of cognitive development directed at the development of abilities, one of which is the development of arithmetic, namely the ability that is directed to mastery of numeracy or the concept of initial counting. Likewise, in cognitive development specifically that leads to the logic-mathematics of early childhood, providing cognitive stimulation, one of which is done through counting games which aim to stimulate children's thinking skills which are designed according to the stages of development.

A very important ability for children that needs to be developed in order to equip them for their lives in the future is to provide them with the ability to count. Then children can also prepare themselves to go to the next level of education. Munandar (in Susanto: 2011) states that ability is the power to perform an action as a result of innate and training. A person can do something because of the ability he has. But in reality, today there are still many children who have problems in counting the number of objects. Children only memorize numbers and numbers without knowing the meaning and relationship between numbers and numbers. Sometimes children also have advantages and disadvantages in counting. Based on the results of interviews with teachers, one aspect that still needs to be improved is the aspect of cognitive development. This can be seen from the results of the daily assessment of

children conducted by the teacher. Children still often miscalculate or distinguish addition or subtraction.

Learning counting concepts in children usually only uses conventional methods such as: the teacher explains or explains the material and provides worksheets and or uses manipulative materials and asks children to work independently without complete assistance from the teacher. The variety of methods, strategies and the use of learning media is very important for a teacher to think about and plan in maximizing and making the learning process successful and enjoyable.

In line with the explanation above, Yuhatriati and Dewi Wahyuni (2016) in their research entitled "Developing Children's Cognitive Ability Through Playing Design and Build Blocks at PAUD IT Al-Fatih City Banda Aceh" showed that the development of children's cognitive abilities through playing design and building blocks at PAUD IT Al-Fatih Banda Aceh City can develop, namely children can design buildings from blocks confidently and independently according to the existing buildings in the sub-themes and can tell the results of their work. While Yurike, et al.(2018) in their research entitled "Improving Cognitive Development through Mind Mapping" revealed that children can pair objects according to their partners in mind mapping based on color, aspects of distinguishing sizes in mind mapping based on size, aspects of sorting objects on mind mapping based on order. , recognize colors, recall recently seen objects and introduce the concept of numbers.

Based on the studies that have been presented above, it can be seen that children need new strategies or methods in improving cognitive abilities. In this case the author will focus on the focus of research in the concept of counting. The ability to start counting according to Susanto (2011: 98) is the ability of every child to develop his abilities, the characteristics of his development starting from the environment closest to him, in line with the development of children's abilities can increase to the stage of understanding the number, which is related to addition or subtraction.

So that one of the counting learning methods used to smooth children's numeracy skills is the Jarimatika method. This method uses fingers and is made fun for children because it provides a visualization of arithmetic operations for children. Therefore, based on the problems that occurred above, the authors are interested in researching the use of the Jarimatika technique to improve the cognitive abilities of children at Bimbel Calistung Alamanda.

## 2. LITERATURE REVIEW

### 2.1. Early Childhood Cognitive Development

The term cognitive comes from the word cognition which is equivalent to Knowing, which means knowing. In a broad sense, cognition is the acquisition, arrangement and use of knowledge (Khadijah, 2016:31). According to Piaget, cognitive development is a genetic process, which is a process based on the biological mechanism of the development of the nervous system (Sit, 2015:38).

Table 1. Stages of Cognitive Development According to Piaget

Stages	Age Range	Description
Sensorimotor	0-2 years	Babies gain knowledge about the world from their physical actions. Infants coordinate sensory experiences with physical actions. An infant develops from reflexive, instinctive actions at birth to the development of early symbolic thought at the end of this stage.
Preoperational	2-7 years	Children begin to use mental images to make sense of their world. Symbolic thoughts, which were reflected in the use of words and pictures, began to

		be used in mental imagery, which went beyond relating sensory information to physical action. However, there are some barriers in children's thinking at this stage, such as egocentrism and centralization.
Concrete Operations	7-11 years	Children are able to think logically about concrete events, understand the concept of conversation, organize objects into hierarchical classes (classification) and place objects in an orderly order (serialization).
Formal Operations	11 years to adulthood	Adolescents think more abstractly, idealistically, and logically (hypothesis-deductive)

(Santrock, 2007: 246)

According to Khadijah, (2016: 40) some indicators of early childhood cognitive development are as follows: 1) Age 3-4 Years: (a) Children can group objects based on certain characteristics, (b) Children can sort numbers 1-10, (c) Children can show geometric shapes, (d) Children can distinguish between heavy and light objects, (e) Children can put together a 5-piece puzzle; 2) Ages 4-5 years: (a) Children can group simple objects, (b) Children can observe experiments that occur, (c) Children can sort numbers 1-10, (d) Children can group simple geometric shapes, (e) Children can recognize the concept of simple space and position, (f) Can recognize length, short, large and small; 3) Ages 5-6 years: (a) Children can group objects in a way that children know, (b) Children can tell the results of simple experiments, (c) Children can sort numbers from 1-20, (d) Children can group shapes -geometric shapes, (e) Children can recognize the concept of space and position, (f) Can recognize length, short, large and small, (g) Can recognize time.

Cognitive development in early childhood can be influenced by two factors, namely heredity factors and environmental factors. The heredity factor is that since in the womb the child has had the characteristics that determine his intellectual working power. This is because each of us started life as a single cell that weighs about one-twentieth of an ounce. Based on several studies, it is shown that the role of heredity factors on a person's cognitive development or intelligence is mainly due to a series of relationships between family ties and IQ measures. In addition to heredity factors, a person's cognitive level is also influenced by environmental factors. The environmental factors are divided into two environmental elements that have a very important role in influencing the intellectual development of children, namely, family and school (Khadijah, 2016: 41-43).

The development of early childhood arithmetic is directed at mathematical abilities. Some things that need to be considered by parents before teaching mathematics to children, especially in early childhood are: 1) Mathematics is not just counting numbers, 2) Mathematics is part of everyday life and is not something abstract, 3) To make early childhood love mathematics, parents should not be afraid of mathematics, 4) Learning should not be separated from playing (Adityasari, 2013: 7).

Arithmetic skills are related to abilities that are directed to numeracy skills or initial numeracy concepts. The skills developed include: recognizing or counting numbers, mentioning sequences of numbers, counting objects, recognizing sets with different number values, assigning number values to a set of objects, working on or completing addition, subtraction operations, using concepts from concrete to abstract, connecting the concept of numbers with number symbols, and creating the shape

of objects according to the concept of numbers. In practice, it can be applied by: 1) Using the concept of time for example today, 2) Expressing time with hours, 3) Sorting five to ten objects based on the highest order of magnitude, and 4) Knowing addition and subtraction (Khadijah, 2016: 52- 53).

## 2.2. Children's Counting Ability

Numeracy is the ability to use reasoning, logic and numbers. Understanding the ability to start counting is the ability that every child has to develop his abilities, the characteristics of his development starting from the environment closest to him, in line with the development of his ability the child can increase to the stage of understanding the number, which is related to addition and subtraction (Susanto, 2011: 18). According to Naga, numeracy is an attempt to recognize mathematics with regard to the properties and relationships of real numbers and with their calculations, especially concerning addition, subtraction, multiplication, and division (Naga, 1990: 1). Furthermore, Sudaryanti (2006:18) reveals that addition, subtraction, multiplication, and division are very basic number operations. However, for early childhood, being able to add up or add up is already very good.

Counting activities for early childhood are also referred to as numbers sequence activities or blind counting. Children mention sequences of numbers without connecting with concrete objects. At the age of 4 they can name a sequence of numbers up to ten. While the age of 5 to 6 years can mention numbers up to twenty (Nining, 2008: 25). Sujiono revealed the benefits of learning to count for children, among others, to teach children based on basic mathematical concepts that are correct, interesting and fun, avoid fear of learning to count from the start and help children learn to count naturally through play activities (Sujiono, 2008: 11).

The principles of starting counting according to the Ministry of National Education in the Learning Guidelines for Beginning Counting Games (2007: 2) are as follows: 1) Initial counting games must be given gradually, starting with counting objects or experiences of concrete events experienced through observation of surrounding environment. 2) Skills and knowledge about the initial counting game are given gradually according to the level of difficulty, for example from concrete to abstract, easy to difficult, and from simple to more complex. 3) The success of counting games is if children are given the opportunity to participate actively and are motivated to solve their own problems. 4) Counting games require a pleasant atmosphere or conditions and a sense of security and freedom for children. Therefore, we need visual aids or media that are concrete in accordance with the actual object (imitation), interesting and varied, easy to use and harmless. 5) The use of language in introducing the concept of counting should use simple language and if possible take examples from the environment around the child. 6) In counting games, children can be grouped according to the stages of mastery, namely the concept stage, the transition period, and the symbol. 7) In evaluating the results of child development, it must be started from the beginning to the end of the activity. Indicators of early numeracy skills according to the Guide to Learning in Kindergarten (Depdiknas, 2007: 52-54) are: (1) Gradually recognize numbers 1-10; (2) Counting objects 1-10; (3) Count operations 1-10; (4) Mention the numbers in sequence 1-10 or vice versa 10-1.

## 2.3. Jarimatika Method

Munafiah, et al. (2018: 64) Jarimatika is a way of counting using fingers and finger joints. Meanwhile, according to Sitio (2017: 148) jarimatika is an abbreviation of finger and arithmetic. Fingers are fingers and arithmetic is the ability to count. So Jarimatika is counting using the fingers. In line with this opinion, Prasetyo (2008:10) states that the Jarimatika method is a way of calculating mathematics using finger tools. So from some of the opinions above, it can be concluded that the Jarimatika method is one way for numeracy skills such as addition, subtraction, multiplication and division using the fingers.

Wulandani (2013: 1) reveals the advantages of using the Jarimatika method are as follows: First, Jarimatika uses visualization as a counting process so that it is easy to understand. Second, the movement of the fingers is interesting so that learning becomes fun. Third, the arithmetic is simple, so it doesn't make the brain's memory tired. Fourth, the tools used are always available and not easy to buy. Fifth, use the left and right brain. Meanwhile, Faizatin (2012: 12) states that the weakness of the

Jarimatika method is the limited number of fingers, so that the number of counting operations that can be completed is also limited.

The steps of the Jarimatika method are as follows: (1) Introducing the symbols used in Jarimatika. Starting with the right hand showing the units 1-9 and the left hand showing the tens 10-90. (2) Invite the children to always be happy and try not to bother the children to memorize the symbols of numbers. (3) Demonstrating the formation of the fingers showing the numbers. (4) Practicing simple arithmetic operations (Sitio, 2017: 149).

### 3. METHOD

The research method used in this research is qualitative. The term qualitative research is intended as a research method whose findings are not obtained through statistical procedures or other forms of calculation. This type of qualitative research uses descriptive qualitative research that describes cognitive abilities using the Jarimatika method. This research was conducted at Bimbel Calistung Alamanda which was carried out on children aged 5-6 years. Collecting data using observation, interviews, and documentation. The observations were made to determine the cognitive development of children using the Jarimatika method. Then interviews were conducted with the Jarimatika method teachers and also the teachers who teach at the Bimbel to obtain more accurate information. Furthermore, documentation is done by obtaining data on children's learning outcomes in the form of teacher assessment results and taking pictures of some of the activities carried out by children. Data analysis used pre-field analysis and field data analysis.

### 4. RESULTS AND DISCUSSIONS

Based on observations and interviews conducted by the teacher, information was obtained regarding the evaluation of learning carried out by the teacher during carrying out learning in the classroom. I asked, "Mother, from the six aspects of child development, according to the mother according to the evaluation that is done every day, which of the six are still having difficulties in learning?". Then the teacher explained that there are several aspects of child development that are still difficult to develop and still need guidance and training, one of which is the cognitive aspect. Actually it is only for a few children who dominate. In accordance with my observations, it appears that some of these children still need more guidance and attention from the teacher.

In line with the statement conveyed by the teacher above, I see the assessment system carried out by the teacher every day. The assessments used by the school are observation, performance, and portfolio. For observations made by teachers on children's learning outcomes that occur every day during the learning process. From the results of the assessment, it can be seen that there are indeed some developments that still need training or guidance. So that the school itself has prepared a solution to this problem by using the Jarimatika method.

Basically, the learning system implemented by the teacher is divided into three stages, namely the enactive stage, the iconic stage, and the symbolic stage. This is in line with Bruner's theory which states that teachers need to know the stages in learning arithmetic early in order to be able to plan effective learning activities, namely:

- a. The enactive stage is a learning stage in which knowledge is actively studied, using concrete objects or using real situations.
- b. Iconic stage, which is a stage of learning something knowledge where knowledge is represented (manifested) in the form of visual imagery (visual imagery), pictures, or diagrams, which describe concrete activities or concrete situations contained in the enactive stage mentioned above.
- c. The symbolic stage, which is a learning stage in which knowledge is represented in the form of abstract symbols, namely arbitrary symbols used based on the agreement of people in the field concerned, both verbal symbols such as letters, words -words, sentences, mathematical symbols, and other abstract symbols. (Suwarsono, 2002:26).

So based on these symbols, in the first (enactive) stage, the teacher introduces the numbers 1-20 by mentioning the name of the number to the child while showing objects starting from the child's limbs, followed by showing objects that children often use or see every day. , such as one head, one

nose, two hands, two eyes, one shirt, and so on. This is done by the teacher so that children easily understand the concept of a number by relating it to concrete objects that are around the child.

The teacher also uses other games such as asking the children to count the number of children in the class by starting to mention the numbers sequentially from left to right, counting how many girls or boys are in the class, and the number of tables based on color. This is done so that through a variety of games children have a lot of experience and various ways to understand the concept of numbers and counting.

In other activities, the teacher also often invites children to play together with children who sit in a circle. Then the teacher puts a basket of colorful blocks in the middle of the circle and explains the rules of the game and reminds students not to fight. Next the teacher mentions the names of numbers and colors that must be taken by several children, enthusiastically and spontaneously students compete to take the object. In the next instruction, the teacher asks the child to take some blocks and then give half of it to the teacher or according to the teacher's instructions. In this learning, children can immediately see the process of counting operations, adding and subtracting through their hands that are being tampered with, causing feelings of pleasure and pride because they can see and discover for themselves the new knowledge they are playing.

Then in the second (iconic) stage, the teacher begins to show a number of pictures that resemble objects and events that are often seen by students. In this activity, the teacher no longer invites students to directly manipulate objects, but the teacher begins to display pictures of a set of objects and mention the names of the numbers. For example, the teacher shows an example of a picture by saying: "This picture contains 3 birds" (while showing the picture and inviting students to mention it together). In this activity the teacher no longer gives concrete examples by bringing birds into the classroom, but the teacher teaches children to manipulate the birds with the pictures shown. Children are asked to name the pictures that the teacher brings as if the pictures are real objects.

For the introduction of the Jarimatika symbol, the teacher first mentions the number 1 (one) while showing the finger that is designated as the symbol, then the teacher invites the children to demonstrate it. Then the teacher asked the children to print their fingers on paper in the form of visualization. After all the children drew it then the teacher used the media of finger drawing to show the shape of the hand. In this activity the teacher begins to train children through pictures or visualization media, this is done so that children can see examples that are demonstrated by the teacher.

Then in the third (symbolic) stage, the teacher provides an understanding of the symbols of numbers 1-20 by showing and mentioning there are three balls while inviting the children to count the balls. Then show the ball in a visual form (picture) then paste the picture of the three balls on the blackboard which is then brought closer while the teacher explains this is a collection of three balls and shows symbol 3. This is intended to introduce symbols that represent the concept of number 3. At this stage the teacher also continues to provide games by separating the pictures and symbols, then the child is asked to come forward to arrange and match correctly the symbols and a set of pictures of the objects that represent them.

Furthermore, for the use of Jarimatika, the teacher gives an understanding to the children that their ten fingers will be used as symbols in counting the number of an object. With instructions and explanations they follow the movements shown by the teacher. Previously the teacher introduced the symbols from the numbers 1-10 with the fingers. The teacher explains that the fingers on the right hand are units and the fingers on the left hand are tens. Then the teacher raises the index finger on the right hand to show the name of number one and the symbol of number 1, and so on.

In the process of applying Jarimatika for arithmetic operations of addition and subtraction, the teacher can already write these symbols on the blackboard. For example, where the teacher writes the number symbol  $3+2$  on the blackboard and shows with the finger of the right hand the symbol and the finger being manipulated. Then the step is that the child must distinguish between the big numbers and the small numbers. Then the child will remember the big number in the head while the small number is symbolized by the finger (forming 2 fingers, namely the index and middle fingers). Then to add up, mention the number 3 that is remembered and then add the number 2 that is fingered, so the result is 5. Conversely, for subtraction with the example numbers  $6-4$ . The first step is to distinguish which number is the largest and the smallest and then remember the smallest number in your head. Then close the ten

fingers, then open one by one by mentioning the number in your head and then continue. Then count how many numbers are open. And so on, repeated until the child understands.

During the learning process, children are more active in using their fingers. On the other hand, children also train their fine motor skills. Then learning is also not boring and fun, especially accompanied by singing such as the songs "if the heart is happy" and "open and close". At each exercise the child will be given a reward or appreciation for what he does. Children also become more enthusiastic in learning, this is evidenced by children being more active in asking questions and helping each other with friends who have difficulty using their fingers. So when reviewed on the assessment or evaluation carried out by the teacher, the method succeeded in increasing the cognitive development of children, especially in the field of arithmetic. The method can also affect the assessment of other aspects such as physical-motor and socio-emotional.

## 5. CONCLUSION

Cognitive development of early childhood is one of the important aspects to prepare children to enter the next level of education, especially in the ability to count. Therefore, the Jarimatika method is one of the methods used to help children perform fun arithmetic operations. This method is also an alternative for teachers so that learning is not boring and seems stiff. Based on the research above, it was found that the Jarimatika method was carried out in three stages, namely the enactive stage, the iconic stage, and the symbolic stage. At the enactive stage, it is done by introducing concrete objects that are around the child. Then the iconic stage is manipulating concrete objects into visual forms. And then at the symbolic stage the child turns into a symbol. So that children are trained to think from concrete things to abstract things. Therefore, it can be concluded that the use of the Jarimatika method can improve cognitive abilities in children at Bimbel Alamanda.

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