

# LEARNING MEDIA OF LOGICAL MATHEMATICS FOR EARLY CHILDHOOD

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Maximization on using learning media in education practice is very important. Fusing communication style in using learning media for developing intelligence of logical mathematics of early childhood is really required. A good communication style will stimulate the cognitive development of early childhood, particularly logical mathematics of early childhood. As maximization on using learning media makes the learning material easier in order the children are able to understand. Used method in this research is literature study in which has been analyzed from various kind of articles about learning media and logical mathematics of early childhood. As purpose of this research is to give an information about highly significance in maximization on using learning media and language form of educator to stimulate intelligence of logical mathematics of early childhood.

**Key Words : Learning Media, Logical Mathematics of Early Childhood**

## 1. INTRODUCTION

From times to times, the problem of mathematics learning still become a horrible thing for most of protégés' or students' parents.

However, on early childhood education order, mathematics is still judged as a trivial thing. Mathematics learning about numbers such as addition, subtraction, multiplication, and division. Not only in Indonesia, but also in U.S.A, mathematics ability of early children had been belittled as long as history (Hughes 1986; Bird 1991; Aubrey 1993; Greenes 2004; Carruthers dan Worthington 2006).

Mathematics belongs to cognitive development aspect. Where in one of logical intelligence can develop and help mathematics development of early childhood. Pound, 2008 stated that there is a factor which makes half of children look mathematics up as a fearsome thing, hence becomes a difficult matter. But, all those matters are going to be easier if each mathematics thing is linked to daily activities.

Regardless the other problems, it is a matter that early childhood is first foundation in order to motivate them to be able to like the mathematics subject in early childhood stage. Besides that, there was a field fact based on UNESCO data, about quality of mathematics

education in Indonesia ranked 34<sup>th</sup> from 38 countries that had been monitored. As matter of fact, the lowness of mathematics achievements from Indonesia students was showed on survey result of International Statistic Center for Education (*National Center for Education in Statistics*, 2003) concerning 41 countries in mathematics learning. The result was Indonesia ranked 39<sup>th</sup>, under Thailand and Uruguay (Sriningsih, 2009).

Those datas above prove that material of mathematics logic is still on low interest phase and is very frightened by most of Indonesia children. More spesifically, for early childhood to emphasize more on concept, analyze and problem solving (Emmy Effendy, Annastasia Ediati, Endah Kumala Dewi, 2010).

A quotation from understanding S. Belen in Said Alamsyah, 2015,

“Actually, in this world there is no learning problem, because each child is blessed by the extraordinary brain potential that makes him or her brilliant human. The real one lies on teaching problem. As error in applying method and teaching technique makes the potential student to be a kid with low ability.”

## **2. MATERIALS AND METHOD**

As used method of this paper is theory analyze. Where the writer studied the chosen topic first, and then analyzed articles and books which are related to the topic of logical mathematic intelligence and the used media to early childhood (Dinan Yulianto, Herman Yuliansyah, 2015).

### **2.1 Learning Media of Early Childhood**

In world of early childhood education, communication process with sharing information between teacher and student is called as learning-teaching activity. As communication goes by, the teacher takes role as communicator who will give the material to student receiver (Eliyawati, 2005). Related to that matter, education media is very important to be used in learning-teaching activity. In early childhood, children development on concrete thinking period. According to Heinich, Molenda and Russell (Eliyawati, 2005) media is a communication access tool. Terminology of media in Latin is a plural word of “medium” which literally has meaning “mediator” that is as mediator between message source with message receiver.

The world for early childhood is a world that identically with playing. Development of cognitive ability is able to improve if the given stimulus to children can stimulate the development of brain tissue in nerve and connects left-brain and right-brain. The stimulation is a good one if a variety kind and is done continually also starts early on since birth. Pattern of *authoritative* (*democratic*) care and affectionate will urge development aspects such as multiple intelligences like mathematics logic, language

communication (*linguistic*), musical intelligence, movement (*kinesthetic*), *visio spacial*, fine arts, etc. (Novita Reny, 2006).

Stimulation that is given by teachers or parents must give a good effect for cognitive development, especially logical mathematics of early childhood. One of way to stimulate the development and creativity of children thinking is through learning media. Role of media in nowadays era spurs and makes teachers or parents easily give materials to early childhood. Particularly, in giving material of logical mathematics for them. However, many teachers or parents can not maximize learning-media yet. As research based on British Audio-Visual Association mentioned that information average which is gotten through senses with composition 75% vision, 13% auditory, 6% touching and contact, also 6% through smelling and tongue.

From the way bringing up and language form, using a media does not fully absorbed yet by children. Even though, adding capacity of children is different from one and another. Required a good communication skill in teaching logical mathematics of early childhood with maximization method on using learning media in it. Using learning media indicates significant improvement in children learning result. As exact with a conclusion that learning media is very recommended in order to improve learning quality and result quantity which are absorbed by children (Zaman & Eliyawati, 2010).

Conventional method or also called by traditional teaching, for example is *drill* (method) like numbers memorization, counting fingers to introduce the mathematics. And also working on a question which is required those methods in order to solve it. Due to that similar example, discovered in field that many children with math-phobia, until have less interest to this very subject. Through playing activities that well-kept and educative, innovative, also creative, the children will have fun to study mathematics and furthermore are be able to dig in more what was taught by teacher or educator.

Previously outcome of research from Carole Greenes, Herbert P. Ginsburg, Robert Balfanz, 2004 about carried program namely *Big Math for Little Kids* helped greatly in mathematics learning to be a lot of fun. Program *Big Math for Little Kids* had activity which its stories for developing ideas, total, pattern form, logical reasoning, measuring, operative numbers, and object space. *Big Math for Little Kids* was designed to attract interest and potential of mathematics idea, develop exploration, stimulate ideas and discuss what children were going to discover in daily lives.

Learning media in mathematics logic of early childhood that was adopted from *Big Math for Little Kids* program propagandizes some programs, there were :

1. Build knowledges and interests of children
2. Integrate mathematics into routine of class activities

3. Introduce and enrich ideas with *planful* way
4. Develop mathematics ideas which are complex
5. Promote the development of language and reflection
6. Push the way of thinking like a mathematician
7. Give repetition

(Carole Greenes, Herbert P. Ginsburg, Robert Balfanz, 2004).

As above explanations, we can see that continuity learning-teaching activity which is done by teacher surely was planned first before. From annually, monthly, weekly, and daily programs. The program has to have orientation function in order the teacher does not out of line from what called instructions. On its level, a good program will be completed with supporting media that will help in stimulating the development of logical mathematics of early childhood.

Other than supported by a good program, media stimulation also has to be maximized. Maximization of learning media needs high creativity from an educator. Therefore, a good media is media that has the using instructions and has trial run before. As writer perspective, logical learning-media of early childhood has still not thought yet by some teachers and also parents.

The concept on this learning-media was adopted with several theories of *multiple intelligents* and also by some experts in mathematics field, which will be explained deeper in theory analyze and discussion sections. As not-so-thought-yet concept by most of people, even by teacher circle, writer will put to the effectiveness test in school domain. Hopefully, will be able to help cognitive development of children, especially logical intelligence of early childhood. According to those factors, it will be researched about learning-media development in logical mathematics of early childhood.

Starting creation of *Joy Math* media that fusing with some *Big Math for Little Kids* programs will be able to become a new creative idea with output of interesting and well-concepted learning media for early childhood education.

The *Joy Math* itself is a full color book which its inside there are children worksheets in big size and also supporting tools or demonstrations for early childhood. There are also various directions of concept knowledge how to explain and teach the early childhood. As exactly, a guideline book.

## 2.2 Cognitive Development of Early Childhood

Human have been created along with its both of strenghts and weaknesses. However, human have common sense and mind that had been given by the Creator. Likewise the child as individual person who extremely needs knowledge, life provisions, and also perfect education as investment of the world and hereafter. Teachers and parents have to give good experiences for children where they

are going to need enough knowledge, so that they can have meaningful purpose about their five sense functions. Related to the five senses and its functions, cognitive ability of early childhood is required in development progress of the vision, smelling, touching and auditory aswell.

Process of cognitive ability connects tightly with the intelligence. If cognitive more passive or static and is a potential to understand something, intelligence itself more active kind that is actualization form of activity and behavior (Sujiono, 2008 : 1,3). Definition of cognitive according to Sujiono is a process of thinking. Which is individual competence to relate, evaluate and consider an event or incident. A child who leans toward cognitive and intelligence development will prove something that has interests in ideas and learning.

Multiple Intelligence theory is one of cognitive development theories. This one was stated by J.P. Guilford and Howard Gardner. Gardner divided cognitive to seven different kinds, there were : intelligence of mathematics logic, language intelligence, music intelligence, spacial intelligence, kinesthetic intelligence, intrapersonal intelligence, and interpersonal intelligence.

Development in logical mathematics of early childhood does not apart from the cognitive essence. Alfred Binet (Sujiono, 2008: 1, 15) stated that cognitive essence has three characteristics, there were: (1) Intelligence (2) Ability to create adjustments (3) Ability to do self-criticism.

Intelligence in cognitive development to determine, defense and fighting for certain purpose. As more intelligent in managing mind, so automatically more capable to make a decision also purpose of life. In development of early childhood, the children will express their desires very easily and always make decision appropriately. Relationship that is synergy with mathematics as language and with logical intelligence, there lies in said daily language. Which it contains ratio, number and division, so that it will be easier and accustomed in applying on daily life of children (Dara V. Wakefield, 2012).

Competence in development of early childhood is to create adjustments in order to reach the destination. As its sample, a child will adjust towards the facing problem, like is able to finish the given task from teacher. Mathematics is like language that assures language of consideration and comparison (Dara V. Wakefield, 2012).

Competence in doing self-criticism is children ability to learn from the mistake that was ever done. In extensive meaning, learning from experience will make children to try and keep trying.

A teacher role is a student pillar in order that they will be able to get many knowledges. Teacher form has to get the special place in the heart of students. Teacher must understand and get the whole materials that will be taught to them. According to Prof. Yohanes

Surya.Ph.D, “A student with the low capability is able to become smart due to two things : the right teacher and learning strategy/method that appropriate”. David J. Chard, Scott K. Baker, Ben Clarke, Kathleen Jungjohann, Karen Davis, and Keith Smolkowski (National Assessment Educational Progress [NAEP], 2005) reported concerning about student achievement in mathematics which was the low-income family had limit of mathematics intelligence. This is due to the parents were not able to access the education.

### **2.3 Logical Mathematics of Early Childhood**

As history has been going by, logical development has had long history, started from Ancient Greek age around 400 BC (Nugraha, 2008). At the time, logic had been known as traditional logic. Its meaning that the logic which learned as part of philosophy method. Whereas symbolic logic was logic which learned to build scientific creativity. Logic word has meaning “according to intellect”, meanwhile literally logic means a method or technique that is applied to examine reasoning accuracy. Therefore, if logic is linked to mathematics directly, it can be concluded as way of thinking system or thinking pattern of mathematics.

Intelligence of logical mathematics according to Rozana, 2015 that is someone ability to think abstractly, ground on concept, and capacity to understand pattern of logical and mathematics. The children that have this intelligence usually have competence in analyzing problem, detecting pattern, doing mathematics calculation, having thought and deduction scientifically, also understanding the causal relationship.

In intelligence order of logical mathematics of early childhood, there are still not many schools which deliberately give or stimulate one of this multiple intelligences. Because, it has a really special thing in giving material also the learning method. Not only those matters, but also the using media has an effect in learning process of logical mathematics for early childhood.

A child must interact with the surroundings. This indicates that surroundings also gives effect to process of child knowledge through the scheme. According to Piaget, scheme is sort of knowledge category which helps in interpreting and understanding world. Piaget also believes that children thoughts will develop appropriately with the development stages or more complex period. Each individual also will experience qualitative change which its characteristic is invariant. This change is caused by biological pressure and environment factor also organization of thinking structure.

Intelligence of logical mathematic of early childhood has ten indicators that have ten components of children intelligence TPA, KB and TK. Those indicators are as following :

1. Have sensitivity towards numbers
2. The children interest and involve in computer and calculator

3. The children often ask questions that relate to causal relationship
4. The children like games that using logic, strategy and thought
5. The children are able to explain their light problem logically
6. The children can make guess a consequence and think simple experiment to prove the guess
7. The children deplete so much time to play construction or building
8. The children like arrange something in accordance with serial, category and hierarchical
9. The children understand easily explanation about causal relationship which is relevant with phenomenon that seemed logically if-so or causal
10. The children like to see books that contain pictures of knowledge, nature, technology, and transportation.

### **3. RESULT AND DISCUSSION**

Beside playing is one of methods in improving intelligence and development of logical mathematics for early childhood, there is also learning-media that gives most effect in delivering material of logical mathematics for early childhood. Attention focus of children towards learning time very limited, however if doing as together as playing will help children to study. And they will be happy, then getting science and knowledge unconsciously through playing(Rozi, 2012).

A teacher has to be able to maximize learning media with getting the best of given material. Teacher is source of learning for protégé or student. Therefore, writer concluded that existence of learning media goes side by side with competence of learning source. Some activities of logical mathematics of early childhood, such as arranging patterns and pictures, sorting out and grouping, putting together and plugging, studying number concept and problem solving (Sujiono, 2008:11.41). Whereas logical mathematics that gives effect to development of social-emotional, physical, perception of visual and spacial, creativity, definitely lies on playing activity of logical mathematics for early childhood. What more is that mathematics concept must build an affection and interest with way of fun without coercion element towards children and surely based on desirability and interest from children selves.

In education world, a planning is substantial thing for education domain. So there is a start for program or development media to be able to develop intelligence of logical mathematics of early childhood. There will be built a planning that includes following matters :

- a) purpose of using product;

the purpose of using this *JoyMath* media is to be able to stimulate logical intelligence of early childhood.

- b) Who is user of this product;  
the user of this *JoyMath* media is students, teachers and parents,
- c) description of product components and its using.  
this media consists several elements from development of logical intelligence of early childhood, therefore the development range is accommodated in a media also the tool of assessment instrument.
  - Media "*Find Me*": is a media design that specified to train speed and fast thinking ability in organizing between auditory, thinking and vision. As indicator from this media is to improve intelligence of classification and serial ability, problem solving ability, discovering pattern, understanding measurement.
  - Media "*Little Cube*": is a media design that specified to train concept of number, addition, subtraction and also to train children visual spacial. This media can help in forming and organizing building. As indicator from this media is concept of number, pairing construction pattern, construction competence.
  - Media "*Logic Magic*": is a picture book which its inside has a frame that must be matched with pictures and colors. This game requires focus for early childhood. As its indicator is discovery logical relationship, problem solving ability.
  - Media "*Do Best*": is an experiment media for children that contains experimental tools, such as glasses with various kind of size, flashlight to see light shadow, ruler, and also fan. One of its indicators is Experimental Hypothesis ability.

Give the children freedom to count total that they most like, do not be limited (Carole Greenes, Herbert P. Ginsburg, Robert Balfanz, 2004). In Indonesia itself, there is understanding that teacher always limits it due to the curriculum which is children on kindergarten age are able to count 1-20 that included in Government Laws 146 year 2014. Give the children opportunity to reach a chance bigger. Because, actually that is the knowledge which children can dig in also are the asset and information as they can get for their next provisions and will develop in match with each potential.

To maximize media of logical mathematics for early childhood, it has to be in synergy with the carried on program by teacher. In order to create the systematic and also continuity in learning process there is a procedure in media of logical mathematics for early childhood. Which should be noticed by teacher to get the attention of these principles :

- (1) Media is not mean to replace teacher role
- (2) There is no education media as sole media to reach education goal
- (3) Education media is an integral part that will automatically include in learning activity process
- (4) Using learning media that has variety, balance and continuity is going to deliver a good learning result



- (5) In using education media, children must be active in before, middle and after process of using education media
  - (6) There is procedural in maximize education media of early childhood, particularly which used in learning media of logical mathematics for early childhood.
- a. Preparation stage  
Teacher prepares learning materials, teacher prepares media, teacher prepares instruments, teacher prepares the students.
  - b. Implementation stage  
Teacher gives lesson or provides media.
  - c. Evaluation stage  
Teacher does an evaluation towards learning result, teacher explains the materials that have not clear yet.
  - d. Follow-up stage  
Teacher does activity that direct the wider and deeper understanding into related media and also a reflection to the next activity.

#### **4. CONCLUSION**

From the above explanations, we can conclude that skill in mathematics is able to do with playing first in order to improve happy feeling children towards activity that will be done. Besides that, playing activity has to have a meaning and it also one of the principles in early childhood learning. Logical mathematics learning of early childhood is going to be introduced and understood easily if in daily life the children practice it. In maximization media of logical mathematics for early childhood, must be in synergy with the carried on program by teacher. Where the teacher has to pay attention to the principle and procedural in doing learning activity.

Learning media of logical mathematics for early childhood can bring the children up to play. As first idea of this research, writer will do the trial-run experimental for media called "Joy Math". This media fully equipped with manual book for teacher and materials also media of logical mathematics for early childhood. And it includes learning indicators of logical mathematics for early childhood. Some of indicators and its activities are discovery pattern, discovery logical relationship, strengthening the number definition, understanding measurement, construction competence, hypothesis and experimental competence, also problem solving competence.

From learning material of logical mathematics with "Joy Math" media, writer expects ahead that the media can stimulate intelligence of logical mathematics of early childhood and this very intelligence will be able to improve.

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