

Improving the Intelligence of Mathematical Logic Through Datalang Media

(Research on Child Action Group B in TK AL Karimah Pekanbaru in 2018)

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Abstract: The purpose of this study is to describe how the process of implementing DATALANG media and to determine the increase in intelligence of group children's logic in Al Karimah Pekanbaru kindergarten. This study was carried out on children in group B, amounting to 15 children. This research is an action research with the Kemmis and Taggart method which consists of 4 stages, namely (plan, action, observation and reflection). This study consisted of 2 cycles, with each cycle of 6 meetings. Data collection techniques are using observation, field notes, and documentation. Data analysis uses quantitative and qualitative. Quantitative data analysis is carried out with statistical descriptions to compare pre-cycle to cycle II. The stages of qualitative analysis are data reduction, data display and verification. The results showed that there was an increase in creativity through playing clay with scores in the pre cycle 20.8 increased to 43.73 in the first cycle, and increased by 62.72 in the second cycle with the category of developing very well.

Keywords: Mathematical Logic Intelligence, Media Datalang, Research Action

Introduction

Education at an early age basically covers all efforts and actions taken by educators and parents in the process of care, care and education in children by creating auras and environments that will make children explore experience that gives him the opportunity to know and understand the learning experience he has gained from the environment through the child's potential and intelligence. In early childhood education the provision of cognitive, language, physical motoric, artistic, social emotional and spiritual moral stimulation is very important to support the child to become a qualified personal figure. One important aspect developed at an early age is the intelligence aspect of mathematical logic which is part of cognitive.

Ramos, et. al in his research journal entitled "*Logical Mathematical Notions in Children with Perinatal Encephalopathy*" shows the results of his research that this study focuses on understanding how children capture numbers, and how this process is affected by variations in child development, such as prenatal damage.^[1] Without mastering the idea of mathematical logic, children are affected not only in their school performance but also in daily activities such as calculating, exchanging, asset value allocation and purchase of items. In the perinatal model of encephalopathy it is clear that the greater the number of indicator variables of nervous system dysfunction, such as the presence of perinatal damage, and sequel structuring at the age of assessment, coupled with adverse social conditions such as low socioeconomic status, the more severe difficulties that must be faced in the process of understanding learning Math logic. The researcher emphasizes that this research is important to understand the process of acquiring numerical concepts in the early stages of development in order to develop appropriate teaching strategies.

Subsequent research conducted by Güven entitled *Investigation Of Number And Operations Skills Of Children Attending Preschool Education* states that children's abilities and success in recognizing numbers and addition operations are very closely related to parents' education and children's age.^[2]

In addition Edward C. Melhuish and Mai B. Phan's research entitled *Effects of the Home Learning Environment and Preschool Center on Literacy Experience and Numeracy Development in Early Primary School* shows that the influence of the home environment and children's experiences in kindergarten is very great on language skills and the development of children's mathematical logic intelligence in this case number recognition.^[3] The home environment as a safe and enjoyable learning media and real experiences obtained by children from pre-school greatly determine the success of children in learning.

Furthermore, research conducted by Rasanen et al entitled *Computer-assisted intervention for children with consumerized skills* research results showed that computer intervention by playing games showed an increase in the ability to recognize the concept of numbers in children. In this study the teacher designed game

games through computers that used numbers.^[4] Furthermore, research conducted by Sriani et al., That by using Playing Methods *Puzzle Geometry* can Improve the Cognitive Development of Children in Knowing Forms.^[5] Similar to Sriani et al, Diana also argues that through a multisensory approach can affect the logical-mathematical intelligence of children in a group in kindergarten.^[6]

In addition, research conducted by Gasteger entitled "*Traditional Number-Dice Games: An Opportunity For Early Mathematical Learning*" states that playing traditional dice games can be a good opportunity for early math learning.^[7] Furthermore Guzman and Moral in his research entitled "*Game To Learn Project: Game-Based Learning To Logical-Mathematical Strengthen, Naturalist And Linguistic Intelligence In Primary School*" which states that the application of methodology Game-based learning fully on the use of digital games, serious games or video games is present as a learning medium that takes advantage of the intrinsic motivating effects of certain video games to increase intelligence of mathematical logic, naturalist and children's language.^[8]

From the results of the relevant research above we can see that the introduction of numerical concepts related to the intelligence of mathematical logic from an early age is strongly influenced by the home environment, preschool environment, games, children's learning media and so on. In this study the author wants to know how the media, especially the DATALANG media, can improve the intelligence of mathematical logic in children. This research is very important to do considering that mathematical logic as part of aspects of cognitive development must be stimulated early.

Based on my observations at Al Karimah Pekanbaru Kindergarten in group B (ages 5-6 years) with a total of 15 children. 8 boys and 7 daughters are very far from expectations. In Al Karimah Pekanbaru Kindergarten there are 13 people (76.4%) children who have not been able to recognize the number symbol, have not been able to calculate and have not been able to think logically.

Seeing the reality in the field and from the results of relevant research, the author feels the need to conduct research in TK Al Karimah Pekanbaru with the title "Improving mathematical logic through the media DATALANG". The author hopes that children's mathematical logic can improve through the DATALANG media so that it has a positive impact on other aspects of child development.

The Study of Theory

Mathematical Logic Intelligence

Armstrong describes mathematical logic intelligence as the ability to use numbers effectively (for example as a mathematician, tax accountant, or statistician) and for good reasons (for example, as a scientist, computer programmer, or logician). This intelligence includes sensitivity to patterns and relationships that are logical, statements and postulates (if-then, cause-effect), functions, and other related abstractions. The types used in mathematical logic intelligence services include categorization of categorization, classification, conclusions, generalization, calculation, and hypothesis testing.^[9] This intelligence has two elements, namely mathematics and logic. These two elements are combined so that they become mathematical logic intelligence. This is because the relationship between the two (mathematics and logic) is very close, even both of them follow the same basic laws of consistency.^[10] Children who have mathematical logic intelligence are often attracted to numbers, patterns, calculations, and logical thinking. Morisson explained that children who have mathematical logic intelligence show talent in the field of numbers, reasoning, and problem solving.^[11]

Agreeing with Armstrong, Lunenburg explained that the intelligence of mathematical logic refers to the sensitivity and capacity of individuals to distinguish, logical or numerical patterns; and the ability to handle long chains of reasoning. These people like experimenting, solving puzzles, and asking cosmic questions. Strength in mathematical logic intelligence often implies great scientific ability. Teachers can strengthen this intelligence by encouraging the use of computer programming languages, critical - thinking activities, outlining linear, science fiction scenarios, logic puzzles, and through the use of logical-sequential presentation of subject matter.

Children who have intelligence of mathematical logic will be very fast and happy when doing activities related to numbers, reasoning, calculation and problem solving. According to Parvis *logical / mathematical intelligence as the ability to study problems, to carry out mathematical operations logically and analytically, and to conduct scientific investigations as the ability to study problems, to carry out mathematical operations explain the intelligence of mathematical logic logically and analytically, and to investigate scientific.*^[12]

According to Jackman *Logico-Mathematical Intelligence think conceptually in logical and numerical and numerical patterns, making connections between pieces of information.* Statement can be interpreted that the logic of mathematics is the ability to think, the ability to process numbers, create relationships and gather information.^[13] The

Choral Journal describes mathematical logic intelligence as having its potential in the capacity to analyze problems logically, perform mathematical operations, and investigate problems.^[14] This intelligence is characterized by the ability to think conceptually. Children who have good mathematical logic intelligence, like

exploring patterns, categories, and relationships.^[15] According to Tai intelligence Logic mathematics is the ability to calculate, sum up and carry out mathematical operations.^[16] Whereas according to Vural the logic of mathematics is the ability to make calculations, solve problems, think critically, understand numbers, forms of geometries and abstract symbols.^[17]

Learning Media

According to McLuhan the media is a human extension that allows it to influence other people who do not make direct contact with him.^[18] Romiszowski formulated the teaching media "... as the carries of messages, from some transmitting source (which we caseis the learner)." Submission of messages (*carries of information*) interacts with students through sensing. Students can also be called to use their sensory tools to receive information, or can also use a combination of sensory devices at once so that activities communicate more closely.^[19]

Scanland also provides a definition of media as follows:

Instructional media encompasses all the materials and physical means an instructor might use to implement instruction and facilitate students' achievement of intruotional objectives. This may include traditional materials such as chalkboards, handouts, charts, slides, overheads, real objects, and videotapes or films, as well as newer materials and methods such as computers, DVDs, CD ROMs, the internet, and interactive video conferencing.^[20]

The definition above illustrates that the learning media includes all physical materials and equipment that the instructor uses to carry out learning and facilitate student achievement. According to Biddle and Rossi, "For our medium purpose may be defined as any of the devices that are normally used to transmit information between persons."^[21] This definition explains that media is any form of device or equipment that is usually used to transmit information between people.

According to Gerlach in general the media includes people, materials, equipment, or activities that create conditions that allow students to gain knowledge, skills and attitudes. Based on several definitions of the above learning media can be synthesized that what is meant by learning media is everything that can be used to channel messages / information from the sender (teacher) to the recipient (students), so as to stimulate the mind, feelings, interests of students to learn in order to achieve goals learning.

Media DATALANG

Media DATALANG (Dadu Tabung Bilangan), is a device or equipment in the form of a colored tube with holes on it to make communication and interaction effective between teachers and students to transmit information so that children gain knowledge, skills / abilities of mathematical logic.

Research Methodology

The place of this research was carried out at Al Karimah Kindergarten, Tuah Karya Village, Tampan District, Pekanbaru, through the consideration of researchers where the school had children whose mathematical logic was still underdeveloped and in this school DATALANG media had never been taught in the learning process. This research was conducted in even semester 2017/2018 starting from January to February 2018. This type of research uses *action research*. A qualitative approach is used to explain the events observed during the study to describe the application of DATALANG media to improve mathematical logic. Quantitative approach is used to determine the percentage of students' learning outcomes, especially the mathematical logic of children aged 5-6 years through the DATALANG media. As for this study using the Kemmis and Mc Taggart research design as shown below:

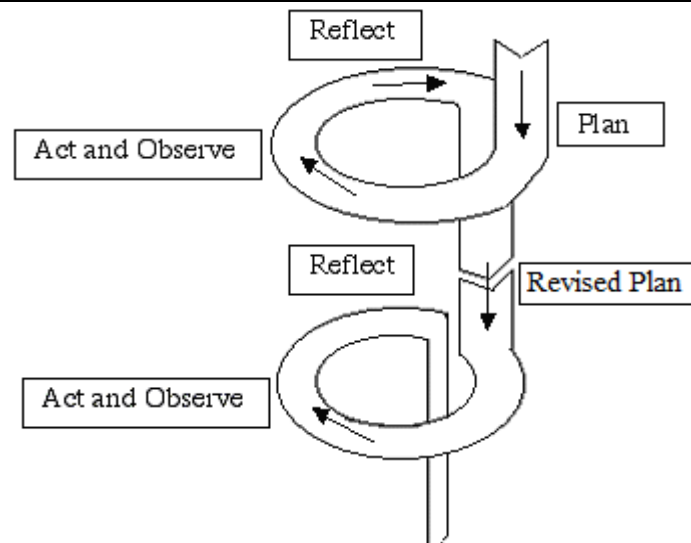


Figure 3.1: The Spiral Series of Action Research Model Kemmis and Taggart

On above chart we can see that the first step in action research is to plan activities to be carried out. This planning phase is very important to be done so that the learning process in the classroom is more directed and can run well. The planning stage gives the teacher the opportunity to determine the right material and methods to be given to children according to the child's development. The planning phase in the classroom action research can be done by the teacher by making a daily learning development plan (RPPH) which refers to the curriculum, annual program, semester program and weekly programs that have been made before and learning methods and learning media. Learning methods and learning media provided and provided by the teacher must attract children to want to play and learn together. In this case, the teacher makes his own DATALANG media for the learning process.

After the planning stage the next stage is the second and third stages which are combined into one, namely the action and observation stages. In this Kemmis and Mc Taggart research method, the second and third stages are combined in one implementation, namely the teacher can provide action and can directly observe children in the learning process. This greatly facilitates the teacher in the action research process because it combines actions and observations directly during the learning process.

Next is the final stage called the reflection stage is an activity carried out by the teacher and collaborators in the form of discussions to reflect and evaluate the learning process that has occurred in relation to any shortcomings and advantages that already exist in the learning process. This reflection process is very important to be carried out as a teacher's material to evaluate the learning process that has taken place. When the evaluation and reflection process is found to have errors and deficiencies, the teacher and collaborators will correct these errors and shortcomings by returning to the learning planning for the next stage until the objectives that will be achieved by researchers and collaborators are optimally achieved. The steps or stages of Kemmis and Mc Taggart's research model can be repeatedly done like the chart above until the goal of the researcher is truly achieved.

This research also involves collaboration between researchers and teachers as executors of action and researchers as the implementation of research activities, so that this research can be categorized as collaborative research, the researcher chose the appropriate research method to carry out this research namely action.

The instrument sheet prepared by the researcher contains indicators which are a reference in assessing the logic of mathematical intelligence of children aged 5-6 years. This instrument is filled by researchers and collaborators by giving a check list (√) on each indicator that matches the level of mathematical logic intelligence that appears in the child.

Data processing in this study uses two data analyzes, namely quantitative data analysis and qualitative data analysis. Quantitative data analysis uses descriptive statistics by comparing the results obtained in pre-cycle to cycle II. Qualitative data analysis is done by analyzing data from the results of field notes, observation and documentation with steps of data reduction, data display and data verification.

Results and Discussion

Data on increasing the logic of intelligence of children aged 5-6 years in Al Karimah Kindergarten Pekanbaru in 2018 can presented as follows:

Table 4.14 Cycle II Mathematical Logic Intelligence Results Children aged 5-6 years in Kindergarten AL Karimah Pekanbaru

No.	Initial	Pre-Intervention		Cycle I		Cycle II	
		TCPChildren	et	TCP Children	Ket	Kids TCP	Ket
	MF	16.66	BB	41.6	MB	66.6	BSB
	MG	25	BB	45	BSH	75	BSB
	PZ	16.66	BB	41.6	MB	50	BSH
	BA	25	BB	33.3	MB	50	BSH
	SH	41.6	MB	58.33	BSH	75	BHB
	RR	25	BB	45	MB	75	BSB
	DC	33.3	BB	50	BSH	75	BSB
	IS	25	BB	41.6	MB	66.6	BSB
	AS	25	BB	33, 3	MB	66.6	BSB
	NJ	16.66	BB	33.3	MB	66.6	BSB
	EZ	41.6	MB	58.33	BSH	75	BSB
	MF	16.66	BB	33.3	MB	50	BSH
	RTO	33.3	MB	58.33	BSH	75	BSB
	EZI	16.66	BB	41.4	MB	66.6	BSB
	NJS	25	BB	41.5	BSH	75	BSB
	Average of	23.8		43.73		67.2	

Table 4.14 above shows that the ability of mathematical logic intelligence in terms of distinguishing many concepts a lot, matching numbers with number symbols, and recognizing the concept of patterns in the level of developmental achievements of children's mathematical logic intelligence shows that there are 12 children who are in the category of developing very well, namely MF, NJS, RTO, EZ, DC, MG, EZI, BZ, RR, IS, NJ, and SH, which is at the lowest score range of 50 and the highest score is 75. Then there are 3 children in the developing category as expected, namely PZ, BA and MF, which is in the lowest score range of 50 and the highest score of 75. The average of 67.2 is in the category of developing very well, the difference in score results in pre-cycle to cycle I, increased by 23.47.

Improved data on mathematical logic intelligence of children aged 5-6 years at Al Karimah kindergarten Pekanbaru in 2018

Stages Score	Pre Cycle	Cycle I	Cycle II
Average	23.8	43.73	67.2
Increase		19.93	23.47

Based on the analysis that has been carried out quantitatively and qualitatively based on field notes, observations and documentation notes, the result is that there is an increase in mathematical logic intelligence through the DATALANG media. The children experienced an increase in mathematical logic intelligence on the indicator of the child capable of matching numbers with the symbol number, this was observed by researchers and teachers when the children were very enthusiastic in answering the questions and answers provided by the teacher, in addition when learning the children were very enthusiastic about using DATALANG media where they are cool to play with the media without them knowing they are learning about matching numbers with the number symbol.

Children are able to get to know the concept a lot, this can be seen from children not only enthusiastic in using DATALANG media, but by using the media children are also able to recognize the concept of a lot of the number of dice they throw, from the number of color buttons they enter into a tube.

Children are able to recognize the concept of patterns, seen from the activities of children in forming various patterns of plasticine according to the theme given by the teacher. In cycle 2 with the development of children's mathematical logic intelligence that develops very well, children have been able to produce various forms of patterns. In this case it is not only the child's mathematical logic intelligence that increases but the movement of eye and hand coordination, the child is able to think critically about what they make.

Seeing the results of the research above, talking about the DATALANG media and its relation to the intelligence of mathematical logic in accordance with the variables examined by the researchers. This states that the intelligence of children's mathematical logic can increase or develop through the DATALANG media as stated by Srianis et al entitled the application of the method of playing puzzles geometrickto improve children's cognitive development in recognizing shapes.^[22] states that *puzzle* geometry can improve children's cognitive development. As we know *puzzle* is one of the learning media that is often used during the learning process, and besides that children's mathematical logic intelligence also includes a variety of children's cognitive development proves that there is a connection between the learning media and the intelligence of mathematical logic for early childhood.

Furthermore according to Zughoiriyah et all, in his research which was conducted the implementation ofto recognize *teams games tournament* assisted by media domino cards numbers to improve the abilitythe number symbol.^[23] The results of this study indicate that there is an increase in the ability to recognize number symbols by implementing *teams games tournament* aided by Domino number card media.

In line with the above, Rasanen et all, in his research entitled "*Computer-assisted intervention for children with low numeracy skills*"^[24] Research using this experimental method shows that computer intervention by playing games shows an increase in the ability of numerical concept recognition on child. in this study the teacher designed game games through computers that used numbers. This study proves that there is a relationship of learning media with children's mathematical logic intelligence. In connection with the research

that the researchers did, there was an increase in mathematical logic intelligence through the DATALANG media.

Qualitatively, according to data according to Milles and Hibermen, the stages of analysis are data reduction, data display and conclusions. The description of each indicator of the child can differentiate many concepts a little as follows:

Data on indicators that show children's abilities are obtained based on field notes, and documentation notes. The following is the reduction of data on indicators that show children can differentiate concepts a little during the implementation of activities using the media. DATALANG

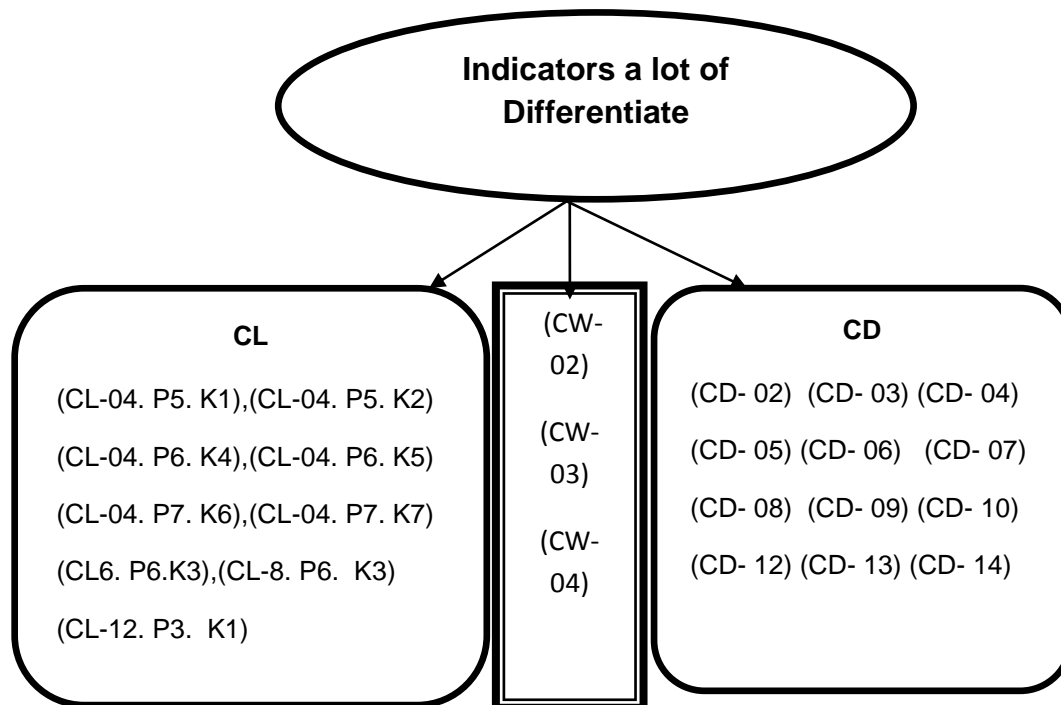
In the first cycle on indicators of children can distinguish the concept a lot of activities carried out by the teacher is the teacher introducing children to numbers through dice, the number of buttons. (CL-04. P5. K1) (CD-02),. So that children know the concept of a little bit, the teacher invites children to count the numbers on the two dice that are different and proceed to insert the buttons of the colored clothes into a tube that has been provided by one package with DATALANG media. The teacher stimulates children's mathematical logic intelligence slowly counting. (CL-04. P5. K2), (CD-03).

Then in the next activity the teacher stimulates the child, to do the activity of sticking to the pattern using paper and boards that have been provided. (CL-04. P6. K5) (CD-06).

In the second cycle the activities carried out by the teacher related to the indicator of the child can differentiate the concept a little bit that is in the estapet play activities on the DATALANG media, in this activity the teacher explains to how to use the DATALANG media estetetically. (CL-6. P6. K3). When finished explaining the next stage of the activity the teacher asks the child to be able to play by itself.

The next activity the teacher provides 2 bowls of fruit on different tables. (CL-8.P2.K1) then the child points to a larger number of bowls. In this activity the teacher does to bring up the indicator of the child can distinguish the concept of a lot of little is the teacher puts various colors of buttons with different amounts, the teacher asks the child what color they like, how many buttons they can, the teacher explains the difference - the difference in number buttons that children can differ according to the many number of buttons. (CL-10 P6. K3)

Display data that shows children's mathematical logic intelligence capabilities on indicators distinguish many little concepts in children aged 5-6 years in Al Karimah Pekanbaru kindergarten in form chart as follows:



The logic and mathematical intelligence abilities of children aged 5-6 years in Al Karimah Pekanbaru kindergarten, on the indicators of children distinguish the concept of many little seen experiencing an increase. Based on data analysis conducted qualitatively, it can be seen that active children participate in learning activities while using DATALANG children 's media enthusiastically in activities with different activities in each cycle. In the indicator of children to differentiate the concept, many children are able to give their opinions when using the DATALANG media in activities, children dare to differentiate the concept a lot. In cycle I, activities that show children differentiate concepts from many are small, namely teachers stimulate children to

dare to play dice (CL-04. P7. K6) (CD-06) (CW-01). At the time of the child's activities the child is able to give his opinion, using the media provided. (CL-04. P7. K7) (CD-07), and in cycle II, the activities carried out were, the teacher stimulated the child to play throwing buttons into the tube (CL-11. P6. K5), (CD-20) (CW-02) Activities carried out by children with DATALANG media, children actively express what they got from using the media so that there were improvements in mathematical logic intelligence. The teacher acts as a facilitator and motivator in learning activities using the DATALANG media. Activities are carried out in a fun way, children are invited to play, so that children are motivated to always learn.

Conclusions and Implications

Conclusion

There is an increase in the intelligence of children's mathematical logic group B in Al Karimah Pekanbaru Kindergarten through DATALANG media where the analysis of the average level of child development achievement in the first cycle is 43.73 which is in the Developing category in accordance with Hope (BSH).

In cycle I, there was an increase in the average score of the level of achievement of child development as a whole of 19.93 with the level of achievement of the average pre-cycle development of 20.8. In the second cycle the average value of children's development achievement on children's creativity as a whole is 67.2 in the category of Very Good Developing (BSB). As for the magnitude of the increase in cycle II, research is said to be successful because it has reached the criteria of success that has been agreed between researchers and collaborators by 75%.

Implications

From the results of the discussion and conclusions in this study, it was found that there was an increase in children's mathematical logic intelligence in group B at Al Karimah Pekanbaru Kindergarten through the DATALANG media. Theoretically, the results of this study provide an illustration of the improvement of mathematical logic intelligence through the DATALANG media. Children's mathematical logic intelligence has an important role that is owned by every early child, especially, so it requires attention and methods and the right media, so that children's mathematical logic of intelligence can increase.

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