

The Realistic of Mathematic Educational Approach (RME) toward the Ability of the Mathematic Connection of Junior High School in Bukhari Muslim Medan

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Abstract The purpose of this study was to determine the ability of the student mathematic connection by using the realistic of mathematic educational approach is better than conventional learning. This research used quasi-experimental design with *two-group design*, they were *pretest-posttest*. The sample of this study was taken from random class, that is taken 2 classes with total number 54 students. Class VII-1 as an experimental class which taught by using realistic mathematic approach that consists of 27 students, class VII-2 as control class which taught by using conventional learning that consists of 27 students. The instrument of this research used the essay test and observation. The result was analyzed by using t-test. After the learning is done, the data descriptions were collected on pres-test and post-test to determine students' mathematic connection ability during mathematic learning. The result showed that the ability of the students' mathematic connection by using the realistic of mathematic educational approach is better than conventional learning. Furthermore, based on the observation of student activity in the learning process by using the realistic of mathematic educational approach is very positive and they became more active than before.

Keywords: *the Realistic of Mathematic Educational Approach, Conventional, the ability of Mathematic Connection Ability*

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1. Introduction

The advancement of science and technology required a person to be able in information and knowledge. Thus it is necessary to acquire, select and process information. These capabilities required critical thinking, systematic, logical, and creative. Therefore, an educational program is needed that can developed the critical thinking, systematic, logical, and creative. One of the educational programs that can developed critical thinking, systematic, logical, and creative thinking is mathematic [1].

Therefore, the mathematic is never be achieved if someone is not trying to learn the mathematic. the ability that to be achieved in mathematic learning include: (1) problem-solving, (2) reasoning, (3) communicating, (4) connecting, and (5) representing [2].

One of things to be achieved in the learning process of mathematic was the ability of students' mathematical connections. The ability of mathematical connection is one of the learning purposes that was very useful for the students because the topic of mathematic is interconnected with other disciplines and related to the real world or everyday in life. Therefore, in order for students to become better in learning mathematic, the teachers

should given more opportunities to students to see the relationship [3].

The meaningful learning was the basic for making mathematical connection. Mathematic connection is the most important part needed in every level of education. The ability of a mathematic connection shown from the student in: (1) recognizing the equivalent representation of the same concept; (2) recognizing the relationship of a mathematical procedure to a representation of equivalent representation; (3) using and assessing the interrelationships between topics and interrelationships outside mathematic; (4) Using mathematic in everyday. Thus, in the broadest sense of mathematic connection is the relationship between topics and other disciplines and life. Mathematic connections mean capacity of information provided, with a critical attitude to evaluate something and have metacognitive awareness and problem-solving skills [4].

Mathematic concepts and procedures can be developed to solve problems in mathematic and other disciplines. Some indicators in mathematic connection: (1) find the relationship of various representations of concepts and procedures; (2) understand the relationship between different mathematic topics; (3) use mathematic in other subjects or daily life; (4) understand the concept of representation equivalent or similar procedures; (5) found

a relationship between one another procedure in a similar representation; (6) the connections between mathematic and the mathematic topics with other topics [5].

Mathematic connection aimed to help the formation of a perception of students with how to view mathematic as an integrated part of the real world and recognize the benefits of mathematic both in and outside of school. When students can connect mathematical ideas, then their understanding deeper and more lasting. Through mathematic connection between a material with other material students can reach some aspects of problem solving. Without the mathematic connection then students should learn and remember too many concepts and mathematic procedures that are mutually exclusive [5].

The fact in the field does not match what is expected. In the test result given to junior high school students Al Bukhari Muslim showed that students' ability of the mathematic connection were low. The low ability of students' mathematic connection affect the quality of student learning, which also affects the low learning outcomes of students in schools. This was a fact that proves that students' ability of the mathematic connection were low due to several things, among others: a) the lack of attention of students to learn mathematic, so that students are not very active in learning mathematic; (b) the teaching of mathematic applied by teachers were conventional. Conventionally, the teaching of mathematic going to be teacher-centered, where teachers provided informations that students must absorb either by memorization or writing; (c) the lessons that given by teachers was less meaningful; (d) In the subject of mathematic, many teachers simply taught concepts, without relating them to other concepts or everyday life; (e) Generally, learning mathematic viewed as a number of topics so that each topic tend to be taught separately supported by findings Rohendi [11]. This of course make students remembered many concepts and did not know the general principles relevant to the various fields.

Through those case didn't make the student as a learner, but only received information to memorize the information so as the result was the low ability of students' mathematic connections. In fact, by providing knowledge about the relationship between mathematical concepts with other concepts or in everyday life would be needed by students, especially to solve problems encountered in everyday life. Because the topic of mathematic is intertwined with other disciplines. In addition, mathematic has a relationship with the real world or everyday life. Therefore, in order for students to be better at learning mathematic, teachers should give more opportunities to students to see those relationships.

Furthermore, through solve these problems, in the learning need to change the approach in learning mathematic, the approach that provided opportunities for students to active in learning math so as to provide opportunities for students to be able to improve the capabilities. One of them is the approach of Realistic Mathematic Educational (RME). The Realistic Mathematic Education Approach (RME) is an approach in mathematic learning viewed mathematic as a human activity. The approach has five characteristics; 1) the use of contexts, 2) the use of models 3) the use of students'own production and constructions, 4)

the intractive character of teaching process, 5) the intertwinement of various learning stand "[6].

According to Van den Heuvel-Panhuizen, the used of the word "realistic" did not indicate the existence of a connection with the real world, but rather referred to the focus of realistic mathematic learning in emphasizing on the use of a situation imaginable by the student. The Realistic Mathematic Educational Approach (RME) is an approach in mathematic learning that viewed mathematic as a human activity [7].

In line with that, according to Armanto "the Realistic Mathematic Educational Approach (RME), in addition to students learning mathematic also they got a more meaningful understanding of the used of mathematic in various fields" [1]. The Realistic Mathematic Educational Approach (RME) encouraged students to develop their learning and more active mean that students were required to always think about a problem and they looking for their own way of completion, thus they would be better trained to always develop their skills so that knowledge and experienced would be embedded for a considerable period of time.

The realistic context helped students gained knowledge and skills because they had the opportunity to practice and learn the expected results. Learning by using Realistic Mathematic Education (RME) could helped students to see how mathematical ideas was interrelated. If a mathematical idea was associated with a daily experience, students would surely appreciate the usefulness of mathematic.

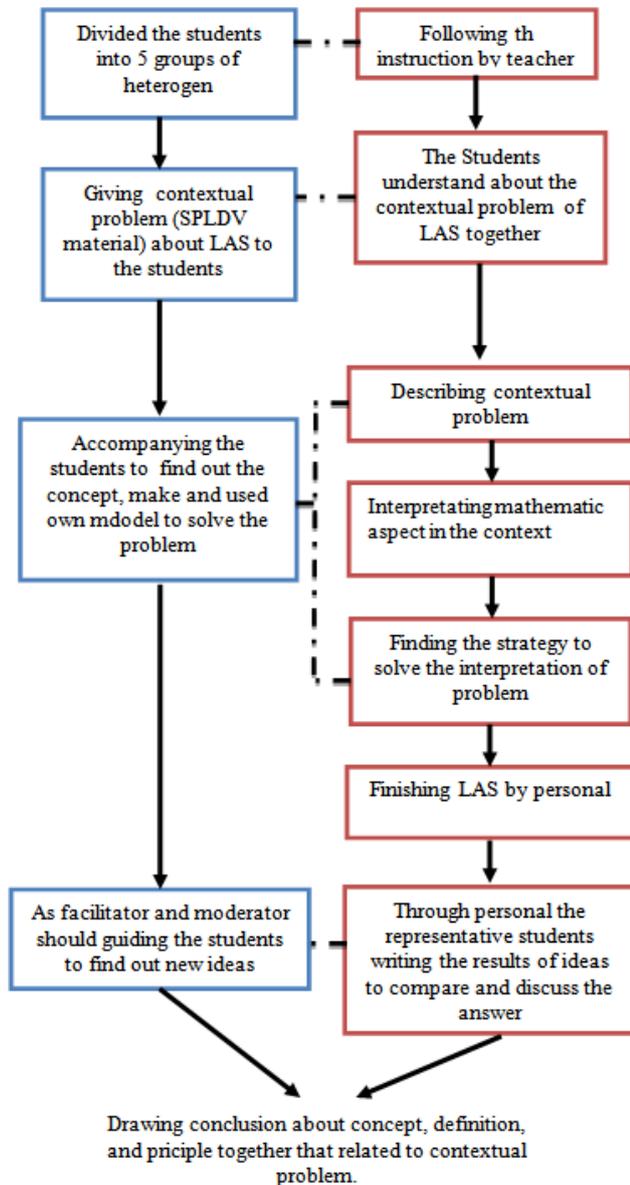
The characteristic aof ththe Realistic Mathematic Educational Approach (RME), namely: 1) The used of context. Context or realistic problem is used as the starting point of mathematic learning; 2) The used of models for progressive mathematization. In realistic mathematic education, models were used in progressive mathematization; 3) Utilization of student construction result. Students have the freedom to develop problem-solving strategies so that a variety of strategies were expected to be obtained. The results of students work and construction were then used for the foundation of the development of mathematical concepts; 4) Interactivity. The utilization of interaction in mathematic learning was useful in developing students' cognitive and affective abilities simultaneously; 5) Linkage.

Furthermore, the steps of learning of the Realistic Mathematic Education Approach (RME) were as followed: 1) Understanding the contextual problem; 2) Resolving contextual issued; 3) Compared and discussed answers; and 4) Concluded [3]. Applying the Realistic Mathematic Education Approach (RME) at the time of classroom learning below (Figure 1).

The Realistic Mathematic Educational Approach was intertwinement between mathematical concepts as a matter to be considered in the learning process. Through this connection, a mathematical learning expected to introduce and construct more than one mathematical concept simultaneously [8].

So the the Realistic Mathematic Education Approach (RME) could be applied and hope would be better and more effective in optimizing students' mathematical connection ability. With the increased ability of

mathematical connections, students can appreciate the value of mathematics and understand the usefulness of mathematics in everyday life. Because the topic of mathematics is intertwined with other concepts of science even with daily life (Rohendi, [11]) so that students can solve problems encountered in everyday life.



Description :

- Role's Teacher
- Role's Students

Figure 1. Schematic Application of RME Approach

2. Method

This research was used a quasi experimental research with two group pretest-posttest design. The study population was all students of class VII Integrated Junior High School Al Bukhari Muslim Medan. The sample in this study was taken by cluster random sampling, that was

as much as 2 classes amounted to 54 students. Class VII-1 as an experimental class taught by Realistic Mathematic Education Approach (RME) consists of 16 female and 11 male students, class VII-2 as control class taught with conventional learning consists of 13 female and 14 male students.

The instrument of this research used the essay test of mathematical connection ability and observation. The essay test instrument consists of 3 questions on the topic of a two-variable linear equation system. The observation sheet consists of 15 items to see students' activeness during the lesson. Before conducting the research, the essay test and the observation sheet were validated by 1 lecturer and 1 mathematics teacher. So the researcher followed the suggestion of improvement given for essay test and observation. Furthermore, an essay test is tested for students to obtain validity and reliability.

Technical analysis of data used was t-test

$$t = \frac{\bar{x}_1 - \bar{x}_2}{dsg \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

Criteria hypothesis: hypothesis (H1) accepted if: $t_{hitung} > t_{tabel}$ in other circumstances the hypothesis was rejected. The hypothesis of this research as followed:

H₁: Student's mathematical connection ability used Realistic Mathematic Education (RME) approach was better than learning

H₀: Students' mathematical connections ability used Realistic Mathematic Education (RME) approach is no better than conventional learning.

3. Result and Discussion

At the beginning of the study, the two class given a pre-test to see students' early skills. The result of pre-test and post-test of the experimental class and control class could be seen in Table 1. After applying learning models, it was obtained post-test score for the control and experimental class were given different model of learning, the result of post-test had been obtained. The post-test score of control and experimentasl class can be seen as the following:

Table 1. Description of Pre-Test and Post-Test Data

Test	Class	Number of Subject	Mean	Highest Score	Lowest Score
Pre Test	Experiment	27	41,65	55	10
	Control	27	32,35	50	10
Post Test	Experiment	27	76,69	90	50
	Control	27	63,44	65	25

Can be seen in Table 1, it was obtained that the mathematical connection ability of students by using Realistic Mathematic Education (RME) showed better result could be seen from the average obtained by the students.

It can be seen from Figure 2. that the post-test result of students' mathematical connection ability in the experimental class is higher than the control class.

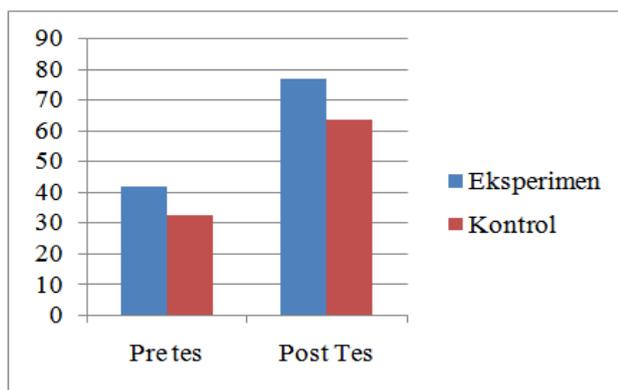


Figure 2. Description of Average Pre-Test and Post-Test Data

Furthermore, to test the proposed hypothesis, the t-test of the two treatment methods shown pre-test and post-test result. Based on statistical result, $t\text{-count} = 10,98$ and $t\text{-table} = 2.01$. Obtained $t\text{-count} > t\text{-table}$, thus based on criteria, the hypothesis was accepted so it could be concluded that the mathematical connection ability of students using Realistic Mathematic Education (RME) was better than those with conventional learning treatment.

However, based on observations during the learning, the result obtained that the teacher has done well every stage in the steps of Realistic Mathematic Education (RME). In general, using Realistic Mathematic Education (RME), students were more enthusiastic and gave positive response to mathematic learning. This could be seen from the analysis on the observation made by mathematic teachers at school. That was the same as positive student enthusiasm, this was due to a positive Realistic Mathematic Education (RME). It because the students given problems, so the students searched and investigated the problem itself, so that students could pour their own math ideas.

Given the contextual issued was provided by teachers, students were very enthusiastic because they could worked on issues related to everyday life as well as how their mathematical abilities could be applied in everyday life. In addition, contextual problems could opened the door to bring other subjects and other discipline to the math class so that students quickly recognize that mathematic was closely related to the problems of everyday life.

The enthusiasm of students who were positive about the ability of mathematical connection, since students given problems in order to link the relationship between mathematic and mathematic itself, mathematic in other subjects and mathematic with issued of everyday life. Thus students became challenged to better train and develop their knowledge skills, so that their knowledge and learning experienced would be embedded for long period of time and make learning more meaningful.

As learning progressed, observers who observed learning activity by Realistic Mathematic Education (RME). Based on the observation, the descriptions of the learning process were obtained as following:

Learning Implementation was done in several meetings. Each meeting lasts 90 minutes. The material discussed in this research was equation. At the meeting the students discussed the definition of equation and the problem of equation.

At the time of apperception, the teacher arranged the class to learn and gave an idea of the material to be studied. Next, the teacher dividd the students into groups, to carry out math group discussions and solved the problems that have been provided.

At first the students seemed to have difficulties, namely in understanding and solving math problems. That's because they were not accustomed to learning Realistic Mathematic Education (RME). Students were still reluctant to search for their own mathematical ideas, but at the second and third meetings students began to become more familiar to learn the model.

While presenting the material, there were several opportunities for each group to ask some questions about the teacher's contextual problems. Teachers did not directly answered questions from students, but teachers simply repeated the material and provided guidance, so that students could find their own answers.

Teachers also motivated students to explore the math skills and students involved in learning activities to let them known about the universal mathematical link. After the group discussion was over, the teacher asked one of the representative of each group to present the result of their discussion and wrote it on the board. After the group was presented and delivered the results on the board, the teacher invited the students directly to see if the explanation was true or false. So the teacher would also explained further to confirm the explanation of each group. At the end of the lesson, the teacher together with all learners make a conclusion on the learning materials.

4. Discussion of Result

The research due to an approach of Realistic Mathematic Educational (RME) has been done a lot. In general, the result of these study could certainly improve the ability of learners. The finding in this study showed the average mathematical connection ability of students who were taught by the Realistic Mathematic Educational Approach (RME) were better than by conventional learning class.

This better result occurred because the learning process of Realistic Mathematic Educational Approach (RME) encouraged students to find answers to a problem that given. By using a Realistic Mathematic Educational Approach (RME) connected mathematical concept with other concept of science or daily life, thereby making learning more meaningful and the students' mathematical connection being better.

The result obtained in this study indicated that there are different in students' mathematical connection ability in the experimental class using the Realistic Mathematic Educational Approach (RME) with the control class which using conventional learning.

The finding of this study was in line with a study by Veloo [9] who found that the Realistic Mathematic Educational Approach (RME) has achieved better result in the reasoning and generalization of mathematical analog than students who underwent a conventional approach. Similarly, it was line with Makonye's research [10] who found that by applying Realistic Mathematic Educational Approach (RME) when learning helped learners to see the

close relationship between conceptual knowledge of mathematic and mathematical procedural knowledge.

Thus, this supported by Widari's finding [11] in the applied of Realistic Mathematic Educational Approach (RME) as an effort to increase activity and achievement of students. Furthermore, by applying Realistic Mathematic Education (RME), the increase of learning activity and improvement of student achievement. Hidayat [12] mentioned that applying the Realistic Mathematic Educational Approach (RME) could improved student conceptual.

The Realistic Mathematic Educational Approach (RME) has been studied by some previous researchers, such as Idris [13] who applied the Realistic Mathematic Educational Approach (RME) students' ability in solving story problems would be increased, and students more understood with the story.

Learning theory is guiding for teachers to assist students in developing cognition, social, and spiritual. In its development, learning Realistic Mathematic Educational Approach (RME) is based on Piaget's theory, Vygotsky's theory, Bruner's theory and Ausubel theory [3]. According to the theory of cognitive learning, learning and thinking was essentially changed the cognitive structure. Piaget argued that a person's cognitive structure occurred because of an adaptation process. Adaptation was the process of scheme adjustment in response to the environment through two processes of assimilation and accommodation. According to Slavin [14], assimilation was the interpretation of new experienced in relation to existing schemes.

Based on Piaget's theory, by learning with RME was closely related to the theory, because RME focused on students' thinking process, not just focusing on result. Then, because students were given a contextual problem so that students were given the available to pour their ideas into solving the problem. Vygotsky's theory [15] was one of the important theory in developmental psychology. Vygotsky's theory emphasized the sociocultural nature of learning. According Vygotsky that learning occurred when children were worked or learned to handle tasks which have not been studied but the tasks were still in the zone of proximal development. Zone of proximal development was a slight improvement over one's current development. Vygotsky believed that generally, higher mental function arised in conversation or cooperation between individuals, before the higher mental function was absorbed into the individual. [14]

There were two major implications of Vygotsky's theory in science learning. Firstly, it was desirable that class arrangement which in the form of cooperative learning between students, so that students could interacted around difficult tasks and generated effective problem-solving strategy within their respective zone of proximal development. Secondly, Vygotsky's approach to teaching emphasized scaffolding so that students became increasingly responsible for their own learning [14]. Vygotsky theory was in line with the Realistic Mathematic Educational Approach (RME) approach was the contextual problem to understand and solve in group, and in this group the students interacted to understand and solve the problems earlier. In this way each students were responsible for their own knowledge.

According to Bruner [16], learning mathematic was to learn about the concepts and structures of mathematic contained in the material being studied and to find the relationship between mathematical concept and structure. Through this concept and structure of a material was understood more comprehensively. In addition, students' knowledge were easier to remember and last longer if the material being studied has a structured pattern. Furthermore, Bruner [16], suggested that the cognitive students development is developed through three stages of development, namely: 1) Enactive, in this stage, the student learned to use concrete objects directly so as to enable his to manipulate the concrete objects; 2) Iconic, in this stage of his learning no longer used concrete objects but used image of such concrete objects, for example the used of visual media, such as picture or movie; 3) Symbolic, it this stage in learning students began to manipulate symbols directly unrelated to objects. Thus, Bruner's theory conformed to RME, the first (guided reinvention and progressive mathematizing) and the second principle (didactical phenomenology), and the relation of the first RME characteristics (the fuse of context), the third, (the student contribution) and the fourth (interactivity).

Ausubel [16], told that learning was to be meaningful if the information learned by the students was arranged to the students' cognitive. So the way of the students could associate their new knowledge with the cognitive. By learning this, students have a strong and easy memory in transferring knowledge. Meaningful learning occurred if students attempted to connect new information into their knowledge.

Based on description above, it shown that RME was relevant to Ausubel's theory, because RME pretent to understand rather than memorize. In addition, the relation between information that would learned to the cognitive structure in RME appeared on contextual issued that were to the student environment as real and observable or at least imaginable so as to help students learn meaningfully.

5. Conclusion

Based on the results of data analysis obtained from pre-test, post-test, and observation, the conclusion from the results of SMP Terpadu Al Bukhari Muslim Medan below:

a) The students' mathematical connection ability by using Realistic Mathematic Educational Approach (RME) were better than conventional learning.

b) From the result of observation, students were more enthusiastic in learning mathematic by using the Realistic Mathematic Educational Approach (RME). This mean that students have a positive to response and participate in the learning process.

Based on the conclusion above, mathematic learning by using Realistic Mathematic Educational Approach (RME) could improved students' mathematical connection ability and each teacher should master in model, approach, or learning methods such as Realistic Mathematic Educational Approach (RME) so that the learning process being more active, variate, and meaningful learning so the

knowledge of students embedded being sharp and would improved students' learning result being better.

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