The Effect of Realistic Mathematic Education (RME) toward Motivation and Learning Achievement of the Fourth Grade Elementary Students

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Abstract—**This research is based on the problem of lack motivation and learning achievement experienced by students in learning mathematics. Thus, new approach like *Realistic Mathematic Education* (RME) is needed. This research aimed to find out the effect of *Realistic Mathematic Education* (RME) model toward motivation and mathematic learning achievement of the fourth grade Islamic elementary students Al Azhar 32 Padang. This research is quasy-experiment research. The population was all 86 fourth grade students who consist of three classes. The sampling technique used was random sampling. The data of this research were collected by using motivation questionnaire and mathematic learning achievement test. The data were analyzed by using normality test, homogeneity test, and hypotheses test related to the studied aspects. The result of the research revealed that: (1) students who were taught by using RME approach in experimental class have higher motivation; with the average questionnaire indicator was 88,46%. (2) students who were taught by using RME approach have higher mathematic learning achievement than those taught by using conventional approach; with $t_{obtained}$ (0,05;56) = 1,67, $t_{calculated}$ = 4,23. Based on this result, it can be concluded that there is significant effect given by RME approach toward motivation and mathematic learning achievement of the fourth grade Islamic elementary students Al Azhar 32 Padang. It is recommended that RME approach should be used since it is one of the approaches that can improve students' motivation and mathematic learning achievement.**

Keyword—Realistic Mathematic Education (RME), motivation, learning achievement

I. INTRODUCTION

Mathematic learning can be much more useful in students' real life only if it orients toward learning as construction of knowledge and interactive learning. These orientations will develop students understanding of the concepts so that they can solve math problems. One type of interactive learning is Realistic Mathematic Education (RME) approach which is based on contextual problems in students' daily life. There are many studies about RME approach which have been conducted globally. Riyan Hidayat and Zanaton H. Iksan, in 2015, have conducted RME study in Malaysia whereas Z Xin, C Lin, L Zhang, and R Yan, in 2007, have studied RME approach in China. In Indonesia, Evi Rahmi has studied RME in 2011. The result of those studies showed how RME approach affect motivation

and students' achievement. Based on those studies too, it can be concluded that RME approach which was implemented to teach math can improve motivation and students' understanding toward math. The use of RME approach has been adjusted with the fourth grade of elementary student's characteristics.

Based on initial observation to the fourth grade students of Islamic Elementary School Al Azhar 32, it was found that: (1) teacher was still using conventional method (2) students were lack of motivation in learning mathematic (3) students were lack of skills in solving math problems. (4) Students' learning achievement was still low.

Motivation of the students is an important factor which influences mathematic learning. According to Uno (2009), motivation and learning are two things which are related to each other. Learning is the change of behavior permanently and it potentially occurs as the result of practice or knowledge which is based on certain objectives. Motivation also can be explained as goal that should be achieved through certain behaviors (*Cropley*). Motivation in math learning is highly needed by the students so that they can easily understand the concept of math.

Lack of motivation in mathematic learning will result at low learning achievement of the students. According to Susanto (2013:5), learning achievement is the changes occurred on students related to cognitive, affective, and psychomotor aspects as a result of learning activity. The changes of those aspects occur systematically and tend to change toward a better ways. It is generally known that systematic education and training will bring the change toward individual. In addition, the use of learning achievement to describe the change is not a new thing at all. Learning achievement score will be high if students can understand the concepts of mathematic in learning.

One of appropriate approaches which can be used to teach mathematic to the students is *Realistic Mathematic Education* (RME) approach. RME is learning approach which is based on contextual problems. It uses a model, interactive learning and generates a product. This is in line with Fauzan (2003) who mentions that the steps in *Realistic Mathematic Education* (RME) are: (1) understanding contextual problems (2) explaining contextual problems (3) solving contextual

problems and (4) comparing and discussing answers (interacting).

RME approach in math learning can help students to understand math concepts which are started from concrete objects. Math learning by using RME approach can improve motivation and learning achievement of the students since learning is started from concrete objects and contextual problems which are close to the students.

This research tried to implement RME approach to learn math in nets of the blocks and cubes material in the fourth grade of elementary students. Further, the effect of RME implementation towards motivation and math learning achievement of the students would be found out. Some studies (Michail Kalogiannakis and Nicholas Zaranis, 2016; Leen Streefland, 2014; I Widari, 2013) showed that RME approach could motivate students in learning math so that it can improve their learning achievement.

RME approach to learn math in nets of the blocks and cubes material is very suitable to be used since it involves concrete objects and contextual problems. Students will be assigned to group work so that they can do interactions while solving the problems. Students can also construct their own knowledge in finding math concepts.

II. METHOD

The type of this research is quasy-experimental research. Sugiyono (2007: 107) defines experimental research as a type of research which is used to find out the effect of certain treatment toward another variable in a controlled situation. This research was conducted to analyze the effect of RME approach implementation toward motivation and mathematic learning achievement of the students by comparing experiment group taught by RME approach and control group taught by conventional approach.

The population of this research was all 86 fourth grade students of Islamic elementary school Al-Azhar 32 Padang in 2016/2017 academic year. They consist of three classes. According to Arikunto (1992:102), population is the whole objects of research. Sampling technique used in this research was random sampling. This sampling technique is used when population has homogeneity elements proportionally. Through lottery, Madinah Class had been chosen as experimental group while Makkah Class had been chosen as control group.

III. RESULT AND DISCUSSION

Based on data analysis results of implementation of RME model in mathematic learning in nets of the blocks and cubes material in fourth grade of Islamic Elementary School Al Azhar 32 Padang, it is found that motivation and mathematic leaning achievement of the students taught by using RME approach were higher than conventional approach. It is proved by hypotheses testing. Based on the result of hypotheses testing, there are two main discussion which would be discussed based on relevant theories: (a) students 'motivation taught by using RME approach in learning mathematic, and (b) students' learning achievement taught by using RME approach in learning mathematic.

In the field, especially in experimental class, it was found that there is indication students have bigger interest and curiosity in learning. Students showed their seriousness in following math learning process and did the assignment very well. Students could also find by themselves math concepts about nets of blocks and cubes through RME approach. In control class, learning process was conducted by using conventional approach. Students were lack of interest toward materials delivered by teacher. In addition, they were less motivated in learning. It was proven by the fact that students have not finished their assignments within a certain time. RME is mathematic learning theory which has been developed in Netherland. According to Freudenthal (in Wijaya, 2012:20), "math is a form of human activity. This idea shows that RME does not place math as a ready-made products. Otherwise, math is a process which is usually called as "*guided reinvention*". Therefore, RME is a suitbale approach used to learn math, especially in nets of blocks and cubes material. RME approach can motivate stduents in math learning. according to Siregar and Nara (2011: 50), motivation can be distinguished into intrinsic motivation and extrinsic motivation. Intrinsic motivation is motivation which comes from individual without any stimulation from outside whereas extrinsic motivation is motivation which is resulted from stimulation from outside like giving appraisal, scores, gifts , and other external factors.

By considering above description, it is found that the implementation of RME approach can improve motivation and mathematic learning achievement of the students. RME approach has been proven effective to increase motivation and improve math learning achievement.

A. Students learning motivation

The result of motivation questionnaire data analysis of the students in experimental class and control class can be seen in the following table:

TABLE I. PERCENTAGE AVERAGE OF STUDENTS LEARNING MOTIVATION

Indicator	Score		Percentage average	
	Experimental class	*Control Class*	*Experimental class*	*Control class*
1	250	218	86,20	75,17
2	379	327	87,12	75,17
3	258	204	88,96	70,34
4	385	289	88,50	66,44
5	256	192	88,27	66,21
6	133	89	91,72	61,38
Sum	1661	1319	530,77	414,71
Average	276,83	219,83	88,46	69,12

Based on analysis table above, it can be concluded that motivation of students who were taught by using RME approach was categorized very high; with the average questionnaire indicator was 88,46%. Meanwhile, students' motivation who were taught by using conventional method was categorized low; with the average questionnaire indicator was 69,12%.

B. *Mathematic learning achievement of experimteal and contrl class*

Based on data calculation of mathematic learning achievement in experimental and control class, it was found that:

TABLE II.   RESULT OF FINAL TEST IN EXPERIMENTAL AND CONTROL CLASS

No	Statistic	Experimental class	Control class
1	N	29	29
2	$\overline{X}$	82,21	72,00
3	Max	96	92
4	Min	68	58
5	S	7,90	10,52
6	S^2	62,38	110,57

Based on the table above, it can be seen that the average score of students' learning achievement in experimental class was 82,21while in control class was 72,00. Minimum score and standard deviation of experimental class were higher than control class.

C. *Analysis of students' learning achievement in sample classes*

1) *Normality test of students' mathematic learning*

After calculation, it was found that L_0 and $L_{(n,a)}$,with 0,05 significant degree, as follow:

TABLE III.   NORMALITY TEST RESULT BY USING LILIEFORS IN EXPERIMENT AND CONTROL CLASS

Sample classes	N	L_0	L_t	Conclusion	Category
experimental	29	0,0987	0,163	$L_0 < L_{tabel}$	Normal Data
control	29	0,148	0,163	$L_0 < L_{tabel}$	Normal Data

From the table above, it was found that for both of classes, $L_0 < L_{(n,a)}$ so that it can be concluded that mathematic learning achievement data of both classless were distributed normally with 95% degree of significance.

2) *Homogeneity testing of Mathematic learnig achevement*

After calculation, it was found that:

$$F = \frac{Varians\ terbesar}{Varians\ terkecil} = \frac{110,57}{62,38} = 1.77$$

TABLE IV.   HEMOGENEITY TESTING OF LEARNING ACHIEVEMENT IN EXPERIMENT AND CONTROL CLASS

Testing result	$F_{calculated}$	F_{Table}	Category
Experiment and control class	1,77	1,84	Homogenous

Based on the result of students learning achievement testing in experiment and control class, it was found that the data were homogenous since $F_{calculated} < F_{table}$.

3) *Hypotheses testing*

Hypothesis testing conducted were normality and homogeneity testing of variance. After ensuring that both sample classes were homogeneous and normally distributed, then in order to conduct hypotheses testing, t_{test} was used. Before that, standard deviation of data from sample classes was calculated.

From list distribution of t with degree of significance 0,05 and degree of freedom =56, it was obtained that $t_{(0,05;56)} = 1,67$ while $t_{calculated} = 4,23$. Based on these calculation, it was found that $t_{calculated} > t_{(\alpha,df)}$, so that null hypothesis was rejected. It can be concluded that "students' learning achievement that were taught by using RME approach was higher than students' learning achievement taught by conventional method". Calculation by using t_{test} on $\alpha=0,05$ can be seen on the following table:

TABLE V. T_{TEST} RESULT

Groups	Experiment	control
N	29	29
$\overline{x}$	82,21	72,00
S^2	62,38	110,57
$t_{calcutaed}$	4,23	
t_{Table}	1,67	

IV. CONCLUSION AND RECOMMENDATION

Based on the result of data analysis and discussion, it can be concluded that students' motivation that was taught by using RME approach were higher than those who were taught by using conventional approach.

Students' Mathematic learning achievement that was taught by using RME approach was higher than those taught by using conventional approach.

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