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The Application of Realistic Mathematics Education Approach In Teaching Mathematics In Penfui Kupang

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Abstract

This research is the classroom action research which aims at implementing of Realistic Mathematics Education approach (RME) on the topic Least Common Multiple (LCM) and Greatest Common Divisor (GCD) and the operation of integer numbers. In RME, the learning started from the real problem so that student can take part in the meaningful learning. Teachers' roles are as the guidance and the facilitator to help students in constructing idea and the concept of mathematics. The method used in this research was descriptive qualitative with the simple of data analysis quantitative applied only for counting the average score of class. This study involved forty six students of the 5th grade students of SDK Penfui Kupang. Learning approaches done by the teacher, and the members of researchers were as the observers. This research was applied in two cycles with the results:(1) students motivation is improving, it can be seen from their enthusiasms on the use of manipulative board of LCM and GCD and the manic-manic of number; (2). The improving of students activity can be seen from their participation in answering tests given by teacher for each group, (3). The comprehension of student concept is advance even though it is small seen from the result of the score average at the end of each cycle.

Key Words: Realistic Mathematics Education, Least Common Multiple, Greatest Common Divisor

Introduction

Comparing with other provinces, East Nusa Tenggara (NTT) is one of the provinces in Indonesia which its field of education still has many weakness, especially In the

learning process, the weaknesses' commonly found in the implementation of the new concept of teaching in every level of education. These weaknesses' dominantly spread out in all subjects not only higher schools but also in the primary school level. One of these subjects which are the most scourges for elementary school students is mathematics. It can be seen from the quality of primary school graduates on the math scores that are still low down.

Cultural diversity, ethnicity and region resulted in a slightly different needs and education approaches in every region, but still in the interests of national unity (Soedjadi and Hadi, 2004). The Curriculum Based Competency stated that the underlined aspect of learning mathematics should be (Freudenthal, 1987) : (1) using a contextual problem, (2) encourage the way of thinking and reasoning of students for making conclusions, (3) develop the creativity involving imagination, intuition, and discovery through divergent thinking , original , predicting , and experimenting ; (4) developing the problem-solving skills, (5) using the model, (6) the reinvent of concepts / formulas / definitions / procedures with the guidance of teachers , (7) accommodate all of students ability such as higher, medium and lower students

Learning mathematics had been influenced by the opinion that mathematics is a ready-made tool (Ekowati, 2002). This point of view encourages teachers tend to tell the concepts / properties / theorems and how to use it. Learning became focused on teachers (Freudental, H. 1973)[4]. Another view (Freudenthal, 1991), stated that "mathematics is human activity". In this view, learning mathematics means doing mathematics, of which solving everyday life problems/contextual problems (Gravemeijer, 1994). The key idea of RME is that children should be given the opportunity to reinvent mathematics under the guidance of an adult / teacher (A. Fauzan, 2002). Learning must be centered on the students need which suitable with local situation (Dewi Purnama. 2011).

From the above discussion, the teachers' roles tend to motivate and encourage student activities. That is necessary in applying an RME approach which is matching with CBC concept. In RME, learning activity starts from the real world, so that students can get involved in the learning process significantly. Teacher's role primarily is a mentor and facilitator for students in the process of reconstruction of mathematical ideas and concepts. De Lange (1987) described it as the art of teaching. De that the process of developing mathematical concepts and ideas starts from the real world, and at the end we need to reflect the solution back to the real world. So, what we do in mathematics education is to take things from the real world, create mathematic become interesting subject, and then bring them back to the real world. Furthermore, in RME approach, every person regardless of race, culture, and gender have the ability to learn and understand math significantly. This fact is in the line with the concept of the Curriculum Based Competency which stated no student is stupid unless they are lazy (Nyimas Aisyah, 2007).

Research Methodology

The subject of this research was the 5^{th} grade students of SDK Penfui Kupang, consist of 46 students. Normally, this was not ideal class but in reality each class in this

school consist of 40 students. The reason for choosing this school was because the location of the school is far away from the city, so that it was less influenced with a variety of activities and seminars as well as a variety innovation of socialization of curriculum in the instruction.

The method used in this study was Classroom Action Research, which is a type of research giving action to a certain class where divided into several cycles. Classroom Action Research was conducted in two cycles and each consist of planning/ preparation, action in class and observation and reflection, also the follow-up stage. Forty six students and a teacher of grade 5^{th} in SDK St. Arnold were involved in this research.

The research data was gathered using observation sheets of students and teachers, student's worksheet of pre test (diagnostic test), evaluation process and post test of each cycle. Student observation sheet used to see the motivations and activities of students in participating in the learning process, teacher observation sheet used to see whether the teacher thought suitable with plans that have been made or not. It can be used as a guiding for further action.

Evaluation process includes affective and psychomotor assessment and the results of tests to determine student achievement in every cycle. The data obtained at each cycle was used to reflect the learning that has been done, so it can be used as a guiding the next cycle. Data were analyzed by descriptive qualitative.

Results and Discussion

Results and Discussion in Cycle I:

a. Preliminary reflections

As the reflection materials for the implementation of the first cycle, starting from the observation of early mathematics learning takes place in the classroom found a few things: the learning undertaken by teachers are good but less varied so that a student who looks low- capacity feel bored. This condition led the concept of understanding by students not optimal.

Learning seems less attractive normally is caused by a large number of classes (46 students), so the attention to each individual teacher cannot be optimally implemented. This kind of learning classical is unfavorable impact for some low-ability students. Similarly, for students who able to get the quickly comprehension, they feel bored when teachers teach the material to continue repeating the same thing.

As compensation from it, frequently the students will make the truth or trying to disturb other friends who are still learning. From the results of early reflections between researcher and teacher of mathematics in class V SDK Penfui Kupang obtained three issues, namely:

1. Academic capability in terms of mastery of basic math concept is very varied. This condition is an obstacle for teachers in managing learning.

2. The stumpy motivation faced by students during learning activities in the learning of mathematics can be described such as students tend to sit and write what teacher taught in front of the class.
3. Less varied learning methods created by the teacher will impact on the bored-feeling in mathematics lesson.

The result of the third problem above, the competence in knowing the math concepts of students have not been fairly well with the average of 3.98 (the value obtained by the class teacher on one math test before the study was conducted). Therefore, researchers are trying to implement an approach for learning that is realistic mathematics approach.

b. Action Plan

Action Plan which taught in the first cycle is the prime number, GCD, and LCM. Researchers plan is divided in four meetings with a time of 8 x 35 minutes for implementation measures.

c. Implementation of the action

Implementation of the action in the classroom was in accordance with realistic learning and learning plan developed by the board GCD preparation and LCM. Similarly, the end of cycle 1 test questions, which previously had consulted with classroom teachers VA will study the implementation placed at the end of the implementation cycle I.

d. Observation and Evaluation

Observation results in cycle 1 math class during the learning process as follows: that the imposition of realistic approach, it turns out students' learning activities in general quite satisfactory. This is due to the teacher creates a pleasant instruction by utilizing the manipulative, GCD and the LCM, so that each student master the concepts quickly factors and multiples of a number.

Manipulative are made not just one is demonstrated by teachers alone , but researchers and teachers have prepared eight sets of boards and the LCM GCD divided to 8 groups were formed . After each group got GCD and the LCM board, the teacher gave the questions are different for each group and presented in front of the class. The group of 8 there are two groups very quickly solve the problems given guns teachers give about another group to the group that can be controlled classroom situation.

Student learning is very enthusiasm in plain view of the seriousness of each group complete each question by using the GCD and the LCM papa there. Almost every child scrambling use the boards so that they are racing each other to answer the questions in their groups. The nature of the children who always want to be the leader appeared at that time. Activities in the first cycle completed in four to five times meeting.

On the last test meeting around the clock cycle 1 by the number of questions about 4 numbers. In this activity partially sighted students do the questions given by the relaxed but serious in the sense of tension and fear as when doing a diagnostic test.

This is because their mastery of the concept is pretty good, so they are not too much trouble to analyze the existing problems. Students' mastery of concepts learned in the first cycle slightly increased although not very significant with an average score of 4.00. In this case the student achievement increased by 177.8 % of the average rat initial score of 1.44

Results and Discussion Cycle 2

a. Preliminary Reflection

In the second cycle, the researchers attempted to rectify some of the shortcomings faced during the implementation cycle such as:

- Students are given an overview on how to study / work in groups, where the importance of working together in groups and tell each other among members of the group.
- Researchers and classroom teachers try to monitor the whole group learning by enabling students to participate in learning less, to the extent an interaction among members of the study group.
- Researchers try to motivate students in group work so that each member of the group actively participates in the group.
- Researchers encourage students who lack academic ability to be more active and not shy to ask both to fellow friends and the teachers in order to create a harmonious interaction.
- Reduce the number of group members learn to optimize the activity of each student in the use of manipulative provided.
- Member an opportunity for students to actively make manipulative "integer line " of cardboard that has been prepared with the hope of understanding the concept will be last long in their brains.

b. Action Plan

The material is taught in the second cycle is introducing the addition operation on integers. This material is not too difficult but the experience of researchers showed that misconceptions still occur in class VII (CTL results in SMPN1 Kupang). Almost all Junior High School students are still having trouble summing two integers of different signs. This is due to a misunderstanding at the time they were still in elementary school, so the school was taken to a higher level.

Plan of action to be performed on the second cycle are : (1) teachers make lesson plans about the operation of addition on integers, (2) create a line of manipulative integer analog of plywood (for teachers) and from manila paper (for students in the group) ; make a guide for work sheets, (4) create questions in the form of a description for a test at the end of the second cycle.

c. Implementation Action

The implementation of the action in the classroom on the second cycle with realistic learning done with lesson plans prepared by teachers along with a team of researchers. Teachers began learning to provide a story as follows:

One evening mother went to a village to find her friend's house when she was child. The friend of mother told that her friend's house numbered is eight. Then mother was walking while conversing with her first child. Her friend's house which she look for has been passed, now the mother standing at number 13. What mother should do to get to the house numbered 8? Most students answered that the mother had to go back and look for house number 8.

Then the teacher asked what if the mother goes backwards? Whether the mother will get to home destination? How much home mom must pass in order to arrive at the number 8? After all the students understand some of the negative stories involving the set, then teachers start by introducing a number line that contains the set of positive numbers , zero and negative. This activity is accompanied by manipulative introduce the number line that contains the set of integers analog made of Manila paper. Furthermore teachers formed small groups with each group consisting of four people. Each group shared a piece of construction paper and given directions to make a number line, as already introduced on the board. Of this activity, students' understanding of line integers is not abstract anymore.

It is followed in the next meeting by introducing the addition operation on two integers using the number line analog. Assessment process is done when students are given problems to be solved guiding the group through the worksheets. At the same time, teachers also introduce other manipulative that manic - beaded number. The procedure is almost the same as the previous manipulative, except for each group distributed a manic - beaded numbers that have been so that students do not need to create their own in-group. Of WS guidance given, each group is required to resolve the problem by using both the manipulative and then match the results.

d. Observation and evaluation

Results obtained observations from the second cycle of the combined observations of action I and II, where the general picture of the course of the learning process in the classroom as follows:

- Visible when there is good cooperation among members of the group in solving the problems faced by the group
- It appears that the ability of some groups with low their academic already started to show symbols of actively engaged solve the given problem.
- Interaction the students and between students and students and teachers were going well, seen from their frequency increased to ask the teacher.
- With the two manipulative in each experimental group then occur in pairs. It is very entertaining for every student in the group.
- The speed of every group in completing worksheets guiding relatively quickly after they take advantage of both the manipulative.
- According to the observations of the research team that is very difficult to control is the classroom atmosphere. Noise levels increase as each group work while talking in the sense that they calculate the results while making the sound.

The activity in this second cycle 5 times and ended the meeting by giving a test at the end of the fifth meeting. In Table 1 and 2 display the development of the concept of their ability to integer operations.

Table 1: Skor Mastery of Concepts Students Learn In The Second Cycle

No	Students Name	Final score cycles	
		I	II
1	Primus A.Nuwa	2,2	3,66
2	Raymundo Boli	-	3,81
3	Yohanes Tasei	-	3,46
4	Maria Y.P.Pukan	-	4,58
5	Rafael R.P.W.Tapun	6,67	5,55
6	Wilhelmus G.G.K.L	-	5,12
7	Gratius D.Serang	3,33	5,04
8	Adolfus M.Bima	3,33	5,12
9	Maria D.P.T Nuwa	2,22	4,38
10	Gregorius A.Tadon	3,33	5,04
11	Firmina O. Tua	4,44	5,24
12	Adrianus G.Oran	2,22	4,82
13	Carolus N.Suban	-	4,77
14	Elenora Lim	5,56	4,23
15	Yakobus R.M. Jondo	-	3,68
16	Heri A.S.Rait	2,22	3,67
17	Thomas L.Gatas	3,33	3,25
18	Elman S.Ledoh	4,44	3,04
19	Yohanes W.Leki	5,56	3,00
20	Albertus Un Lala	4,44	5,56
21	Paskario M.Pata	4,44	3,03
22	Carita Riwu	2,22	4,56
23	Oktoviano Dekrismar	2,22	3,03
24	Katarina Langkeru	2,22	3,28
25	Yustinus A.Werang	6,67	5,47
26	Cindy Clau Seran	2,22	3,03
27	Doni D.Carvallo	4,44	3,22
28	Inggrit S.Beribe	3,33	4,29
29	Paskalis A.P	3,33	3,34
30	Pankritus E.K	5,56	5,39
31	Thomas Wangge	2,22	4,22
32	Adrianus Lopez	4,44	3,16
33	Haris Budianto	-	3,57
34	Melda A.Puay	2,22	3,95
35	Fransiska Laga	3,33	3,80
36	Konradus Tufan	2,22	3,57
37	Elaine Sianturi	4,44	5,36

38	Sonifa Martina Mau	7,78	6,87
39	Riki Yohanes Moat	2,22	4,04
40	Vinsensiana Davona	4,44	4,65
41	Elena D.F Nuka	5,56	4,22
42	Fransiskus F.Mengi	5,56	6,03
43	Maria A.Domonika	2,22	5,36
44	Maria S.Santana Relu	6,67	5,57
45	Yongli Bin A.Smaut	8,89	4,95
	$\sum$	**152,17**	**199,21**
	Mean	**4,00**	**4,33**

Tabel 2: The average of individual concept competence of cycles II

No subject (1-46)	Concept of satisfied		
	Early	Cycles I	Cycles II
Average	1,44	4,00	4,33

Conclusions and Recommendations

Conclusion

1. Realistic approach to the application of on the material GCD, LCM an integer numbers by using many manipulative can increase students' motivation.
2. The use of manipulative also can improve students' mastery of concepts to learn math class VB SDK St Arnold Penfui Kupang.
3. Realistic approaches to establish cooperation between the students and foster a harmonious relationship between students with students and teachers with students by stimulating students to think creatively in expressing ideas , improving communication skills , responsibility , self-confidence and also foster students' interest in learning .
4. With a realistic approach to mathematics teachers, it can change the habit from the role original in which teacher is considered as a speaker or the giver of information but now it has been changed as facilitators and mediators which active and creative in enhancing students' learning activities. In contrast, students who had previously studied in passive attitude and wait for the teacher's explanation will become active and creative students.

Recommendations

Principals should be able to advise the classroom teacher to use a realistic approach to the use of media as a concrete example for each concept being taught.

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