Difference Effect Of The Open Ended Approach And Realistic Approach On The Ability Of Problem Solving Student Elementary School

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Abstract. The study was conducted on the fourth grade students at SD Negeri 1 Blang Mangat. This research type Pre-Experimental Design. Data analysis using t-test and gain-assisted score test. The results show that: (1) the influence of realistic approach is better than the open-ended approach to problem solving ability, based on t count (2.167) > t table (= 1.673); and (2) improved student problem solving skills taught with a higher realistic approach than students taught by open-ended pendeng. This is based on the calculation of gain score and the characteristics of both models. Realistic approach has characteristic that is using LAS which contains real problem and human activity, whereas open-ended approach have characteristic that is using open matter with various settlement.

1. Introduction
Mathematics is a required lesson for students from elementary to high school level even to universities. Mathematics is also used as one of the requirements in determining students’ graduation. In addition, mathematics plays an important role in shaping how a person interacts with his environment both personally, socially and civil lives (Walshaw, M. & Anthony, 2008). This shows that mathematics has a very important role in education.

Mathematical abilities for all levels of schooling are outlined in five aspects of standard capability by the National Council of Teacher Mathematics (NCTM, 2000): problem solving, reasoning, communication, connection, and representation. Problem-solving skills are the highest type of mathematical ability compared to others. The ability to solve problems is not only very important for those who will later learn or study mathematics, but also for those who will apply them in other fields of study in everyday life (Ruseffendi E.T., 2006).

In everyday life, we are inseparable from something called problem, so problem solving is the main focus in learning mathematics. Therefore, problem solving is used as a general goal of teaching mathematics. However, not all questions are a problem. A question will be a problem if the question indicates a challenge that can’t be solved by routine procedures already known to the student. When it comes to problems students often can’t immediately get the solution, so problem-solving skills are a skill that teachers need to teach. Teachers have the task of helping students to understand the meaning of words or terms in the problem, motivating them to always try to solve them and using the experience in solving problems, so that students are not easily desperate when faced with a problem (Fadillah, 2009). But the reality that happened in the field is very different. Many teachers are still...
having difficulty organizing learning so that students have problem-solving skills such as demands so that many students have difficulty in solving mathematical problems (Krismanoto, A. & Wibawa, 2010).

In line with the above description, things are not much different researchers found in the field. Based on the results of observations on the fourth grade students of SD Negeri 1 Blang Mangat. In terms of students, students find it difficult when faced with high-level thinking problems such as problem-solving. Students often do not understand the true meaning of a problem, so students can't plan a problem-solving strategy appropriately. Therefore, the solution obtained by students is also not appropriate.

The low ability of students' mathematical problem solving can be seen from the student's answer in solving the problem. The problem was given to 90 students, but 7 of them who were absent, only 8 students or (9.76%) can answer the question correctly. While students who haven't been able to solve the problem correctly as much as 91.46%.

Based on student answers above can be said that students have not been able to solve the mathematical problems of the given problem. This means that students' mathematical problem solving skills are still low and need to be improved. In addition, from the observations above show that there are 90% of students who walk the solution and wrong answers, it is really very surprising because almost all students are not able to solve the problems contained in the problem. In solving difficult problems, students have doubts about their abilities that will reduce their efforts even tend to give up. So it can be concluded that the difficulties faced by students are not only caused not able to do the calculation but the students do not understand the problem and students still have difficulty in solving mathematical problems given by the teacher, so can't solve the problem.

To overcome the low ability of problem solving students it is necessary a learning approach, where the approach used facilitate teachers in providing learning services, while for students useful to facilitate the understanding of teaching materials delivered by teachers, while maintaining a fun learning atmosphere. In addition, the characteristics and steps of the chosen approach should be able to define problem-solving abilities. In general, mathematics learning approaches include inductive and deductive approaches, spiral approaches, constructive approaches, realistic approaches, problem-solving approaches, and contextual approaches. However, these four approaches to problematic math-based learning are up-dated, problem-solving approaches, Open-Ended approaches, realistic approaches that refer to Realistic Mathematics Education (RME), and the contextual approach.

One alternative mathematical approach that can be applied is the open-ended approach. A learning approach that presents a problem that has a correct method or completion of more than one, so as to provide an opportunity for students to experience finding, recognizing, and solving problems with some techniques is called an open-ended approach (Shimada S, 1997). Furthermore, seen from the context of the problem in this study, the approach of realistic approach is one of the appropriate learning approaches to improve the low ability of problem solving students. Realistic approach is a mathematics learning approach that refers to Realistic Mathematics Education (RME) that uses realistic problems as the starting point of learning. Hans Freudenthal sparked RME based on mathematical philosophy as human activity (Wijaya, 2012). Therefore, to ensure that it is done the research differences the influence of open-ended approach, and a realistic approach to the problem solving skills of elementary school students.

2. Literature Review

2.1. Open-Ended Approach

The open-ended approach was discovered and developed in Japan around the 1970s which is the result of research by Shigeru Shimada, Toshio Sawada, Yoshiko Yashimoto, and Kenichi Shibuya (Muhsinin, 2013). The problem that is formulated to have multi-answer is called an incomplete problem or called open ended problem. A learning approach that presents a problem that has a correct
method or completion of more than one, thus giving students the opportunity to gain experience of discovering, recognizing, and solving problems with some techniques (Shimada S, 1997).

The issue of open-ended should not be a complicated matter because the preferred of open-ended questions is the opportunity given to the students to explore the problem (Wijaya, 2012). This means that the open ended problem that we can give to students is very positive for the success of the open ended approach and the problem given does not have to be a complicated issue but a problem that can make the students dig further the problem. Sawada suggests that in general there are three aspects of Open Ended problems that can be given, namely: 1) finding relationships (this problem is intended to allow students to find some rules or mathematical relationships); 2) classify (students are asked to classify a particular object based on different characteristics of the object to formulate certain concepts, and 3) measurement (students are required to determine the numerical measures of a particular event) Students are expected to apply knowledge and skills learned earlier to solve the problem (Sawada Toshio, 2007).

2.2. Realistic Approach
Realistic approach is a mathematics learning approach that refers to Realistic Mathematics Education (RME) or better known as the Realistic Mathematics Approach (PMR) that uses realistic problems as the starting point of learning. RME comes from the Netherlands which has been known since the 1970s by the Freudenthal Institute. This theory refers to the opinion of Hans Freudenthal (Wijaya, 2012) who says that "mathematics is a human activity". The statement "mathematics is a form of human activity" shows that Freudenthal does not place mathematics as a finished product, but rather as a form of activity or process.

In a realistic mathematical approach, mathematics must be linked to human reality and activity. This means that math must be close to the child and relevant to real life (real) every day. However, a realistic problem should not always be a real-world problem and can be found in the student's daily life. A problem is called "realistic" if the problem is imaginable or real in the mind of the student. According to Gravemeijer (Zulkardi, 2010) the process of learning mathematics based on RME has five characteristics namely: using the context (use of contexts); using models (use of vertical instruments), using student contributions, interactivity, and related to other topics (intertwining).

2.3. Problem Solving
Problem solving is a way to solve a problem or problem. Problem solving means engaging in a task for which the solution is not known in advance. In order to find a solution, they will develop new mathematical understandings (NCTM, 2000). In solving problems students engage in tasks whose solutions are not previously known. In order to find solutions, students must gather various information and through this process, they will develop a new understanding in mathematics so that when students have the ability to solve a problem, then the student already has a new capability. These capabilities can be used to solve further relevant problems. The more problems students can solve, the more capable the ability to solve problems related to their daily lives.

In solving the problem the preferred process is preferred rather than getting the answer. Then it can be concluded the problem solving ability is the ability of students in solving a non-routine problem with high-level thinking and requires analysis in the process of completion by associating with existing knowledge so as to gain new knowledge. According to Polya there are 4 steps that must be done in solving a problem, namely: 1) understand the problem, 2) plan the solution, 3) solve the problem as planned second step, and 4) check back the results obtained (looking back) (Sumarno dkk, 1994).

3. Methodology
The open This research uses Pre-Experimental Designs with Two Group Pretest-Posttest Design type, because in the research, two experimental groups are randomly assigned. The research was conducted
at SD Negeri 1 Blang Mangat which is located at Jl. Railway No.2 No.2 Keude Punteuet, Lokhsumawae. Population in this research is all student of class IV in SD Negeri 1 Blang Mangat which summed 90 people. The sample in this research is Class IV-A and IV-B as many as 58 students, but when post-test 2 people not present. The instruments used in this research are interview and problem solving test. Each research instrument is analyzed using statistics that can answer the problem formulation and research hypothesis appropriately. In this study used descriptive statistical analysis and inferential statistical analysis.

4. Result and Discussions

4.1. Test Of Normality, Homogeneity and Difference Of Mean Score

Instruments were given to each student in two experimental classes namely class IV-A totaling 30 students and class IV-B totaling 28 students, but students of grade IV-A of 2 people were not present during the post-test so that the number of research samples changed to 28 IV-A class students and 28 students of IV-B class. The data of the research results are presented in Table 1 and Figure 1.

Table 1. Description of Pretest Problem Solving

|                | N  | Minimum | Maximum | Sum  | Mean | Std. Deviation | N.1 |
|----------------|----|---------|---------|------|------|----------------|-----|
| pretesPMR      | 28 | 17      | 39      | 25.68| 5.55 | 20.744         | 22  |
| pretesOE       | 28 | 12      | 39      | 23.18| 4.738| 22.448         | 22  |
| Valid N (listwise) | 28 | 12      | 39      | 23.18| 4.738| 22.448         | 22  |

Based on table 1 and figure 1, it can be concluded that the class of open-ended approach and the class of realistic approach has the same relative value, but to know the equivalence score then tested normality, homogeneity and difference average score. Normality calculation results get the sig value. Open-ended pendant class (= 0.449) > α (= 0.05) and sig value. The realistic approach class (= 0.273) > α (= 0.05) so that H₀ is received, in other words the two classes come from normally distributed populations. Homogeneity calculation results obtained sig value. (= 0.330) > α (= 0.05) so that H₀ is received, in other words the two classes come from a population of homogeneous variations. The result of the average score calculation test gets t_count (= 0.465) < t_table (= 1.671) and sig.2-tailed (= 0.642) > α (= 0.05) so that H₀ is accepted, with word the other two classes have the same ability.

Postest are done to determine students' problem solving abilities after treatment. The results of descriptive postest statistical calculations are presented in Table 2 and Figure 2.
Based on table 2 and figure 2, it can be concluded that the class of open-ended approach and the class of realistic approach has relatively unequal value. To know the equivalence score then tested normality, homogeneity and t-test. Normality calculation results get the sig value. the open-ended approach class (= 0.686) > α (= 0.05) and the sig value. the realistic approach class (= 0.115) > α (0.05) so that $H_0$ is received, in other words the two classes come from normally distributed populations. Homogeneity calculation results obtained sig value. (= 0.063) > α (= 0.05) so that $H_0$ is received, in other words the two classes are derived from a population of homogeneous variables. Result of t-test calculation, t value obtained $t_{count}$ (= 2.167) > $t_{table}$ value (= 1.673) and $t_{count}$ is positive so $H_0$ is rejected.

Based on this, it can be concluded that "the influence of realistic approach is better than the open-ended approach in student problem solving skills". This is in accordance with the characteristics of both methods of learning. Realistic approach characteristic is using LAS which contains real problem and human activity, whereas open-ended approach have characteristic that is using open matter with various settlement.

4.2. Analysis Of Student Problem Solving Abilities

Analysis of student problem solving ability using gain score. The result of the gain score calculation is presented in Table 3. Based on table 3 shows that the postest value points of the realistic approach on both indicators of the four indicators of problem-solving abilities are above the open-ended pretest value points, while the highest gain score in the realistic approach class is found in the first indicator and the lowest gain score in the classroom realistic approach is found in the second indicator. In the open-ended approach the postest value of the three problem solving indicators lies above the values of the open-ended pretest approach, whereas the highest gain score in the open-ended approach class is found in the third indicator and the lowest gain score in the open-ended approach class is found on the second indicator.
Table 3. Improved Problem Solving

| Indicator | Understanding The Problem | Planning The Solution | Solving The Problem | Checking Back The Results |
|-----------|---------------------------|-----------------------|---------------------|--------------------------|
| PMR       | OE                        | PMR                   | OE                  | PMR                      | OE                        |
| Precise   | 2.82                      | 3.50                  | 7.71                | 9.79                     | 9.54                      | 6.04                     | 5.88                     | 4.14                     |
| Postes    | 15.89                     | 14.04                 | 13.18               | 12.71                    | 18.95                     | 16.93                    | 15.00                    | 13.07                    |
| Gain Score| 11.07                     | 8.54                  | 5.46                | 3.43                     | 9.39                      | 10.89                    | 9.32                     | 8.95                     |

5. Conclusion

The effect of the realistic approach is better than the open-ended approach to student problem-solving abilities. It is based on the acquisition of $t_{\text{count}} (= 2.167) > t_{\text{table}} (= 1.673)$. In general, the increased problem-solving skills of students taught with a realistic approach is higher than the open-ended approach. This is based on the acquisition of gain score in realistic approach class higher than gain score in open-ended approach class on problem solving indicator, and problem-solving planning, whereas on the mask resolution indicator, and re-examining obtained gain score in realistic approach class is lower than gain score in the open-ended approach class.

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