International Journal of Multidisciplinary Research and Development
Online ISSN: 2349-4182, Print ISSN: 2349-5979; Impact Factor: RJIF 5.72
Received: 18-05-2019; Accepted: 23-06-2019
www.allsubjectjournal.com
Volume 6; Issue 8; August 2019; Page No. 126-128

Using react learning to improve student's problem solving mathematics abilities

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Abstract
This paper describes some activities that author has designed using Relating, Experiencing, Applying, Cooperating, and Transferring (REACT) learning on students' problem solving mathematics abilities. This study used a quasi-experimental study with a nonequivalent posttest only control group design. The subject in this study are 20 elementary students. Data were collected using a questionnaire and a test and this analyzed using descriptive statistical analysis techniques and inferential statistics (t-test). The results showed that the positive response of students using REACT learning to improve mathematics students' understanding of problem solving abilities, namely 14,25 is average yes and 5.75 is average no. Furthermore, the results of hypothesis analysis through the t test, namely t count of 30.822 which means t count> t table at or 30.822> 1.734 with a significant level of 5%. It means this learning give a significant effect on students' problem solving mathematics abilities.

Keywords: REACT learning, mathematical problem solving ability

Introduction

The main purpose of the curriculum of 2013 is 4C capabilities (Communication, Collaboration, Critical Thinking and Problem Solving, and Creativity and Innovation) (Gunawan, 2013). It is a skill that must be possessed by students to face the 21st century, one of which is critical thinking and problem solving. The purpose of learning mathematics above must be realized in the process of learning mathematics starting from the elementary level. The process of learning mathematics at the elementary school level is not easy to do (Novita, 2012) [6]. Many problems arise during the mathematics learning process takes place. Various problems that arise include the difficulty of students in learning the correct mathematics, for example understanding mathematical concepts and mathematical problem solving.

According to Dewi, *et al*. (2019) [1] shows that learning applied in Surabaya elementary school is still a "teacher center", which is teacher-centered learning. This one-way learning results in students being more passive so that the learning experience of students becomes limited. This learning only emphasizes on students having to memorize existing formulas to solve routine problems. So that students are not given the opportunity to explore their understanding through asking questions. In addition, when the learning process takes place, the problem solving ability is less applied by the teacher. So it has the effect of making it difficult for students to solve mathematical problems when working on story problems, especially non-routine or open-ended questions. This is an indication of the students' low mathematical problem-solving abilities, resulting in low mathematics learning outcomes.

Based on some of studies indicate the existence of problem-solving abilities possessed by students is still low (Rosli, 2013) [8]. Difficulties of students in solving problems that are not routine is a fact that must be immediately sought for a solution (Khaerunnisa, 2013) [4]. According to Watson and De Geest (2005) [11] that mathematical problem solving abilities can be improved by making changes in learning. One of them is the application of learning strategies that familiarize students to be able to build their own knowledge so that it is easy to understand the concepts taught, namely by using the REACT strategy. REACT Strategy (Relating, experiencing, applying, cooperating, and transferring) (Muslich, 2008) [5].

Furthermore, Ultay and Alev (2017) [10] explain that REACT strategies are more effectively applied to learning than conventional teaching patterns. Hastuti (2016) also states that there is a contribution of learning with the REACT strategy towards mathematics learning outcomes. This strategy has several advantages including participants can be actively involved in each stage of the implementation of mathematics learning activities. The activity of these students can build students' thinking skills in achieving deep understanding, problem solving, reasoning, communication, connection, and finding the concepts learned. In terms of student activeness, it takes a task based on problem submission.

Method

This research is a quasi-experimental research. The population of this study were all elementary students in Surabaya, Indonesia. The sample of this study was 20 students of class 5A. The experimental design in this study used nonequivalent pretest-posttest control group design (Siswono, 2010) [9].

The method of data collection uses the test method. Making test of problem solving ability based on grid. Data on mathematical problem solving skills obtained through a test in the form of a description. This test is given before and after treatment. In our study, student activity categories to be observed include: 1) Relating, students associate new concepts with their initial knowledge, 2) Experiencing, students search and actively investigate to discover the mathematical concepts learned, 3) Applying, students apply the mathematical concepts that have been obtained to solve mathematical problems, 4) Cooperating, students cooperate with each other in carrying out the task of submitting

problems, and 5) Transferring, students are given the opportunity to find patterns in determining how to solve mathematical problems in the form of non-routine questions.

Result

The results showed that the questionnaire of students responses filled by 20 students after following REACT learning obtained as follows:

Table 1: The results of students' response

Questions	Answer Frequency	
	Yes	No
Item_1	14	6
Item_2	16	4
Item_3	15	5
Item_4	11	9
Item_5	10	10
Item_6	17	3
Item_7	17	3
Item_8	12	8
Item_9	14	6
Item_10	16	4
Item_11	16	4
Item_12	18	2
Item_13	15	5
Item_14	13	7
Item_15	13	7
Item_16	11	9
Item_17	13	7
Item_18	17	3
Item_19	10	10
Item_20	17	3
The average of students' answer	14,25	5,75

Based on the criteria of students' responses to instructional tools, it can be concluded that the average of students' responses to learning tools amounted to 14,25 which means that students' responses are positive to follow REACT learning. The results of pretest before given REACT learning is presented in the following Table:

Table 2: t-test results *Paired Samples Test*

		Paired Differences					t	df	Sig. (2-tailed)
		95% Confidence Interval of the Difference							
		Mean	Standar. Deviation	Standar. Error Mean	Lower	Upper			
Pair 1	pre - post	-25.000	3.627	.811	-26.698	-23.302	-30.822	19	.000

From table 2, it is known that tcount is 30.822 which means tcount> t table at or 30.822> 1.734 at a significant level of 5%, it can be concluded that there is a significant effect of learning Relating, Experiencing, Applying, Cooperating, Transferring (REACT) on students' problem solving mathematics abilities.

Furthermore, an independent t test can be done to see whether there is a difference or not between experience class and the other class. Consider the following table:

Table 3: Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
				95% Confidence Interval of the Difference						
		F	Sig.	T	df	Sig. (2-tailed)	Mean Difference	Standar. Error Difference	Lower	Upper
Nilai	Equal variances assumed	.545	.465	2.982	38	.005	6.500	2.179	2.088	10.912
	Equal variances not assumed			2.982	36.661	.005	6.500	2.179	2.083	10.917

From table 3 it is known that t count is 2.982 which means thitung> t table at or 2.982> 2,000 at a significant level of 5%, it can be concluded that there is a significant difference between the experimental class and other class on students' mathematical problem solving abilities.

Discussion and Conclusion

Response is an idea or feeling of students after following the lesson. According to Poerwadarminta (2003) [7], response means reaction or idea that is acceptance or rejection, as well as indifference to what is communicated by the communicator in the message. Student responses are traced through a questionnaire filled after students follow this PBL lesson. Based on the result, students' responses in REACT learning is 14.25 is yes and 5.75 is average no which means that students' responses are positive.

Hasanah (2017) [3] also explained that in each stage of REACT learning provides an opportunity for students to learn in solving a problem. So this paper shows that there is a significant effect of learning Relating, Experiencing, Applying, Cooperating, and Transferring (REACT) on students' problem solving abilities through problem posing tasks.

During the learning process, which applies the REACT

strategy based on problem posing tasks, students are actively involved in each step of the learning applied by the teacher. In each meeting, each student makes a new question and makes an alternative solution for each question he has made. Variations in making questions have also been shown by each student even though at the beginning of the meeting students still find it difficult to make questions. But in the end students begin to get used to the learning patterns applied by the teacher.

The conclusion of this study is that there is a significant effect of the learning of Relating, Experiencing, Applying, Cooperating, and Transferring (REACT) on students' problem solving mathematics abilities. This conclusion is also based on the results of hypothesis analysis through the t test, namely t count of 30.822 which means t count> t table at or 30.822> 1.734 with a significant level of 5%. Furthermore, it was also shown the response of students to the implementation of task-based Relating, Experiencing, Applying, Cooperating, and Transferring (REACT) strategies of problems posing tasks to mathematical problem solving abilities is very active in learning. It can be concluded that this learning can provide a positive response for students to apply in class.

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