Implementation Of Cooperative Learning Model With React Strategies To Improve Student Mathematical Problem Solving Ability

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Abstract.
This research is an experimental study that examines problem posing in an effort to improve the ability of mathematical problem solving of students conducted at SMA Negeri 15 Medan with a sample of class XI as many as two classes taken randomly.The instrument used in this study was a student mathematical problem solving test in the form of multiple choices to determine the ability of students to solve mathematical problems. The results of the study concluded that mathematical problem solving abilities who obtained cooperative models of Jigsaw with REACT's strategy increased better than the mathematical problem solving abilities who obtained conventional learning. Student activities that follow the cooperative model of Jigsaw with REACT's strategy reflect active activities, and student responses to the cooperative model of Jigsaw with REACT's strategy are very good. Based on the results of the study it can be concluded that the application of the cooperative model of Jigsaw with REACT's strategy is effective in improving mathematical problem solving, and student learning activities.

Keywords : *Cooperative Learning, Jigsaw, REACT and Problem Solving ability.*

I. INTRODUCTION

1.1. Background.

Mathematics has a very important role for human life. Along with the rapid developments in science and technology, especially in terms of communication and information, everyone is now required to have good problem-solving skills, be able to think critically, systematically and creatively. According to Hendriana (2017), Mathematics as one of the subjects which is a basic science that has an important role in the framework of preparing quality and useful human resources for the development of science and technology. Mathematics subject matter taught in schools plays a role in training students to think logically, critically and practically, as well as to be positive and have a creative spirit. Because of the important role of mathematics in life, in the education curriculum in Indonesia, Mathematics is taught at every level of education from elementary school to high school. Mathematics lessons rank first in the number of hours of study, this shows that the importance of understanding the concept of mathematics lessons for students at various levels of education.Astuti (2017) said that mathematics is one of the most important subjects in the world of education, because mathematics lessons can make students think logically, rationally, critically and broadly, this statement is in line with the goals of national education, namely: Prepare students to be able to face changes in the world constantly changing, act on the basis of logical, rational, critical thinking, and so that students are able to use mathematics in everyday life and in studying various sciences.Learning mathematics basically a person cannot be separated from problems because the success or failure of a person in mathematics can be marked by the ability to solve the problems they are facing. Bell (1978: 157) states that a question is a problem for someone if he is aware of his existence in that situation, and admits that the situation really requires an action and cannot quickly find a solution or resolution of the situation.

According to Dindyal (2005: 70), a situation is called a problem if there are several obstacles in the ability to solve the problem. The existence of these obstacles can cause a problem solver to be unable to solve the problem directly.In connection with the importance of mathematical problem-solving abilities, the researchers conducted observations, interviews, and looked at the training documentation and students' test results on the previous material. Based on the results of interviews with teachers in mathematics at SMA Negeri 15, it was found that the mathematical problem solving abilities of XI class students were not very good, which could be seen from the symptoms. Students understand when the teacher explains, but students find it difficult to re-express what they have learned. Students are less able to apply mathematics if it is turned into another form. Students are only focused on the material being studied and at the next meeting students forget about the material that has been studied even though the material has something to do with it. Based on the symptoms that have been stated, the problem is how to facilitate students so that they have the ability to understand mathematical problem solving. For this reason, an innovation in learning is needed, this focuses on a learning activity from the students themselves, helping students when there are difficulties or guiding them to obtain a conclusion. One way that teachers can do is to carry out improvements to the learning process. According to (Zulfah, 2018), one of the efforts to improve the learning process that teachers can do to overcome the problems above is to hold a variation of the learning process, for example by implementing a learning strategy that can involve students directly in building their understanding. Strategies that are believed to be able to assist teachers in improving students' mathematical problem solving understanding abilities.

A learning strategy that is expected to activate, understand, and develop students' thinking is to use a strategy that can relate material to real life and students' prior knowledge, involve students in problem solving and manipulation of teaching aids, involve students in learning cooperatively, providing an opportunity for students to discover for themselves, apply, and transfer the concepts learned. One of the learning strategies that can be used is the REACT strategy (Relating, Experiencing, Applying, Cooperating, Transferring) (Rizka, 2014).REACT Strategies a learning strategy with a contextual approach offered by the Center of Occupational Research and Development (CORD) (Lefrida, 2014). The REACT strategy was first developed by Micheal L, Crawford in the United States (Siahaan, 2017). Learning with the REACT strategy is a learning strategy that emphasizes student activities to find the concepts they learn, students work in small groups, apply these concepts in everyday life and transfer these concepts to new conditions.In accordance with the acronym, the REACT strategy contains five activities, namely: a) Relating, which shows that the content to be learned is related to the knowledge students have previously possessed; b) Experiencing, that is, students are actively involved in the process of discovering the concepts they are learning; c) Applying, namely the activity of applying the concepts found in solving everyday problems or problems in mathematics; d) cooperative, which depicts students working and studying in small groups, brainstorming with other friends; e) Transferring, namely students transfer the knowledge gained during learning into everyday life or other situations.Processthe implementation of the REACT strategy follows learning steps that form a cycle of activities that are repeated and uninterrupted. The five steps are depicted in table 1.1. the following.

Table 1.1. React Model's Syntax

Stages	Activity
Related	The teacher begins the lesson by presenting contextual problems that contain new content that is linked to existing concepts
Experiencing	Student conducts experimental activities or hands on activities to find concepts to be studied, and the teacher helps and directs students to carry out their activities.
Applying	Students using the concepts they learn or the knowledge they learn in solving everyday problems or mathematical problems
Cooperating	Students study or work in small groups, brainstorm with each other, conduct group discussions to solve problems and develop the ability to work together with friends.
Transferring	Students apply the knowledge they gain during learning into new situations or contexts.

Relevant research using the REACT learning model by Fakhruriza and Kartika (2015) shows that the REACT learning model is proven to be effective in improving student learning outcomes. In addition, based on Muzdalifa's research (2013) the REACT learning model provides experience to students, so as to improve student physics learning outcomes. Because of this model, students are really actively involved in learning, not just listening to the teacher. In each phase students are actively involved so they are not easily bored in the learning process. Students are also trained to associate the material studied with applications in everyday life, with everyday problems so that students are able to analyze and relate it to learning, and are able to apply it in everyday life.

1.2. Formulation of the problem

Based on the background of the problem and problem identification, the formulation of the problem in this study is:

1. How is the problem-solving ability of students who use Jigsaw cooperative learning with the REACT approach?
2. How do students respond to the application of Jigsaw cooperative learning with the REACT approach and questions about students' mathematical problem solving abilities?

1.3. Research purposes

Based on the formulation of the problem put forward, the objectives of this study are as follows:

a. Examine the mathematical problem solving abilities of students who use Jigsaw cooperative learning with the REACT approach and students who use conventional learning

b. Describe students' responses to the implementation of Jigsaw type cooperative learning with the REACT approach and questions about mathematical problem solving abilities.

1.4. Benefits of research

This study aims to provide input for classroom learning activities, especially in an effort to improve students' mathematical problem solving abilities. These inputs include:

a. Provide information about the effect of applying the Jigsaw cooperative learning model with the REACT approach to increasing students' mathematical problem solving abilities.

b. If this influence is positive then this model can be used as one of the learning models used in learning mathematics.

II. METHODS

2.1. Location and Time of Research

This research was conducted at SMA Negeri 15 Medan. The time for conducting this research is the even semester of the 2022/2023 school year

2.2. Population and Sample

Sugiono (2017) said that the population is the entire object of research as a source of data that has certain characteristics in research. The population in this study were all students of SMA Negeri 15 Medan, with a random sample of two classes from class XI IPA.

2.3. Research design

The design in this study is to use a pretest and posttest control group which is stated as follows:

R	O	X	O
R	O	-	O

With R = random grouping

O = Pretest / Posttest

X = Jigsaw type cooperative learning with REACT approach

2.4. Research Instruments

The instruments used were tests (pretest and posttest), and observation sheets to measure the level of student activity during the learning process.

2.5. Data analysis technique

Data analysis techniques in this study include:

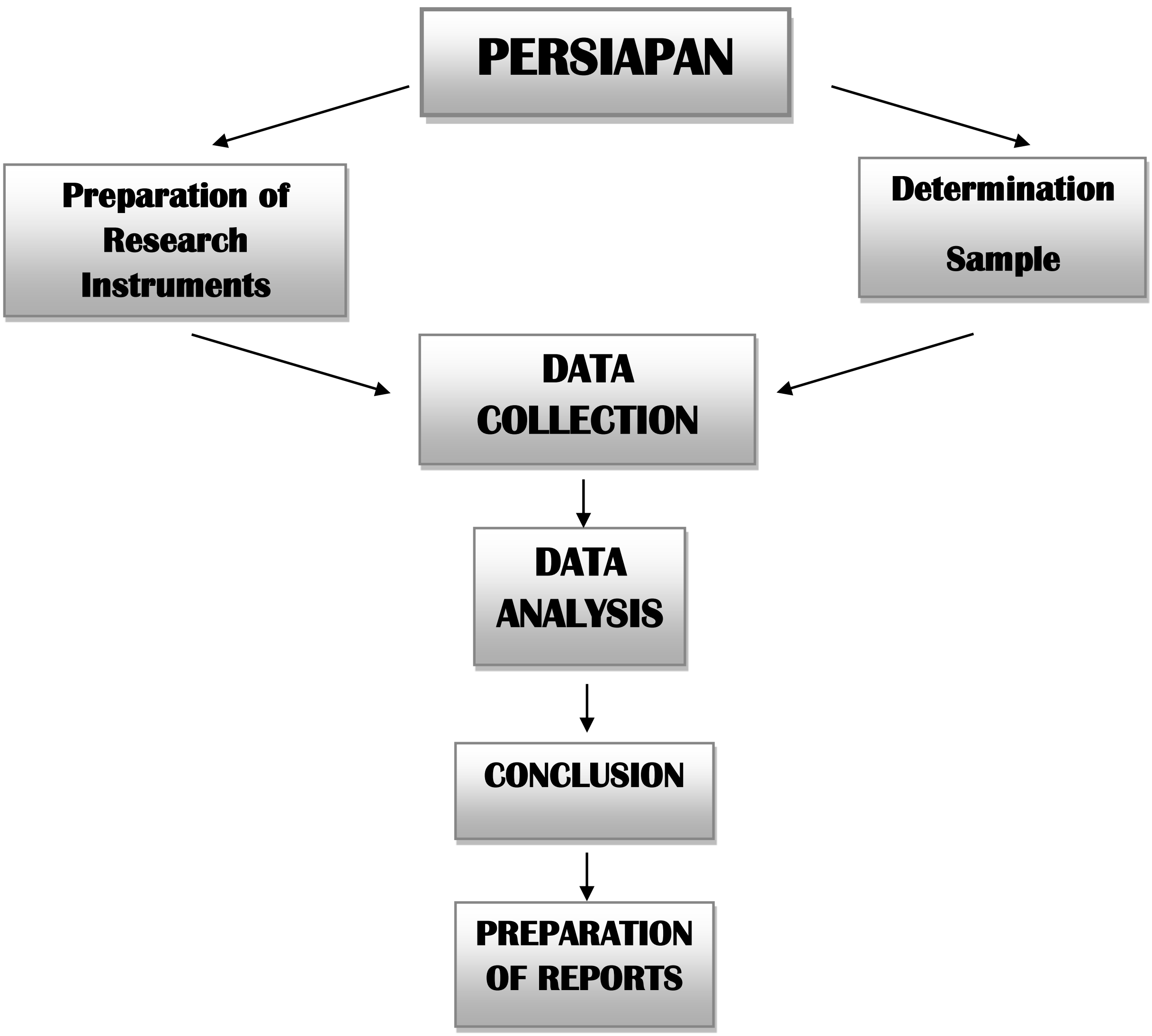
1. Data analysis of Mathematical Connection and Problem Solving abilities

Based on questions number one and two in the formulation of the problem, the pre-test and post-test data will be analyzed with ANAKOVA inferential statistics. This analysis is used to test the hypothesis in this study

2. Analysis of active student activity data

Data from observations of student activities during learning activities were analyzed using percentages. The percentage of observations of student activity is the average frequency of each aspect of observation divided by the number of average frequencies of all aspects of observation multiplied by 100% with a tolerance limit of 5%.

2.6. Research Method Flowchart



III. RESULTS AND DISCUSSION

3.1. Data on Mathematical Problem Solving Ability Test Results

After being given learning in the experimental class with the Jigsaw cooperative learning type with the REACT approach and the control class with conventional learning (ordinary), students are given the opportunity to answer the final test questions (posttest). Post-test data is KPMM (Mathematical Problem Solving Ability).After processing the post-test data in the experimental and control classes, the lowest score (Xmin), highest score (X max), average score (X average) and standard deviation (s) are obtained as shown in Table 3.1.

Table 3.1. Posttest Data Recapitulation of Experiment Class and Control Class

Aspect	Ideal Score	Experiment				Control			
		Xmin	Xmax	$\bar{x}$	S	Xmin	Xmax	$\bar{x}$	S
Mathematical Problem Solving Ability (KPPM)	36	5	25	15 (44.72%)	5.12	3	20	13.69 (38.05)	4.79

Table 3.1. above shows that there is a sizable difference between the experimental class and the control class. In the aspect of Mathematical Problem Solving Ability (KPMM) in the experimental class the achievement score was 44.72% of the ideal score, greater than the score of the control group with an achievement of 38.05% of the ideal score.

3.2. Student Activity Data During Learning

Data on student activity during the Jigsaw type cooperative learning with the REACT strategy took place, obtained through two observers (namely researchers and 1 math teacher at SMA Negeri 15 Medan) at each meeting/face to face with observation sheets. Furthermore, at the time of learning, observations were made and then an assessment was carried out with three categories of assessment, namely, Good (B), Enough (C), and Poor (K). Data from observations were analyzed by converting the Good category (B) to Score 3, Enough Category (C) to score 2 and Poor Category (K) to score 1. Then look for the average value and percentage of student activity. The results of the analysis are presented in Table 3.2.

Table 3.2. Student Activity during Learning in the Experiment class

No	Observed aspect	Average Student Activity Score						Average	Category
		pert Number 1	pert 2nd	Pert The 3rd	pert To 4	pert To 4	pert to 5		
1	2	3	4	5	6	7	8	9	10
1	Involvement of each member in group activities	2.8	2.7	2.9	3	3	2.7	2.83	Good
		93 %	90%	97%	100%	100%	90%	93%	
2	Work on LKS	2.7	2.6	2.65	2.7	2.95	2.9	2.7	Good
		90%	86 %	86%	90%	99%	99%	91.7%	
3	Discussion between students and teachers	2.6	2.5	2.6	2.5	2.7	2.6	2.56	Good
		86.7%	83.3%	86.7%	83.3%	90%	86.7%	85.3%	
4	Discuss among fellow students	2.8	2.7	2.7	2.6	2.7	2.75	2.78	Good
		92%	90%	90%	86.7%	90%	91.7%	91%	
5	Pay attention to friends' explanations	2.5	2.6	2.65	2.75	2.7	2.8	2.66	Good
		84%	85%	88.3%	91.7%	88.3%	93.3%	88%	

6	Note things that are relevant to learning	2.45	2.6	2.65	2.75	2.7	2.8	2.66	Good
		81.7%	86.7%	88.3%	91.7%	90%	93.3%	88.7%	
7	Pay attention to the teacher's explanation	2.5	2.5	2.7	2.65	2.8	2.8	2.66	Good
		83.3%	83.3%	90%	88.3%	93.3%	93.3%	88.7%	
8	Behavior that is irrelevant to KBM	0	0	0	0.3	0	0	0.04	Good
		0%	0%	0%	8.4%	0%	0%	1.33%	

The existence of differences between the mathematical problem solving abilities of experimental class students and control class students can be explained theoretically and empirically operationally. In terms of theoretical foundation, the Jigsaw type cooperative learning model with the REACT strategy is a learning model that emphasizes student activities to find the concepts they learn, students work in small groups, apply these concepts in everyday life and transfer these concepts in new conditions. which contains five activities, namely: a) Relating, which shows that the content to be learned is related to the knowledge students already have; b) Experiencing, that is, students are actively involved in the process of discovering the concepts they are learning; c) Applying, namely the activity of applying the concepts he finds in solving everyday problems or problems in mathematics; d) cooperative, which depicts students working and studying in small groups, brainstorming with other friends; e) Transferring, namely students transfer the knowledge gained during learning into everyday life or other situations.

The form of the questions given can be in the form of pictures, stories, or other information that must be related to the subject matter being taught. While the conventional learning method is more prioritizing rote memorization than understanding, placing more emphasis on numeracy skills or abilities, prioritizing results rather than the process that occurs, emphasizing more on theoretical content than the motivation given and the intention behind the content or material content, and learning is more centered to the teacher.In terms of operational empirical basis in the presentation of learning, students who study using the Jigsaw type cooperative learning model with the REACT approach are equipped with student worksheets (LKPD). In each learning process with the Jigsaw cooperative learning model with the REACT approach, learning activities emphasize students more on several things, namely the ability of students to formulate questions and solve them which can develop mathematical thinking abilities or use students' mathematical thinking patterns. Thus the students' ability to solve problems is also getting better because when students raise questions/problems that are given by the teacher, they indirectly think about the answers (Japa, 2020). Thus, students become more trained to think actively, creative and productive. So that learning can be more meaningful and also students become easier in solving every math problem or problem in their daily lives.

IV. CONCLUSION

Based on the results and discussion, it can be concluded that learning using the Jigsaw cooperative learning model using the REACT strategy is as follows: (1) students' physics learning activities while using the Jigsaw cooperative learning model using the REACT strategy (Relating, Experiencing, Applying, Cooperating, Transferring) at SMA Negeri 15 Medan is included in the active category, with the highest percentage of indicators in the Experiencing stage and the lowest percentage indicators being oral activity in the relating, applying and cooperating stages. (2) the Jigsaw type cooperative learning model using the REACT strategy (Relating, Experiencing, Applying, Cooperating, Transferring) has a significant effect on students' mathematics learning outcomes in the cognitive domain at SMA Negeri 15 Medan. The suggestions from this study include: (1) For other researchers, a) it is hoped that the Jigsaw type cooperative learning model using the REACT strategy (Relating, Experiencing, Applying, Cooperating, Transferring) can be a reference for further research with different material and with different school populations, b) activities at the transferring stage in the form of practice questions should be multiplied, so students will get used to working on questions during the post test;(2)

The characteristics of students, time allocation and adequate experimental tools should be considered by teachers in planning learning devices so that learning objectives can be achieved optimally. a) it is hoped that the Jigsaw type cooperative learning model using the REACT strategy (Relating, Experiencing, Applying, Cooperating, Transferring) can be a reference for further research with different material and with different school populations, b) activities at the transferring stage in the form of exercises questions should be reproduced, so that students will get used to working on questions during the post test; (2)

The characteristics of students, time allocation and adequate experimental tools should be considered by teachers in planning learning devices so that learning objectives can be achieved optimally. a) it is hoped that the Jigsaw type cooperative learning model using the REACT strategy (Relating, Experiencing, Applying, Cooperating, Transferring) can be a reference for further research with different material and with different school populations, b) activities at the transferring stage in the form of exercises questions should be reproduced, so that students will get used to working on questions during the post test; (2) The characteristics of students, time allocation and adequate experimental tools should be considered by teachers in planning learning devices so that learning objectives can be achieved optimally. b) activities at the transferring stage in the form of practice questions should be multiplied, so students will get used to working on questions during the post test; (2) The characteristics of students, time allocation and adequate experimental tools should be considered by teachers in planning learning devices so that learning objectives can be achieved optimally. b) activities at the transferring stage in the form of practice questions should be multiplied, so students will get used to working on questions during the post test; (2) The characteristics of students, time allocation and adequate experimental tools should be considered by teachers in planning learning devices so that learning objectives can be achieved optimally.

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