Efforts to Improve Science Learning Outcomes on Vibrations and Waves with the Jigsaw Method for Class VII Junior High School Students

Darsono[1]

[1] Junior High School 221 Tanjung Priok, North Jakarta

E-mail: Darsono@gmail.com

ABSTRACT

The purpose of this study was to determine how much the increase in student learning outcomes in the learning process using the Jigsaw method in natural science subjects in grade VIII at SMP Negeri 221 Jakarta. This research is a type of classroom action research with the research subjects of class VIII A SMP Negeri 221 Tanjung Priok, North Jakarta, and the object is the improvement of student learning outcomes using the Jigsaw method. The action taken in this study was to apply the Jigsaw method during the learning process, students were divided into several discussion groups in which there was a team of experts in presenting the results of the discussion in front of the class. This research was conducted in 3 cycles on natural science subjects. The research data is in the form of student learning outcomes instruments. The technique of collecting data on student learning outcomes by direct observation by 3 observers. Data were analyzed descriptively using percentages, the implementation of the Jigsaw method can improve student learning outcomes. In the first cycle the average learning outcomes of 66.56 in the second cycle increased significantly, reaching an average value of 73.75, reinforced by in the third cycle an increase in the average score to 78.13, from the results of these studies it can be concluded that there is an increase in learning outcomes Science on Vibration and Wave material for class VIII A SMP Negeri 221 Jakata with the Jigsaw method learning.

Keywords: Learning Outcomes, Jigsaw Method, PTK.

INTRODUCTION

The quality of education in school is marked by the achievement of the learning process. There are several factors that influence, namely curriculum, educational content, learning and evaluation processes, teacher quality, school facilities and infrastructure and textbooks.

Based on the description above, it is necessary for the teacher's efforts as one of the supporting factors. The role of a teacher in learning as a motivator, mediator, facilitator, and dynamist, evaluator, instructor and manager because learning in KTSP is essentially a process of interaction between students and their environment so that there is a positive change in behavior and this interaction, there are several factors that influence it. be it internal factors that come from within the individual or external factors that come from the environment. The main task of the teacher here is to condition the environment so that it can contribute to the behavior of students[1].

In order to learn something well, we need to hear, see, ask questions about it, and discuss it with other people. Not only that, students need to "operate", that is, do things in their own way, show examples, try to practice skills, and carry out tasks that require the knowledge they have or must acquire, therefore a teacher's effort is to apply interesting learning methods. for students[2].

Efforts to improve learning outcomes are called CAR which stands for Classroom Action Research. Research is an activity of examining objects by using certain methodological rules to obtain data and information that is useful in improving the quality of a thing, as well as attracting interest and importance to researchers.[3]. CAR can provide benefits and

input with the aim of improving the quality and quality of education in the classroom / school. In addition, PTK globally can provide solutions to national problems, especially the decline in the quality of national education. PTK.

To implement efforts to improve student learning outcomes through this CAR, teachers need to choose the best method that will be applied in learning. The learning method is directed at increasing student activity in the teaching and learning process to take place optimally between teachers and students, as well as students and their environment. The optimal interaction between teachers and students has an impact on increasing student mastery of concepts which can improve student achievement[4].

Based on the results of observations made by researchers, it turns out that student learning outcomes are less than optimal, it can be seen from the indicators of formative test results that are held after every meeting. The score, the mean score of grade VIII A students of SMP Negeri 221 Jakarta Utara 75% is below the KKM standard (Minimum Completeness Criteria) set by the school, namely 7.0

Less optimal learning outcomes of class VIII A students of SMP Negeri 221 Tanjung Priok, North Jakarta, can be seen in science lessons compared to other subjects. This is because students are less active, in class learning so that students feel bored[5] and do not pay attention to the explanation of the material that the teacher conveys.

Researchers seek to improve student learning outcomes using the Jigsaw method. The Jigsaw method is a type of cooperative learning that encourages active students and helps each other in mastering material to achieve maximum achievement[6].

Cooperative learning is a joint activity between two or more people to achieve the same goal. Cooperation or learning together is a team (group) process in which members support and rely on each other to achieve a consensus. The classroom is an excellent place to build teamwork, which is needed in life. Cooperation / learning together is influencing each other as team members[7].

In its application, students are formed into groups, each group consisting of a team of experts according to the questions prepared by the teacher[8], Some of the advantages are as follows: Developing the ability of students to express ideas or ideas in solving problems without fear of making mistakes, Students are more active in speaking and arguing because students are given the opportunity to discuss and explain the material in each group, Students better understand the material provided because it is studied more deeply and simply with members of the group[9].

Another reason for choosing the Jigsaw Method learning, students will be more active in learning on their own and finding out the parts assigned to them. This Jigsaw method also makes students more motivated[10]. From several reasons for choosing the learning method, it is very appropriate to choose the Jigsaw Method learning method in delivering science subject matter[1].

RESEARCH METHODS

The method used in this research is the Classroom Action Research (CAR) which has a very important and strategic role to improve the quality of learning, if implemented properly and correctly.[11]. This research also includes descriptive research, because it describes how a learning technique is applied and how the desired results can be achieved. In this classroom action research, the teacher acts as a researcher, the full person in charge of this research is the teacher. The main purpose of

this action research is to improve learning outcomes in class.

This Classroom Action Research Design was carried out in 2 cycles to see an increase in student learning outcomes in following learning with the Jigsaw Method. The research design is described in the image below:
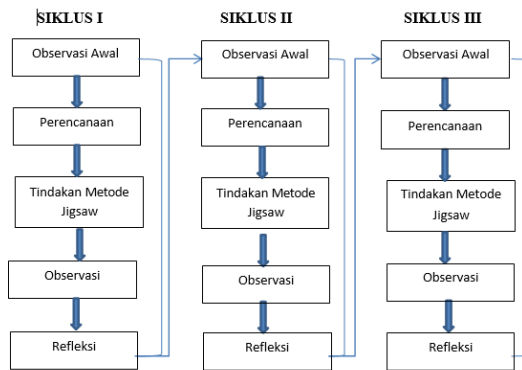

Figure 1. The Jigsaw Method CAR Cycle

This research was conducted in class VIII SMP Negeri 221 Tanjung Priok, North Jakarta. By planning to take 2 cycles with 6 meetings, consisting of 4 meetings and 2 replications. The implementation of CAR is carried out using four activities, namely planning, implementing, observing or observing and reflecting[12]. The implementation of the CAR begins with the first cycle. If in the first cycle the successes and obstacles can be seen, the teacher fixes the problems in the second cycle. The activities in the second cycle are the same as the first cycle, usually the results of the second cycle show a good increase in learning outcomes compared to the first cycle. If in the second cycle it is significant, then the researcher does not require the same repetition of the activity.

Instruments needed to obtain or collect valid data. There are two types of instruments used in this study, namely learning instruments and data collection instruments. Learning instruments are tools that support the implementation of learning, while data collection instruments are used to obtain the required data and information. Learning instruments include syllabus and lesson plans while data collection instruments include formative test sheets, observation sheets, field notes and documentation.

An indicator is a benchmark or reference used to determine the success of an activity or program. In accordance with the characteristics of classroom action research, the success of the action changes towards improvement, whether related to children or learning by utilizing a kinesthetic learning style compared to before action with after action. The measure that is used as an indicator of success in this Classroom Action Research is if the score is above the IPA Minimum Completion Criteria of 70.00. Students play an active role, dare to ask questions, and are confident to seek and find the subject matter themselves. Students are able to apply the subject matter achieved at school in their daily life.

Data analysis is a very important part of this classroom action research, intended to identify and agree on the criteria used to explain what happened. Data analysis techniques, researchers used data acquisition from student learning outcomes and observation sheets during the implementation of the cycle. These results were analyzed descriptively using a percentage technique based on the researcher's experience.

Assessment for individuals:

$$\frac{Jumlah\ jawaban\ yang\ benar}{Jumlah\ maksimal} \times 100\% \quad (1)$$

Atau

$$KB = \frac{T}{T_t} \times 100\%$$

Keterangan:

KB = Ketuntasan Belajar

T = Jumlah skor yang diperoleh siswa

T_t = Jumlah Skor Total

For the test assessment, the researcher added up the scores obtained by the students, then divided by the number of students in the class so that the average score was obtained. This average value is obtained by the formula

$$\bar{X} = \frac{\sum X}{N}$$ ………………………………..(2)

Information:
X = Average value
ΣX = Number All Student's score
N = Number All Student

After the average value and percentage value are obtained, a diagram is made to compare student learning outcomes during the study. The assessment of the percentage of learning outcomes is as follows:

$$P = \frac{\sum Siswa\ yang\ tuntas\ belajar}{\sum siswa} \times 100\%$$

RESULTS AND DISCUSSION

The results of this study are the basis of the cycle described in the research method. This research was conducted with pre-cycle activities, cycle I meeting 1, cycle I meeting 2 and cycle II meeting 1. All cycles were shown the results based on the following points:

a. Pre-Cycle Science Learning Outcomes

The following table 1 presents the pre-cycle learning outcomes

Table 1. Pre-Cycle Science Learning Outcomes

Score	Pre Cycle	%	NX
55	4	1176%	220
60	9	2647%	540
65	8	2353%	520
70	8	2353%	560
75	3	882%	225
80	2	588%	160
85	0	0%	0
90	0	0%	0
95	0	0%	0
100	0	0%	0
amount	32	10000%	2225
Average	65.44		
Percenta	654412 %		

The table above is the Pre-Cycle value, which is obtained from the daily test questions in science subjects. The pre-cycle values can be expressed in the form of a value, frequency and percentage table as follows

Table 2. Analysis of Pre-Cycle Science Learning Outcomes

Score Test	Frequency	Percentage	Completeness Value
<70	21	62%	
≥ 70	13	38%	
amount	32	100%	

Based on the pre-cycle observations, it was found that the science learning outcomes with a value of less than 70 were 62%, while a value of more than 70 was 38%

b. Science Learning Outcomes in the first cycle of meetings 1

Table 3. Science Learning Outcomes in Cycle I of meeting 1

Score	Value of the First Cycle of Meeting 1	kkm	NX	%
55	5		275	0
60	8		480	25
65	4		260	13
70	8		560	31
75	3		225	16
80	2		160	9
85	2		170	6
90	0		0	0
95	0		0	0
100	0		0	0
amount	32		2130	100
Average	66.56			
Percentage	67%			

The table above shows an increase in science learning outcomes through the Jigsaw method in cycle I replications reaching 67%, not reaching the specified target of 70%. The

average value in cycle I repetitions can be seen in table 4 below.

Table 4. Analysis of Science Learning Outcomes in the first cycle of meeting 1

Test Value	Frequency	Percentage	Completeness Value
<70	17	53.1%	
≥ 70	15	46.8%	
amount	34	100%	

The table above shows an increase in science learning outcomes in the first cycle of tests reaching 53.51% who have not met the KKM while those who have met the KKM are 46.8%.

c. Science Learning Outcomes in the first cycle of meeting 2

Because it has not reached the target, a learning cycle I meeting 2 was carried out which obtained the following results:

Table 5. Science Learning Outcomes in Cycle I, meeting 2

Score	Value of Meeting Cycle I 2	%	NX
55	0	0%	0
60	1	294%	60
65	2	588%	130
70	14	4118%	980
75	10	2941%	750
80	4	1176%	320
85	2	588%	170
90	1	294%	90
95	0	0%	
100	0	0%	
amount	34	10000%	2500
Average	73.53		
Percentage	735294%		

The table above shows an increase in science learning outcomes through the Jigsaw method of learning there is an increase in the value of the test results in cycle I reaching

73.53%, there is an increase from 67 that have not reached the specified target of 80%. Based on the values above, it is analyzed again and is presented in table 6 below:

Table 6. Analysis of Science Learning Outcomes in the first cycle of meeting 2

Test Value	Frequency	Percentage	Completeness Value
<70	7	21.87%	
≥ 70	27	79.41%	
amount	34	100%	

The table above shows an increase in science learning outcomes through the Jigsaw method learning method in the repetition of the first cycle of meeting 2 reaching 21.87% who have not met the KKM, while those who have met the KKM are 79.41%.

d. Science learning outcomes in cycle II meetings 1

Then again carried out cycle 2 meeting 1 with the results as in point d below:

Table 7. Science Learning Outcomes in Cycle II meetings 1

Score	Cycle I Value kkm Meeting 2	NX	%
55	0	0	0
60	0	0	0
65	1	65	3
70	7	490	22
75	10	750	31
80	5	400	16
85	5	425	16
90	2	180	6
95	2	190	6
100	0	0	0
amount	32	2500	100

Average	78.13			
Percentage	78%			

Percentage	65%	67%	74%	78%

The learning outcomes are then analyzed into table 8 below:

Table 8. Analysis of Science Learning Outcomes in the second cycle of meetings 1

Test Value	Frequency	Percentage	Completeness Value
<70	1	3.1%	
≥ 70	31	96.8%	
amount	32	100%	

The table above shows an increase in learning outcomes Science through the learning method *Jigsaw Method* in the second cycle repetition reached 96.8%, not reaching the specified target of 3.1%.

Increasing the effectiveness of the implementation of the Jigsaw method in learning to improve student learning outcomes starting from the pre-cycle, cycle I test, and cycle II test can be seen clearly in the following table.

Table 9.Analysis of Science Learning Outcomes from pre-cycle to cycle II meetings 1

Score	Pre cycle	Value of the First Cycle of Meeting 1	Value of Meeting Cycle I 2	Cycle Value 2 Meeting 1	KKM Target
55	4	1	0	0	
60	9	5	1	0	
65	4	2	2	1	
70	8	5	12	7	
75	3	7	10	10	
80	4	4	4	5	
85	0	6	2	5	
90	0	2	1	2	
95	0	0	0	2	
100	0	0	0	0	
amount	32	32	32	32	
Average	65.44	66.56	73.75	78.13	

From the data above, the test scores from pre-cycle, cycle I and cycle II can be seen that the percentage of student learning progress is high so that Classroom Action Research does not need to be continued to the next cycle. Based on the data the results of this study indicate that the CAR with the Jigsaw method succeeded in increasing student grades beyond the KKM.

CONCLUSION

Based on the results of research from cycle I, cycle II and III, it can be concluded that the Jigsaw method can improve science learning outcomes in class VIII A students of SMP Negeri 221 North Jakarta. This can be seen from the increase in student learning outcomes in each cycle, the first cycle increased the average score of 66.56 in the second cycle increased the average value of 73.75 and the third cycle increased the average value of 78.13.

The application of the Jigsaw method in improving science learning outcomes in class VIII A students of SMP Negeri 221 Tanjung Priok, North Jakarta can make it easier for students to express ideas and ideas and increase the ability of students' interest in learning. This can be seen in the data analysis of student learning outcomes in each cycle that experienced a significant increase in value.

BIBLIOGRAPHY

[1] Marliyah, "Efforts to Improve Science Learning Outcomes through the Use of Concrete Teaching Aids for Class 1A Students at SDN Darungan 01, Tanggul District, Jember Regency," *J.   Pancar.*,

vol. 3, no. 4, pp. 153–162, 2014.

[2] DS Mulia and Suwarno, "Ptk (Classroom Action Research) with Local Wisdom-Based Learning and Scientific Article Writing at Kalisube State Elementary School, Banyumas," *Educator's Treasure. J. Ilm. Education*, vol. IX, no. 2, p. 11, 2016.

[3] Nurjanah, "Improving Ipa Learning Outcomes by Applying Inquiry Methods for Class V SD Negeri 68 Kec. Read the City of Parepare, " J. Publ. Educator., vol. 6, no. 2, pp. 107–110, 2016.

[4] P. Hutautuk and R. Simbolon, "Improving Student Learning Outcomes with Teaching Aids in Science Subjects for Class IV SDN Number 14 Simbolon Purba," Sch. Educ. J., vol. 8, no. 2, pp. 121–129, 2018.

[5] Amir and M. Zaini, "Increasing Learning Outcome using Cooperative Learning Jigsaw Type in Secondary High School," vol. 6, no. 2, pp. 25–28, 2017.

[6] D. Giyarni, "Improving Ipa Learning Outcomes through the Think-Talk-Write Type of Cooperative Learning Model in Class VIII.H Students of SMP Negeri Banyudono Semester 1 of the 2013/2014 Academic Year," J. Bioeducation, vol. 9, no. 1, pp. 11–17, 2016.

[7] A. Syarifuddin, "The Jigsaw Type of Cooperative Learning Model in Learning," Ta'dib J. Islam. Educ., vol. 16, no. 02, pp. 209–226, 2011.

[8] AS Alfazr, D. Gusrayani, and DT Sunarya, "Application of the Jigsaw Learning Model to Improve Student Learning Outcomes in Finding the Main Sentence in Each Paragraph," J. Pen Ilm., vol. 1, no. 1, pp. 111–120, 2016.

[9] S. Supentangin, "The Effect of Jigsaw Learning Model on Study Results of Indonesian Student Society Studies," J. Educator. Econ. UM Metro, vol. 5, no. 1, pp. 105–116, 2017.

[10] D. Kurniasih, "Increasing Interest and Learning Outcomes of Ipa Through the Think Pair Share Learning Model," Nat. J. Ilm. Educator. IPA, vol. 5, no. 1, pp. 7–11, 2018.

[11] E. Lamajau, "Improving the Ability of Class V Students' Speaking Skills SDN Sampaka Kec. Bualemo Kab. Banggai through the Group Discussion Method, " J. Creat. Tadulako Online, vol. 5, no. 1, pp. 201–211, 2014.