

THE IMPLEMENTATION OF A JIGSAW-TYPE COOPERATIVE LEARNING MODEL TO IMPROVE STUDENT LEARNING OUTCOMES ON STATISTICS MATERIAL FOR CLASS VIII SMP WALI SONGO BANYUWANGI

Beta Lailatur Rohma ¹, Saiful Saiful ², Dian Noer Asyari ³

^{1,2,3}Mathematics Education, Faculty of Education, Universitas Ibrahimy Situbondo, East Java, Indonesia

ABSTRACT

This study aims to describe the implementation of a jigsaw-type cooperative learning model. This research was a Classroom Action Research (CAR) conducted in two cycles. Each cycle consists of four stages, namely: planning stage, implementation stage, observation, and reflection. The subjects in this study consisted of 23 students of class VIII SMP Wali Songo Banyuwangi. The data collection techniques used in this study are observation, tests, interviews, and documentation. Data analysis in the form of data reduction, data presentation, and conclusion. The results showed that students' activities and average test results increased from cycle I to cycle II. The results of the observation of students' activities in the first cycle were an average of 83.3% increased in the second cycle to 91.6%. The test results in the first cycle were completed by 16 students (69.5%) with an average score of 78.3 increased in the second cycle which was completed by 21 students (91.3%) with an average score of 81.1. The conclusion is that the implementation of a jigsaw-type cooperative learning model can improve student learning activities and outcomes.

Keywords: Cooperative Learning Type Jigsaw Model, Learning Outcomes.

1. Introduction

Education is the most important component of life. According to Tohir et al. (2020), Education is a conscious effort to make people think wisely. Mathematics as one of the subjects plays an important role in education (Saiful, 2019). In more detail, Saiful (2020) states that mathematics learning activities in the 21st century have an important role in education so that students can master critical thinking skills, think creatively and innovatively, and can communicate and collaborate between fellow students and others. However, so far mathematics is still considered a boring and scary lesson, so students feel lazy and their learning outcomes are less than optimal. The application of varied and innovative learning models by teachers is expected to be a solution. According to Maswar (2019), through varied, innovative, and interesting learning methods, the learning process of mathematics in class is entertaining and fun for students. The application

of the jigsaw type of cooperative learning model is predicted to improve student learning outcomes.

Learning outcomes are a reflection of the level of student success in the learning process. Student learning outcomes can be known by the existence of test items that are made by the objectives of learning. According to Nurrita (2018), learning outcomes are the results given to students in the form of an assessment after participating in the learning process by assessing knowledge, attitudes, and skills in students with changes in behavior. According to Mappedasse (2009), learning outcomes are abilities possessed by students both in terms of knowledge, attitudes, and skills obtained through the learning process. Wassahua (2016) states that learning outcomes are benchmarks or benchmarks that can determine the level of success of students in understanding and knowing the subject matter obtained through their learning experiences as measured by evaluation tools.

The low student learning outcomes may be caused by the lack of students' understanding of basic concepts, especially statistical material. As a teacher, he should be able to see the various problems of his students and be able to find the

^{*)} Saiful Saiful

E-mail : saiful@ibrahimy.ac.id

Phone : 085336180371

causes of the difficulties faced by students. For this reason, teachers are required to improve their teaching skills to have the necessary competencies in carrying out their duties and functions to create effective and efficient learning conditions for their students (Cahyadi, 2016). To solve this problem, it is necessary to have a learning method in the classroom to help students understand some concepts of learning mathematics, especially in statistical material.

Efforts that can be made to improve student learning outcomes are through appropriate learning. It is important to apply a learning model that can actively involve students in the learning process because the learning model used by teachers greatly affects the learning outcomes that will be achieved by students (Amin, et al. 2020). One alternative that can be used is through the application of cooperative learning models. Cooperative learning is a learning model by prioritizes cooperation and discussion in small groups to achieve learning objectives. characteristics of cooperative learning, namely, group rewards, individual accountability, and equal opportunities to achieve success. The cooperative learning model has several types. One of the most common types of the cooperative model is the jigsaw (Saputra, et al. 2019). Jigsaw has the advantage that it can develop better behavior and relationships among students and can develop students' academic abilities which have an impact on increasing their learning achievement (Berlyana & Purwaningsih, 2019).

According to Lubis and Harahab (2016), jigsaw cooperative learning is a learning model that can encourage students to be active and help each other in mastering learning materials to achieve maximum results. This species has special characteristics in terms of group formation. Jigsaw has a more complex group structure; They are the original group and the expert group (Saputra, et al. 2019). In more detail, according to Fika (2020) that a home group is a group of students with diverse abilities and backgrounds. The expert group is a combination of several expert students. Expert groups are groups of students who are experts in learning tasks, exploring certain topics, completing tasks related to the topic, and explaining to the home group.

The Jigsaw is a cooperative learning model, where students learn in small groups consisting of 4-6 people heterogeneously. Learning materials are given to students in the form of text and each member is responsible for completing the part of

the subject matter that must be studied (Berlyana & Purwaningsih, 2019). Original groups were formed with the aim of assigning responsibilities to each group member and discussing the material in general while expert groups were formed to study more specific material (Saputra, et al. 2019). The jigsaw type of cooperative learning approach is a type of learning approach that emphasizes the concept of cooperative learning, where students are defined as social beings who need groups in learning or are placed in small communities in the classroom (Berlyana & Purwaningsih, 2019). Quoted from the article Fika (2020), Steps of Jigsaw-type Cooperative Learning Model: 1) Lecturer prepares text or learning materials; 2) Lecturers divide students into groups (origin groups) and distribute sub-groups to each group; 3) Students carry out expert group discussions; 4) The student returns to the original group (presenting) and performs the quiz (determination of group score); 5) Lecturer gives evaluation and award.

Research conducted by Amin, et al. (2020) namely testing the effect of the jigsaw-type cooperative learning model on student motivation and mathematics learning outcomes. The research conducted by Madiar & Azizah (2022) aims to describe the implementation of a jigsaw-type cooperative learning model, student activities in applying the learning model, students' metacognitive skills, and student responses to the applied learning model. Meanwhile, this study aims to determine how the implementation of a jigsaw-type cooperative learning model and whether there is an increase in student learning outcomes in mathematics, especially in statistics material.

2. Research Methods

This research uses Classroom Action Research (CAR). According to Arikunto (2015) Classroom Action Research is research that describes the cause and effect of treatment, as well as describes what happens when the treatment is given and describes the entire process from the beginning of the treatment to the impact of the treatment. In this study, there are two variables, namely the application of the jigsaw-type cooperative learning model as the independent variable and student learning outcomes as the dependent variable. The subjects were students of class VIII SMP Wali Songo Banyuwangi, totaling 23 students. This Classroom Action Research uses 2 cycles with four stages in each, namely:

planning, implementing, observing, and reflecting.

Data collection techniques using observation, tests, interviews, and documentation. Observations were made to obtain an objective picture and observe student activities during the implementation of learning in each cycle. The test is used to determine the level of student learning outcomes in learning mathematics in each cycle. Interviews were conducted with students to determine the extent to which students' understanding of mastery of the material. While documentation is used to describe events that have been carried out. Data analysis in the form of data reduction, data presentation, and concluding. Data analysis was calculated by simple statistics on the results of observing student activities and the completeness of student learning outcomes.

3. Results and Discussion

The implementation of a jigsaw-type cooperative learning model in mathematics learning is carried out to develop group work, and increase knowledge, skills, and student learning outcomes. Students respond to the learning process. The results of observation of student activities and test results in cycle I and cycle II can be described as follows.

Cycle I

Classroom Action Research with the application of the jigsaw cooperative learning model in the first cycle has four stages, namely: planning, implementing, observing, and reflecting. At the planning stage is the preparation of learning tools in the form of Learning Implementation Plans, learning resources, student activity observation instruments, and test questions.

The implementation stage is a learning activity using the Learning Implementation Plan which consists of 3 activity stages, namely: introduction, core activity, and closing. The preliminary stage begins by saying greetings, reading prayers, checking student attendance, and conveying learning objectives. The core activity stage is the implementation of a jigsaw-type cooperative learning model with the following steps: 1) The teacher divides the students into several groups according to the material into sub-sections. 2) The teacher asks students to gather with expert groups and discuss together according to their respective material. 3) Students return to their original group to discuss and understand the

material. 4) The teacher gives a test to each student in the form of questions. 5) The teacher gives an award to the group whose total score meets the criteria. The closing stage ends by giving conclusions, giving homework, conveying the lesson plans for the next meeting, and praying and saying greetings.

The observation phase uses the instrument of observing student activities to observe student activities during the learning process. Observation of student activities is a description of the activities contained in the Learning Implementation Plan which consists of 3 stages of activity, namely: introduction, core activity, and closing.

The reflection stage is the result of observations during the learning process. Based on the results of observations of student activity in the first cycle, it reached a score of 50 out of a maximum score of 60 (83.3%) and was included in the very good category. Meanwhile, the results of student tests showed that there were 7 students (30.4%) who did not complete and 16 students (69.6%) who did not complete the test. The average overall score is 78.3 so that the student's ability level is still in the medium category.

Cycle II

Research in cycle II also has four stages, namely: planning, implementation, observation, and reflection. At the planning stage is the preparation of learning tools in the form of Learning Implementation Plans, learning resources, student activity observation instruments, and test questions.

The implementation stage in cycle II is also a learning activity using the Learning Implementation Plan which consists of 3 activity stages, namely: introduction, core activity, and closing. The preliminary stage begins by saying greetings, reading prayers, checking student attendance, and conveying learning objectives. The core activity stage is the implementation of a jigsaw-type cooperative learning model with the following steps: 1) The teacher divides the students into several groups according to the material into sub-sections. 2) The teacher asks students to gather with expert groups and discuss together according to their respective material. 3) Students return to their original group to discuss and understand the material. 4) The teacher gives a test to each student in the form of questions. 5) The teacher gives an award to the group whose total score meets the criteria. The closing stage

ends by giving conclusions, giving homework, conveying the lesson plans for the next meeting, and praying and saying greetings.

The observation phase in the second cycle also used student activity observation instruments to observe student activities during the learning process. Observation of student activities is a description of the activities contained in the Learning Implementation Plan which consists of 3 stages of activity, namely: introduction, core activity, and closing.

The reflection stage is the result of observations during the learning process. Based on the results of observations of student activities in the second cycle, they achieved a score of 55 from a maximum score of 60 (91.7%) and were included in the very good category. Meanwhile, the results of the student tests showed that 2 students (8.7%) did not complete and 21 students (91.3%). The overall average score is 81.1 so the student's abilities level is included in the high category.

Based on the test results, students are grouped into three based on the level of their ability categories, namely students with low, medium, and high abilities. The test results showed that there were 2 students with low abilities, 13 students with moderate abilities, and 8 students with high abilities. From each category level, one student was selected to be interviewed.

Table 1. Subject's Ability Level

Code	Subject	Score		Level
		Cycle I	Cycle II	
S-1	NR	54	55	low
S-2	DW	75	80	medium
S-3	RS	95	100	high
Average		78,3	81,1	

Based on the table above, there are differences in the test results of a cycle I and cycle II. Each category of the high, medium and low ability levels showed an increase in test results from cycle I to cycle II. This shows that the implementation of a jigsaw-type cooperative learning model in mathematics learning can improve student learning outcomes. In detail, the results of the answer sheets and student interviews from each category of ability level are as follows:

1. Low Ability Students

Nurul Hidayat

No. Simulus 3

Date:

1.	Nilai	5	6	7	8	9	10
	Frekuensi	2	5	8	5	7	3

rata-rata : $10 \cdot 30 + 56 + 40 + 63 + 30 \cdot 229 \cdot 7.63$

2. $\bar{x}_2 = \frac{10 \cdot 64 + 1 \cdot 640 + 1 \cdot 641}{10} = 64.1$

3. $Me = \frac{\frac{5}{2} + \frac{5}{2} + 1}{2} = \frac{5 + 5 + 1}{2} = 5.5$

4. $\bar{x}_{gab} = \frac{6 \cdot 68 + 14 \cdot 78}{6 + 14} = \frac{3296}{20} = 164.8$

5. Data diurutkan dari nilai terendah sampai nilai tertinggi :
 4, 4, 5, 5, 6, 6, 6, 7, 7, 7, 7, 7, 8, 8, 8, 9
 Modus dari data tersebut adalah 7, karena muncul paling banyak sebanyak 5 kali.

Nurul Hidayat

Nurul Hidayat

No.

Date:

1.	diket: Datum terbesar 57, Datum terkecil = 21
	Jangkauan $\rightarrow$ Datum terbesar - Datum terkecil
	$57 - 21 = 36$
2.	Data = 4, 4, 5, 5, 6, 6, 6, 7, 7, 7, 7, 8, 8, 8, 9
	Banyak data = 16 $\rightarrow$ genap
	a). $Q_1 = \frac{1}{4} 16 + \frac{1}{2} = 4 + \frac{1}{2} = 4.5 \rightarrow$ data ke $4.5 = 5$
	b). $Q_2 = \frac{1}{2} 16 + \frac{1}{2} = 8$
	c). $Q_3 = \frac{3}{4} 16 + \frac{1}{2} = 12 + \frac{1}{2} = 12.5 \rightarrow$ data ke $12.5 = 13$
3.	Data 51, 55, 57, 58, 59, 60, 60 $\rightarrow$ 7 data $\rightarrow$ ganjil
	$Q_1 = \frac{1}{4} (7+1) = 2 \rightarrow 55$
	$Q_2 = \frac{1}{2} (7+1) = 4 \rightarrow 58$
	$Q_3 = \frac{3}{4} (7+1) = 6 \rightarrow 59$
	Jangkauan $\rightarrow Q_3 - Q_1 \rightarrow 59 - 55 = 4$
4.	Data 4, 4, 5, 5, 6, 6, 6, 7, 7, 7, 7, 8, 8, 8, 9
	a). Jangkauan $9 - 4 = 5$
	b). $Q_1 - Q_3 \rightarrow Q_3 - Q_1 \rightarrow 5 - 4 = 1$
	c). Simpangan kuartil $\frac{1}{2} (Q_3 - Q_1)$

Figure 1. Test Answers from S-1

The results of the answer sheet above show that S-1 does not understand the questions that have been given. S-1 is able to calculate the mean and mode, but has difficulty determining the steps for solving the combined average and median values. In addition, S-1 is less active in asking questions. This causes the S-1 value to be incomplete. This is evident when he says "I'm still confused about how to determine the overall average and median".

problem to the maximum.” S-3 has no difficulty in solving problems.

Based on the explanation above, shows that the implementation of a jigsaw-type cooperative learning model in learning mathematics has increased in each cycle. The following is a comparison diagram of the results of observing student activities and the results of student learning tests in Cycle I and Cycle II:

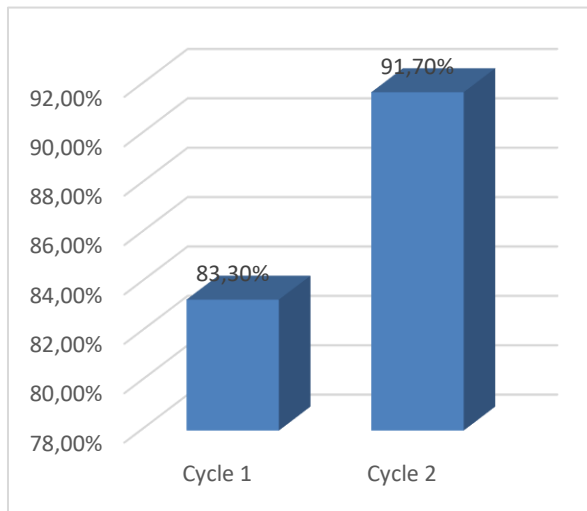


Figure 4. Students' Activities Observation

Figure 4 shows an increase in activity from cycle I and cycle II. The results of the observation of student activities in the first cycle reached 83.30% then increased in the second cycle to 91.60%. This proves that the implementation of a jigsaw-type cooperative learning model has increased from cycle I to cycle II.

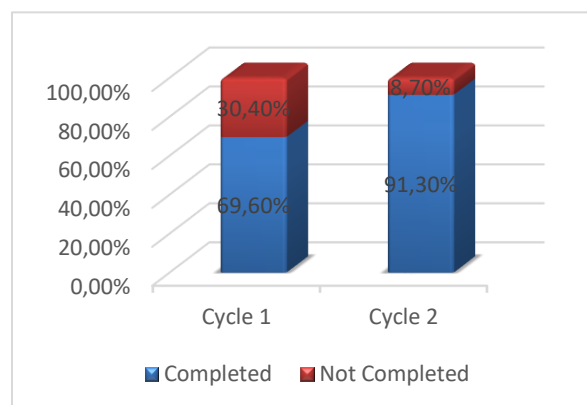


Figure 5. Student Test Results

Figure 5 shows that there is an increase in student test results in cycle I and cycle II. The results of student learning tests in the first cycle that were completed were 16 students (69.60%)

with an average score of 78.3. In the second cycle, there were 21 students (91.30%) with an average score of 81.1. So that those who did not complete each cycle decreased, in the first cycle that did not complete there were 7 students (30.40%) and in the second cycle it decreased to 2 students (8.70%).

4. Conclusions

Based on the results of the study, it can be concluded that the implementation of a jigsaw-type of cooperative learning model can increase the activity and learning outcomes of class VIII students at SMP Wali Songo Banyuwangi. This can be seen from the results of observations of student activities in the first cycle reaching 83.30%, increasing in the second cycle to 91.60%. While the results of student learning tests in the first cycle the average value of 78.3 increased in the second cycle to 81.1.

5. References

- Tohir, M., Maswar, M., Atikurrahman, M., Saiful, S., & Pradita, D. A. R. (2020). Prospective Teachers' Expectations of Students' Mathematical Thinking Processes in Solving Problems. *European Journal of Educational Research*, 9(4), 1735-1748.
- Saiful, S., Susanto, S., & Hobri, H. (2019). The Students' Metacognition Analysis through Jumping Task Based on Lesson Study for Learning Community. *IOP Conf. Series: Journal of Physics: Conf. Series* 1265 012002.
- Saiful, S., Hobri, H., & Tohir, M. (2020). Analisis Metakognisi Siswa Berbasis Lesson Study for Learning Community (LSLC) Ditinjau dari Gaya Kognitif. *Alifmatika: Jurnal Pendidikan dan Pembelajaran Matematika*, 2(1), 73-91.
- Maswar, M. (2019). Strategi Pembelajaran Matematika Menyenangkan Siswa (MMS) Berbasis Metode Permainan Mathemagic, Teka-Teki dan Cerita Matematis. *Alifmatika: Jurnal Pendidikan dan Pembelajaran Matematika*, 1(1), 28-43.
- Nurrita, T. (2018). Pengembangan Media Pembelajaran untuk Meningkatkan Hasil Belajar Siswa. *MISYKAT: Jurnal Ilmu-ilmu Al-Quran, Hadist, Syari'ah dan Tarbiyah*, 3(1), 171.
- Mappeasse, M. Y. (2009). Pengaruh Cara dan Motivasi Belajar Terhadap Hasil Belajar

- Programmable Logic Controller (PLC) Siswa Kelas III Jurusan Listrik SMK Negeri 5 Makassar. *Jurnal Medtek*, 1(2), 1-6.
- Wassahua, S. (2016). Analisis Gaya Belajar Siswa terhadap Hasil Belajar Matematika pada Materi Himpunan Siswa Kelas VII SMP Negeri Karang Jaya Kecamatan Namlea Kabupaten Buru. *Matematika dan Pembelajaran*, 4(1), 84-104.
- Cahyadi, R. (2016). Hubungan Antara Motivasi Belajar Siswa dan Penampilan Guru terhadap Hasil Belajar Siswa. *JURNAL e-DuMath*, 2(2).
- Saputra, M. D., Joyoatmojo, S., Wardani, D. K., & Sangka, K. B. (2019). Developing Critical-Thinking Skills through The Collaboration of Jigsaw Model with Problem-based Learning Model. *International Journal of Instruction*, 12(1), 1077-1094.
- Lubis, N. A., & Harahap, H. (2016). Pembelajaran Kooperatif Tipe Jigsaw. *Jurnal As-Salam*, 1(1), 96-102.
- Berlyana, M. D. P., & Purwaningsih, Y. (2019). Experimentation of STAD and Jigsaw Learning Models on Learning Achievements in terms of Learning Motivation. *International Journal of Educational Research Review*, 4(4), 517-524.
- Amin, M., Nur, F., & Damayanti, E. (2020). The Influence of Jigsaw-type Cooperative Learning Model on Students' Mathematics Learning Outcomes and Motivation. *Desimal: Jurnal Matematika*, 3(3), 235-246.
- Madiar, D., & Azizah, U. (2022). The Application of Jigsaw Cooperative Learning Model on The Reaction Rate Material to Train Students Metacognitive Skills. *Jurnal Pijar MIPA*, 17(1), 112-117.
- Fika, R. (2020). The Effectiveness of Jigsaw and STAD (Student Teams Achievement Division) Cooperative Learning Model on Pharmaceutical Mathematics. *Journal of Advanced Pharmacy Education & Research* | Apr-Jun, 10(2).
- Arikunto, S. (2015). *Penelitian Tindakan Kelas*. PT Bumi Aksara.