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Application of the Cooperative Learning Model using the Jigsaw type to improve Student Learning Outcomes at SMA Negeri Ambulu

Penerapan Model Pembelajaran Kooperatif Tipe Jigsaw untuk Meningkatkan Hasil Belajar Siswa di SMA Negeri Ambulu

Khoirul Anwar[*1], **Laily Ramadhanty**[2], **Yushardi**[3]

[1]Program Profesi Guru, Universitas Jember, Indonesia

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ABSTRAK

Berdasarkan penelitian penerapan model pembelajaran kooperatif tipe jigsaw pada siswa kelas X-6 SMA Negeri Ambulu pada materi pencemaran lingkungan diperoleh hasil yang terdiri dari tiga siklus yaitu siklus I, siklus II, dan siklus III. Penelitian ini merupakan penelitian tindakan kelas yang bertujuan untuk mengetahui peningkatan siswa dalam memecahkan masalah berupa keberhasilan siswa pada nilai aspek kognitif dan nilai aspek afektif. Pada siklus I diperoleh hasil pada aspek kognitif dan afektif masing-masing dengan nilai rata-rata 62,5 dan 67,25. Sedangkan pada siklus II diperoleh hasil pada aspek kognitif dan aspek afektif dengan nilai rata-rata masing-masing 66,67 dan 70,67. Sedangkan pada siklus III diperoleh hasil pada aspek kognitif dan afektif dengan nilai rata-rata masing-masing 75,32 dan 77,32. Sehingga dapat disimpulkan bahwa pada setiap siklus pembelajaran terjadi peningkatan hasil belajar dan penerapan model pembelajaran kooperatif tipe jigsaw dapat berjalan efektif dan optimal.

Kata Kunci: *Aspek Kognitif, Aspek Afektif, Jigsaw, Model Pembelajaran Kooperatif.*

ABSTRACT

Based on research on the application of the cooperative learning model with the jigsaw type of grade X-6 students of SMA Negeri Ambulu on the topic environmental pollution, the results obtained consisted of three cycles, namely cycle I, cycle II, and cycle III. This research is a classroom action research that aims to determine the improvement of students in solving problems in the form of student success in the value of the cognitive aspect and the value of the affective aspect. In cycle I, the results were obtained on the cognitive and affective aspects, each with an average value of 62.5 and 67.25. Whereas in cycle II the results were obtained on the cognitive and affective aspects with an average value of 66.67 and 70.67, respectively. While in cycle III the results were obtained on the cognitive and affective aspects with an average value of 75.32 and 77.32, respectively. So it can be concluded that in each learning cycle there is an increase in learning outcomes and the application of the jigsaw cooperative learning model can run effectively and optimally.

Keywords: Affective Aspects, Cooperative Learning Model, Jigsaw, Cognitive Aspects.

INTRODUCTION

In the old model learning process the teacher still has a dominating role in the classroom (Anas et al. 2018). This is because the teacher still applies the lecture method and students play more of a role as listeners. So that learning goes one way and students are less able to explore their potential and interests to the fullest (Bialangi et al. 2016). If the teacher still applies the old learning model, it will have an impact on the lack of learning motivation and student activeness in the classroom.

If the learning motivation and activeness of students are low, it will have an impact on the learning outcomes of students who are less than optimal. Based on the results of interviews that I conducted with Physics teachers in grade X, it was found that the

* **Correspondence Address**
E-mail: khoirulanwar724@gmail.com

posttest and daily test scores of students were still relatively low. The relatively low value is caused by the low ability of students to analyze and solve problems (Laoli et al., 2022).

The ability to analyze and solve problems is the skill of applying existing knowledge to an unknown condition (Hasanah & Zuriatun 2021). Competence in solving a problem is very important for students. Students can independently find solutions to problems based on their knowledge. That way, Students can gain a more meaningful understanding. So that later students can solve similar or different problems maximally because learners gain real and contextual experience based on previous problems (Alfazr, 2016).

Every individual must face problems in their lives and look for solutions in solving these problems. In finding solutions to problems, a certain strategy is needed. If the strategy does not work well, another alternative strategy is needed in order to solve it. As teachers we must guide and direct students to be able to think critically and analytically in making decisions in life.

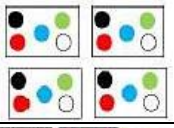
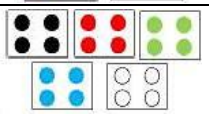
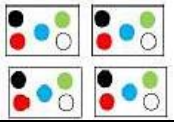
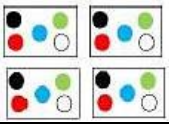
As a teacher, we must always train students to find a solution to a problem and how students can make the right decision in receiving relevant information and can analyze it. According to the learning theory proposed by Gagne states that high-level cognitive abilities that include aspects of mathematical reasoning can be resolved through problem solving. According to Muthi'ah et al. (2018) a good question for students if they fulfill the prerequisite knowledge in solving the problem. In addition, students do not know the problem solving procedure.

Learning using jigsaw type is one of the cooperative learning models. Jigsaw type learning has a procedure in the form of dividing learners into several groups based on heterogeneous characteristics. Each learner has the responsibility of learning the material with the topic of discussion that has been assigned by the teacher. Then learners who are more competent can become peer tutors for their group members. Peer tutor activities aim to enable learners to interact and discuss with each other. Based on research conducted by Trisianawati, et al. (2016), jigsaw learning can foster an attitude of responsibility for the learners themselves and their peers. This jigsaw type learning can also foster an attitude of cooperation between students on the material with the topic that has been assigned by the teacher.

1. Jigsaw-type learning is more suitable for topics that contain theories and concepts and contain few formulas. Students are expected to have learned the topics independently. In principle, jigsaw-type learning prioritizes students experience and mutual discussion. Based on the research that I have done, jigsaw type cooperative learning has the following procedures:Before learning begins, students are given the opportunity to read the topics. Students are also given pretest questions based on the topics facts of environmental changes due to environmental pollution.
2. When jigsaw type learning is implemented, students are divided into small groups with the number of group members adjusted to the topic to be discussed, referred to as expert groups.
3. Then students are divided into small groups based on the abilities, interests, learning profiles of different learners referred to as the origin group.
4. Next, the origin group will get worksheets with different topics. The worksheet contains questions that are useful for developing problem-solving skills for learners.
5. Students who get worksheets with the same topic based on the group of origin will join to form an expert group.
6. In the expert group, students conduct discussions to solve the problems contained in the worksheet. If the expert group has finished discussing, students return to the original group to present the results of the discussion and conduct questions and answers related to the questions that have been given by the teacher.

In order to better understand in detail about jigsaw type cooperative learning, the following are the stages of learning activities:

Table 1. Jigsaw cooperative learning

No.	Activity	Illustration
1.	Students gather in their home groups and each gets a different task	
2.	Each student with the same part of the topic assignment gathers in an expert group to discuss the assigned topic	
3.	students return to the home group to work on various materials according to their respective assignments to all members of the home group	
4.	Discussion between groups guided by the class teacher	
5.	Conduct individual test/Posttest	Test
6.	Group awarding	

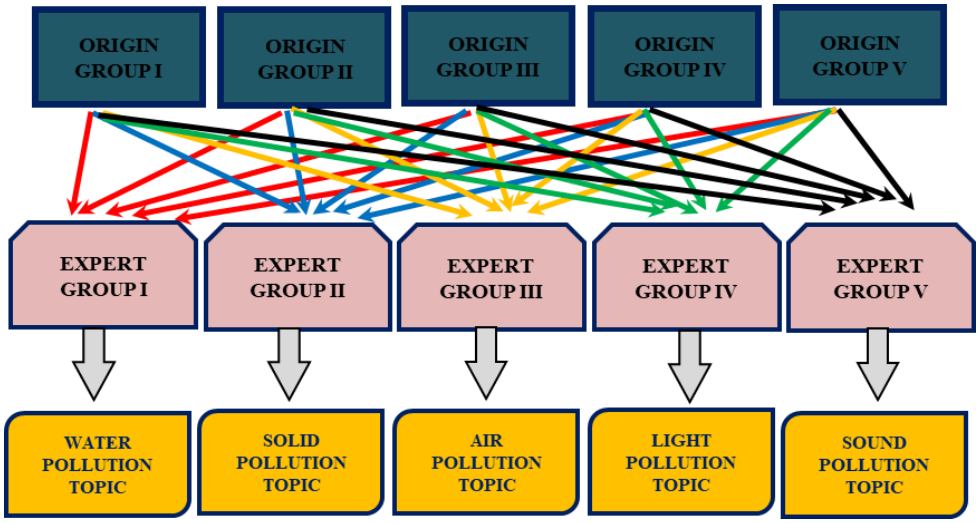


Figure 1 Jigsaw Cooperative Learning Chart

This study aims to determine the implementation of cooperative learning model with jigsaw type in developing problem solving skills and improving students learning outcomes at SMA Negeri Ambulu. The cooperative learning process with jigsaw type was implemented based on lesson study using three cycles.

METHOD

This research was conducted as a form of classroom action research. The subject of this research was conducted in grade X-6 SMA Negeri Ambulu in the 2022/2023 school year with a total of 35 students. This research concentrates on the application of the cooperative learning model with the jigsaw type which includes student performance, teacher performance, and increasing students ability to solve problems in the form of problems which lead to an increase in student learning outcomes.

This research was conducted in three cycles with 4 meetings. This is because there is 1 cycle that has only been completed in 2 meetings. The cycle in this learning process uses a lesson study system and consists of five

stages including planning, implementation, observation, reflection, and follow-up plans.

Learning planning in cycle I was designed based on the results of observing students using cognitive diagnostic assessments. Based on these results most students are still at a low cognitive level. Implementation of the next cycle is almost the same as cycle I only with different sub-topics. Cycle I discusses the facts of environmental changes due to environmental pollution. Cycle II discusses the causes and impacts of environmental pollution. Cycle III discusses solutions in overcoming environmental pollution.

In the planning stage, researchers identified students. The results of the initial identification in grade X-6 SMA Negeri Ambulu based on cognitive diagnostic assessment and the results of interviews with physics teachers grade X showed that the cognitive level of students is still low. After the researchers formulated the problem, the next step was to plan a cooperative learning model with the jigsaw type. Things that need to be prepared by researchers are teaching devices in the form of teaching modules which include learning media, pretests, reading assignments, student worksheets, posttest questions at the end of the cycle.

The learning process is carried out based on a pre-designed plan. The material content contains different topics in each cycle. Then reflection and follow-up activities were carried out by researchers together with Field Experience Practice (PPL) colleagues, supervising teacher, and field supervisors. Reflection activities are a review of this series of jigsaw-type learning activities. Reflection activities are used as a reference for researchers as an action plan, namely how researchers can plan the improvement process for the next cycle.

In this study, the instruments used included a set of teaching modules, diagnostic assessments, students worksheets / expert sheets, formative assessments, reading assignments, posttest questions at the end of the cycle. The instrument contains case studies that are contextualized with the daily lives of students. Meanwhile, so that the items made by researchers have precise and accurate data, the researchers conducted a trial first based on the level of validity of the questions, the reliability of the questions, the level of difficulty/Higer Order Thinking Skills (HOTS), and the differentiating power of each question. So that if the question has fulfilled these aspects, the researcher can apply it as an evaluation tool (Azmin, 2016).

Next is the formative assessment which includes a student observation sheet in the form of affective aspects including the profile of Pancasila students. The Students observation sheet uses a graded scale, that is, the statements in a table are based on certain criteria, for example (Very Good, Good, Medium, Enough) (Anas et al., 2018). The level of success in this class action research can be measured based on the following indicators, there is a significant increase for students in solving problems in the form of questions, the completeness of the value of each student in accordance with the Minimum Completion Criteria (KKM) value at SMA Negeri Ambulu, namely if students achieve a minimum score of 70 for physics subjects and classical completeness of 85% of all students.

RESULT AND DISCUSSION

The learning process in this study used the jigsaw type cooperative learning model. The aim is to improve students' ability to solve problems. In planning this jigsaw-type learning, things that need to be designed include a set of teaching modules, diagnostic assessments, students worksheets / expert sheets, formative assessments, reading assignments, posttest questions at the end of the cycle and student activeness performance sheets. In the implementation of this jigsaw type cooperative learning, researchers provide questions that aim to improve problem solving.

Researchers gave questions to students before learning began, namely using cognitive diagnostic assessments. Then students work on questions on worksheets during the learning process in the form of group discussions. Finally, the posttest is carried out at the end of the cycle. The assessment of students activeness performance aims to determine the ability of students attitudes in cooperating in groups. In addition to the

attitude aspect, the knowledge aspect is also observed.

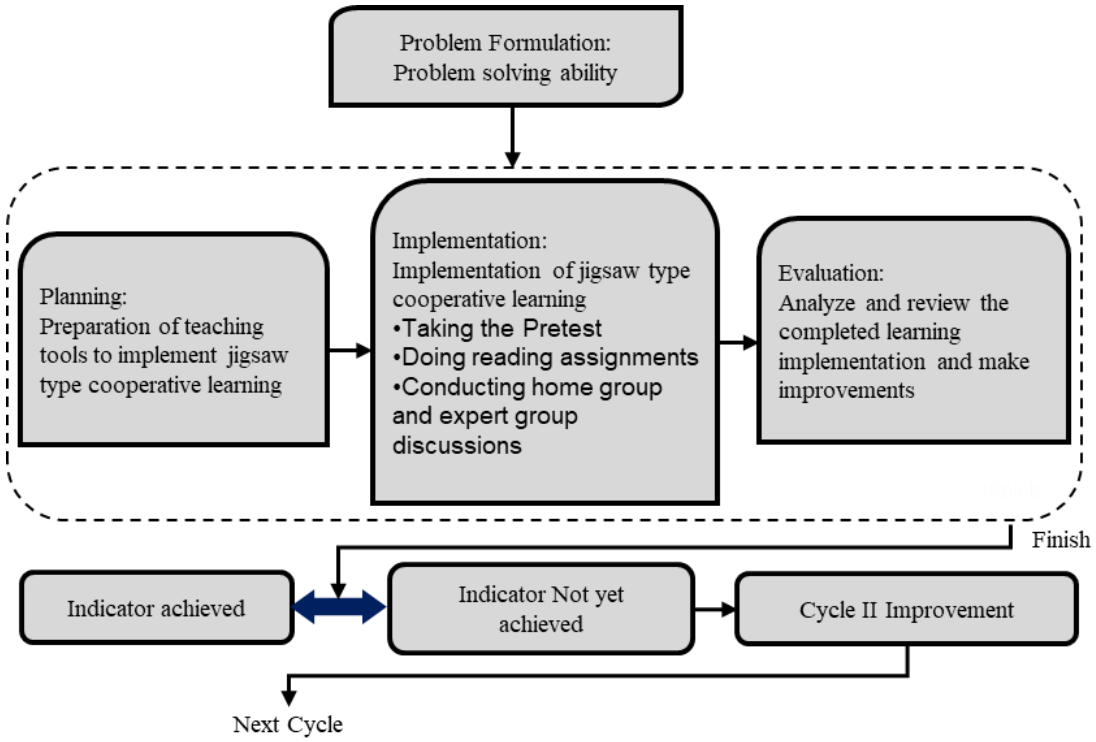


Figure 2 Classroom Action Research Design

These observations are used as authentic evidence to measure student success in learning. Teachers strive to make questions using language structures that are easily understood by students. In addition, making questions the teacher also pays attention to the cognitive level of students based on Bloom's taxonomy operational verbs ranging from C1 to C6 (Karacop, 2017). Students must also carry out literacy activities before learning begins so that when learning is carried out they understand the material discussed. The teacher does not only act as a teacher but also as a facilitator, namely serving and students and monitoring students during learning.

In this jigsaw type cooperative learning research, the method used by researchers is using the t test, namely by comparing the previous cycle with the next cycle. The thing that is compared is the ability of students to solve problems in the form of working on problems so that the cognitive value of students is known (Karacop, 2017).

The ability of students to solve problems can be measured based on the learning outcomes of students in the form of cognitive scores. This cognitive value is used as a reference in determining the success of improving student learning outcomes by applying jigsaw type cooperative learning. The following is a table presentation of the cognitive value of students in grade X-6 SMA Negeri Ambulu.

Table 2. Cognitive aspect scores of students

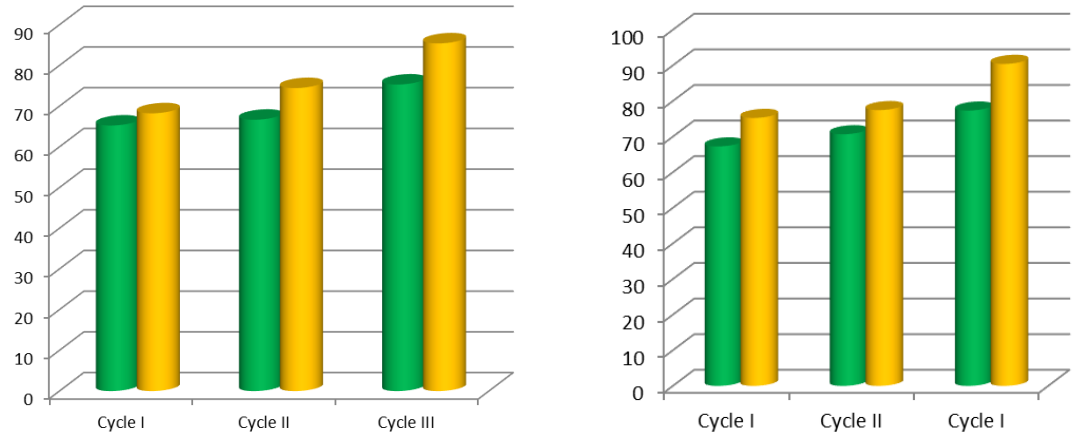
No.	Description	After Action at the end of the cycle		
		Cycle I	Cycle II	Cycle III
1.	Higest Score	73	75	84
2.	Lowest Score	55	60	65
3.	Average Score	65,25	66,67	75,32
4.	Classical Completeness (%)	68,25	74,45	85,43

Based on the table above, it shows an increase in the cognitive value of students from each cycle. The application of cooperative learning model with jigsaw type is proven to be able to improve students' learning outcomes. This is because jigsaw-type learning applies the rules of the original group and expert group so that it can allow intensive discussion between students. In addition, the jigsaw type cooperative learning model allows more competent learners to become peer tutors for other learners with lower cognitive abilities.

According to Kahar et al. (2020), it is easier for students of the same age to exchange information and easier to gain understanding. Next, Kahar et al. (2020 states that the jigsaw type cooperative learning model can help learners in understanding the procedures in solving problems. Students are also more encouraged to improve their experience in learning. Students self-confidence can also grow from the application of jigsaw-type cooperative learning. The following is the value of the attitude aspects of students in grade X-6 SMA Negeri Ambulu.

Table 3. Affective Aspect Score of Students

No.	Description	After Action at the end of the cycle		
		Cycle I	Siklus II	Cycle III
1.	Higest Score	75	78	88
2.	Lowest Score	60	65	65
3.	Average Score	67,25	70,67	77,32
4.	Classical Completeness (%)	75,25	77,45	90,43



(a) (b)

Figure 3 Improvement in (a) Cognitive Aspect and (b) Affective Aspect Scores for Each Cycle (Green is Average Score Yellow is Classical Completeness)

Based on the data table above, the results are obtained in the form of an increase in the value of the attitude aspect in each cycle. This attitude aspect value is an activity carried out by students during the learning process. The jigsaw type cooperative learning model that studies environmental pollution material is carried out by carrying out literacy tasks, playing an active role in discussion activities, respecting the opinions of students in other groups.

Teacher performance is an important aspect to pay attention to because it can be a benchmark for the success of teachers in the implementation of learning. Teacher performance can be done by implementing lesson study in each cycle. Lesson study is implemented by involving observers as observers for the model teacher during the cycle. Observers can be done by Field Experience Practice (PPL) colleagues, guest teachers, field supervisors. Observers are tasked with observing the teacher's

performance in organizing and controlling the learning process in the classroom.

According to Khaerunnas et al. (2021), the learning model can adjust the characteristics of students, the needs of students, teaching materials, and school conditions. The teacher also acts as a provider of precise, accurate and valid information, motivates students, and becomes a facilitator for students during learning. Teachers must also act reflectively, meaning that they must be able to create a learning atmosphere that is fun, accountable/ responsible, satisfaction/ gives satisfaction to students, and can increase self-confidence for students.

Components in observing teacher performance include the application of triggering questions, delivering learning objectives and providing motivation, using learning media, organizing students into groups, directing and guiding students in discussions, carrying out formative and summative assessments in learning, concluding topic, and reflecting and following up on the next cycle.

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CONCLUSION

This cooperative learning model with jigsaw type aims to improve students' ability to solve problems so that learning can be obtained maximum results. This success can be measured by the suitability of the teacher in implementing the teaching module that has been designed. Then, each cycle the teacher has done planning, implementation, reflection, evaluation and follow-up. This jigsaw type cooperative learning can also be seen based on the table of cognitive and attitudinal aspects above which shows an increase in learning outcomes for each cycle.

The suggestions that researchers can convey regarding this jigsaw type cooperative learning are related to time management that teachers must pay attention too. Because of course this learning model requires quite a long time so that the teacher must be able to manage the time allocation during the learning process. Then the next suggestion is that the teacher must really provide direction and guidance to students because if it is not optimal, students will chat with other students outside the context of the subject matter. Meanwhile, teachers must also always remind students to increase their literacy/reading activities so that students can gain prior knowledge before the learning process is carried out

Author declaration

Author Contributions and Responsibilities

The authors made major contributions to the conception and design of the study. The authors took responsibility for data analysis, interpretation and discussion of results. The authors read and approved the final manuscript.

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Availability of data and materials

All data is available from the author.

Competing interests

The authors declare no competing interests.

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