



# Application of the Jigsaw Cooperative Learning Model Oriented Towards Improving High School Student Learning Outcomes

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## ABSTRAK

Masalah yang sering dialami dalam pembelajaran yaitu rendahnya motivasi dan hasil belajar siswa. Hal ini disebabkan oleh pembelajaran yang kurang memberikan kesempatan kepada siswa untuk meningkatkan kemampuan berpikir dan berargumentasi. Penelitian ini bertujuan untuk menerapkan penerapan Model Pembelajaran Kooperatif Tipe Jigsaw Berorientasi terhadap Hasil Belajar Siswa SMA. Jenis penelitian ini yaitu penelitian tindakan kelas. Penelitian Tindakan Kelas yang digunakan dalam penelitian ini adalah model yang dikembangkan oleh Kemmis dan McTaggart. Penelitian Tindakan Kelas yang digunakan dilaksanakan dalam dua siklus, dan setiap siklus terdiri dari 2 kali pertemuan. Jumlah siswa yang terlibat sebanyak 36 orang yang terdiri dari 22 siswa (61%) perempuan dan 14 siswa (39%) laki-laki. Metode pengumpulan data menggunakan observasi, wawancara, dan tes. Instrumen yang digunakan untuk menilai hasil belajar fisika siswa pada setiap siklusnya berupa soal pilihan ganda. Teknik analisis data menggunakan analisis deskriptif kualitatif dan kuantitatif. Hasil penelitian yaitu Setelah dua siklus dilakukan tindakan penelitian yang menunjukkan adanya peningkatan hasil belajar siswa, baik secara individu maupun kolektif. Rata-rata hasil belajar siswa meningkat dari 79,8 menjadi 81,1. Jumlah siswa yang tuntas dari 75% menjadi 83,3%. Oleh karena itu, menggunakan paradigma pembelajaran kooperatif seperti Jigsaw dapat meningkatkan pemahaman fisika siswa. Disimpulkan bahwa Model Pembelajaran Kooperatif Tipe Jigsaw dapat meningkatkan hasil belajar siswa SMA.

## ABSTRACT

The problem often encountered in learning is students' low motivation and learning outcomes. This is caused by learning that does not provide opportunities for students to improve their thinking and argumentation skills. This study aims to apply the Jigsaw-Oriented Cooperative Learning Model to the Learning Outcomes of High School Students. This type of research is class action research. The Classroom Action Research used in this study is a model developed by Kemmis and McTaggart. The Classroom Action Research was conducted in two cycles, each with 2 meetings. The number of students involved was 36, consisting of 22 (61%) female and 14 (39%) male. Data collection methods used observation, interviews, and tests. The instruments used to assess students' physics learning outcomes in each cycle were multiple-choice questions. Data was analyzed using qualitative and quantitative descriptive analysis. The study results show that after two research cycles, actions were carried out that showed an increase in student learning outcomes, individually and collectively. The average student learning outcomes increased from 79.8 to 81.1. The number of students who completed was 75% to 83.3%. Therefore, using a cooperative learning paradigm such as Jigsaw can improve students' understanding of physics. It is concluded that the Jigsaw Type Cooperative Learning Model can improve the learning outcomes of high school students.

## 1. INTRODUCTION

Education is important for a nation (Aminuddin et al., 2021). Education can improve community development, especially educating the younger generation about their obligations and responsibilities towards society. In addition, education is a means of improving and developing human resources (HR)

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quality (Baeti et al., 2021). Education also guarantees a modern, sophisticated, and advanced society. Progress in industrial development depends on progress in science and technology, so good and quality education is needed (Pujiasih, 2020; Darmadi, 2015). Improving educational standards starts with improving class standards, where the role of teachers as professional educators is the main key. The important role of teachers in creating an effective learning environment has been recognized as one of the determining factors for educational success (Sundari, 2017). Therefore, teachers must continue to innovate and enrich themselves with various learning techniques that suit students' needs and characteristics.

Education in schools is a teaching and learning activity. There is an interaction between educators and students. Success in education at school depends on the learning process carried out (Wahyudi et al., 2023). The teaching and learning process or teaching process is an activity of implementing the curriculum of an educational institution to influence students to achieve predetermined goals. In the learning process, teachers must develop learning strategies so that students can obtain learning with optimal results (Adam et al., 2010; Kasrianti et al., 2022). The existence of learning strategies can create an interesting and attractive learning environment for students and allow them to support and learn from each other. From a teaching perspective, it can also help teachers pay attention to student's needs so that students get the support they need to reach their maximum learning potential (Mulana, 2022 Resmi, 2022). This will certainly have a positive influence on student learning outcomes in class.

However, this hope is still inversely proportional to the reality in the field. Based on interviews with school teachers, information was obtained that student learning outcomes were still relatively low. Based on the previous year's Physics learning results at SMAN 1 Bantul, only a little material about Newton's Laws has been completed. The minimum completeness at SMAN 1 Bantul for the physics subject Newton's Laws is 75. Meanwhile, only half of the students achieve this minimum completeness. Students still think physics is difficult, has few formulas, and needs more motivation. In learning activities, teachers still teach using traditional methods, where students listen to the teacher explain, and some ask questions before practicing. Based on observations and interviews, it is known that students often need help gaining in-depth understanding due to the need for more opportunities for collaboration and interaction between students in learning. In addition, the conventional learning model often causes students to feel less motivated due to the lack of opportunities to participate actively in learning. So this impacts student learning outcomes, which still need to be higher (Arta, 2021).

Based on this problem, a solution is needed to create meaningful learning for students. One way is to develop learning strategies. Learning strategies are methods used by educators to help students carry out learning activities. The learning strategy can be in the form of a learning model in the classroom. The learning model is one factor that greatly influences teaching and learning achievement (Widarta, 2020; Ardiawan et al., 2020). With varied learning models, teachers can use them to optimize student potential. The application of the learning model is expected to help make the learning process effective and efficient and convey messages and learning content at that time (Kahar et al., 2020). Applying innovative learning models can increase students' engagement in the learning process, as they feel inspired and motivated by diverse and engaging learning experiences. Students also can develop critical, creative, and collaborative skills needed in real life, as they are familiar with learning approaches that encourage exploration, discussion, and problem-solving (Nashiroh et al., 2020 Nurhalizah et al., 2022).

There are various ways to make learning more exciting and effective. One way is to apply a specific learning model according to the needs of the material. Learning outcomes are expected to improve significantly if the chosen learning model is appropriate. One that can be chosen is jigsaw cooperative learning. Cooperative learning allows students to work in small groups to solve problems (Wulandari & Jariono, 2022; Siahaan et al., 2021). One of the cooperative learning models is the jigsaw type. Jigsaw is a learning model that requires students to work individually and in groups. The advantage of this strategy is that it can involve all students in learning while teaching others. The jigsaw model is an effective way to change the pattern of class discussion because it requires students to play actively after the teacher explains the material. The variation of this learning model is expected to make students more interested in the material taught, namely material about Newton's Law. Students who are enthusiastic about learning are expected to master the studied material. Good learning outcomes characterize students' mastery of the material; at least 80% achieve a minimum mastery (Sobri, 2021). This is expected to be achieved using the jigsaw cooperative learning model.

Several studies that have been conducted previously reveal that the Jigsaw cooperative learning model is proven to improve students' physics learning outcomes (Kahar et al., 2020). Using this approach can help create a variety of learning that can increase student interest and understanding of the material, especially material about Newton's Law. Jigsaw learning has been widely used to improve students' physics learning outcomes (Kasrianti et al., 2022; Nurhadi, 2022; Sobri, 2021). The results of other studies also reveal that the jigsaw cooperative learning model positively affects student learning outcomes. This jigsaw

cooperative learning model can allow students to solve problems with other groups to make learning more meaningful (Mulana, 2022; Wahyudi et al., 2023). Based on some research results, the jigsaw learning model is suitable for improving student learning outcomes. This research aims to apply the Jigsaw Type Cooperative Learning Model Oriented to Student Learning Outcomes. This research is expected to improve students' understanding of the material and foster teacher readiness in creating a meaningful learning process.

## 2. METHODS

This research is a Classroom Action Research that aims to improve student learning outcomes in physics subjects. The type of classroom action selection is based on problems and research objectives that require improvement (follow-up) based on effective, collaborative, and participatory recycling principles. The Classroom Action Research used in this study is a model developed by Kemmis and McTaggart (Muthaharoh & Sukarelawan, 2023). The Classroom Action Research was conducted in two cycles, each with two meetings. We prepared lesson plans and supporting and evaluation tools at the planning stage. Furthermore, at the implementation stage, jigsaw-type cooperative learning is applied. Students were grouped into several small groups. Students work together in small groups to learn a specific part of the subject matter. After understanding the material, each group member will return to the home group to share their knowledge with others who have studied a different part of the material. In this way, each student becomes an expert in one aspect of the material and contributes to the group's understanding. The next stage is the observation of student learning outcomes. At this stage, the measurement of student learning outcomes is carried out. Then, based on the observation of learning outcomes, a reflection will be carried out to evaluate the implementation of learning in the first cycle. If the specified criteria are unmet, proceed to the second cycle.

This research was conducted at SMAN 1 Bantul Yogyakarta, class X IPA 7 even semester. The subjects involved in the study were 36 students consisting of 22 (61%) female and 14 (39%) male. Data collection methods in this study used observation, interviews, and tests. The instrument used to assess students' physics learning outcomes in each cycle was a multiple-choice question consisting of five choices. The material used in this research is Newton's law. The data analysis technique used qualitative and quantitative descriptive analysis. /Data on student learning outcomes were analyzed using percentage techniques. Students are considered complete if their scores reach the Minimum Completeness Criteria of 75. This research is likely successful if the number of students who complete learning is at least 80% of the total number of students. The average classical physics learning outcome of students was 75. This learning outcome was measured by conducting a test at the end of the learning process.

## 3. RESULT AND DISCUSSION

### Result

First, in the first cycle, The highest score of students at the first meeting was 100, and the lowest score was 63. While at the second meeting, the highest score obtained by students was 100, and the lowest score was 60. The class average score at the first meeting was 85.4, and at the second meeting was 74.1. After calculating the average score of the two meetings in the first cycle activities, the highest score achieved by students was 92.5, and the lowest score was 61.5. While the average value of students' learning outcomes classically was 79.8. The physics learning outcomes of students at each meeting in the first cycle are presented in Figure 1.

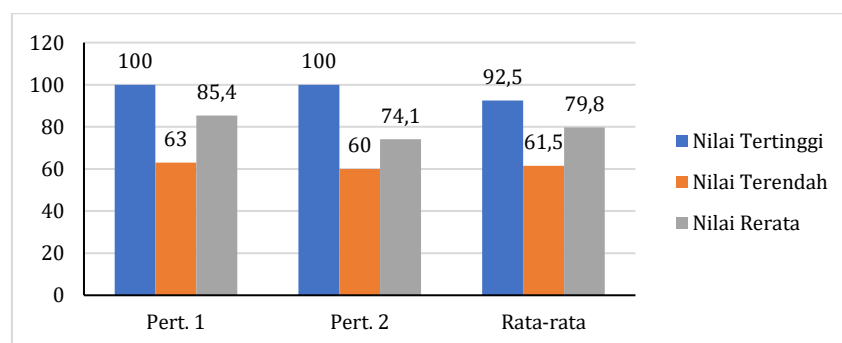


Figure 1. Students' Physics Learning Outcomes in the First Cycle

The results of the data analysis showed that the number of students who reached completeness was 83.3%, and 16.7% of students needed to be completed at the first meeting. At the second meeting, the % of students who reached completeness was 47.2%, and those who had not reached completeness were 52.8%. After calculating students' average physics learning outcomes in the first cycle, the number of complete students reached 75%, and those who were not complete were 25%. The percentage of students' physics learning completeness in the first cycle is shown in Figure 2.

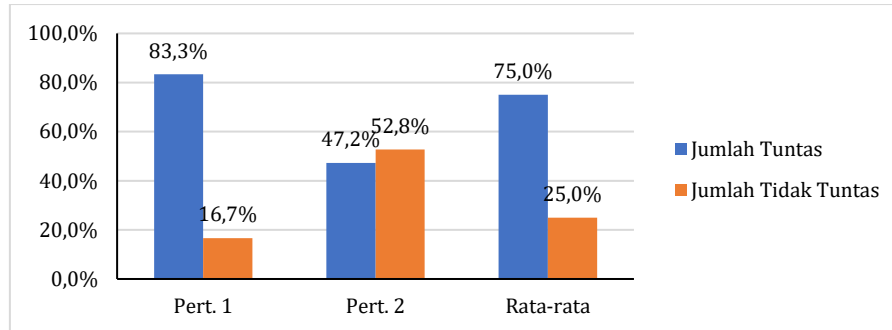


Figure 2. Percentage of Student Learning Completeness in the First Cycle

The reflection results on the first learning cycle obtained the completeness criteria, some of which had reached the specified standards, and some s. The classical average score has exceeded 75, which is 79.8. Meanwhile, the number of students who achieved completeness was still below 80%. Therefore, researchers felt the need to take action in the second cycle. Students' physics learning outcomes are shown in Figure 3.

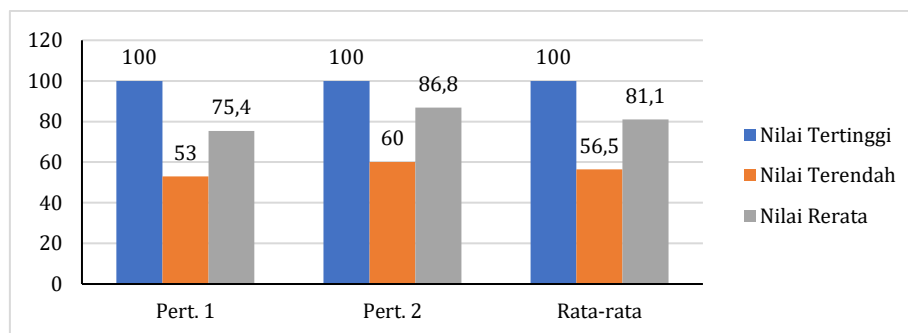


Figure 3. Physics Learning Outcomes of Students in the Second Cycle

The physics learning outcomes of students at each meeting are shown in Figure 4 for the second cycle. In the first meeting, students obtained a maximum score of 100 and a minimum score of 53. The highest score obtained by students in the second meeting was 100, while the lowest score was 60. In the first meeting, the class average score was 75.4, and in the second meeting, 68.8. Cycle two activities at the two meetings were averaged, and the highest score that students achieved was 100, while the lowest score was 56.6. While the average value of students' learning outcomes classically was 81.1. The percentage of students' physics learning completeness in the second cycle is shown in Figure 4.

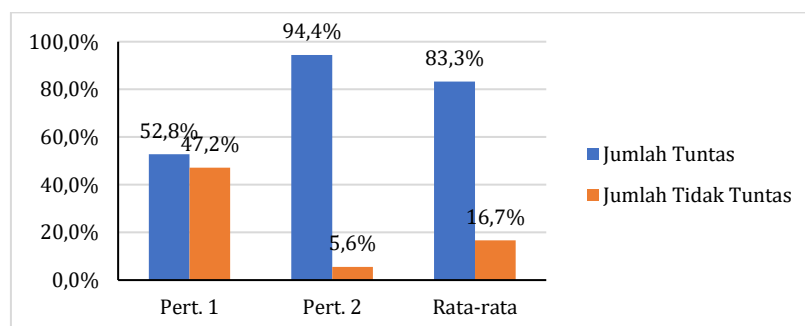


Figure 4. Percentage of Student Learning Completeness in the Second Cycle

Based on Figure 5, 52.8% of students have reached mastery, and 47.2% still need to complete the first meeting. In the second meeting, 94.4% of students had reached mastery, and 5.6% still needed to be completed. By calculating students' average physics learning outcomes in the second cycle, 83.3% of students have completed or are complete in the subject. In comparison, 16.7% of students still need to complete or need to be completed. The reflection results on the first learning cycle showed that all the completeness criteria had reached the set standards. The class average score exceeded 75, 81.1, and the number of students who achieved mastery exceeded 80%, 83.3. Therefore, the researcher concluded that the action activities only needed to be continued in the third cycle. Students who have yet to achieve mastery will participate in remedial learning activities.

## Discussion

This research is classroom action research, implemented through two cycles of action activities. It aims to apply Jigsaw-type cooperative learning to improve students' physics learning outcomes. Student learning outcomes were analyzed, and scores were compared to see the increase. In the first cycle of the first meeting, some students scored 100. Similarly, in the second meeting, some students scored 100. The lowest score in the second meeting was 63. This decreased from the second meeting's learning outcome of 60. Meanwhile, from the calculation of the average, the highest score decreased to 92.5. However, the classical mean value reached 79.8. The classical mean value has yet to reach the predetermined standard. This shows that applying Jigsaw cooperative learning has yet to be implemented optimally. Teachers apply the steps of Jigsaw learning that need to be maximized. Likewise, students still need time to adapt to the new learning model. As a result, the number of students who met the completeness criteria in the first cycle was 75%. This aligns with class action research using the jigsaw cooperative learning model (Arta, 2021; Hastuti, 2022).

In the second cycle of the first meeting, several students scored 100. However, the lowest score achieved by students was lower than the condition of student scores in the first cycle. After the second meeting, the lowest score of the students increased to 60. This had an impact on the increase in students' scores. If student learning success is determined at the end of the second cycle, then students' average physics learning outcomes are calculated as a whole at the end of the second cycle. The maximum average score of students was 100, and the lowest was 56.5. However, there was an increase in the final average of student learning outcomes by 1.3 points to 81.1. More than 80%, 83.3% of all students were identified as having achieved learning completeness. This is none other than because the teacher's skills in applying the Jigsaw cooperative learning model are increasingly proficient, and students are used to learning using this learning model. Many students become more active when learning is conducted. Applying Jigsaw cooperative learning can make students more active because this model encourages active participation in learning (Sembiring, 2021).

Based on the results of each cycle, it is known that the jigsaw cooperative learning model has a positive effect on student learning outcomes. Applying Jigsaw-type cooperative learning is a form of active learning that can motivate students to be actively involved in learning (Budiarti dkk, 2022). Active learning in the classroom can encourage students to use the central meaning they learn in unique ways according to their creativity. This shows that active learning can stimulate student creativity and encourage active involvement in the learning process. This aligns with the findings (Wahab, 2022), which state that Jigsaw-type cooperative learning can increase student activeness during the learning process. This learning model provides opportunities for students to collaborate and can increase learning motivation so that the final learning results increase the number of students who meet the completeness criteria. In addition, the results of this study also show the same results as those of research on the use of the jigsaw cooperative learning model on student learning outcomes in physics subjects (Nurhadi, 2022; Sobri, 2021). The study revealed that using the jigsaw learning model can improve students' cognitive aspects.

Applying the Jigsaw cooperative learning model can improve students' physics learning outcomes and has been proven to improve student learning outcomes in other science fields such as biology (Ardiawan et al., 2020), chemistry (Ardiawan et al., 2020), physical education (Ardiawan et al., 2020), and civics (Ardiawan et al., 2020). In addition to improving learning outcomes, applying the Jigsaw cooperative learning model can also increase motivation (Tuna, 2022; Widarta, 2020), math skills (Poerwati et al., 2020), and Creative Thinking (Siahaan et al., 2021). In terms of education, applying the Jigsaw cooperative learning model is also effective at various levels of education. For example, at the elementary level (Heriwan & Taufina, 2020), Junior High School (Septian & Ramadhanty, 2020), Senior High School (Nurhalizah et al., 2022), and even university (Nashiroh et al., 2020). Therefore, applying the Jigsaw-type cooperative learning model can improve students' physics learning outcomes and also improve students' learning outcomes in other science fields, such as biology, chemistry, physical education, and civics. This learning model can also improve students' motivation, math skills, and creative

thinking. Applying the Jigsaw cooperative learning model is also effective at various levels of education, from elementary school to college.

Based on this explanation, the jigsaw cooperative learning model positively affects student learning outcomes. The jigsaw-type cooperative learning model has advantages because it can encourage student cooperation, promote inclusive attitudes, and build social skills such as cooperation and communication (Siahaan et al., 2021; Wahab, 2022). This research has implications for student learning outcomes that have improved. The results of this study show that the jigsaw cooperative learning model can improve students' concept understanding, social skills, and learning motivation. The practical implications of these findings are the importance of integrating cooperative learning models in the curriculum and teaching practices and the need for adequate teacher training to implement this strategy effectively. In addition, educational institutions also need to facilitate a learning environment that supports collaboration and interaction between students to maximize the potential of jigsaw-type cooperative learning in improving student learning outcomes (Tuna, 2022). The limitations of this study include the need to pay more attention to other factors that may affect student learning outcomes, such as individual student motivation factors or differences in student learning styles. Recommendations for future research are to expand the scope of this study to a wider range of schools and subjects and to consider the influence of other factors that might affect student learning outcomes. In addition, future researchers can observe the application of the Jigsaw cooperative learning model in online learning or a combination with learning support technology.

#### 4. CONCLUSION

Applying the jigsaw-type cooperative learning model can improve student learning outcomes in physics subjects. After the second cycle, student learning outcomes increased from the first cycle. This jigsaw-type cooperative learning model provides meaningful learning opportunities because students are more interested and enthusiastic about the material taught, namely Newton's Law. Student learning outcomes achieved minimum mastery and improved in each cycle.

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