

IMPROVING STUDENT LEARNING OUTCOMES THROUGH THE APPLICATION OF THE REVISED JIGSAW COLLABORATIVE LEARNING MODEL ON IMPULSE AND MOMENTUM MATERIAL

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Received: December 29, 2021. Accepted: March 28, 2022. Published: March 31, 2022

Abstract: This research aims to improve student learning outcomes by applying the revised jigsaw collaborative learning model. This research is conducted at a public high school (SMA Negeri) in Posigadan, Indonesia. The research subjects are the tenth-grade student of SMA Negeri Posigadan, totaling 17 students. This research is conducted in 1 cycle consisting of 3 meetings. The data collection instruments are tests to measure the learning outcomes, observation sheets of student activities, and learning implementation sheets. Based on the data analysis at cycle 1, findings reveal that the classical completeness is 100% totaling 17 students, student activities account for 87%, obtaining excellent and good criteria, and the learning implementation reaches 94.7%. It signifies that the success indicators of this cycle are well-improve the learning implementation, student activities, and student learning outcomes.

Keywords: *Jigsaw Collaborative, Learning Outcomes, Impulse and Momentum*

INTRODUCTION

One of the goals of national education is to educate the nation's life. Without a good education, it is difficult for the Indonesian people to know a better future, peace, and development [1]. Physics is a subject that plays an essential role in supporting science and technology to educate the nation's life and helping teachers plan and implement primary education in physics subjects that can support everyday life.

Teachers in the field of education play a very prominent role when considering the position and role of teachers who are in direct contact with students through the teaching and learning process in schools. Teachers must be more sensitive and look at the conditions or factors that affect the low quality of education, in this case, student learning outcomes. Efforts to improve the quality of the system and learning outcomes are the duties and responsibilities of teachers, so one of the efforts to improve learning outcomes is to use the revised jigsaw collaborative learning model.

The revised jigsaw collaborative learning model is developed from the collaborative learning model, which is integrated into the jigsaw learning model, and its syntax has been reviewed. Collaborative learning can be done in large groups or groups of four or five students, and collaborative learning is only a small group of students working and understanding together. Students can engage in collaborative learning through discussion or conversation with their peers. In this activity, they have the opportunity to present one or more ideas. They defend their ideas, then communicate different beliefs to each other, question different conceptual conditions, and be actively involved [2].

Jire collaborative learning model is an advanced learning model with a comprehensive learning approach, and the syntax has been revised and improved. Collaborative learning can be done in large groups or groups of four or five students, but only a small group of students will work and understand collaborative learning. Cooperative learning is a form of collaborative learning in which large groups learn together to achieve consistent results [3].

Students learn together, share the burden during the learning process, and gradually achieve the desired learning outcomes. The learning process in these groups will help students discover and form their understanding of the subject matter, which is not present in teacher-centered teaching methods. The advantages of the Jire collaborative learning model for shared learning: 1) Increase students' self-confidence; 2) Students are more active; 3) Increase students' educational motivation; 4) can understand the material more quickly and efficiently; 5) Expert groups master the required topics; 6) Perception of correct and equal answers in one group; 7) Learning to teach peers; 8) Improve social relations between students in groups [3]. It is confirmed by Hertavi [4], who asserts that the Jigsaw type of cooperative learning is a cooperative and flexible learning strategy. This type of Jigsaw learning is divided into several groups, the members of which have heterogeneous characteristics. Each student is responsible for learning a particular topic and for teaching group members so that they can communicate and help each other.

Learning outcomes are achievements achieved by students in various subjects. Achievement is an ideal learning outcome that

includes all psychological fields that change along with students' experience and learning process [5]. According to Hamalik [6], learning outcomes are those who have learned that there will be a change in that person's behavior, for example, from not knowing to know and from not understanding to understanding. Learning outcomes are skills acquired by students after gaining their learning experience. Then to assess the expected results for student education, performance objectives are needed, namely, goals in a workable and measurable way. Objectives refer to specific performance characteristics and learning objectives [7].

Based on the results of observations made on Saturday, October 10, 2020, at the Posigadan State High School. Students learning outcomes are still low; where students who get scores above the minimum Completeness Criteria, from 65 students, only 6 students (category of completed). At the same time, those who scored below the minimum Completeness Criteria were 11 students (incomplete category). Posigadan State High School is one of the public schools that has input or input from students who have varied learning achievements. Students' mastery of the material in teaching and learning activities is also diverse. Based on observations, some facts show that 85% do not like physics and only 15% like physics. The reason students don't like physics is that physics is difficult because they learn formulas and concepts. They also feel bored because the way the teacher teaches is only dominant in mastering concepts.

RESEARCH METHODS

This research is a Classroom Action Research (CAR) conducted at Posigadan State High School in the Odd semester of 2020/2021. The class in this study consisted of 17 people consisting of 13 women and 3 men. These students have abilities that vary from students with low, medium, to high abilities. This research was conducted in the 2020/2021 academic year. The research was conducted during physics lessons and according to the teaching and learning activities scheduled in schools.

The data collection technique consisted of learning outcomes data and data about student activities, teaching activities, and learning steps. Researchers apply by using observation sheets and data about improving student learning outcomes through assessment of learning outcomes. Research instruments are tools for collecting data and processing various data to be collected. It consists of a learning implementation sheet, student activity observation sheets, and learning outcomes tests.

Observation of teacher activities in learning physics through the collaborative model of revised jigsaw the teacher as an observer observes the technique used in this observation. The

observer checked yes or no. 24 aspects were observed, including preliminary activities, core activities, and closing activities contained in the observation sheet. The student activity observation sheet is carried out to determine how active students are in participating in the teaching and learning process. This analysis was carried out on the observation sheet instrument through percentages, namely the number of frequencies of each student activity divided by the maximum score of the student activity multiplied by 100%. The technique used by researchers in student learning outcomes is the Multiple Choice (PG) test with 10 questions to determine learning outcomes after applying to learn using the collaborative, collaborative model of cognitive types C2, C3, and C4. Researchers carried out this data collection by checking and giving scores on learning outcomes tests that had been filled out by students individually.

RESULTS AND DISCUSSION

Teacher Activity Observation Results

Observations of teacher activities were carried out 3 times according to the number of learning plans for 3 meetings. The teacher's activities or activities during learning activities are monitored and assessed by 2 observers, namely as teachers at the school using observation sheets that the researcher has prepared. According to the design of the lesson plans, the observations of teacher activities are more directed at 24 aspects. The results of observing teacher activities in learning obtained the following data:

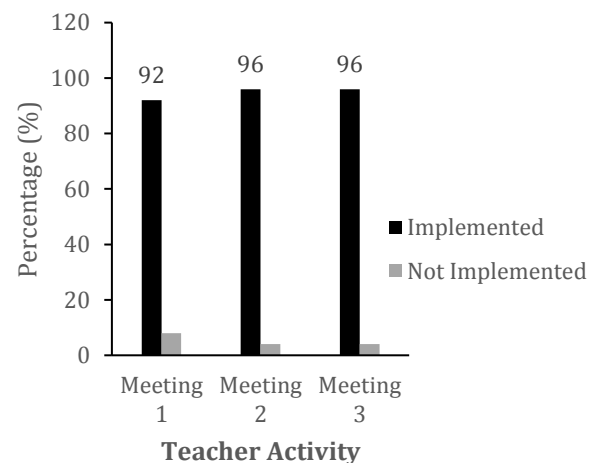


Figure 1. Results of Teacher Activity Percentage

Figure 1 shows the results of the percentage of teacher activity for the three meetings. Where each meeting is carried out and not carried out, the value is different. There is a difference between the first meeting, the second meeting, and the third meeting.

Results of Observation of Student Activities

Observations of student activities were carried out 3 times according to the design contained in the lesson plan. The results of observing student activities are obtained based on the observation sheets made by observers. The observed aspects for each student activity observation sheet consist of 12 aspects. This observation was carried out by 2 observers, namely 2 teachers at the school. Observations and assessments were carried out during group discussions, but the assessment was done individually. The results of observing student activities can be seen in the following figure:

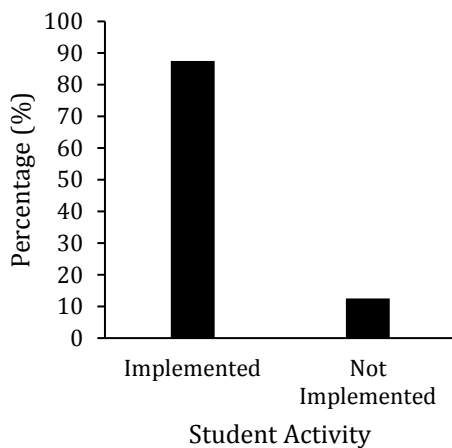


Figure 2. Results of the Percentage of Student Activities

Based on Figure 2, it can be seen that the average results for the first meeting, second meeting, and third meeting show that those who are implemented are (87.5%) and those that are not implemented are (12.5%). 12 students obtained very good criteria. Then the good criteria were obtained by 5 students. It is as expected from the 12 aspects because all of them meet the criteria of good and very good, the activities have reached the indicators of success.

Student learning outcomes

Students' learning mastery or student absorption in physics subjects, especially momentum and impulse material, then at the end of the lesson, a written assessment is carried out using the Multiple Choice (PG) test, which consists of 10 questions attached in the appendix. Based on the analysis of the results of the assessment obtained data on student learning outcomes (figure 3).

Figure 3 shows that student learning outcomes with the teacher's collaborative learning model have been successful. Based on the written evaluation, student learning outcomes were measured using an objective test, which consisted of 10 questions. The following is data on learning outcomes that can be seen in Figure 4.

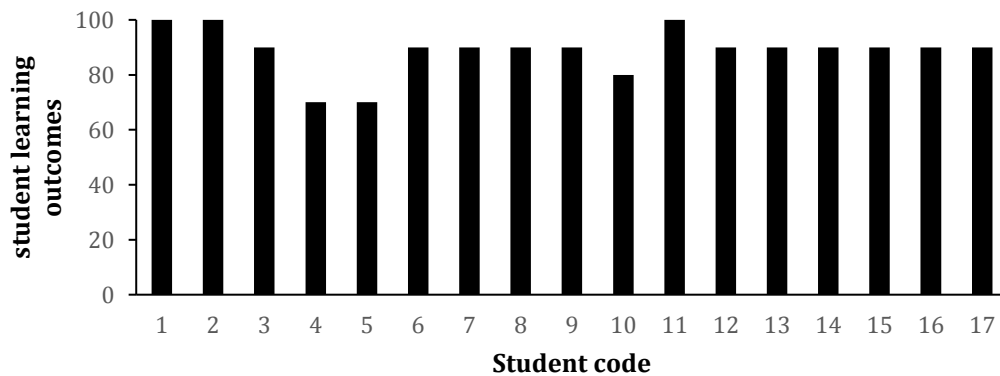


Figure 3. Student Learning Outcomes

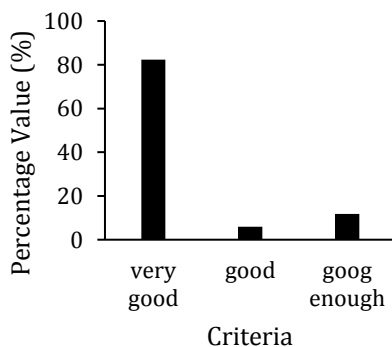


Figure 4. Percentage of Student Learning Outcomes

Figure 4 shows that the percentage of student learning outcomes that meet the Minimum Completeness Criteria, the percentage of student learning outcomes on the Very Good criteria reaches (82.35%) totaling 14 students, the good criteria (5.88%) amounting to 1 student, while the percentage of criteria Enough, namely (11.76%) totaling 2 students. This data shows that the collaborative learning model carried out by teachers has been successful because the school's Minimum Completeness Criteria is 65 and has reached the success indicator, so it does not need to be continued in the next cycle.

This research is called Classroom Action Research (CAR) and is carried out to improve the previous learning process whose learning outcomes tend to decrease. Therefore, the researchers used the Jire collaborative learning model to improve student activity and learning outcomes on momentum and impulse materials. The tools used to support the success of the research are student activity observation sheets, learning implementation sheets, and learning outcomes tests. With these tools, it is possible to measure the progress of the learning process.

According to Paizaluddin and Ermalinda [8], Classroom Action Research (CAR) comes from English Classroom Action Research which means research conducted in a class to find out the consequences of actions applied to an object of research in that class. Empirically, teachers experienced in teaching have unconsciously carried out many additional activities not listed in the lesson unit but have carried out Classroom Action research.

Based on the analysis of all the activities carried out, the Jire collaborative learning model can be used as an alternative to improve student learning outcomes and student activities on physics material. Jigsaw cooperative learning is one type of cooperative and flexible learning strategy. In jigsaw learning, students are divided into groups whose members have heterogeneous characteristics. Each student is responsible for studying the assigned topic and teaching his group members to interact and help each other. Research related to jigsaw cooperative learning has been proven to improve student's academic abilities [9].

The jigsaw learning model is a type of cooperative learning consisting of several members in a group who are responsible for mastering the learning material section and can teach the material to other group members [10]. According to Nurkancana [11], the jigsaw learning model is a learning model by grouping students into several teams whose members consist of 4 to 6 students with one type of heterogeneous learning. Jigsaw cooperative learning is a type of learning that encourages students to be active and help each other in mastering learning materials to achieve maximum achievement [12-15].

Aspects that need to be considered in implementing the revised jigsaw collaborative learning model are the appropriate teacher time and division of labor in the learning process. Applying the revised jigsaw collaborative model takes a long time because of the original and expert groups. In learning, students are in the homegroup. So they go to the expert group and return to the original group, requiring appropriate time for each syntax so that learning can run well and without problems [16].

The application of the Jire collaborative model on momentum and impulse material aims to

determine the improvement of student learning outcomes. This model requires students to be more active both individually and in groups, while the teacher's role in this learning is as a companion in learning so that learning is centered on students and no longer centered on the teacher [17-20].

In general, the implementation of collaborative learning runs smoothly, making learning more varied. This is evident in the noise in the classroom atmosphere. In a positive way, students become more active in listening, expressing opinions, and refuting the group presenting the material. Data on increasing student learning activity was obtained from observation sheets of student activities carried out by observers. These observations were made during the lesson. The observer observed the student's activities during the lesson and checked them in an observation sheet that had been provided. These observations get an average for observers 1,2 , and 3 who are implemented (87.5%) and not implemented (12.5%). Research on teacher activities was carried out by 2 observers using a learning implementation sheet consisting of 24 aspects, teacher activities were carried out during learning activities. Based on the results of observations made by observers, conducted for 3 meetings, it shows that the first meeting of 24 aspects of teacher activity. Learning outcomes data is data obtained from the results of learning outcomes tests. The data is obtained by providing a series of questions composed of material submitted to students. The questions that have been made are then given to students to find out students' understanding of the material presented by the teacher.

This study was conducted to test the learning outcomes once at the end of the meeting. The following are the student learning outcomes as many as 14 students with very good criteria (82.35%), 1 student with good criteria (5.88%), and 2 students with sufficient criteria (11.76%). Jire's collaborative model is complete. Completeness is measured by the percentage of student learning outcomes who score above the minimum completeness criteria (MCC) is 65, while the number of students who score above the MCC is more than 85%. The percentage of completeness obtained is 100% based on the results of the achievement of learning mastery which refers to the criteria of completeness that have exceeded 85%, so in the first cycle, learning using the collaborative model of JIRE was stopped in the first cycle because it had reached the indicator of success. Student activities were conducted using a student activity observation sheet consisting of 12 aspects.

Student activities were observed during the learning process with 2 observers. The results of observing student activities from 12 aspects in

the very good category reached (70.6%) or 12 students, and in the good category reached (29.4%) or 5 students. A test of learning outcomes is held in the form of Multiple Choice (PG), which consists of 10 questions to know the students' cognitive learning outcomes. The student learning outcomes test given refers to the cognitive types C1, C2, C3, and C4. Data on student learning outcomes on individual completeness, 14 students got very good category, 1 student got good category, and 2 students got enough category.

Based on the research and discussion results, it is clear that the revised jigsaw collaborative learning model can improve student learning outcomes and activities in physics subjects, especially momentum and impulse materials. This model has the advantages of revised jigsaw collaborative learning: self-confidence, students are more active, increased learning motivation, understand the material faster and more effectively, and the expert group has a good mastery of the topic. They have the perception of correct and identical answers in the group. They learn to teach peers and improve social relations between student relationships in the group.

CONCLUSIONS

Based on the research and discussion data, it can be found that the student learning outcomes have been completed by 17 students or overall, in the very good category 14 students (88.35%), good category 1 student (5.88%), and sufficient category 2 students (11.76%). Student learning outcomes that have been completed are also supported by research instruments observing teacher activities in the first meeting (92%), for the second meeting (96%), and for the third meeting (96%). Then for the second research instrument, namely the observation of student activities that were carried out (87.5%) and not carried out (12.5%) had reached the indicator of success so that it was not continued in the next cycle because it had reached the Minimum Completeness Criteria which was 65. Thus, using the revised jigsaw collaborative learning model can improve student learning outcomes in physics subjects on momentum and impulse in class X MIA 1 at SMA Negeri Posigadan.

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