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Improving Science Learning Outcomes Through the Implementation of the Inquiry Learning Model During the Covid-19 Pandemic in Class IX-A Students of SMP Negeri 1 Bendungan for the 2021/2022 Academic Year

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ABSTRACT: This type of research is Classroom Action Research (CAR). The purpose of this classroom action research (CAR) is to find out how far the improvement of student learning outcomes in science subjects in Fermentation material by applying the Inquiry Learning model. In this classroom action research (CAR), it is carried out in 2 cycles, from the results of the actions taken it is proven to be able to improve student learning outcomes by achieving the classical mastery that is set at 85%. Classical completeness 73.3% obtained in the first cycle, can be increased in the second cycle to 87%. In terms of student activity, there was also an increase, namely in the first cycle, the moderately active category increased to an active category. The results of this action research show that the implementation of the Covid-19 Learning Period Inquiry Learning Model can improve student learning outcomes in science lessons on electrical. Material with completeness reaching 87 % At the end of cycle II.

Keywords: Learning outcomes, inquiry learning, model.

INTRODUCTION

Learning science at the junior high school (SMP) level provides a foundation through experience and processes for studying science at a higher level and emphasizes its application in everyday life. Science learning in junior high school is an integration of three scientific disciplines, namely Biology, Physics and Chemistry so that the science subjects studied are integrated science. In studying science, all students are expected to have the ability to develop scientific process skills that involve all five senses through observation to obtain a concept, principle or theory and the ability to think logically, objectively through good recording and calculating techniques in interpreting data with the participants' expectations. Students can be trained to have high scientific literacy abilities.

Bendungan 1 State Junior High School is one of the formal educational institutions that has problems regarding the low learning outcomes of students in science subjects(Clark & Hsu, 2023).

This can be seen from the large number of students who have to take part in remedial activities for doubt or fermentation (making tempe or tape) because they have not reached the Minimum Learning Completion Criteria (KKM). Based on these problems, teachers need to develop a learning process that can improve students' mastery of material by involving more active roles from students and optimizing the role of all components that support the success of the learning process. Of the many components that influence the learning process, the teacher is one component that plays a very important role. In their role as teaching staff, teachers are required to have the ability to create conducive learning conditions. This condition will be achieved when a teacher can deliver lesson material and teach students well. Therefore, choosing the right model, strategy and learning method is something that must be considered. This is based on the fact that the teacher's accuracy in choosing learning models and methods will influence the success and learning outcomes of students, because the models, strategies and learning methods used by teachers influence the quality of the learning they carry out(Nikou & Maslov, 2023).

One of the learning activities that can increase students' activity in learning is through models or learning strategies that involve students in discovering scientific concepts through direct observation activities, collecting data based on the results of observations and being able to interfere with the results of observations into a scientific concept. can involve active participation from students in learning activities, namely through inquiry-based learning(Plaat et al., 2023). Inquiry-based learning emphasizes learning that prioritizes the discovery process in learning activities to obtain knowledge which includes several stages, namely the orientation stage, the problem formulation stage, the hypothesis formulating stage, the hypothesis testing stage and the conclusion formulating stage.

Inquiry-based learning, the pattern follows scientific methods, which gives students the opportunity to learn meaningfully (Depdiknas: 2002). Inquiry as a learning strategy prioritizes the discovery process in learning activities to gain knowledge. Learning science through inquiry requires a method that can involve all students in learning. Implementation of inquiry-based learning requires teachers to prepare activities that enable students to identify and critically review secondary science information. Teachers should identify the best strategies in teaching certain topics with full involvement of students to understand scientific concepts and principles. (Rustaman, N: 2005) Through inquiry-based learning, students learn science and also learn scientific methods. The inquiry process provides students with the opportunity to have real and active learning experiences, students are trained how to solve problems and make decisions. The characteristics of inquiry learning strategies are: 1) maximum student activity to search and discover, 2) students not only act as recipients of lessons through verbal teacher explanations, but they play a role in discovering the essence of the lesson material themselves. 3) search for and find your own answer to something that is being questioned, so that it is hoped that it can foster an attitude of self-confidence (Selfbelief)(Haider & Andrews-Larson, 2022).

According to Harumni (2012), inquiry learning steps are a cycle with the following stages:

1) Orientation stage;
2) The level of formulating the problem;
3) Stage of formulating a hypothesis;
4) Level of data gathering;
5) Hypothesis testing stage and
6) Level of formulating conclusions.

The following will explain the explanation of each inquiry learning step based on Harumni (2012) as follows.

Orientation Stage

At this stage, the teacher conditions students to be ready to carry out the learning process. Teachers stimulate and invite students to think about solving problems. The orientation step is a very important step. The success of this strategy really depends on the students' willingness to carry out activities using their abilities in solving problems. Without this willingness and ability it is impossible for the learning process to run smoothly.

Level of formulating the problem

Several things that must be considered in formulating problems are 1) the problem should be formulated by students. Students' learning motivation will increase if they are involved in the process of formulating the problem, 2) the problem being studied has a definite answer 3) the concepts in the problem are concepts that the students already know.

Stage of proposing a hypothesis

A hypothesis is a temporary answer to a problem being studied. As a temporary answer, the validity of the hypothesis needs to be studied. An estimate as a hypothesis is not just any estimate, but must have a solid basis for thinking, so that the hypothesis raised is rational and logical. The ability to think logically itself will be greatly influenced by the depth of insight possessed and breadth of experience. Thus, any individual who lacks insight will find it difficult to develop rational and logical hypotheses.

Level of data collection

The data collection stage is the activity of gathering the information needed to test the proposed hypothesis. In inquiry learning, collecting data is an important mental process in intellectual development(Aksa, 2022).

Hypothesis testing stage

Testing a hypothesis is the process of determining answers that are considered acceptable according to the data or information obtained based on data collection.

Level of formulating conclusions

Formulating conclusions is the process of describing findings obtained based on the results of hypothesis testing. The advantage of the inquiry learning model is that it emphasizes cognitive, affective and psychomotor aspects in balance with students' learning styles, and can serve the needs of students who have above average abilities. (Daryanto and Karim, S: 2017). Meanwhile, according to Anggraeni Wayan, et al (2013), the ongoing inquiry learning process is student centered. Students are given the opportunity to be actively involved in learning both mentally, intellectually and socially emotionally. The ongoing learning activities maximally involve all students' abilities to search and investigate systematically, critically, logically and analytically, so that they can fully formulate their own discoveries. self-confidence. Meanwhile, the weakness is that he experiences a little difficulty in planning learning related to students' learning habits.

METHOD

This type of research is classroom action research so that the researcher will carry out actions that focus on teacher and student activities as well as increasing science learning abilities. The subjects of this classroom action research were class IX A students for the 2021/2022 academic year with a total of 25 students. The reason for choosing class IX A as the research subject is because this class has problems in participating in science learning, students who are not paying enough attention seem to be taking learning for granted so that their ability to learn science is low. It is proven that the average score in the even semester exam for the 2021/2022 academic year is still low, namely 60.00. . This classroom action research is planned to be carried out in three cycles. Each cycle is completed once and planned in two cycles. Each cycle consists of four stages, namely planning, implementing actions, observing and evaluating, and reflecting at the end of the action (Sugiyono, 2009: 45). The data collection techniques in this research are tests and observations. The observation method is very necessary in most qualitative research with the aim of obtaining information that is close to reality regarding the object of a research. According to Nasution (2001: 23), this observation seeks to observe natural and actual conditions without deliberate efforts to influence, regulate or manipulate them. Thus, the observation method is an effort to collect real, actual and real data from information sources without any attempt to manipulate it. Meanwhile, the test used is a written test. The criteria for individual student learning completion that is determined is 80 in accordance with the minimum criteria (KKM) for science subjects which are determined based on the Ministry of National Education assessment standards (2007). Classical learning completeness is declared to have been achieved if at least 80% of the total number of students have met the minimum completeness criteria.

RESULT AND DISCUSSION

Based on the results of the Daily Assessment analysis obtained in the previous material, student learning results were obtained for class IX A, which had an odd absence number, where the average score was obtained for the number of students who did not meet the minimum completeness criteria (KKM). The following is an analysis of data obtained from initial observations in the form of learning outcomes in pre-cycle activities(Khanittanuphong et al., 2022).

Table 1. Recapitulation of Preliminary Data on student learning outcomes in class IX-A Science at SMPN 1 Bendungan (taken from PH scores before action)

No.	Description	Information
1.	Number of students	25
2.	Number of Men	12
3.	Number of women	13
4.	The highest score	75
5.	Lowest Value	50
6.	Average value	69,5
7.	Number of students who completed	5
8.	Number of students who have not yet completed	20
9.	Completion Percentage	46,6%

A total of 5 students with a percentage reaching 46.6% of the total number of students have met the KKM, and a total of 20 students with a percentage of 46.6% have not yet reached the KKM. The average score obtained by students was 69.5. These numbers are still far from the expected completeness, both individually and classically. Starting from this, it is necessary to improve the learning process to achieve student learning outcomes with an approach, model or learning method that involves the participation and active role of all students. In overcoming this problem, learning activities were selected, namely by implementing inquiry-based learning(Sutton et al., 2023).

Implementation of Cycle 1

Action Planning

At this stage, what is done is to prepare all research equipment in the form of observation sheets, written test instruments, lesson plans with the application of the inquiry learning model for each meeting as needed(Putu Verawati et al., 2022).

Implementation of Actions

Learning activities for the first cycle included two meetings. The first meeting was held on Monday 25 October 2021 and the 2nd meeting was held on Wednesday 27 October 2021. Evaluation for cycle I was carried out on 1 November 2021. For learning activities, the first meeting was held based on the Learning Implementation Plan that had been prepared previously. The learning steps can be described as follows:

1. Formulate learning objectives by conveying the learning objectives to be achieved and motivate students by relating the material to students' daily lives. In this case, the teacher tries to attract students' attention to focus on learning.
2. Before the learning process was carried out further, the researcher first divided the students into 5 groups consisting of 3 people.
3. Explaining doubt or fermentation (making tempeh or tape) briefly with the aim that before students make observations students can understand dynamic electricity and its uses in everyday life
4. Formulate questions according to the material
5. Distribute Student Activity Sheets (LKPD) to each group and explain the steps and tasks that must be carried out by each group.
6. Ask each group to start activities and guide students and observe student activities during observations, by giving students the opportunity to be active in carrying out observations and experiments.
7. Direct students to present the results of group work with questions and answers between groups.
8. Provide reinforcement for the results of group work
9. Guiding students in concluding the material that has taken place
10. Provide reinforcement for the material that has been studied and reflection.
11. Closing learning.

Observation result

Obtaining student learning outcomes in science learning activities by implementing inquiry-based learning.

Students' learning outcomes while participating in learning activities are measured using tests in the form of written description questions which are given at the end of the lesson at the second meeting after students have followed all stages of learning. Questions in the form of descriptions were chosen to measure high levels which are difficult to measure through objective tests and train 15 students to formulate answers. The average score for student learning outcomes and learning completion in class can be seen in table 2 below(Zhao et al., 2023).

Table 2. Table of Student Learning Results After Participating in Learning Activities by Applying Inquiry Based Learning in the First Cycle

No	No	Mark	Information
1	Aldi Nuriya Saputra	80	T
2	Alfin Maulana Dian Saputra	60	TT
3	Alief Adi Wibowo	80	T
4	Alvina Fajar Renata	75	T
5	Andin Yustipa Olivia Putri F	60	TT
6	Devita Luxviana	80	T
7	Dimas Dwi Atmoko	80	T
8	Eko Wahyu Abdullah	75	T
9	Elly Nur Rohadhotul Ilmi	65	TT
10	Eva Noviani	80	T
11	Faina Hamidah	80	T
12	Hewin Prasetio	60	TT
13	Indra Bagus Setyawan	80	T
14	Joko Susilo	75	T
15	Liza Egi Safira	75	T
16	Maira Intan Lestari	85	T
17	Mita Handayani	60	TT
18	Pebriana Kusuma Putri	85	T
19	Rina Amin Lestari	85	T
20	Rio Tegar Subekti	58	TT
21	Site Virga Augustia	83	T
22	Sri Wahuningsih	85	T
23	Teguh Edi Saputro	50	TT
24	Yodik Supriadi	85	T
25	Zainal Miftakul Azis	58	TT
	Number of Values	1839	

	Average value	73.56
	Completeness	73.3 %
	The highest score	85
	Lowest Value	58
	Complete Amount	17
	Incomplete Amount	8

Based on table 2, the highest learning result was obtained with a score of 85 and the lowest score was 50. The learning results of students who had reached the minimum completeness criteria were 17 students and those who had not reached the minimum completeness criteria were 8 students. The average score at the end of the first cycle was 73.56 with learning completeness in class reaching 73.3%. This shows that even though the average score reaches 73.56, learning completeness in class IX A has not yet reached the performance indicator, namely with completeness reaching 85% of all students.

Students' activeness in learning activities by implementing Inquiry Based Learning.

Observation results were obtained from the results of observations made by observers carried out by fellow research teachers by filling in observation sheets of teacher activities and student activities to record the course of the learning process. From the results of the observations and observations made, it was found that the learning process was not as expected because there were still deficiencies both on the part of the teachers themselves and on the part of the students. Below is presented data from data analysis obtained from observations of student activities during learning in meetings 1 and 2 in cycle 1.

Table 3. Observation Results of Student Activities in Pre-Cycle

Pertemuan	Jumlah skor yang tampak						Σ Skor aktivitas	Rata-rata Aktivitas	Kategori
	1	2	3	4	5	6			
Pertama	3,6	3,3	3,3	3	3	2	18,2	3,03	Cukup aktif
Kedua	4	3,3	4	4	3,3	2,3	20,9	3,48	Cukup aktif

From the table above it can be seen that student learning activities in cycle I, meeting 1, obtained an average of 3.03 in the quite active category and at meeting 2, an average of 3.48 also obtained in the quite active category.

Reflection Stage

Based on the average learning outcome scores of students in cycle 1 and learning completion which has not yet reached the performance indicators, namely at least 85%, it is necessary to carry out learning activities for cycle 2. The improvements that need to be implemented in learning for cycle 2 are:

1. Teachers are more active in encouraging students to ask questions, answer questions, or provide suggestions and responses during group discussions and class discussions;
2. Learning still uses the same groups as the groups in the first cycle, but students who are identified as having low grades and have not achieved significant improvements in learning outcomes in the first cycle are given more intensive attention;
3. Students in groups, after determining the problem formulation and hypothesis, determine the content that will be observed in the form of data that must be collected by students that can support the learning material that will be discussed.
4. Ask groups of students to share roles in observing objects after formulating problems and formulating hypotheses together;
5. When learning, students are asked to maximize their use of internet browsing or bring articles about material that will be discussed at the next meeting;
6. Make improvements to the lesson plan so that each stage of learning can be carried out in a planned manner and run smoothly.

Second Cycle Research Results Action Planning

Based on the results of reflection on learning cycle 1, it is necessary to prepare and plan improvements for the learning stages in cycle 2. Things that need to be improved are by re-arranging the Learning Implementation Plan in class, placing emphasis again on learning activities, including encouraging students. to ask questions actively and follow all stages of learning well, especially for students who have not had improved learning outcomes in the pre-cycle or first cycle, providing encouragement to look for references and explore the literature in order to obtain complete knowledge when collecting data to test hypotheses(Davis & Knight, 2023). The technique of dividing roles is also maximized in groups, both when collecting data and during group presentations.

Implementation of Actions

Learning activities for the second cycle included two meetings. The first meeting was held on Wednesday, 03 November 2021 in class. Then the second meeting was held on Monday, 08 November 2021. The first learning activity was carried out based on the Learning Implementation Plan that had been prepared previously. The first meeting was carried out using the experimental method in groups by carrying out experimental activities based on the guidelines from the Student Activity Sheet. The learning steps are adjusted to the guided inquiry-based learning syntax (Guided Inquiry) and students carry out experiments based on the results of reflection in the first cycle.

Cycle 2 Observation Results

Obtaining student learning outcomes in learning activities by implementing inquiry-based learning

Students' learning outcomes while participating in learning activities are measured using tests in the form of written description questions which are given at the end of learning at the second meeting after students have participated in all stages of learning. The average score for students' learning outcomes and learning completion in class in learning activities in the 2nd cycle can be seen in the table below(Han, 2023).

Table 4. Student Learning Results After Participating in Learning Activities in Cycle II.

No	No	Mark	Information
1	Aldi Nuriya Saputra	80	T
2	Alfin Maulana Dian Saputra	80	T
3	Alief Adi Wibowo	85	T
4	Alvina Fajar Renata	85	T
5	Andin Yustipa Olivia Putri F	65	Tt
6	Devita Luxviana	80	T
7	Dimas Dwi Atmoko	85	T
8	Eko Wahyu Abdullah	75	T
9	Elly Nur Rohadhotul Ilmi	75	T
10	Eva Noviani	80	T
11	Faina Hamidah	80	T
12	Hewin Prasetio	60	Tt
13	Indra Bagus Setyawan	85	T
14	Joko Susilo	80	T
15	Liza Egi Safira	80	T
16	Maira Intan Lestari	81	T
17	Mita Handayani	80	T
18	Pebriana Kusuma Putri	80	T
19	Rina Amin Lestari	85	T
20	Rio Tegar Subekti	85	T

21	Site Virga Augustia	80	T
22	Sri Wahuningsih	80	T
23	Teguh Edi Saputro	80	T
24	Yodik Supriadi	85	T
25	Zainal Miftakul Azis	82	T
Number of Values		1993	
Completeness		86,67 %	
The highest score		85	
Lowest Value		60	
Complete Amount		23	
Incomplete Amount		2	

Based on the table above, the highest score is 85 and the lowest score is 60. The average score at the end of the second cycle is 80.72 with complete learning in class reaching 86.67 (%). This shows that students' learning completeness has reached more than 85% of all class IX A students.

Students' activeness in inquiry-based learning activities by implementing a series of illustrated stories.

Based on the results of observations of student activities after analysis, the following data were obtained:

Table 5. Observation Results of Student Activities in Cycle II

Pertemuan	Jumlah skor yang tampak						Σ Skor aktivitas	Rata-rata Aktivitas	Kategori
	1	2	3	4	5	6			
Pertama	4,3	4	3,6	4	3	2,3	21,9	3,65	AKTIF
Kedua	4,6	4,3	4	4,3	3,6	2,6	23,4	3,9	AKTIF

From the table above it can be seen that student learning activities in cycle II at meeting 1 obtained an average of 3.65 in the active category and at meeting 2 an average of 3.9 was obtained in the active category.

Learning using inquiry-based learning is a means of achieving scientific literacy for students. This is in accordance with the characteristics of inquiry-based learning, which provides opportunities

for students to learn meaningfully (Depdiknas: 2002). Inquiry as a learning strategy prioritizes the process of discovery in learning to gain knowledge. Learning outcomes in this study were measured using written tests after learning activities took place or at the end of each cycle. From the results of the final evaluation after cycle 1 was completed, the researchers concluded that there was an increase in the value of learning outcomes when compared with the evaluation results from the pre-cycle. Below is presented comparative data on student learning outcomes for the pre-cycle and first cycle in table 6 below.

Table 6. Comparison of Student Learning Outcomes in the Pre-Cycle and First Cycle Stages.

No	Aspect	Pre level Cycle	Level Cycle 1	enhancement
Average Value		69,5	73,56	6,43
Completeness		46,6%	73,3 %	26,7 %

Furthermore, based on the results of the reflection in cycle I, it was decided that the action would continue to cycle 2. At the end of the second cycle after the meetings had been held 2 times, an evaluation was carried out by giving a written test to measure the extent of students' mastery of the electrical material that had been discussed. To see the increase in student learning outcomes and learning completion in the second cycle, the learning outcome data in the second cycle was compared with the student learning outcome data in the first cycle. Below is presented comparative data on student learning outcomes in the first cycle of learning with data on student learning outcomes in the second cycle which are in table 7 below.

Table 7. Comparison of Student Learning Outcomes and Completeness of Learning Between Learning in the First Cycle and Learning in the Cycle Second.

No	Aspect	Phase I cycle	Cycle II stage	enhancement
1	Average value	73,56	80,72	7,8%
2	Completeness	73,3 %	86,67%	80,2%

Based on the data obtained in table 4.5, it can be seen that there have been changes in student learning outcomes between the first cycle and student learning outcomes after participating in learning activities for the second cycle. In the first cycle stage the average score obtained by students was 73.56 and had an interpretation of a significant increase in average compared to the average score in the pre-cycle, while in the second cycle the average score obtained by students

was 80. 72. Based on the results of learning activities carried out at the end of the second cycle, namely through giving a written test and obtaining completeness of learning outcomes that exceed 85%, it can be stated that the performance indicators have been achieved and the research hypothesis is accepted.

CONCLUSION

Based on the results of the research and discussion above, it can be concluded that the application of the Inquiry Learning Model can improve student activities and learning outcomes at SMP Negeri 1 Bendungan(Ribeiro et al., 2023). This increase can be seen from the achievement of student activity scores, and the average class value and level of classical completion in each cycle has increased in both cycle I and cycle II. Based on the results of learning activities carried out at the end of the second cycle, namely through giving a written test and obtaining completeness of learning outcomes that exceed 85%, it can be stated that the performance indicators have been achieved and the research hypothesis is accepted. From the results of the research and discussion above, we can conclude that the application of the Inquiry Learning Model can improve science learning outcomes in the material of doubt or fermentation (making tempeh or tape) in class IX-A students in the odd semester of the 2021/2022 academic year(Prihadi, 2023).

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