IMPLEMENTATION OF CIRCUIT LEARNING STRATEGY TO IMPROVE SCIENCE LEARNING OUTCOME

Mahyaeny
SMPN 4 Mataram, Mataram, Indonesia
Email: mahyaeny69@gmail.com

Abstract: This research aims to improve student learning outcomes in class VII science subjects at SMPN 4 Mataram in 2022-2023 by implementing strategies of Circuit Learning. The type of research used was classroom action research, carried out in two cycles with 32 students. Learning outcome data is collected through evaluation tests, while student activity data is collected through observation sheets. The research results showed that in cycle 1 to cycle 2, the average score was 75 with classical completeness of 72% to an average score of 80 with classical completeness of 87.5%, increasing the average score of results and learning and classical completeness. Meanwhile, the observations of the implementation of the first learning cycle show that students' learning activities in the learning process are included in the active category because, in the following lessons, students have achieved a score of 3. Meanwhile, in cycle II, the score obtained was 4.6, which was included in the very active category. It shows an increase in the student activity category from cycle I to cycle II, with an increase of 1.6. Teacher activities in teaching are included in the quite good category. It is proven from the observations made by obtaining a score in cycle I, namely 9. Meanwhile, in cycle II, the score obtained was 14, with an increase of 5. It shows an increase from cycle I, where teacher activities were included in the fairly good to very good category. This research concludes that the Circuit Learning Strategy can improve student learning outcomes in Class VII Science Subjects at SMPN 4 Mataram in 2022-2023.

Keywords: *Circuit Learning Strategy, Science Learning Outcomes*

INTRODUCTION

Education has a very important role in forming a civilized society [1]. Apart from that, education can also change people's mindsets for the better. The better the quality of education a country provides, the better the quality of its human resources will be.

However, one of the problems facing the world of education today is the problem of weak implementation of the learning process implemented by teachers at school. The learning process that has occurred so far has yet to be able to develop students' thinking abilities. Implementing the ongoing learning process inside classes is only directed at the student's ability to memorize information. Students' brains only need to remember various information without being required to understand the information obtained to relate it to situations in everyday life [2].

This condition also occurs in science learning, which shows that the science learning process in elementary schools is still carried out conventionally. Teachers have yet to carry out active and creative learning involving students fully and have not used various and varied learning strategies. So, in science learning, creating conditions that encourage students to be active, creative, and curious is necessary.

Science is a subject that instills and develops students' knowledge, skills, and scientific values, as well as love and respect for the greatness of God Almighty. The learning process requires students' attention because the material is abstract and concrete. Science education is also very interesting because, in its implementation, it is directly related to oneself and the surrounding natural environment.

The factors involved in learning activities that occur in elementary schools to achieve a learning goal are students who learn and teachers who teach [3-4]. The factors for students are motivation, interest, perseverance, readiness, health, and abilities of the students themselves. Meanwhile, the factors for teachers are mastery of the material, their ability to teach, program planning, assessing the progress of the learning process, and the accuracy of using strategies, learning strategies, and techniques for learning material. Improving student learning outcomes requires an innovative and creative learning strategy to improve student activities to understand science concepts and increase student learning outcomes.

The learning results of 32 students in class VII who took the second-semester exam were 22 students who got a score above the minimum completion criteria (MCC) and as many as ten students who had not yet reached the MCC, so the Classical Completeness obtained 66%, and the class average score was 74. Meanwhile, the MCC for science is 85, and the classical completeness set by the school is 85%, thus showing that students' learning outcomes at SMPN 4 Mataram in science lessons are still low. It happens because the use of strategies still needs to be varied. Some students also needed to pay more attention to the teacher's explanation. It makes students still not dare to express their ideas.

Based on the abovementioned gap between expectations and reality, a learning strategy is needed to provide new nuances and activate and improve student learning outcomes. One strategy that can involve student activity and improve student learning outcomes is the strategy of Circuit Learning.

If adapted to the conditions and problems faced by class VII students at SMPN 4 Mataram, it is necessary to implement learning strategies that can improve student learning outcomes, namely learning strategies Circuit Learning. Circuit Learning is a learning strategy that maximizes the empowerment of students' minds [5-7]. This research aims to improve student learning outcomes in Class VII science subjects at SMPN 4 Mataram in 2022-2023 by implementing strategies for Circuit Learning.

RESEARCH METHODS

This research is Classroom Action Research, where the process is designed in at least two cycles and ends when there has been an increase in student activity if indicators with active criteria are achieved and teacher activity if indicators with good criteria are achieved [8-9]. Student learning outcomes are said to have increased if the indicator is reached 85% of students get a score of more than 75. The location of this classroom action research was carried out in class VII of SMPN 4 Mataram with a total of 32 students consisting of 15 male and 17 female students. The subjects of this classroom action research were class VII students at SMPN 4 Mataram for the 2022/2023 academic year, with a total of 32 students consisting of 15 boys and 17 girls. In this research, researchers collaborated with class VII teachers or colleagues.

This research was designed in 2 cycles and ended if there had been an increase in student activity if indicators with active criteria were achieved and teacher activity if indicators with good criteria were achieved, and student learning outcomes were said to have increased if the indicator was achieved 85% of students scored more than 75. This research refers to the procedures for implementing classroom action research according to Suharsimi Arikunto, namely (1) planning, (2) implementation, (3) observation, and (4) reflection.

The methods used for data collection are tests and observations. After implementing its strategy of circuit learning, the test is used to collect quantitative data in the form of Natural Sciences (IPA) scores for class VII students at SMPN 4 Mataram. The value of student learning outcomes will be assessed using tests at the end of each cycle. The tests used are in the form of multiple choice and description tests. Observations or observations were carried out in this research to observe student activities and teacher activities when the learning

process takes place by applying the Strategy of Circuit Learning.

Student learning outcomes are obtained through giving tests. Then, the data is analyzed systematically and quantitatively. Student learning outcomes are said to be individually complete if the student obtains a score greater than 75. The student's final individual score is obtained using the formula [10-11]:

$$\text{Final score} = \frac{\text{The score obtained}}{\text{Maximum score}} \times 100$$

The formula used to analyze the average completeness data:

$$\text{Me} = \frac{\sum \text{Xi}}{\text{N}} \qquad X = \frac{\sum X}{N}$$

Information:
X = Class average value.
∑xi = Sum of all scores
N = Subject

Student learning outcomes are said to be complete if 85% of the students studied scored 75. Completeness of classical learning outcomes is calculated using the formula [12].

$$\text{Classical completeness} = \frac{\text{number of students who scored} \geq \text{MCC}}{\text{many students take the test}} \times 100$$

The indicator of success in this research is the implementation of learning science by implementing Strategy Circuit Learning as follows: For student learning outcomes, they are said to be successful if their learning outcomes have increased or with a target of at least 85% or more of the total number of students who achieve a score of ≥ 75 in the classroom VII SMPN 4 Mataram. Activity Students are said to be minimally successful in the active category. Activity teacher is said to be successful if the implementation of learning is at least in the good category.

RESULTS AND DISCUSSION

This classroom action research was carried out from March 8 to March 16, 2023, at SMP Negeri 4 Mataram. This research aimed to improve student learning outcomes in Class VII science subjects at SMPN 4 Mataram in 2022-2023 by implementing the StrategyCircuit Learning. The implementation was carried out in two cycles with peer observers.

In this research, data on student learning outcomes was obtained from the evaluations carried out at the end of each cycle. In contrast, data on student activities and teacher activities in the teaching and learning process in the classroom were obtained from observation sheets. The research results for each cycle are described below:

Cycle 1

Cycle I was held on March 8, 2023. The material discussed in the first cycle was about environmental concepts, interactions, food chains, and webs. Evaluation is held at the end of the cycle. The meeting is held in 2 class hours.

The steps for implementing research in cycle I are as follows:

a. Planning stage

At this planning stage, researchers carried out the following activities:

(1) Prepare learning objectives and materials
(2) Prepare instructional Media
(3) Prepare learning scenarios/RPP
(4) Prepare student worksheet (LKS)
(5) Prepare teacher activity observation sheet
(6) Prepare student activity observation sheet
(7) Prepare about evaluation
(8) Prepare Evaluation question scoring guidelines

b. Level of implementation

At this stage, the cycle I scenario/RPP is implemented, as well as observation according to the observation sheet that has been provided. The learning steps are as follows:

1) Initial activity

In the initial activity at the meeting, students entered on time, and the teacher prepared the media for the learning activities that would be used. When the teacher prepared the learning media, the students prepared their learning materials, but some students still bothered her friend. The teacher checks students' attendance, then reminds them of the material that has been studied and relates it to be studied, conveys the learning objectives, and provides an overview of the circuit learning strategy.

2) Core activities

At this core activity meeting, the teacher explains the material using pictures and concept maps, the material. The teacher and students conduct questions and answers about the material that has been presented. The teacher divides the students into five groups, each with four students. After the teacher gives students worksheets to work on with their respective groups, the teacher provides ample opportunities to complete them. They guide, visit each group, and help students who find it difficult. During the discussion, there was still a need for the division of group tasks, which could be seen from the group being dominated by the smart ones while the other friends did not help. After completing the group discussion, the teacher appointed a group to present the results. During the presentation, the other groups listened attentively but did not dare to ask questions and provide responses. The teacher gives rewards through praise and applause to the advanced group of students. After the presentation is finished, the teacher and students explain the results of the discussion again.

3) End activities

The teacher guides students to conclude the material they have studied. Some students dare to conclude what they have learned but fail to record the conclusion. Evaluation is given to determine student learning outcomes in cycle 1.

c. Observation and Evaluation

In this case, those who act as observers are fellow class VII teachers. Based on the results of observations and evaluations during learning, the following results were obtained:

(1) Observation of teacher activities

Based on the results of teacher observations carried out in cycle I, the results of Table 1 were obtained. Recapitulation of observation results of teacher activities in cycle I:

Table 1. Recapitulation of observation results of cycle I teacher activities

No.	Item	Score
1	Carrying out apperception	1
2	Explain the learning objectives that students must achieve	1
3	Conduct questions and answers about the topics discussed	0
4	Show pictures about the topic in front of the class	0
5	Ask questions about the images presented	1
6	Displays the concept map that has been created	1
7	Explain the concept map that has been displayed	0
8	Divide students into several groups	1
9	Give students worksheets and fill in parts of the concept map in their language	1
10	Explain that the results of students' worksheets will be presented	0
11	Carry out a presentation of the part of the concept map that has been worked on	1
12	Reinforce the form of praise or prizes for good presentation results and encourage those who have not received praise or prizes to try harder	0
13	Explain the student's discussion again so that the student's insight becomes broader	0

14	Together with students, make a summary	1
15	Assessing student work results	1
Total score		9
Category		Pretty good

Based on the detailed table above, it can be concluded that teacher activities in classroom learning by applying learning strategies Circuit Learning, the score is 9 in the quite good category. However, many shortcomings still exist during learning, so further learning must be improved to increase teacher activity in implementing Circuit learning strategy Learning.

(2) Observation of student activities

Student activities In this case, the assessment is carried out by observers. The details of the observation results of student activities are as follows (Table 2):

From observing the table above in cycle I, the average score was 3. It shows that students' activities are categorized as quite active. These results have yet to reach the standard indicators of success that have been determined as the completion target, namely, if student learning activities have reached the active category. Therefore, researchers must further increase student activities in the next cycle.

(3) Evaluation

An evaluation is carried out to determine student success in the learning process by applying Strategist Circuit Learning at the end of cycle I. This evaluation activity is given individually by giving a learning outcomes test. The results of student evaluation in cycle I are as follows (Table 3):

Based on the table above, it can be seen that of the 32 students who took the test, 23 students completed it, while nine students did not. The highest score was 85, and the lowest score was 60. The average score for student learning outcomes was 75, with a classical completion percentage. Namely 72%. The results obtained in cycle I still needed to be successful. It can be seen from the large percentage of completion, which only reached 72% of the 32 students participating in the evaluation activity. It was said to be successful if it reached ≥85%. Therefore, improvements need to be made in the next cycle.

Table 2. Recapitulation of observation results from student activities cycle I

No.	Indicator	Score
1	Actively carry out question-and-answer activities about learning topics	2
2	Active in carrying out group discussion activities	3
3	Active in filling out worksheets in learning circuit Learning	4
4	Make a presentation of the results of the discussion	3
5	Participate in summarizing learning	3
Total		15
Average		3
Category		Quite active

Table 3. Cycle I Evaluation Results

No.	Aspect	Results
1.	Students who take part in learning	32 people
2.	Students who take evaluation tests	32 people
3.	Completed students	23 people
4.	Students do not complete	9 people
5.	The highest score	85
6.	Lowest value	60
7.	Average student score	75
8	Classical completeness	72%

d. Reflection stage

Based on the results of the first cycle of research, both the results of observations of the teaching and learning process and the results of evaluations, in this case, student activity during the learning process still needed to be improved.

Therefore, reflection is carried out to determine the deficiencies, and then improvements are made in the next cycle. The results of reflection in cycle I are as follows:

(1) Deficiencies in teacher activity

(a) The teacher does not ask questions about the topics discussed

(b) The teacher does not display pictures about the topic in front of the class

(c) The teacher does not explain the concept map that has been displayed

(d) The teacher didn't explain that the result work students will be presented

(e) Teachers do not reinforce the form of praise or prizes for good presentation results and encourage those who have not received praise or prizes to try harder

(f) The teacher does not explain the student's discussion again so that the student's insight becomes broader

(2) Deficiencies in student activities

(a) Not yet actively carry out question and answer activities about learning topics

(b) Not yet active in carrying out group discussion activities

(c) Not yet actively presenting the results of the discussion

(d) Not yet active participation in concluding learning

After an evaluation was carried out at the end of the first cycle meeting at the second meeting, some students still needed help understanding the material. It was because many students still needed to pay attention to the teacher's explanation. Based on existing deficiencies, improvements need to be made in cycle II.

After looking at the results of student observations and evaluations, it was seen that the results had yet to reach the indicators of success. Therefore, this research had to be continued in cycle II to improve cycle I, which had yet to be successful, and to increase student activity and learning outcomes.

Cycle II

Cycle II is a learning step carried out to improve the less successful cycle I. Cycle II was carried out on March 16, 2023. The steps for carrying out research in cycle II are as follows:

1) Planning stage

The planning stage of cycle II is the same as the previous cycle, namely:

(1) Prepare objectives and material to be discussed

(2) Prepare instructional Media

(3) Prepare Lesson plan

(4) Prepare student worksheet

(5) Prepare observation teacher activities

(6) Prepare observation of student activities

(7) Prepare about evaluation

(8) Prepare Evaluation question scoring guidelines

2) Level of implementation

The implementation of learning in cycle II is the same as the previous cycle. Still, there are slight changes to improve the less successful cycle I because the cycle II learning process is based on the

reflection results of cycle I. The learning steps are as follows:

a. Initial activity

In this initial activity, several things are done. Namely, the teacher opens the lesson by saying hello to the students, praying and checking the students' attendance, asking how the students are doing, as well as providing motivation, conveying the learning objectives, the teacher explaining the circuit learning activities, and preparing the media that will be used.

b. Core activities

In this cycle, the teacher explains the material with concept maps and pictures, after which the teacher and students ask and answer questions. The teacher divides students into several groups of 32 students. The teacher distributes worksheets to each group of students and instructs students in group discussions to work together. The teacher observes and visits each group and helps students with difficulty completing group assignments. In group discussions, student interaction with each group has improved. Each member helps each other, and there is a division of tasks within solving The student worksheet and collaboration. While the presentation was taking place, the other students were paying attention, and only a few students responded to the results of their friends' presentations.

c. End activities

During the core activities in cycle II, the teacher asks questions and answers with the students to make confirmations and conclusions about the presentation of the results related to the material being studied and then evaluate to determine student learning outcomes at the end of the second meeting cycle.

3) Observation and Evaluation

At the observation stage, two activities are observed, namely teacher and student activities.

(1) Observation of teacher activities

Based on the results of observations, the following results were obtained (Table 4):

Based on the details of the table above, it can be concluded that the teacher's activities in learning in class are by implementing learning strategies Circuit Learning, the score is 14 in the very good category. Observation of student activities. In this student activity, the assessment is carried out by observers. The details of the results of observing student activities are as follows (Table 5):

From observing the table above in cycle I, the average score was 4.6. It shows that student activities are categorized as very active. These results have reached the standard success indicators determined as the completion target: whether the student's learning activities have reached the active category.

(4) Evaluation

To determine student success in the learning process by applying strategies of Circuit Learning, an evaluation is carried out at the end of cycle II.

This evaluation activity is given individually by giving a learning outcomes test. The results of student evaluations in cycle II are as follows (Table 6):

Table 4. Recapitulation of the results of observations of cycle II teacher activities

No.	Item	Score
1	Carrying out apperception	1
2	Explain the learning objectives that students must achieve	1
3	Conduct questions and answers about the topics discussed	1
4	Show pictures about the topic in front of the class	1
5	Ask questions about the images presented	1
6	Displays the concept map that has been created	1
7	Explain the concept map that has been displayed	1
8	Divide students into several groups	1
9	Give students worksheets and fill in parts of the concept map in their language	1
10	Explain that the result students will be presented	1
11	Carry out a presentation of the part of the concept map that has been worked on	1
12	Reinforce the form of praise or prizes for good presentation results and encourage those who have not received praise or prizes to try harder	1
13	Explain the student's discussion again so that the student's insight becomes broader	0
14	Together with students, make a summary	1
15	Assessing student work results	1
Total score		14
Category		Very good

Table 5. Recapitulation of observation results of cycle II student activities

No.	Indicator	Score
1	Actively carry out question-and-answer activities about learning topics	4
2	Active in carrying out group discussion activities	5
3	Active in filling out worksheets in learning circuit Learning	5
4	Make a presentation of the results of the discussion	5
5	Participate in summarizing learning	4
Total		23
Average		4.6
Category		Very active

Table 6. Cycle II Evaluation Results

No.	Aspect	Results
1.	Students who take part in learning	32 people
2.	Students who take evaluation tests	32 people
3.	Completed students	23 people
4.	Students do not complete	9 people
5.	The highest score	90
6.	Lowest value	70
7.	Average student score	80
8	Classical completeness	87.5%

Based on the table above, it can be seen that of the 32 students who took the test, 28 students completed it, while four did not. The highest score was 90, and the lowest score was 70. The average score for student learning outcomes was 80, with a classical completion percentage of 87.5%. The results obtained in cycle II were successful because they reached ≥85%.

(5). Reflection stage

Based on the results of the second cycle of research, both the results of observations of the teaching and learning process and the results of evaluations, in this case, the student's activities during the learning process have reached completion.

This classroom action research was carried out to improve student learning outcomes in class VII science subjects at SMPN 4 Mataram by implementing strategies of circuit learning in learning activities. This research was conducted in two cycles. The research data shows increased science learning outcomes by implementing learning strategies in circuit learning.

The summary of the research results in Cycle I and Cycle II contains student activities, teacher activities, average student achievement scores, and classical completion. Based on the research results, it shows that there is an increase in teacher activity, student activity, and student learning outcomes from cycle I to cycle II. A summary of the results can be seen in the table below (Table 7):

Table. 7. Summary of activity results and student learning outcomes for Cycle I and Cycle II

Cycle	Teacher Activities		Student Activities		Learning outcomes	
	Score	Criteria	Score	Criteria	Score	Completeness
I	9	Pretty good	3	Quite active	75	76%
II	14	Very good	4.6	Very active	80	87. 5%

Based on the data above, the results of observations of the implementation of cycle I learning show that the teacher's activities in teaching are in the quite good category. It is proven from the observations made by obtaining a score in cycle I, namely 9. Meanwhile, in cycle II, the score obtained was 14, with an increase of 5. It shows an increase from cycle I, where teacher activities were included in the fairly good to very good category. The score increase was due to improvements and better planning than in the previous cycle. It cannot be separated from the role and responsibility of teachers in creating an active and effective learning atmosphere.

The observations of the implementation of learning in cycle I showed that students' learning activities in the learning process were included in the active category because, after the lessons, students achieved a score of 3. Meanwhile, in cycle II, the score obtained was 4.6, which was included in the active category. It shows an increase in the student activity category from cycle I to cycle II, with an increase of 1.6. The increase in the total score on the observation sheet occurred because students were more prepared to participate in lessons and better understood the learning process using strategies. Circuit learning compared to the previous cycle.

Based on the table of activity results and student learning outcomes for cycle I and cycle II above, students' understanding of the material presented by the teacher is by applying strategies circuit Learning is good, this is proven by the average student learning outcomes increasing from cycle 1 to cycle 2, namely 75 with classical completeness of 72% to 80 with classical completeness of 87.5%, increasing by 15.5%. This is because the circuit learning strategy was designed to help teachers provide less information than possible to students. Still, this strategy was developed to help students maximize the empowerment of thoughts and feelings with patterns of addition and repetition [13-15].

The pattern of addition and repetition in this concept means that after students have received the material provided by the teacher, through question and answer, the teacher reminds them of the important things from the material discussed at each meeting. In this circuit learning model, the teacher only acts as a facilitator and motivator for students to seek and find answers to the problems or topics discussed by highlighting students' creativity and concentration to focus on the topics raised [16-17].

Increasing student learning outcomes must be balanced with implementing the learning strategies used. Using learning strategies in the learning process can encourage the growth of students' enjoyment of lessons, increase motivation, and make it easier for students to understand lessons. If the learning process goes well, student learning outcomes are hoped to increase [18-20].

Based on research results, student learning outcomes in class VII science subjects at SMPN 4 Mataram in 2022-2023 by implementing strategiesCircuit learning increased. It is because the teacher conditions students to be ready to participate in learning well, the teacher conveys an overview of the circuit learning strategy to students, and asks initial questions to find out students' understanding of the material being discussed to make students enthusiastic in participating in learning, the teacher explains the material with pictures. and concept maps so that students become interested and focused on the concept maps displayed by the teacher. Through this circuit learning strategy, the teacher divides students into several groups and then guides the students in completing the worksheet so that no students are confused and disturb their friends in completing the worksheet. The teacher appoints

groups of students who come forward to present their work, and the other students pay attention to their friends' presentations, giving rewards of praise if someone dares to come forward to present the results of their work, repeat the results of the discussion together, and the teacher and students conclude what they have learned. Learning strategies Circuit Learning Is learning strategies that maximize the empowerment of thoughts and feelings with patterns of addition and repetition. After students have received the material provided by the teacher, through the question and answer method, the teacher reminds them of the important things from the material discussed at each meeting.

CONCLUSION

Based on the research and discussion results, implementing the strategy of Circuit Learning can improve student learning outcomes in class VII science subjects at SMPN 4 Mataram in the 2022-2023 academic year. It is done with steps starting from questions and answers about the topics being studied, presentation of concept maps, explanation of concept maps, division into several groups, filling in student worksheets accompanied by concept maps, explanation of procedures for filling in, carrying out group presentations, and giving rewards or praise. Strategy implementationCircuit Learning can improve student learning outcomes in class VII science subjects at SMPN 4 Mataram in 2022-2023, as shown by the average student learning outcomes in cycle 1, namely 75 with classical completeness of 72% and the average student learning outcomes in cycle 2, namely 80 with complete completion. Classical 87.5%, so there was an increase of 15.5%. The results of observations of teacher activities in teaching were included in the quite good category and increased to very Good. Meanwhile, the results of observations of students' activities in participating in learning have increased from quite active to very active.

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