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EFFORTS TO IMPROVE STUDENTS' LEARNING OUTCOMES THROUGH COLLABORATIVE LEARNING: THE TOPIC OF QUADRILATERALS

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ABSTRACT

Collaborative learning has been proven beneficial in mathematics education. This study aims to enhance learning outcomes through collaborative learning, particularly focusing on the topic of quadrilaterals. The research method employed in this study is classroom action research. Data analysis for this research utilizes both quantitative and qualitative data. The research findings indicate that: (1) students' learning outcomes prior to implementing collaborative learning were incomplete as students did not achieve the targeted indicators; (2) students' learning outcomes improved after the implementation of collaborative learning in both Cycle I and Cycle II; (3) the overall class achievement in Cycle I showed an improvement compared to the pre-action phase. Meanwhile, the mastery of learning between Cycle I and Cycle II showed further improvement, becoming even better; (4) observation results of the teacher's activities in facilitating collaborative learning in Cycle I were rated as moderately good, while in Cycle II, they were rated as very good; (5) students' responses during the collaborative learning process in Cycle I were categorized as moderately good, whereas in Cycle II, they were categorized as very good.

Keywords: Collaborative Learning, Students'Learning Outcomes, Quadrilaterals

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PRELIMINARY

Success in learning is seen based on changes in student behavior and learning outcomes (Eriyanto et al., 2021; Nugraha et al., 2021; Puspitarini & Hanif, 2019; Rafiola et al., 2020). Learning outcomes are defined as the maximum results that have been achieved by students after the teaching and learning process is carried out in studying certain subject matter. Learning outcomes are not only values, but can be changes, reasoning, discipline, abilities, and others that can lead to positive changes.

In fact, the low learning outcomes in mathematics can be attributed to the monotonous and teacher-dominated teaching practices (Munawaroh et al., 2021). Teachers often rely on lecture-style methods (Saleh & Lubis, 2018), and adopt a teacher-centered

approach to instruction (Widana & Umam, 2023). Teachers should instead utilize a contextual learning approach (Dewi & Agustika, 2020), which involves equipping students with real-life problems to generate greater interest and a sense of challenge among students.

Based on the interview and observation results with teachers MTs YTPI Al-Bukhari Muslim, it was found that a significant portion of the instruction still adheres to conventional methods, lacking variety in teaching approaches. On the other hand, from the students' perspective, a low interest in learning was identified due to the lack of innovation and creativity displayed by teachers in their instructional practices. Teachers still rely heavily on giving exercise problems, which results in students becoming passive learners. Students lack enthusiasm during the learning process, exhibit a lack of focus as evidenced by their limited attention to teacher explanations, and struggle to comprehend the taught material. These factors need to be addressed to minimize the low learning outcomes because mathematics is crucial in real-life situations and is an included subject in the final school examination.

This is in line with research Ningsih et al (2022) that low mathematics learning outcomes are not only student errors but inappropriate learning strategies. This is because teachers still use conventional learning strategies so that teacher and student communication is only one way. In addition, learning activities tend to be teacher-centered so that students are more passive and do not discover the skills and knowledge needed or their own attitudes. The aforementioned issues can be addressed by improving the learning process and utilizing innovative teaching models (Le et al., 2018). Innovative and engaging teaching models can enhance more meaningful learning experiences for students. However, not all teaching models are suitable for mathematics instruction.

Collaborative learning can serve as an alternative to address this issue. Collaborative learning involves two or more students working together in groups, sharing information, knowledge, ideas, and experiences to enhance the understanding of all group members (Le et al., 2018). This agrees with Munifah et al (2019), collaborative learning is group learning, students learn and work together, can improve verbal skills, and student interaction. Collaborative learning activities consist of sharing and passing on lessons (Scager et al., 2016). Students who do not understand the activities should be encouraged to seek help from their peers who have a better understanding by saying, "Please teach me" (Sato, 2014). The goal of collaborative learning is to encourage active student participation within groups and create a student-centered learning environment (Pertiwi1, 2017).

Additionally, collaborative learning is highly beneficial for enhancing mathematics education such that encouraging students to study in groups, making students more active in

conveying ideas, being responsible for themselves, and students can carry out inventory activities necessary, accept the ideas of others and draw conclusions (Marhamah et al., 2017). This is because the activities involved in collaborative learning foster students' conceptual understanding (Francisco, 2013; Mullins et al., 2011).

Improvement occurs when students have negative perceptions towards mathematics (Yackel et al., 1991). There is a great opportunity for students to reassess their reasoning and construct forms of reasoning (Yackel et al., 1991), as well as engage in ongoing idea generation and innovation processes to build collective understanding (Martin & Towers, 2009), by making collaborative learning beneficial in mathematics education. When teachers inform students that they must work collaboratively, students have no choice but to actively generate ideas, discuss them, and collaboratively answer questions (Elbers & Streefland, 2000). Moss & Beatty (2006) also state that when students face increasingly challenging problems, it triggers their desire and commitment to provide clear explanations as group members. Therefore, implementing collaborative learning is beneficial for students' conceptual understanding in solving mathematical problems as a group, where each student in the group contributes their ideas, attitudes, opinions, abilities, and skills to collectively enhance mutual understanding of the entire discussion.

In the implementation of collaborative learning, it is important to identify the existing constraints in order to facilitate the search for appropriate teaching solutions. This is necessary for optimal learning. If the current instructional implementation encounters various challenges, teachers need to analyze and find suitable solutions. As a result, students' learning achievements can be optimally attained in line with the learning objectives. Nia et al (2017) suggest that teachers should select teaching models that can support effective teaching and learning activities. Teachers should project different roles for students within group work. This analysis can provide a more accurate determination of which areas of study are feasible for students.

This study aims to enhance learning outcomes through collaborative learning, particularly focusing on the topic of quadrilaterals. This study analyze: (1) the mathematics learning outcomes prior to being taught with collaborative learning; (2) the mathematics learning outcomes after being taught with collaborative learning; (3) the improvement of students' mathematics learning outcomes through collaborative learning; (4) the process of mathematics instruction through collaborative learning; (5) the students' response when taught through collaborative learning.

METHODS

This research is a classroom action research aimed at improving students' learning outcomes, specifically in the topic of quadrilaterals, through collaborative learning. The implementation of classroom action research consists of four stages: (1) planning; (2) action; (3) observation; and (4) reflection (Cohen, 2007). The following are the stages of classroom action research, as depicted in the diagram below.

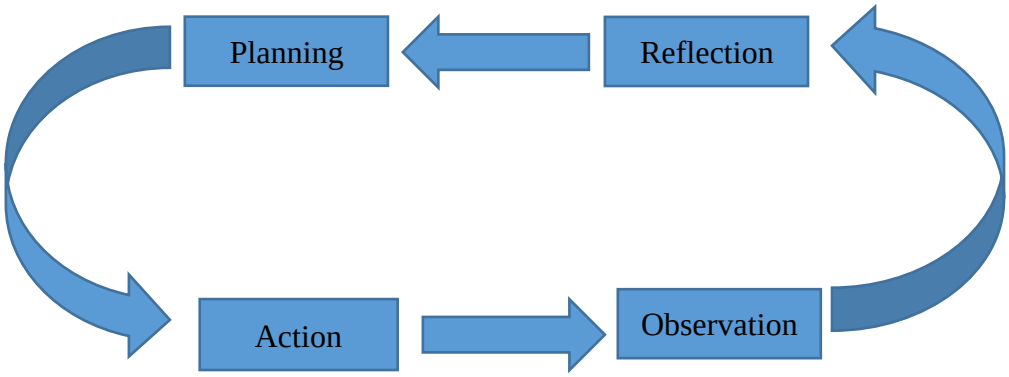

Figure 1. Stages of Classroom Action Research

The subjects of this study are 23 students from class VII of MTs YTPI Al-Bukhari Muslim. The object of this research is collaborative learning to enhance the learning outcomes of seventh-grade students in the topic of quadrilaterals. The data collection instruments used are observation, tests, and interviews. Observations are conducted to observe the learning process based on the prepared observation sheets and provide assessments based on the conducted observations. The observation results were returned to the researcher to see how far the teaching and learning process had been achieved. The results obtained from the teacher and student observation sheets are calculated using the formula below. The formula used in the percentage of student activity is as follows:

$$\text{Mark} = \frac{skor\ yang\ diperoleh}{banyak\ observasi}$$

The criteria for evaluating observations are as follows:

Table 1. Criteria Observation

Average Observations	Category
1,0 – 1,5	Not good
1,6 – 2,5	Currently
2,6 – 3,5	Good
3,6 – 4,0	Very well

The learning outcomes assessment used in this study is in the form of written responses in the form of opinions based on the students' knowledge (Sukmadinata, 2012). The learning result test is given after collaborative learning is implemented. This test of

learning outcomes aims to determine the increase in students after being given learning. The questions given through interviews were directed to find out the difficulties experienced by students in solving quadrilaterals. The interviews conducted focus on the test results carried out by students as an action to improve students' mathematics learning outcomes. The data analysis technique involves both quantitative and qualitative data analysis methods. Quantitative data analysis technique involves calculating the mean values and success rates of student learning, both individually and classically.

How to calculate the mean or average value using:

$$M = \sum \frac{X}{N}$$

Classical individual/individual learning mastery criteria, namely:

A student is called complete learning if he has achieved a score of 65% or 6,5 in determining student absorption individually/individually using the following formula:

$$KB = \frac{T}{T_1} x\ 100\ \%$$

With the criteria:

65 % ≤ KB ≤ 100 % = classified as complete

0 % ≤ KB ≤ 65 % = classified as incomplete

Classical Absorption

A class is called complete learning if in the class there are 85% who have achieved a value of ≥ 65%, the completeness is calculated by the formula:

$$P = \frac{X}{N} x\ 100\ \%$$

Meanwhile, qualitative data analysis technique involves data reduction, data display, and drawing conclusions, with a cyclic process occurring throughout the research (Miles et al., 2014).

RESULT AND DISCUSSION

RESULT

1. Pre-Action Learning Outcomes

The purpose of conducting the pre-action test on students was to assess their initial abilities in solving quadrilateral problems. Twenty-three students were given the pre-action test, but only 20 students did not achieve the individual passing grade. Based on this, it can be concluded that the students' learning outcomes are still low. Further details can be seen in the following table:

Table 2. Description of Pre-Test Learning Outcomes of Students

No	Minimum Passing Grade	Level of Proficiency	Number of Students	Average
1	< 70	Did Not Meet Minimum Passing Grade	20	51,09
2	≥ 70	Minimum Passing Grade	3	
		Total	23	

For the description of student achievement and the criteria for initial learning outcomes, they are presented in the following table.

Table 3. Description of Initial Test Proficiency

No	Proficiency (%)	Level of Proficiency	Number of students	Percentage of Students
1	< 70%	Not proficient	20	86,96%
2	≥ 70%	Proficient	3	13,04%
	Total		23	100%

Based on the table above, it can be observed that the initial proficiency of students in mastering the topic of quadrilaterals is still low. This is evident from the fact that out of 23 students, 20 students or 86,96% of the total students who took the test achieved low scores. Furthermore, the researcher interviewed students with low proficiency to identify their mistakes. Based on these facts, it was found that, on average, students still struggle to grasp the topic of quadrilaterals and have difficulty determining the area and perimeter of quadrilaterals. The results of the test serve as an initial identification for planning the actions to be taken. At this stage, a learning plan is developed for implementation in Cycle I. The planned learning activity involves collaborative learning as the instructional approach.

2. Results of Cycle I Research

a. Problem Phase

After administering the *pre-test*, the difficulties experienced by students were identified. The researcher found the following difficulties among students based on the results of the *pre-test:*

1) Students have not fully understood the given problems about quadrilaterals because they are still confused.
2) Students perceive the given problems as very difficult to solve individually.
3) Students have not fully grasped the method of solving story-based quadrilateral problems, particularly in terms of using formulas, causing confusion.

b. Implementation of Action

The implementation of the learning process has been organized based on the learning scenario and the implementation of alternative solutions that have been devised. The activities carried out in the learning process are as follows:

1) Begin the lesson by greeting the students and reciting the salutation and basmalah before commencing the learning activities.
2) The researcher presents the learning objectives.
3) The researcher informs the students about the practical application of the subject matter in everyday life.
4) Instruct the students to pay attention to the lesson content written on the whiteboard.
5) Ask the students to express their opinions regarding the presented material.
6) Provide and explain examples of questions related to the lesson content.
7) Allow students to ask questions and provide answers.
8) Instruct the students to form four groups by having them count from 1 to 6, then gather and sit in a circle with an equal number of classmates.
9) The researcher provides the groups with questions and worksheets.
10) Communicate the steps for completing the worksheets.
11) The researcher asks the students to start working on the questions and worksheets while observing and assessing the participation of each student within the group.
12) Select a representative from one of the groups to present the group's worksheet results.
13) Ask a representative from another group to provide feedback and ask questions.
14) Provide reinforcement for student responses and questions.
15) Invite students to return to their seats.
16) Ask students to summarize the lesson they have received.
17) At the end of Cycle I, students are given the first learning outcome test in the next meeting, which aims to identify the specific difficulties students face in problem-solving.

c. Description of Teacher's Activity Observation Results in Cycle I

The observation was conducted from the beginning to the end of the learning session. In this cycle, observations were made during each meeting. The following are the results of the observation of the teacher's activities in Cycle I through collaborative learning:

Table 4. Description of Teacher's Activity Observation Results in Cycle I

No	Indicator	Aspects Assessed	Scoring Scale for Meeting I and II	
			I	II
1	Opening skills	Greet with salutations and basmallah	4	4
		Conduct pre-lesson activities and motivation	3	3
		Communicate learning objectives	3	3
2	Presentation of material	Master the material	3	3
		Class presentation	2	3
		Systematic presentation	2	3
		Incorporate enrichment of material	3	3
3	Opening skills	Provide individual guidance to students	3	4
		Guide students in group settings	3	3
		Provide steps to solve problems from worksheets	3	4
		Explain the topic of squares in instructional materials	3	3
4	Classroom management	Efforts to discipline students	2	3
		Responding to problematic students	2	3
5	Communicating with students	Expressing questions	2	2
		Allowing time for thinking	2	3
		Motivating students to ask questions	3	3
		Providing answers to student questions	3	3
6	Conducting evaluations	How the teacher collects students' written work and presents group work results	3	4
		How the teacher gives praise to students	3	3
		How the teacher gathers students to present their work results	2	3
		Assigning tasks and learning outcome tests	3	3
7	Covering learning skills	Clarity of the teacher in informing about the next lesson content	2	3
8	Effective use of time	Starting class on time	3	3
		Timely delivery of content	3	3
		Timeliness in providing evaluations	3	3
		Knowing when to end the class	3	3
Total score			71	81
Average score			2,73	3,11
Average score of teacher's activity observation			2,92	

Based on the table above, the average score for the teacher's activity observation in Cycle I is 2,92, which falls under the category of fairly good. This indicates that the teacher's activities during the learning process in Cycle I were conducted well.

d. Description of Student's Activity Observation Results in Cycle I

During the implementation of the action, the researcher was observed by the mathematics teacher of class VII-2. The observation of the researcher was conducted to observe the students' learning activities during the learning process. The observation took place from the beginning to the end of the learning session in each meeting, namely meeting I and meeting II.

The data was obtained after conducting Cycle I observation on students' learning activity responses as follows:

Table 5. Description of Student's Activity Observation Results in Cycle I

No	Aspects Assessed	Scoring Scale for Meeting I and II	
		I	II
1	Student's engagement in learning	2	3
2	Student's participation in answering questions during discussions	2	2
3	Student's participation in problem-solving during discussions	3	3
4	Student's responsibility in completing assignments	2	3
5	Student's engagement in asking questions about the discussed material	3	3
6	Accuracy of students' answers to the discussed material in the learning process	2	3
Total score		12	17
Average score		2,00	2,83
Average score of Cycle I Observation		2,42	

Based on the results of the percentage of student engagement above, the average score of students participating in the learning process is 2,42, which is considered fairly good. This indicates that the students' activity level was satisfactory during collaborative learning.

e. Description of Learning Outcome Results in Cycle I

In Cycle I, students were first given the first learning outcome test to assess the improvement of learning outcomes through collaborative learning. It was found that the students' learning outcomes did not reach the class proficiency level. More detailed data can be seen in the table below.

Table 6. Description of Students' Learning Outcomes in Cycle I

No	Minimum Passing Grade	Level of Proficiency	Number of Students	Average
1	< 70	Did Not Meet Minimum Passing Grade	7	72,39
2	≥ 70	Minimum Passing Grade	16	
		Total	23	

For the description of student proficiency and the criteria for student learning outcome test proficiency in Cycle I, please refer to the following table.

Table 7. Description of Student Learning Outcome Proficiency in Cycle I

No	Percentage of Proficiency	Level of Proficiency	Number of students	Percentage of students
1	<70%	Not proficient	7	30,43%
2	≥ 70%	Proficient	16	69,57%
	Total		23	100%

Based on Table 7, the learning outcomes of students who received Cycle I intervention in class VII at MTs YTPI Al Bukhari Muslim can be observed. It can be seen that 16 students (69,57%) have achieved learning proficiency (score ≥ 70). However, 7 students (30,43%) have not met the proficiency level. The classical proficiency level obtained in Cycle I is 69,57%, which does not meet the requirement for classical proficiency. This is because less than 85% of students have reached the assessment percentage of ≥ 70%. Out of the 23 students, there are 6 students who scored 80-89, categorized as high-achieving students, 14 students who scored 65-79, classified as average-achieving students, and 3 other students who scored 55-64, categorized as low-achieving students. Based on these results, the intervention will continue to Cycle II, where the learning outcome test results will be used as a reference for providing interventions in Cycle II.

f. Reflection

Based on the observations in Cycle I, several challenges were identified in the learning process, particularly in collaborative learning. Considering the challenges encountered in the field during Cycle I and the discussions with the observer, it is necessary to continue the research in Cycle II. Some areas that need improvement are as follows:

1. During the learning activities, there were several students who lacked focus in paying attention and listening to the teacher's explanation. For the next cycle, the teacher should be able to open the lesson in a way that captures the students' attention.
2. During the learning activities, some students lacked confidence in their group because they felt inadequate compared to other group members. For the next cycle, the teacher

should reassure all students that group assignments are intended to help them understand and appreciate the differences among group members.

3. During the learning process, there were still many students who did not participate actively, particularly in solving problems in front of the class. For the next cycle, the teacher should provide recognition to encourage students to increase their participation in solving problems in front of the class.

The evaluation or learning outcome test conducted in Cycle I showed that the classical proficiency level of students has not been achieved, as the results only reached 69,57%, while the action hypothesis for classical proficiency was ≥ 85%.

3. Cycle II

a. Description of Teacher's Activity Observation Results in Cycle II

The observation was conducted during the implementation of the learning activities from the beginning to the end of the session. In this cycle, observations were made in each meeting, namely Meeting I and Meeting II. The following table shows the results of the teacher's activity observation in Cycle II through collaborative learning:

Table 8. Description of Teacher's Activity Observation Results in Cycle II

No	Indicator	Aspects Assessed	Scoring Scale for Meeting I and II	
			I	II
1	Opening skills	Greet with salutations and basmallah	4	4
		Conduct pre-lesson activities and motivation	3	3
		Communicate learning objectives	3	3
2	Presentation of material	Master the material	4	4
		Class presentation	4	4
		Systematic presentation	4	4
		Incorporate enrichment of material	4	4
3	Teaching model	Provide individual guidance to students	4	4
		Guide students in group settings	4	4
		Provide steps to solve problems from worksheets	4	4
		Explain the topic of squares in instructional materials	3	4
4	Classroom management	Efforts to discipline students	3	4

No	Indicator	Aspects Assessed	Scoring Scale for Meeting I and II	
			I	II
		Responding to problematic students	3	4
5	Communicating with students	Expressing questions	3	3
		Allowing time for thinking	3	3
		Motivating students to ask questions	3	3
		Providing answers to student questions	4	4
6	Conducting evaluations	How the teacher collects students' written work and presents group work results	4	4
		How the teacher gives praise to students	4	4
		How the teacher gathers students to present their work results	4	4
		Assigning tasks and learning outcome tests	4	4
7	Covering learning skills	Clarity of the teacher in informing about the next lesson content	4	4
8	Effective use of time	Starting class on time	4	4
		Timely delivery of content	4	4
		Timeliness in providing evaluations	4	4
		Knowing when to end the class	4	4
Total score			96	99
Average score			3,69	3,81
Average score of Teacher's Activity Observation			3,75	

Based on the table of teacher's activity observation above, it can be seen that the average score of teacher's activity observation in Cycle II is 3,75, indicating a satisfactory description. Therefore, it can be concluded that the teacher's activities in the learning process in Cycle II were carried out excellently.

b. Description of Student's Activity Observation Results in Cycle II

During the implementation of the action, the researcher was observed by the mathematics teacher of class VII-2. The researcher's observation was conducted to observe the students' learning activities during the learning process. The observation took place during the implementation of the learning activities from the beginning to the end of the

session. In this cycle, observations were made in each meeting, namely Meeting I and Meeting II.

The data obtained after conducting observations in Cycle II on student's learning activity responses are as follows:

Table 9. Description of Student's Activity Observation Results in Cycle II

No	Aspects assessed	Scoring Scale for Meeting I and II	
		I	II
1	Student's engagement in learning	3	4
2	Student's participation in answering questions during discussions	4	4
3	Student's participation in problem-solving during discussions	4	4
4	Student's responsibility in completing assignments	4	4
5	Student's activeness in asking questions about the discussed material	3	3
6	Accuracy of students' answers regarding the discussed material in the learning process	4	4
Total score		22	23
Average score		3,67	3,83
Average score of Cycle II Observation		3,75	

Based on the percentage of student engagement above, the average score for students participating in the learning process is 3,75, indicating a satisfactory description. This indicates that the students' activities were quite good during the collaborative learning.

c. Description of Learning Outcome Results in Cycle II

In the Cycle II phase, students were given a second learning outcome test to assess the improvement in learning outcomes through collaborative learning. After the learning activities in Cycle II, it was found that students' learning outcomes did not reach the classical proficiency level. Further details can be seen in the following table.

Table 10. Description of Student Learning Outcomes in Cycle II

No	Minimum Passing Grade	Level of Proficiency	Number of Students	Average
1	< 70%	Did Not Meet Minimum Passing Grade	4	83,91
2	≥ 70%	Minimum Passing Grade	19	
		Total	23	

For the description of student proficiency and the criteria for student learning outcome test proficiency in Cycle II, please refer to the table below.

Table 11. Description of Student Learning Outcome Proficiency in Cycle II

No	Percentage of Proficiency	Level of Proficiency	Number of Students	Percentage of Total Students
1	<70%	Not proficient	4	17,39%
2	≥ 70%	Proficient	19	82,61%
	Total		23	100%

Based on the student learning outcome test after implementing Cycle II, it can be observed that 19 students (82,61%) have achieved proficiency (score ≥ 70), indicating that the proficiency indicators mentioned earlier have been achieved by these students, while 4 students (17,39%) have not met the proficiency level. The average score has also increased from 72,39 in Cycle I to 83,91 in Cycle II. This achievement has reached the minimum average student learning achievement of 70 and the minimum classical student proficiency level of 85%. This proves that the topic of quadrilaterals through collaborative learning, as reflected in the learning outcome tests I and II, has improved both individual and classical learning proficiency.

d. Reflection

The efforts made by the researcher in Cycle II have successfully improved students' learning outcomes in the topic of quadrilaterals. Student-centered learning approach has made students more confident in engaging in activities and expressing their opinions. Based on the data analysis conducted, the following findings are obtained:

1. The researcher has been able to enhance the learning through collaborative learning. This is evident from the observation results showing an improvement in teaching and learning activities conducted by the researcher based on the observations made by the observer. Although some students still face difficulties in solving the given problems, the number of students experiencing difficulties has decreased compared to before.
2. The students' learning outcomes have improved. This can be seen from the increase in the class average score from 72,39 (moderate criteria) in the first achievement test to 83,91 (high criteria) in the second achievement test, as well as the number of students who achieved learning mastery. In the first cycle, 16 students (69,57%) reached the learning mastery, which increased to 19 students (82,61%) in the second cycle. Therefore, based on the results of the second cycle, the average score of students has increased to 83,91, with 82,62% of students achieving a score of ≥70. These results meet the criteria for learning mastery.

3. The success indicators for each cycle in this study have been achieved as the observation results of the learning activities fall within the criteria of average observation assessment, the problem-solving abilities of students are categorized as high, and both individual learning mastery and class learning mastery have been attained. However, during the learning activities, there were some students who lacked focus in paying attention and listening to the teacher's explanations. Therefore, in the next cycle, the teacher should be able to open the lesson in a way that captures the students' attention.

Since the success indicators for each cycle in this study have been achieved, the objectives of this research have been accomplished, and therefore, the learning can be concluded without proceeding to the next cycle. Based on the observations of the learning implementation and the results of the learning assessments, it is evident that collaborative learning has effectively improved the students' learning outcomes in the topics of plane figures and rectangles in Grade VII of MTs YTPI Al Bukhari Muslim.

DISCUSSION

The assessment of learning achievement is applied based on the criteria of Minimum Classical Mastery (KKM), taking into account three components related to the implementation of learning. These three components are (1) the complexity of the material and competencies that need to be mastered, (2) the level of support provided, and (3) the students' initial abilities. The third component is the students' initial abilities, which can be assessed through a pretest or diagnostic test conducted as a pre-action test. According to (Hamalik, 2009), the diagnostic test also serves as a benchmark for providing guidance to students regarding their learning difficulties. In other words, this diagnostic test also functions to assess students' initial understanding (Eriyanto et al., 2021).

In line with the aforementioned diagnostic function, this study employed the diagnostic test as an initial step for further actions. In the pre-class action, which took place before implementing collaborative learning, none of the 23 students achieved the standard classical mastery with a score ≥ 70. The average score obtained from the 23 students was 51,09. Three students, comprising 13,04% of the total, achieved the classical mastery. A class is considered to have achieved learning mastery if 85% of the students have achieved a percentage score of 70 or higher. Since the classical mastery has not reached ≥ 85%, it can be said that the students of class VII MTs YTPI Al Bukhari Muslim have not achieved mastery in mathematics learning, particularly in the topic of quadrilaterals. From the diagnostic test, it is known that students are experiencing difficulties in solving the given

problems, specifically, they have a limited understanding of quadrilateral-related problems. In this case, students still appear confused and find the given problems challenging to solve independently. They have not fully grasped the proper approach to solving story-based quadrilateral problems, and they still struggle with applying the formulas accurately (Sutama et al., 2021).

After implementing the intervention in Cycle I through collaborative learning, there was an improvement observed. From the test results, it can be seen that 16 students or 69,57% achieved mastery, while 7 students or 30,43% did not meet the mastery criteria. The class average was 72,39. This indicates that the learning outcomes have not reached their maximum potential, and the mastery target has not been achieved yet.

By understanding the students' learning difficulties, Cycle I intervention was implemented through collaborative learning using the discussion method. The discussion method in collaborative learning can facilitate meaningful learning for students. The benefits of discussion include the following: (1) students have the opportunity to think critically; (2) students are trained to express their opinions, attitudes, and aspirations freely; (3) students learn to be tolerant towards their peers; (4) discussions can foster active participation among students; (5) discussions can develop a democratic attitude, where students learn to respect the opinions of others; and (6) through discussions, lessons become relevant to the needs of society (Sagala, 2009).

The students' activities in Cycle I have shown some improvement, but the researcher still needs to provide extra guidance, especially in group formation. At the beginning of the group formation, it was challenging because there were some groups that couldn't complete the assigned tasks. Based on the second learning outcome test given at the end of the lesson, there are 19 students who have passed, accounting for approximately 82,61%, and have achieved a sufficient KKM score. There are also 4 students who have not reached proficiency, accounting for approximately 17,39%, and have not achieved the KKM score. This means that the learning process has shown improvement and has achieved the classical mastery level of ≥ 85.

By maximizing active collaborative learning, it helps enhance students' ability to stimulate students' thinking styles, resulting in an improvement in students' learning outcomes between the learning outcomes in Cycle I and the learning outcomes in Cycle II. This can be seen from the following:

1. Increasing the percentage of classical mastery. In Cycle I, the classical completeness was 69,57% and in the cycle II the percentage of classical completeness was 82,61%. So the increase that occurred was 13,04%.
2. Adding to the average class grade. The class average score on the cycle I student learning outcomes test was 72,39 and the class average score on the cycle II student learning outcomes test was 83,91. Then there was an increase in the class average value of 11,52.
3. Increasing the number of students who achieve a score of ≥ 80.

Therefore, it can be concluded that collaborative learning can improve students' learning outcomes in mathematics, specifically in the topic of quadrilaterals, in the 7th grade of MTs YTPI Al Bukhari Muslim.

CONCLUSION

Based on the research findings, it can be concluded that: (1) Students' learning outcomes before implementing collaborative learning were inadequate. This indicates that the initial assessment given to the 7th grade students of MTs YTPI Al Bukhari Muslim did not meet the required indicators for proficiency; (2) Students' learning outcomes improved after implementing collaborative learning in each cycle conducted. Cycle I and II implemented collaborative learning while taking into account the difficulties encountered during its implementation. Mathematics learning outcomes in Cycle I achieved proficiency and showed an improvement in learning proficiency in Cycle II, indicating that further cycles of the study were not necessary. (3) The improvement in students' learning outcomes after implementing collaborative learning can be observed in the implementation of Cycle I, where classical proficiency increased compared to the pre-action stage. Meanwhile, the learning proficiency between Cycle I and Cycle II improved even further. (4) The process of implementing mathematics learning through collaborative learning was carried out according to the stages of collaborative learning. The stages of collaborative learning are as follows: (a) students in groups determine the learning materials and divide individual tasks, (b) after the collaborative group agrees on the problem-solving results, each student writes a comprehensive report individually, (c) the teacher randomly selects one group to present the collaborative group discussion results in front of the class, (d) each student in the group performs elaboration, inference, and revision (if necessary) of the reports to be submitted, and (e) each group compiles the student reports on the collected tasks, arranged in the collaborative group. Based on the observation of the teacher's activities in implementing

collaborative learning in cycle I, the average scores were categorized as "fairly good," and in cycle II, the average scores were categorized as "very good." Additionally, (5) the students' responses during the collaborative learning process showed improvement, as evidenced by the observation sheets indicating an increase in both cycle I and cycle II. In cycle I, the average scores were categorized as "fairly good," while in cycle II, the average scores were categorized as "very good."

This research is limited to efforts to improve student learning outcomes through collaborative learning, especially quadrilateral topics. Additionally, the making of learning achievement tests that are used to measure the increase in student learning outcomes is still not good and students find it difficult to solve questions from various points of view. Therefore, researchers recommend further research to combine collaborative learning with the application of mathematics to improve students' mathematical abilities by using mixed method research.

As for the suggestions and implications of the research results for education and learning in the classroom, namely: (1) to math teachers, especially math teachers at MTs YTPI Al Bukhari Muslim, to always pay attention to the difficulties students experience in learning. For this reason, mathematics teachers should be able to use collaborative learning to provide broad-mindedness for students to be able to motivate students and train students for active learning. (2) the teacher is expected to provide problems and exercises related to students' daily lives in solving questions. (3) to students of MTs YTPI Al Bukhari Muslim, especially students of class VII-2 who have low and moderate problem-solving skills, so that they have more practice solving questions. (4) to future researchers who are interested in conducting similar research so that they pay attention to the weaknesses in this study.

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