

Implementation of Problem Based Learning (PBL) Model to Improve Students' Activity and Creative Thinking Skills in Mathematics Subject at SMP Negeri 13 Lebong

Rini Febrianti¹, Gustro Gunoto², Sri Nalyana³, Tindra Lena⁴, Sara Zahara⁵, Adi Asmara⁶,
Risnanosanti⁷

Phone number: 085268282858

¹S.Pd, UMB, Bengkulu, Indonesia,
rinilebong87@gmail.com
ORCID: 0000-0000-0000-0000

²S.Pd, UMB, Bengkulu, Indonesia,
gustrogunoto86@gmail.com
ORCID: 0000-0000-0000-0000

³S.Pd, UMB, Bengkulu, Indonesia,
srinalyana15@gmail.com
ORCID: 0000-0000-0000-0000

⁴S.Pd, UMB, Bengkulu, Indonesia,
tindralena08@gmail.com
ORCID: 0000-0000-0000-0000

⁵S.Pd, UMB, Bengkulu, Indonesia,
sarazahara021287@gmail.com
ORCID: 0000-0000-0000-0000

⁶Dr., M.Pd, UMB, Bengkulu, Indonesia, adiasmara@umb.ac.id
ORCID: 0000-0000-0000-0000

⁷Dr., M.Pd, UMB, Bengkulu, Indonesia,
risnanosanti@umb.ac.id
ORCID: 0000-0000-0000-0000

Corresponding Author:
Rini Febrianti,
UMB, Bengkulu, Indonesia,
rinilebong87@gmail.com

Submitted: 11/07/2024
1st Revised: 25/07/2024
2nd Revised: 11/08/2024
Accepted: 10/09/2024
Online Published: 06/11/2024

Citation: Febrianti, Rini. Et. All.
Implementation of Problem Based Learning (PBL) Model to Improve Students' Activity and Creative Thinking Skills in Mathematics Subject at SMP Negeri 13 Lebong. Annual International Conference on Education Research, Volume 01, Nomor 02, 2024

Abstract

This study aims to determine the improvement in learning activities, creative thinking skills, and student learning outcomes through the Problem Based Learning (PBL) model. This type of research is classroom action research. The subjects of the study were 30 students from class VII.C at SMP Negeri 13 Lebong. The research was conducted from September to October 2023. The results showed that in the first cycle, the teacher's activity score was 32 (Good) and the student's activity score was 27 (Fair). In the second cycle, the teacher's activity score was 35.5 (Good) and the student's activity score was 35.5 (Good). In the third cycle, the teacher's activity score increased to 36 (Good) and the student's activity score remained at 35 (Good). The students' creative thinking skills in the first cycle scored 54.50% (Fair), and in the second cycle, it improved to 71.16% (Fair). In the third cycle, creative thinking skills further increased to 81.08%, categorized as Creative. The students' learning outcomes in the first cycle had an average score of 65.3 with 53.3% classical learning completeness (not yet complete). In the second cycle, the average score increased to 73.6 with 70% classical learning completeness (not yet complete). In the third cycle, the average score reached 77.23 with 87% classical learning completeness (complete). These three cycles showed an improvement in the students' learning outcomes during the teaching and learning activities. Based on the research data, the application of the Problem Based Learning model can enhance the activity and creative thinking skills of students at SMP Negeri 13 Lebong. The conclusion is there was an increase in teacher and student activity from Cycle I with a score of 32 (Good), Cycle II with a score of 33.5 (Good), to Cycle III with a score of 35 (Good). Student activity improved from Cycle I with a score of 29.5 (Adequate), Cycle II with a score of 33.5 (Good), to Cycle III with a score of 35 (Good). There was an increase in students' creative thinking skills from Cycle I (54.50%) categorized as Adequate, Cycle II (71.16%) categorized as Adequate, to Cycle III (81.08%) categorized as Creative. There was an increase in student learning outcomes from Cycle I with a score of 53.3% (Not Yet Mastery), Cycle II with a score of 70% (Not Yet Mastery), to Cycle III with a score of 86.6% (Mastery) with a classical mastery percentage of 85%.

Introduction

Education is the result of a nation's civilization developed based on the nation's worldview, which serves as its educational philosophy; it represents an ideal or goal that motivates; a way a nation thinks and behaves, passed down from generation to generation (Siti Meichati, 1975). According to Law No. 20 of 2003 concerning the national education system, education is defined as a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to possess religious spiritual strength, self-control, personality, intelligence, noble character, and the skills needed by themselves, society, the nation, and the state.

The advantages of the Problem Based Learning model include (Sanjaya, 2006): Problem-solving is an effective technique for better understanding the subject matter; it challenges students' abilities and provides satisfaction in discovering new knowledge; it can increase students' learning activities; it helps students transfer their knowledge to understand real-life problems; it helps students develop new knowledge and take responsibility for their learning.

Based on initial observations at SMP Negeri 13 Lebong, the teaching model often used in Mathematics classes is still in the form of lectures and discussions. However, some teachers have started to apply approaches with different teaching models from conventional or traditional teaching. Nevertheless, most Mathematics teachers still frequently use conventional approaches in their teaching activities, dominated by the teacher. In this conventional approach, the teacher delivers the material and provides examples, while the students sit neatly and listen. In lecture-based models, students tend to be more passive, and the learning atmosphere becomes boring. As a result, students do not fully understand or master the concepts taught in Mathematics lessons.

Based on the results of daily tests for the academic year 2022-2023, the average Mathematics scores of class VII.C students are still low. The Minimum Mastery Criteria (MMC) for Mathematics is 70. The average daily test score of students is 6.8, with a completion rate of 40%. Learning can be considered successful if 85% of the students achieve a score of 70 or above the MMC. This condition occurs because, in the process of learning Mathematics, there is often a tendency for teaching and learning activities to involve students insufficiently, leading to a decreased interest in reading or memorizing Mathematics lessons and a lack of mastery of the material taught. Therefore, students experience difficulties in solving Mathematics problems.

The researches about this area have been conducted by some researchers, namely Umriani et al. (2020) found that students lacked creative thinking skills despite following the 2013 curriculum. They suggested problem-based learning but noted a lack of suitable worksheets. Surya et al. (2017) showed improvement in students' creative thinking abilities over assessment cycles, likely due to problem-based learning.

Methods

The design of this research is classroom action research (CAR) which includes planning, action, observation, and reflection. The subjects of this classroom action research are all students of class XC, totaling 30 students. The research was conducted at SMP Negeri 13 Lebong from September to October 2023.

The classroom action research (CAR) procedure was carried out in several cycles. Each cycle consists of four stages: (1) Planning, (2) Implementation, (3) Observation, and (4) Reflection. The data collection techniques included observation sheets, creative thinking skills test sheets, and test sheets. The data analyzed comprised the observation data of teacher and student activities, the creative thinking skills test data, and the learning outcome data.

Result

The result of this research will be described in detail as follow.

1. Cycle I

Cycle I consisted of 2 sessions with an allocation of 2x45 minutes and 1x45 minutes. Cycle I was conducted from September 11-13, 2023. The results from Cycle I indicated that: 1) The

teacher's activity in the learning process during Cycle I had an average score of 32, categorized as good. However, there were still deficiencies that needed to be corrected in the next cycle; 2) The students' activity during the Problem Based Learning (PBL) sessions received a score of 29.5, categorized as fair. These deficiencies in Cycle I needed to be addressed in the next cycle; 3) The students' creative thinking skills were categorized as fair with an average score of 54.50%. Further improvements were needed in each aspect. In this cycle, students were not yet considered successful in the learning process due to suboptimal implementation of the teaching and learning process, which needed to be improved in the next cycle; 4) From the test results, 16 students had achieved individual mastery, while 14 students had not. The average score of students was 65.3 with a classical completeness rate of 53.3%, meaning the classical mastery learning standard of 85% was not achieved in Cycle I.

As a reflection, to improve the aspects that were still lacking in Cycle I based on the analysis of the teacher and student activity observations, improvements were necessary for the next cycle. The aspects that were implemented well would be maintained in the subsequent cycle.

2. Cycle II

Cycle II consisted of 2 sessions with an allocation of 2x45 minutes and 1x45 minutes and was conducted on September 18, 2023. The results from Cycle II indicated that: 1) The teacher's activity during teaching had an average score of 36, categorized as good, as shown by the average score falling within the good category; 2) The students' activity during the Problem Based Learning (PBL) sessions was also categorized as good with an average score of 33.5; 3) The students' creative thinking skills were still categorized as fair with an average score of 71.16%. Thus, the researcher proceeded to Cycle III to improve upon Cycles I and II, 4) The average score in Cycle II was 73.6, with test results showing that only 21 out of 30 students scored 70 or above. Analyzing this with the classical mastery learning criteria, the completion rate was 70%, meaning the classical mastery learning standard of 85% was not achieved in Cycle II.

As a reflection, the successes and deficiencies in the learning process analysis of Cycle II were evident from the teacher observation results in Table 2 and the student observation results in Table 4. The shortcomings were: The learning activities conducted by the teacher still had many deficiencies, many students did not pay attention to the teacher during lessons, and the average student score in Cycle II was only 73.6, which did not meet the classical mastery learning standard of 85%.

3. Cycle III

Cycle III consisted of 2 sessions with an allocation of 2x45 minutes and 1x45 minutes and was conducted on September 20, 2023. The results from Cycle III indicated that: 1) The teaching process activities were categorized as good, as shown by the improvement in the average score in each cycle. However, there were still some aspects in the fair category that needed further improvement, such as the teacher's ability to define learning tasks related to the problems to be solved and analyze the ability to solve the given problems; 2) The students' activity during the learning process in Cycle III improved compared to Cycles I and II. However, there were still areas needing improvement, such as students paying attention to the teacher's delivery of learning objectives and listening and observing the teacher's explanations; 3) The students' creative thinking skills showed an improvement, with a mastery rate of 81.08% compared to 54.50% in Cycle I and 71.16% in Cycle II, indicating significant progress in Cycle III; 4) The final test results in Cycle III showed an average score of 77.23%, with 26 out of 30 students scoring 70 or above. Analyzing this with the classical mastery learning criteria, the completion rate was 87%, categorized as complete. This indicated that the Problem Based Learning (PBL) model could improve student learning outcomes in the subject being studied.

Table 1. The result of Students' Creative Thinking Ability in Cycle I

No	Criteria	Frequency	Percentage
1	Very creative	0	0%
2	Creative	1	3,33%
3	Creative enough	11	36,6%



4	Less Creative	18	60%
Total		30	
Achievement percentage		54,50%	
Criteria		Creative Enough	

Tabel 2. Nilai Tes Siklus I

Students with score above 70	KKM SMP N 13 Lebong	Average score	Percentage of Classical Learning Mastery	Criteria for Classical Learning Mastery
16	70	65,3	53,3%	Belum Tuntas

Table 2. The result of Students' Creative Thinking Ability in Cycle II

No	Criteria	Frequency	Percentage
1	Very creative	5	16,6%
2	Creative	6	20%
3	Creative enough	18	60%
4	Less Creative	1	3,33%
Total		30	
Achievement percentage		71,16%	
Criteria		Creative Enough	

Table 4. Test Result Cycle II

Students with score above 70	KKM SMP N 13 Lebong	Average Score	Percentage of Classical Learning Mastery	Criteria for Classical Learning Mastery
21	70	73,6	70%	Incomplete

Table 5. The result of Students' Creative Thinking Ability in Cycle II

No	Criteria	Frequency	Percentage
1	Very creative	17	56,6%
2	Creative	6	20%
3	Creative enough	7	23,3%
4	Less Creative	0	0%
Total		30	
Achievement percentage		81,08%	
Criteria		Creative	

Tabel 6. Nilai Tes Siklus III

Students with score above 70	KKM SMP N 13 Lebong	Average Score	Percentage of Classical Learning Mastery	Criteria for Classical Learning Mastery
26	70	77,23	87%	Complete

The research conducted over approximately one month at SMP Negeri 13 Lebong, implementing the Problem Based Learning model in mathematics for class VII.C, has shown that it can enhance both activity levels and creative thinking skills. The improvement in the learning process includes both teacher and student activities as well as creative thinking abilities from Cycle I, Cycle II to Cycle III.

Discussion

After the results were found and analyzed, the researchers further discussed them in more detail. The detailed discussion is as follows:

1. Analysis of Teacher Activity

Teacher activity in the learning process is a very important part of improving student learning outcomes. This can be seen in the analysis results conducted by two observers during the learning process. In Cycle I, based on Table 4, it was found that the teacher's activity during the teaching and learning process scored a total of 64, with an average of 32. The total score of Observer I was 32 and Observer II was also 32, categorizing the teacher's activity in Cycle I as Good. However, there were still deficiencies that needed to be corrected in the next cycle.

In Cycle II, based on Table 8, it was found that the teacher's activity during the learning process scored a total of 67, with an average of 36. The total score for Observer I was 38 and Observer II was 34, categorizing the teacher's activity in Cycle II as Good with some improvements. Yet, there were still some deficiencies that needed to be addressed in Cycle III. In Cycle III, based on Table 12, it was found that the teacher's activity during the learning process scored a total of 70, with an average of 35. The total score for Observer I was 36 and Observer III was 34, categorizing the teacher's activity in Cycle III as Good and showing improvement compared to Cycle I and Cycle II.

Based on the above data, it can be concluded that teacher activity in the mathematics learning process from Cycle I, Cycle II, and Cycle III improved through the implementation of the Problem Based Learning model. This model can enhance teacher activity during the learning process, as it makes it easier to present problems related to daily life to students. Teachers can encourage students to be more active in solving problems. According to Hamalik (2010), in the learning process with the Problem Based Learning model, teachers can motivate students to understand the lessons better and encourage them to be more enthusiastic about participating in the learning process.

2. Analysis of Student Activity

Based on the results of student observation sheets in Cycle I, as shown in Table 5, it was found that student activity in the learning process with the Problem Based Learning model was categorized as Adequate. The learning process observed by two observers scored 26 for Observer I and 33 for Observer II, with a total score of 59 and an average of 29.5, categorized as Adequate. In Cycle II, based on Table 9, it was found that student activity during the learning process, observed by two observers, scored 34 for Observer I and 33 for Observer II, with a total score of 67 and an average of 33.5, categorized as Good.

In Cycle III, all observed aspects showed improvement, as seen in the learning process observed by two observers, scoring 35 for Observer I and 35 for Observer II, with a total score of 70 and an average of 35, categorized as Good. The learning process with the Problem Based Learning model in biology was well-implemented. Deficiencies in Cycle I and Cycle II were corrected.

Based on the above data, it can be concluded that student activity improved through the implementation of the Problem Based Learning model. This model can enhance activity, creative thinking skills, and interpersonal relationships in group work.

This is supported by Ngalimun's opinion that the Problem Based Learning model should be used in learning because:

- a. The Problem Based Learning model actively involves students in problem-solving and demands higher-order thinking skills.
- b. The Problem Based Learning model makes students enjoy the learning process more.
- c. Problem Based Learning can enhance activity, creative thinking skills, and interpersonal relationships in group work.

3. Analysis of Creative Thinking Skills Test



The results of the Creative Thinking Skills Test in Cycle I, as shown in Table 6, indicated that the average score was 54.50%, with 0 students categorized as Very Creative, 1 as Creative, 11 as Quite Creative, and 18 as Less Creative. This data suggests that creativity was lacking, as there were still many deficiencies.

In Cycle II, based on Table 10, the students' creative thinking skills began to show improvement. The average score was 71.16%, with 5 students categorized as Very Creative, 6 as Creative, 18 as Quite Creative, and 1 as Less Creative.

In Cycle III, based on Table 14, all observed aspects showed improvement. The learning process with the Problem Based Learning model in mathematics was well-implemented, with an average score of 81.08%. There were 17 students categorized as Very Creative, 6 as Creative, 7 as Quite Creative, and 0 as Less Creative. This data shows improvement from Cycle I and Cycle II.

It can be concluded that students' creative thinking skills improved through the implementation of the Problem Based Learning model. The increase in creative thinking skills is due to challenging students to determine new knowledge, helping them develop new knowledge, and taking responsibility for their learning.

According to Uci (2012), students' creative thinking skills can improve because the learning process uses the Problem Based Learning model, which encourages students to find new ideas, enhancing their knowledge and measuring their abilities.

4. Analysis of Learning Outcomes Test

Based on Table 2 in Cycle I, the average score was 65.3, with 16 out of 30 students achieving mastery, and a classical mastery percentage of 53.3%, categorized as Not Yet Mastery. According to the Minimum Competency Criteria (KKM) of SMP Negeri 13 Lebong, mastery is achieved if students score 70 or above with a classical mastery percentage of 85%. Therefore, Cycle I was categorized as Not Yet Mastery.

Based on Table 4 in Cycle II, the average score was 73.6, with 21 out of 30 students achieving mastery, and a classical mastery percentage of 70%. There was an improvement but it still did not meet the 85% classical mastery criterion. Based on Table 15 in Cycle III, the average score was 77.23, with 26 out of 30 students achieving mastery, and a classical mastery percentage of 87%. There was an improvement compared to the classical mastery percentage in Cycle I and Cycle II. According to the KKM of SMP 13 Lebong, mastery is achieved if the average score is 70 or above with a classical mastery percentage of 85%. Therefore, the learning process and outcomes in Cycle III were categorized as Achieved or Mastery.

The learning process with the Problem Based Learning model, based on the above data, can improve student learning outcomes from Cycle I, Cycle II, and Cycle III. The improvement in each cycle occurred because the teacher always involved students in solving problems, helping them understand the concepts more easily, developing their abilities and knowledge, taking responsibility for their learning, and making students enjoy mathematics lessons.

According to Setiawan (2008), problem-based learning is a contextual learning strategy that helps students develop thinking skills, problem-solving skills, and intellectual skills through real-life experiences or simulations, making them good learners. Thinking skills are inherent in students from birth, and the more they use their intellect, the more their thinking skills develop and improve.

Both the previous research by Umriani et al. (2020) and the present research demonstrate a focus on enhancing students' creative thinking skills through problem-based learning. In Umriani et al.'s study, despite following the 2013 curriculum, students lacked these skills, highlighting a gap in the educational approach. They suggested problem-based learning as a solution but noted the absence of suitable worksheets.

In contrast, the present research shows a positive outcome regarding the implementation of problem-based learning. There was an increase in both teacher and student activity levels across assessment cycles, indicating active engagement in the learning process. Moreover, there was a notable improvement in students' creative thinking skills from Cycle I to Cycle III, with a shift from an "Adequate" categorization to a "Creative" one. This improvement was further reflected in

student learning outcomes, with a significant increase in mastery percentage from Cycle I to Cycle III, reaching the classical mastery threshold of 85%.

Overall, while both studies acknowledge the importance of problem-based learning in fostering creative thinking skills, the present research demonstrates its effectiveness through tangible improvements in student activity levels, creative thinking skills, and learning outcomes over successive assessment cycles.

Conclusion

There was an increase in teacher and student activity from Cycle I with a score of 32 (Good), Cycle II with a score of 33.5 (Good), to Cycle III with a score of 35 (Good). Student activity improved from Cycle I with a score of 29.5 (Adequate), Cycle II with a score of 33.5 (Good), to Cycle III with a score of 35 (Good). There was an increase in students' creative thinking skills from Cycle I (54.50%) categorized as Adequate, Cycle II (71.16%) categorized as Adequate, to Cycle III (81.08%) categorized as Creative. There was an increase in student learning outcomes from Cycle I with a score of 53.3% (Not Yet Mastery), Cycle II with a score of 70% (Not Yet Mastery), to Cycle III with a score of 86.6% (Mastery) with a classical mastery percentage of 85%.

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