Improving Mastery of Science Concepts Using Problem Based Learning Models in Class V in Elementary School

M. Habib Ridho [1] , Ramdhan Witarsa [2] , Musnar Indra Daulay [3] , Nurhaswinda [4] , Putri Hana Pebriana [5]

[1,2,3, 4, 5] *(PGSD, Tuanku Tambusai Hero University, Riau)*

E-mail: Habibridho74@gmail.com

Abstract. *The background of this study is the low mastery of science concepts by fifth grade students at SDN 008 Salo Timur. This study aims to improve the mastery of science concepts using the problem-based learning model for class V in elementary schools. This research is a class follow-up research, which was carried out in two cycles and each cycle consisted of two meetings. The subjects in this study consisted of 1 teacher and 29 students, while the object was to use a problem-based learning model to improve students' mastery of science concepts. The research instrument consisted of teacher activity observation sheets and student activity observation sheets, test sheets and documentation sheets during the learning process using the problem based learning model. While the data analysis technique used is descriptive qualitative and quantitative analysis. Based on the results of research that has been carried out through 2 cycles, at the second meeting of cycle I mastery of classical mastery of science concepts students only 24.13% in the low category and the average learning value is only 67.03 in the medium category. It is known that there was an increase in students' mastery of science concepts after improvements were made in the second cycle of meeting 2, the classical mastery of students' science concepts was 86.20% in the very high category and the average student learning score was 80.55 in the high category. Based on the results of the study, it can be concluded that if the problem-based learning model is used , it can improve students' mastery of science concepts in class V 008 Salo Timur.*

Keywords: Mastery of Science Concepts, problem based learning (PBL)

Introduction

One of the goals in learning is to achieve mastery of the concept by students. Learning activities are often found difficult by some students to understand the material presented by the teacher, so it is necessary to make efforts to improve mastery of the concept. Concept mastery is a higher level of ability than just knowing a concept, but one must really understand a concept taught by the teacher (Muslim, 2015).

Mastery of student concepts is characterized by students being able to solve various problems given. Another thing, students can also solve problems in life by applying the concepts they have mastered. A teacher must master learning material, also required to master strategies when delivering material to students. The way the teacher "creates" the classroom atmosphere will affect student responses in the learning process. Learning will be more meaningful if students are given the opportunity to know and be actively involved in discovering the concept of existing phenomena from the environment with the guidance of the teacher. The use of learning resources and learning media is necessary for successful learning (Trianto, 2015). That is, in this period students have been able to think logically, think with formal theoretical

thinking based on propositions and hypotheses.

Learning in concept mastery is often dominated by memorizing rather than understanding. Teachers do not include students in the learning process, so students become passive (Rosana, et al, 2014). Students who have memorized it can be said that the student has learned. Such an understanding becomes an inadequate understanding as a notion of learning. The mastery of science concepts in question is how students get a concept and can develop it through an equal level for students, not concepts that are accepted roundly from books or reasoning from the teacher alone. Good concept mastery can be done if the learning model used is appropriate to the character of the material and students to be taught, this requires an instructional design (Sadikin, 2018).

Based on the results of observations and interviews that have been conducted with students and teachers in one of the schools in Bangkinang kota, namely SDN 008 Salo Timur, mastery of science concepts is a problem that is often faced by students, especially grade V students. Out of 29 students, only 13 students have the value of concept mastery is above the KKM while 16 other people are below the KKM. This can be seen from the results shown by the class teacher during the exercise. One of the causes of the lack of mastery of science concepts to students is that concepts that are often given to students are concepts that do not originate from the students' own concepts (ideas), but concepts taken from books and teacher's ideas so that the achievement of mastery of science concepts is less than optimal. This stimulates the learning process that must develop potentials and think for themselves in solving problems.

The problem of mastery of concepts that researchers encountered in class V students was that students were unable to remember the material that had been taught. Students find it difficult to understand and find it difficult to understand the problems given, students are not able to find solutions to problems that are given properly, students only wait for answers from other friends or from the teacher, students are not able to draw conclusions from what is given, and students only provide solutions or answers based on existing books.

One model to overcome these problems is to apply problem-based learning or *Problem Based Learning* . The *Problem Based Learning* learning model is a learning model that involves students in learning activities and prioritizes real problems both in the home, school and community environments as a basis for acquiring knowledge and concepts through critical thinking skills and solving a problem (Anugraheni, 2018). Planning and instructions from the teacher often use explanation and presentation methods from the teacher, while *Problem Based Learning* is focused on a problem that must be solved by students. Students identify the *problem* or issue they want to study, then look for materials and other sources of material they need to deal with these *problems* or issues.

The *Problem Based Learning model* can optimize students' thinking skills, so students can be empowered to hone, test, and develop thinking skills on an ongoing basis (Rusman, 2012). The *Problem Based Learning model* is the development of a curriculum and teaching system that develops simultaneously with a problem solving model and basic knowledge and skills by placing students in an active role as problem solvers of everyday problems that are not well structured (Shoimin, 2016). The *Problem Based Learning model* is expected that students can obtain an invention that will be used as a concept, so that the concepts that students find themselves will always be remembered.

Based on the background previously described, the researcher intends to conduct research to improve mastery of science concepts in fifth grade students at SDN 008 Salo Timur.

Method

This study used the Classroom Action Research (CAR) method. Research is carried out by designing, implementing and reflecting on collaborative and participatory actions that aim to improve the learning process in the classroom through an action in a cycle (Ananda, 2017). Arikunto further in (Aprinawati, 2017) explains that CAR is an action research carried out with the aim of improving the quality of learning practices in the class. This research will be conducted in class V SDN 008 Salo Timur which is located in Salo, East Salo District, Kampar Regency, Riau Province. The subjects in this study were 29 students of class V SDN 008 Salo Timur, with 15 boys and 14 girls. The object is the mastery of science concepts by fifth grade students at SDN 008 Salo Timur.

This research will be carried out in an odd semester in October 2022 consisting of two cycles, each cycle is planned with two meetings. It is intended that teachers and students can adapt to the learning model examined in this study. So that the results of this study can have a good impact and can be used in the next learning process.

Accurate and complete data is needed in a research process, so to obtain these data various data collection techniques are needed, therefore the data collection techniques used in this study are 3 data collection techniques used, namely tests, observation, and documentation.

The research instrument used was a learning device instrument and a data collection instrument. The instrument in the form of a learning device consists of a syllabus and a Learning Implementation Plan (RPP). While the instrument in the form of data collection consists of test sheets, documentation sheets, observation sheets.

The data analysis technique used is using qualitative analysis techniques and quantitative analysis techniques. Quantitative data analysis is by looking for the percentage score of students' mastery of science concepts. The percentage results are then analyzed qualitatively in the form of data presentation in the form of words.

The completeness of individual students can be seen from the results of the rhyme writing skills that have been checked by the teacher from the results of the meeting in each action. Individual learning completeness if a student scores more than the Minimum Completeness Criteria (KKM) set by the school, namely 70. The way to calculate the percentage of student scores is calculated using the formula:

$$KI = \frac{Jumlah\ Skor\ \ perolehan}{Total\ Skor} x\ 100$$

Table 1. Criteria for Classical Completeness Mastery of Student Concepts

Intervals	Category
86-100 %	Very high
71-85%	Tall
56-70%	Currently
41-55%	Low
0 < 40%	Very low

(Hajar Wakano. et al , 2020)

Determining individual student completeness can be calculated using:

$$KI = \frac{Skor\ yang\ diperoleh\ siswa}{Total\ Maksimum} x\ 100$$

Table 2. Individual Adequacy Criteria Mastery of Student Concepts

intervals	Category
86-100	Very high
71-85	Tall
56-70	Currently
41-55	Low
0 < 40	Very low

(Ramdani et al., 2020)

Students are said to be complete if their grades have reached the KKM score or exceed the KKM score determined by the school, namely 70 for thematically related subjects. Classical learning completeness is 80% (Ramdani et al., 2020) .

Results and Discussion
 A. Pre-action Description

Researchers make observations first to find out the problems that exist. Researchers conducted unstructured interviews related to learning outcomes to class teachers and several students and made observations during the learning process. The results of these observations found problems in students' mastery of science concepts. The problem that researchers encountered was that students were unable to remember the material that had been taught. Students find it difficult to understand and find it difficult to understand the problems that are given properly. Students are not able to find solutions to the problems given. Most students are unable to draw conclusions from what they have learned because the teacher only uses the lecture method and does not use visual aids when delivering material.

The time that the researchers determined was in November, namely the 1st and 02nd for cycle 1, 03 and 04 for cycle 2.

B. Description of Action Results for Each Cycle

1. Cycle 1

Cycle 1 in this meeting consisted of 2 meetings. Each meeting lasts approximately 70 minutes (2x 35 minutes) or 2 hours of lessons. The first meeting in cycle 1 was held on November 1, 2022, and the second meeting was held on November 2, 2022. Each research meeting consisted of planning, implementation and observation stages, as well as reflection which were explained as follows:

a. Planning Stage

In this planning stage, the researcher first planned Cycle 1 on mastering science concepts by using a problem-based learning model on the thematic content of class V SDN 008 Salo Timur. After the planning procedures for Cycle 1 were formulated, a Cycle 1 implementation plan was prepared according to the specified schedule, namely November 1, 2022. A complete explanation of the Cycle 1 Learning Implementation Plan can be seen in the attachment.

b. Action Implementation Stage

1) Meeting I (01 November 2022)

K13 learning connects several subjects in one lesson. This action will be carried out on Friday 01 November 2022 at 07.00 . 30 - 08.40 WIB, at SDN 008 East Salo.

a) Initial activity, the teacher entered the class by greeting. Students pray together, led by the class leader. Students sing the obligatory national anthem (Indonesia Raya and so on). The teacher asks students to always keep the class clean and tidy up the desk. Teacher absent students. The teacher conveys the appreception of learning material.

b) Core activities, students pay attention to the video that the teacher asks about the respiratory system and function of animals and humans. Students listen to the teacher's explanation of the material that has been displayed in front of the class. Students are divided into several groups heterogeneously. Students are guided to draw pictures of the respiratory function systems of animals and humans. Each student sends 1 representative from their group to explain the results they have made in front of the class.

c) Final Activity This final activity lasts for 10 minutes. Teachers and students together conclude today's learning material. The teacher gives the opportunity for students to ask questions about material that they do not understand. The teacher invites students to say hamdalah (to end the learning activity).

2) Meeting II (02 November 2022)

a) Initial Activities, Meeting 2 cycle 1 was held on November 2 2022 for 2 hours of learning (2x 35 minutes) starting at 07.30-08.40 WIB. Activities as usual begin with saying greetings, students praying guided by researchers, singing the national obligatory anthem, asking how students are doing, then researchers taking student attendance, and researchers asking about student readiness, doing apperceptions and

motivating students to participate actively in learning.

b) Core activity, students pay attention to the video that the teacher asks about the process of breathing in humans. Students listen to the teacher's explanation of the material that has been displayed in front of the class. Students are divided into several groups heterogeneously. Students are guided to draw pictures of the respiratory function systems of animals and humans. Each student sends 1 representative from their group to explain the results they have made in front of the class.

c) Core activity, students pay attention to the video that the teacher asks about the process of breathing in humans. Students listen to the teacher's explanation of the material that has been displayed in front of the class. Students are divided into several groups heterogeneously. Students are guided to draw pictures of the respiratory function systems of animals and humans. Each student sends 1 representative from their group to explain the results they have made in front of the class.

d) Observation Stage

Observations were carried out guided by the teacher's observation sheet and the student observation sheet that had been planned beforehand. Based on observations of teacher activity and student activity in learning, it is known that learning runs smoothly, students enthusiastically participate in learning, even though there are students who are noisy. The results of observations of teacher activities, it can be said that it is already good in carrying out learning. Meanwhile, the results of observations on student activities are also known to be quite good in participating in learning.

This learning activity certainly influences students' mastery of science concepts. From the results of observation and evaluation of cycle 1 questions, researchers and collaborator teachers can find data on students' mastery of science concepts.

The learning outcomes obtained by students at cycle 1 meeting 1 can be seen in table 3 as follows:

Table 3. Mastery of Science Concepts _Cycle 1 Meeting 1

No	Category	intervals	Total students
1	Very high	86-100 %	5
2	Tall	71-85%	9
3	Currently	56-70%	8
4	Low	41-55%	4
5	Very low	0 < 40%	3
Total students		29	
Average		65,24	
Category		Currently	
Final Amount		14	48.27%
Incomplete Amount		15	51.75 %

Learning Test Results 202 2

Based on table 3, it is known that of the 29 students, only 5 students are in the very high category and 3 are in the very low category. This is because students who get very high scores really like science lessons and they are also serious about participating in the learning process. Whereas the 3 people in the very low category happened because they still had difficulty understanding the material and were not fluent enough to read. At meeting 1, the number of students who passed was only 14 people and 15 people who did not complete it.Mastery of science concepts in cycle I meeting II can be seen in table 4 as follows:

Table 4. Mastery of Science Concepts Cycle I Meeting II

No	Category	intervals	Total students
1	Very high	86-100 %	1
2	Tall	71-85%	6
3	Currently	56-70%	21
4	Low	41-55%	1
5	Very low	0 < 40%	0
Total students		29	
Average		67, 03	
Category		Currently	
Final Amount		7	24.13%
Incomplete Amount		22	75, 87%

Learning Test Results 2022

(M. Habib Ridho , Ramdhan Witarsa, Musnar Indra Daulay , Nurhaswinda, Putri Hana Pebriana)

Based on table 4, it is known that only 1 student achieved a very high score. Namely with a value of 88, while the others are in the range of values 40-85. A very low score was also obtained by 1 student with a score of 50. The student who received the very low score was also a student who was not good at reading, which made it difficult for him to understand the questions and write down the answers.

e) Cycle 1 reflection

Actions in cycle I with 2 meetings have been carried out. Teachers, students and observers conduct discussions or evaluate the actions that have been taken in cycle I. Based on the results of observations and discussions with the teacher, there are several problems that still need to be fixed. These problems include, teachers are still difficult to condition students when explaining the material. Most students are not active in the learning process, students still have difficulty understanding the material. The results of their answers are still many that are less than perfect in working on the questions. As for the mastery of science concepts students are still difficult to use the concept in solving a problem.

Based on the problems previously mentioned, it is necessary to take several actions to overcome them, namely researchers try to make students able to answer questions given in learning so that those who still get results below the KKM can get scores above the KKM. So in general the results of the actions in cycle I show that mastery of scientific concepts has increased. However, the percentage of mastery of science concepts has not reached the Minimum Completeness Criteria (KKM) set at 80% and also the number of students who pass is also decreasing. Thus, improvements are still needed at the next meeting held in cycle II.

2. Cycle II

this study consisted of 2 meetings. Each meeting lasted for approximately 70 minutes (2x 35 minutes) or 2 hours of lessons. Meeting 1 cycle 2 was held on November 3 2022 while meeting 2 was held on November 4 2022. The research procedure in cycle II was the same as the research procedure in cycle I, namely the planning stage, the action and observation stage, and the reflection stage.

a. planning stage

At the stage of implementing the actions in cycle II, this is almost the same as the action planning stage in the cycle. However, in cycle II, the researcher did not ask for permission to go out in the field or ask permission from the school again because cycle II was a continuation of the previous cycle. For other plans, it is still the same as cycle I, namely the researcher makes a lesson plan first, before starting the learning process, and the lesson plan is first consulted with the teacher. The lesson plans that are made still use the problem-based learning model. the researcher also prepared test sheets used by students to measure students' abilities as well as data collection tools in the form of teacher observation sheets and student observation sheets to find out the learning process in class.

b. Action Implementation Cycle I Meeting 1 (03 November 2022)

a) Initial activities, the first meeting of cycle II was held on November 3 for 2 hours (2x 35 minutes) to be exact, the first hour started at 07.30-08.40 WIB.

b) Core activity , students pay attention to the video that the teacher asks about how to maintain the respiratory organs in humans. Students listen to the teacher's explanation of the material that has been displayed in front of the class. Students are divided into several groups heterogeneously.

c) Final activity, the final activity is carried out for (10 minutes), the researcher and the students conclude the learning outcomes. Researchers provide opportunities for students to ask about material that they do not understand.

1) Meeting II (04 November 2022)

a) The initial activity, the second meeting of cycle 2 was held on November 4 2022 for 2 hours (2x 35 minutes) starting from 07.30-08.40 WIB.

b) Main activity, students pay attention to the video that the teacher asks about how to maintain the respiratory organs in humans. Students listen to the teacher's explanation of the material that has been displayed in front of the class.

c) Final activity, the final activity is carried out for (10 minutes), the researcher and the students conclude the learning outcomes. Researchers provide opportunities for students to ask about material that they do not understand. Then the researcher gave an overview of the next learning activity.

c. observation stage

The results of observations of teacher activities, it can be seen that the teacher is good at carrying out learning. Likewise with the results of observations on the results of student activities it can be seen that students are already good in the learning process and the results increase at each meeting and cycle.

From the results of observations and evaluations of cycle II, researchers and collaborator teachers obtained data on mastery of science concepts for class V SDN 008 Salo Timur. Can be seen in table 5 below:

Table 5. Mastery Science concept Cycle II Meeting 1

No	Category	intervals	Total students
1	Very high	86-100 %	3
2	Tall	71-85%	13
3	Currently	56-70%	13
4	Low	41-55%	0
5	Very low	0 < 40%	0
Total students		29	
Average		72,31	
Category		Tall	
Final Amount		18	62.06%
Incomplete Amount		11	37.80%

Learning Test Results 202 2

Based on table 5, it can be seen that there has been an increase in student learning outcomes. This can be seen from the students who get scores in the very high category, there are 3 students. While students with very low category did not

exist. Even though there were no students who scored in the very poor category, the number of students who had not reached the minimum completeness score (KKM) was still quite a lot, namely 11 students with scores below 70.

The results of the observation and evaluation of cycle 2 of the second meeting of researchers and collaborator teachers were able to find data on the results of class V students at SDN 008 Salo Timur. Can be seen in table 6 below:

Table 6. Mastery of Science Concepts Cycle II Meeting II

No	Category	intervals	Total students
1	Very high	86-100 %	13
2	Tall	71-85%	12
3	Currently	56-70%	4
4	Low	41-55%	0
5	Very low	0 < 40%	0
Total students		29	
Average		80, 55	
Category		Tall	
Final Amount		25	86.20%
Incomplete Amount		4	13.80%

Learning Test Results 202 2

Based on table 6, it can be seen that there were 13 students who scored in the very high category. Meanwhile, there are no students with very poor categories. In cycle 2 of meeting 2, the lowest score obtained by students was the range of 56-70 in the moderate category. Students who have not been able to do it in the previous cycle get a little help from their friends in filling out the question sheet. Meanwhile, 4 students who did not complete were students who could not read, so they had difficulty writing answers.

C. Ratio

1. Comparison of Learning Outcomes Between Cycles

Comparison of mastery of science concepts in science content, cycle I and cycle II using the problem based learning model can be seen in table 7 as follows:

Tabel 4.5 Rekapitulasi Nilai Tema Muatan IPA Siswa Kelas V SDN 008 Salo Timur
Menggunakan model problem based learning Siklus I dan Siklus II

Skor	Kategori	SIKLUS 1				SIKLUS 2			
		Pertemuan I		Pertemuan II		Pertemuan I		Pertemuan II	
		Tuntas	Tidak Tuntas	Tuntas	Tidak Tuntas	Tuntas	Tidak Tuntas	Tuntas	Tidak Tuntas
86-100%	Sangat Tinggi	5	-	1	-	3	-	13	-
71-85%	Tinggi	9	-	6	-	13	-	12	-
56-70%	Sedang	-	8	-	21	2	11	-	4
41-55%	Rendah	-	4	-	1	-	0	-	0
<40%	Sangat Rendah	-	3	-	0	-	0	-	-
Jumlah		14	15	7	22	18	11	25	4
Persentase		48, 27	51, 73	24, 13	75, 87	62, 06	37, 94	86, 20	13, 80
Kategori		Rendah	Rendah	Sangat Rendah	Tinggi	Sedang	Sangat Rendah	Sangat Tinggi	Sangat Rendah

Sumber : Data Hasil Olahan 2022

Seen from table 7, there is an increase in student scores which is caused by increased student learning activity using the problem based learning model for class V SDN 008 Salo Timur. It is known that the percentage of student completeness in cycle 1 meeting I was 48.27% in the very low category (<40%) and decreased at the second meeting by 24.13% in the very poor category (<40%), then in the second cycle II meeting I experienced an increase of 62.06% in the moderate category (56-70%), and an increase in the second meeting of 86.20% with very high (86% -100%). The average score of students in cycle 1 first meeting was 65.24 in the moderate category and increased at the second meeting to 67.03 in the moderate category. Then in cycle II meeting I experienced an increase of 72.31 in the high category. Then it increased again at the second meeting to 80.55 with the category also high.

Knowing the progress of the results obtained by students from cycles 1 and 2 in class V SDN 008 Salo Timur clearly can be seen in table 8 below:

Table 8. Comparison of Cycle I and Cycle Values Cycle II on the Theme of Science Content Grade V students at SDN 008 Salo Timur

No	Information	Cycle 1		Cycle 2	
		Meeting I	Meeting II	Meeting I	Meeting II
1	Average value	65, 24	67, 03	72,31	8 0.55
2	Calcal presentation	48, 27 %	24, 13 %	62, 06 %	86, 20 %

Comparison of the values of cycle I and cycle II of class V students at SDN 008 East Salo can be seen in table 8 above. In the

table it can be seen that each cycle has increased both the average value obtained by students and the classical percentage value.

To clearly know the improvement of each action can be seen in Graph 1.
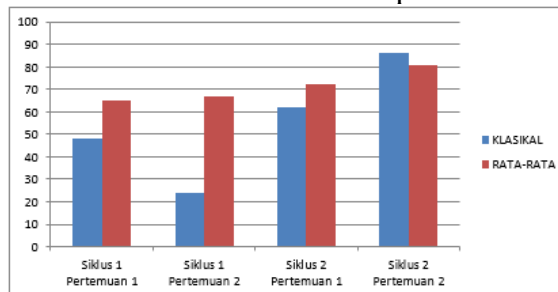
Graph 1. Comparison of the Value Each Cycle

Comparison of students' mastery of science concepts in Figure 4.1 can be seen that there is an increase in students' mastery of science concepts from each cycle and meeting.

Conclusion

Based on the results of research that has been carried out by researchers using the problem based learning model to increase mastery of science concepts in class V SDN 008 East Salo for the 2022/2023 academic year, it can be concluded that the use of problem based learning models can increase mastery of concepts science class V SDN 008 Salo Timur. Learning goes well can be seen from the test results. The test results in cycle 1 meeting I showed that there were 14 students (48.27%) out of 29 students who passed in the very low category (<40), and in cycle 1 meeting II showed there were 7 students (24.13%) from 29 students included in the very low category (<40), while in the second cycle of meeting I showed that there were 18 students (62.06%) of the 29 students who were included in the low category (56-70), and in the cycle II meeting II showed that there were 24 students (86.20%) of the 29 students who were included in very high pass (86-100%).

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