

## THE APPLICATION OF THE DOUBLE LOOP PROBLEM SOLVING (DLPS) MODEL TO IMPROVE STUDENT LEARNING OUTCOME OF MATRIX MATERIALS IN CLASS XI MM 2 SMK NEGERI 1 DLANGGU

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### Abstract

#### Article Info

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This study aims to determine student learning outcomes on matrix material through the application of the Double Loop Problem Solving (DLPS) learning model at SMK Negeri 1 Dlanggu Mojokerto class XI MM 2 semester 1 of the 2019/2020 school year. This research is classroom action research (CAR) which was carried out at SMK Negeri 1 Dlanggu Mojokerto class XI MM 2 semester 1 of the 2019/2020 school year, from August to October 2019. The research was carried out through 2 cycles with each cycle consisting of planning, implementation, observation and reflection. Based on the results of research and discussion, it can be concluded that the application of the double loop problem solving learning model can improve student learning outcomes. This can be seen from the increase in mastery learning outcomes from the first cycle to 86.11% then increased in the second cycle to 91.66%. In addition, the application of the double loop problem solving learning model in class XI MM 2 SMK Negeri 1 Dlanggu in semester 1 of the 2019/2020 academic year in Physical Education lessons with the main matrix material can increase student activity, implementation of lesson plans and student scientific behavior. And the average student learning outcomes also increased rapidly from the first cycle of 81.12 increased to 86 in the second cycle.

Keywords: Learning outcomes, Double Loop Problem Solving (DLPS), Matrix

### 1. Introduction

Educators play an important role to ensure the survival of the state and nation. This happens because education is a vehicle to improve and impose the quality of human resources. To realize these goals, concrete efforts are needed, both from learning, teachers, the community and the government. As stated in various mass media, that through the development of the 2013 Curriculum, we will produce Indonesian people who are productive, creative, innovative, affective through strengthening integrated attitudes, skills, and knowledge. In this case, curriculum development is focused on the formation of competence and character of students, in the form of a combination of knowledge, skills that can be demonstrated by students, as a form of understanding the concepts they learn contextually.

The 2013 curriculum allows teachers to assess student learning outcomes in the process of achieving learning goals, which reflects mastery and understanding of what is being learned. Therefore, students need to know the criteria for mastering competencies and characters that will be used as standards for assessing learning outcomes, so that students can prepare themselves through mastering certain competencies and characters as a requirement to continue to the next level of competency and character mastery.

Along with the development of civilization and culture, strengthening the field of education has recently become a top priority in development. In the field of education, there are several components that determine the success of educational goals, including the existence of a curriculum that is in accordance with the times and the character of the local community, the quality of educators and education personnel and supported by adequate facilities and infrastructure. In the teaching and learning process (PBM) there will be interaction between students and educators. Learners are a person or group of people as seekers, recipients of the lessons they need, while educators are a person



or group of people who work as processors of teaching and learning activities and a set of other roles that enable effective teaching and learning activities to take place.

Based on this explanation, learning innovation is needed so that learning can take place with high enthusiasm. One thing that can be done is to apply the Double Loop Problem Solving (DLPS) learning model. Improvements in learning can be done by applying the double loop problem solving learning model. Huda (2013:303) states that the DLPS method accommodates differences in the causes of a problem, including the mechanism of how a problem occurs. In DLPS, students need to be encouraged to work on two distinct, but interrelated, solving loops.

In addition, Zoler (Sutaji, 2002:17) states that teaching begins with questions that lead to concepts, principles, and laws, then continues with problem-solving activities referred to as teaching that applies problem-solving methods. The double loop problem solving method provides several benefits, including: (1) developing students' skills in solving problems, as well as in taking decisions objectively and independently, (2) developing students' thinking skills, the assumption that thinking skills will be born if knowledge increasing, (3) through DLPS thinking skills are processed in situations or circumstances that are truly internalized, interested by students and in various kinds of alternatives, and (4) fostering the development of feelings (wanting to know more) and objective ways of thinking - independent, crisis – analysis both individually and in groups.

The advantages of the double loop problem solving learning model include the following, (1) educating students to think systematically, (2) training students to design inventions, (3) thinking and acting creatively, (4) solving problems faced realistically, (5) identify and conduct investigations, (6) interpret and evaluate the results of observations, and stimulate the development of students' thinking progress to solve the problems faced appropriately. Based on the description above, the title taken by the researchers in this study is the Application of the Double Loop Problem Solving (DLPS) Model to Improve Student Learning Outcomes of Matrix Materials in Class XI MM 2 SMK Negeri 1 Dlanggu.

The results of this research activity are expected to foster student motivation to learn, increase students' courage to express opinions or ask questions, familiarize students with being critical and creative in teaching and learning so that it can improve the quality of learning. Adding teacher insight and knowledge about effective learning for sports learning so as to improve the quality of learning.

## 2. Method

The place of research was carried out in a teaching place, namely SMK Negeri 1 Dlanggu class XI MM 2 semester 1 of the 2019/2020 academic year. The time of the research was carried out from August to October 2019. The research subjects were students of SMK Negeri 1 Dlanggu class XI MM 2 semester 1 of the 2019/2020 academic year, totaling 36 students. This research method uses a quantitative descriptive approach and uses a cycle method with two cycles. Each cycle is intended to determine the increase in student learning outcomes in mastering sedative life material when compared with the ability of students at the beginning of the study through the values obtained from conventional learning outcomes. Furthermore, the initial data is compared with the results of cycle one and then evaluated and reflection to move on to the second cycle. to get maximum results.

### Research design

There are several experts who put forward an action research model with different charts, but in general there are four stages that are commonly passed, namely planning, implementation, observation and reflection.

### Data collection technique

The types of data used in this study are qualitative and quantitative data consisting of data about the activity of students. Data on the implementation of learning by teachers. Data on the evaluation of student learning outcomes. The observation method was used to collect data by conducting direct observations of student activities in the process of implementing matrix learning Mathematics subjects at SMK Negeri 1 Dlanggu class XI MM 2 semester 1 of the 2019/2020 school year. This test method is used to determine student learning outcomes before and after using the double loop



problem solving learning model in Mathematics subject matter matrix at SMK Negeri 1 Dlanggu class XI MM 2 semester 1 as a form of evaluation.

#### Data analysis technique

Then the data obtained from the research either through observation or tests are then processed with descriptive analysis to describe the state of increasing the achievement of the success indicators for each cycle and to describe the success of learning Mathematics subject matrices at SMK Negeri 1 Dlanggu class XI MM 2 semester 1 of the 2019 academic year. /2020 after applying the double loop problem solving learning model. The data collection techniques in the form of quantitative data are presented based on numbers using descriptive percentage analysis with the following formula:

$$\text{Percentage} = (\text{score achieved}) / (\text{number of students}) \times 100\%$$

#### Research Instruments

The instruments that researchers use to assess the success rate of students are: 1) Evaluation instruments as a tool to obtain data on learning outcomes that have been given to students. The form of the test used is a written test in the form of 10 multiple choice questions with a score of 10 for one question with correct answers and a score of 0 is incorrect. 2) Observation sheet, which must be filled out by the observer. The observation sheet contains the activities of students in learning.

#### Success Indicator

Meanwhile, to determine the success rate of this action research, if the learning outcomes of MATHEMATICS subjects increase in the matrix material, the scores achieved above the KKM 70 are 75% of the total number of students. There is an increase in the learning activity of students in the very active and active categories which reaches 80%.

### 3. Results And Discussion

#### Pre-Cycle Class Condition Analysis

Before conducting the research, the researcher made initial observations on the condition of the class, namely class XI MM 2 consisting of 36 students. The condition of students in class XI MM 2 has academic abilities, economic conditions, and regional origins are heterogeneous. Class XI MM 2 is included in the category with less interest in learning adaptive and normative subjects but is very superior in the fields of Mathematics and natural sciences. Generally, they are very enthusiastic about learning mathematics. This situation causes a less conducive learning atmosphere and ultimately low learning outcomes. Based on the results of the pretest, it can be seen that through conventional learning the learning outcomes are very low. Pre-cycle learning outcomes as shown in Table 1 below.

Table 1 Pre-cycle learning outcomes

No.	Student's name	Score	Description
1	Abdul Rokhim	70	TT
2	Achmat Samsul Arifin	60	TT
3	Akhmad Alim Afandi	80	T
4	Aldian Maulana Putra	80	T
5	Ananda Ramadhan	40	TT
6	Arjidah Eka Puspita	80	T
7	Bambang Irawan	50	TT
8	Devi Berliana Aprillia	80	T
9	Dimas Anggara	30	TT
10	Faradina Tasya	80	T



No.	Student's name	Score	Description
11	Fariz Akhlakul Karim	80	T
12	Fitrah Maulanah	40	TT
13	Indra Dwi Kurniawan	60	TT
14	Krisna Andriyas	80	T
15	Maulana Arya F.	50	TT
16	Moch. Indra	80	T
17	Mohammad Wahyu A.	80	T
18	Monica Ayu Meylinda	60	TT
19	Muchamad Dedi Irawan	60	TT
20	Muhammad Adi	80	T
21	Muhammad Alfian M.	60	TT
22	Muhammad Iqbal	70	TT
23	Muhammad Priyo Tri	40	TT
24	Muhammad Rizki Rizal	70	TT
25	Muhammad Zamaludin	80	T
26	Mukhammad Wildan	30	TT
27	Nurul Azizah	80	T
28	Pindo Syakur	40	TT
29	Syaicku Bahrul Alam	80	T
30	Triangga Arya Sanjaya	50	TT
31	Vernanda Aunun Nur	80	T
32	Yuda Malik Ibrahim	60	TT
33	Tegar Bagus	80	T
34	Ummu Salamah	80	T
35	Vensky Della Saputri	40	TT
36	Vivi Widya Saharani	60	TT
<b>Average</b>		63.82	
<b>Lowest Value</b>		30	
<b>The highest score</b>		80	
<b>Number of Completed Students</b>		16	
<b>Completeness (%)</b>		44.45	

Based on the data from Table 1, it can be seen that the completeness of the pre-cycle learning outcomes has not been achieved, the completeness is only 40.63%. Therefore, it is necessary to improve learning. The solution given is to apply the double loop problem solving learning model. Through this model students will be actively involved in learning, students will get used to thinking critically in solving problems as the characteristics of class XI MM 2 students at SMK Negeri 1 Dlanggu who like problem solving systems.



Learning activities were carried out for two cycles at SMK Negeri 1 Dlanggu class XI MM 2 semester 1 for the 2019/2020 school year, totaling 36 students. The first and second cycles were carried out from August to October 2019. For more details, they will be discussed in detail as follows.

### Cycle 1

The steps in this classroom action research are planning, implementation, observation, and reflection. Things that were observed included: the implementation of lesson plans, student activities, scientific attitudes of students' character, evaluation of cycle 1 and recording events during the first cycle as material for consideration of conclusions or follow-up plans for the next cycle.

Table 2 Implementation of RPP

No.	Activity	Score
	<b>Management of KBM</b>	
	<b>A. Introduction</b>	
1	Motivate students	4
2	Communicating goals	4
	<b>B. Core Activities</b>	
3	Syntax 1: Identify the problem	3
4	Syntax 2: Detect the immediate cause, and quickly implement a temporary solution	3
5	Syntax 3: Evaluate the success of a temporary solution	3
6	Syntax 4: Decide whether root cause analysis is necessary or not	3
7	Syntax 5: Detection of the cause of the problem at a higher level	4
8	Syntax 6: Designing a solution to the root of the problem	
	<b>C. Closing</b>	
9	The teacher and students conclude the material/lesson	3
	Class management	
	Class situation	
10	1. Enthusiastic students	3
11	2. Enthusiastic teacher	3
	<b>Time management</b>	
12	Time according to allocation	3
	<b>Average score</b>	3.27
	<b>% implementation</b>	100

Based on the results of the observer in observing the teacher's activities, it can be seen that the teacher can apply the double loop problem solving learning syntax. This can be seen from the average score obtained, which is 3.27 (good) and all learning syntax is implemented (100%). The results of observations on student activities in the first cycle are as shown in Table 3 below.

Table 3 Student activities in the first cycle

No.	Student Activities	Turus	%
1	Listen to the teacher's explanation	7	15.22
2	Working in groups (problem solving in groups)	15	32.61
3	Ask the teacher/student	7	15.22
4	Communicating ideas/ideas (classical or individual)	6	13.04
5	Summing up the material	4	8.70
6	Irrelevant behavior	7	15.22



Amount	46	100.00
Activity (%)		84.78

Based on the data from Table 3, it can be seen that in general the students' learning process is very active (84.78%), the highest activity is working in groups (problem solving in groups), which is 32.61 and the lowest activity is concluding the material by 8.70%. Based on the data from Table 4.5, it can be seen that the scientific attitude of the students in the first cycle was categorized as good for all aspects. Student learning outcomes after participating in learning with the double loop problem solving learning model are presented as Table 4 data

**Table 4 Student learning outcomes in the first cycle**

No.	Name	Question Number										Score	Score	description
		1	2	3	4	5	6	7	8	9	10			
1	Abdul Rokhim	1	1	0	0	1	1	1	1	1	1	8	80	T
2	Achmat Samsul Arifin	1	1	1	0	1	0	1	1	1	1	8	80	T
3	Akhmad Alim Afandi	1	1	1	1	1	0	1	1	1	1	9	90	T
4	Aldian Maulana Putra	1	1	0	1	1	1	0	1	1	1	8	80	T
5	Ananda Ramadhan	1	1	0	1	1	1	1	1	1	1	9	90	T
6	Arjidah Eka Puspita	1	0	1	0	1	1	1	1	1	1	8	80	T
7	Bambang Irawan	1	1	0	1	0	1	1	1	1	1	8	80	T
8	Devi Berliana Aprillia	1	1	1	1	1	1	1	1	1	1	10	90	T
9	Dimas Anggara	1	1	1	1	0	1	1	0	0	0	6	60	TT
10	Faradina Tasya	1	1	1	1	1	0	1	1	0	1	8	80	T
11	Fariz Akhlakul Karim	1	1	1	1	1	1	1	1	1	1	10	100	T
12	Fitrah Maulanah	0	1	1	1	1	1	1	1	0	1	8	80	T
13	Indra Dwi Kurniawan	1	0	1	0	1	1	1	1	1	1	8	80	T
14	Krisna Andriyas	1	1	1	1	0	1	1	1	1	1	9	90	T
15	Maulana Arya F.	1	1	1	0	1	0	1	1	1	1	8	80	T
16	Moch. Indra	1	1	1	1	1	0	1	0	1	1	8	80	T
17	Mohammad Wahyu A.	1	1	1	1	1	1	1	1	0	0	8	80	T
18	Monica Ayu Meylinda	1	1	1	1	1	1	0	1	0	1	8	80	T
19	Muchamad Dedi Irawan	1	0	0	1	0	1	0	1	1	1	6	60	TT
20	Muhammad Adi	0	1	0	1	0	1	1	1	1	1	7	80	T
21	Muhammad Alfian M.	1	1	1	0	1	1	1	1	1	1	9	90	T
22	Muhammad Iqbal	1	1	1	0	1	1	1	1	1	1	9	90	T
23	Muhammad Priyo Tri	1	1	1	1	0	1	0	1	1	1	8	80	T
24	Muhammad Rizki Rizal	1	1	1	1	1	1	0	1	0	1	8	80	T



25	Muhammad Zamaludin	1	1	1	1	1	1	1	1	1	0	9	90	T
26	Mukhammad Wildan	1	1	1	0	1	0	1	0	1	0	6	60	TT
27	Nurul Azizah	1	1	1	0	1	1	1	1	1	1	9	90	T
28	Pindo Syakur	0	1	0	1	1	1	1	1	1	1	8	80	T
29	Syaicku Bahrul Alam	1	1	1	1	1	1	1	1	1	1	10	100	T
30	Triangga Arya Sanjaya	1	1	1	1	0	0	1	1	1	1	8	80	T
31	Vernanda Aunun Nur	1	1	1	0	1	1	1	1	1	1	9	90	T
32	Yuda Malik Ibrahim	1	1	1	0	1	1	1	1	1	1	9	80	T
33	Tegar Bagus	1	0	0	1	0	1	0	1	1	1	6	60	TT
34	Ummu Salamah	0	1	0	1	0	1	1	1	1	1	7	80	T
35	Vensky Della Saputri	1	1	1	0	1	1	1	1	1	1	9	90	T
36	Vivi Widya Saharani	1	0	0	1	0	1	0	1	1	1	6	60	TT
Number of Incomplete Students (Tt)														5
Number of Completed Students (T)														31
Average Learning Outcomes														81.12
Completeness Presentation														86.11%

Based on the data in Table 5, it can be seen that classical completeness has been fulfilled, namely 86.11%. The average value is 81.12, the lowest score is 60 and the highest score is 100.

#### a. Reflection

Based on the results of the study as shown in Table 4.3; 4.4; 4.5; and 4.6 the results of the reflection can be explained as follows: 1) Teachers/researchers can carry out learning well, are able to carry out learning syntax in accordance with the learning implementation plan. In general, the quality of learning is in the good category (3.27). 2) Students look very active in learning, this shows students can be motivated to participate in learning by improving learning through the application of the double loop problem solving learning model. The percentage of student activity is 84.78% (active). 3) Scientific behavior or character shows good character for all categories with an average score of 3.23 (good). 4) Learning outcomes also show good results, as many as 83.34% of students can complete learning. Nevertheless, there are several learning evaluations as well as suggestions and criticisms of collaborators, including the quality of learning that needs to be improved to be in the very good category, or at a value of > 3.5. To improve the quality of learning, teachers should conduct simulations before learning is applied, besides that various tools and materials during learning need to be carefully prepared. Student activities need to be improved because there are still some students who show irrelevant behavior. What researchers need to do is to provide motivation and maximize the researcher/teacher as a facilitator. Scientific behavior needs to be improved because there are still some aspects that get sufficient marks (2). In general, learning outcomes need to be improved so that the deviation from the highest value to the lowest value is not far apart.

#### Cycle 2

The second cycle of learning was carried out on 23 and 30 September 2019, 14 October 2019. Researchers were still assisted by collaborators as in the first cycle. Things that were observed included: the implementation of lesson plans, student activities, scientific attitudes of students' characters, evaluation of cycle 2 and recording events during the first cycle as material for consideration of conclusions or follow-up plans for the next cycle.





Table 5 Implementation of RPP

No.	Activity	Evaluation
	<b>Management of KBM</b>	
1	<b>A. Introduction</b>	4
2	Motivate students	4
	Communicating goals	
3	<b>B. Core Activities</b>	4
4	Syntax 1: Identify the problem	3
5	Syntax 2: Detect the immediate cause, and quickly implement a temporary solution	3
6	Syntax 3: Evaluate the success of a temporary solution	4
7	Syntax 4: Decide whether root cause analysis is necessary or not	4
	Syntax 5: Detection of the cause of the problem at a higher level	
	Syntax 6: Designing a solution to the root of the problem	
8	<b>C. Closing</b>	4
	The teacher and students conclude the material/lesson	
	<b>Class management</b>	
9	Class situation	4
10	1. Enthusiastic students	4
	2. Enthusiastic teacher	
11	<b>Time management</b>	4
	Time according to allocation	3.82
	Average score	100
	% implementation	

Based on the results of the observer in observing teacher activities, it can be seen that teachers can improve the quality of learning. This can be seen from the average score obtained, which is 3.82 (very good) and all learning syntax is implemented (100%). The results of observations on student activities in the second cycle are as shown in Table 6 below.

Table 6 Student activities in the second cycle

No.	Student Activities	Turus	%
1	Listen to the teacher's explanation	5	11.11
2	Working in groups (problem solving in groups)	18	40.00
3	Ask the teacher/student	7	15.56
4	Communicating ideas/ideas (classical or individual)	9	20.00
5	Summing up the material	4	8.89
6	Irrelevant behavior	2	4.44
	Amount	45	100.00
	Activity (%)		95.56

Based on the data from Table 8, it can be seen that in general the students' learning process is very active (95.56%), the highest activity is working in groups (problem solving in groups), which is 40.00% and the lowest activity is irrelevant behavior at 4.44%. Based on the data from Table 4.9, it can be seen that the scientific attitude of the students in the second cycle was categorized as good for all aspects, not even one aspect was found that got a sufficient score.

Table 7 Student learning outcomes in the second cycle

No.	Student's name	Question Number	Score	Value	
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		1	2	3	4	5	6	7	8	9	10			Informasi
1	Abdul Rokhim	1	1	1	1	0	1	0	1	1	1	8	80	T
2	Achmat Samsul Arifin	1	1	1	1	1	1	0	1	1	1	9	90	T
3	Akhmad Alim Afandi	1	1	1	1	1	1	1	1	1	1	10	100	T
4	Aldian Maulana Putra	1	1	1	1	0	0	1	1	1	1	8	80	T
5	Ananda Ramadhan	1	1	0	1	1	1	1	1	1	1	9	90	T
6	Arjidah Eka Puspita	1	1	0	1	0	1	1	1	1	1	8	80	T
7	Bambang Irawan	1	1	1	1	1	1	1	1	1	1	10	100	T
8	Devi Berliana Aprillia	1	1	1	1	1	1	0	1	1	1	9	90	T
9	Dimas Anggara	1	1	1	1	1	1	0	0	1	1	8	80	T
10	Faradina Tasya	1	1	1	0	1	1	1	0	1	1	8	80	T
11	Fariz Akhlakul Karim	1	1	1	1	1	1	1	1	1	1	10	100	T
12	Fitrah Maulanah	1	1	1	0	1	0	1	1	1	1	8	80	T
13	Indra Dwi Kurniawan	1	1	1	1	1	0	1	0	1	1	8	80	T
14	Krisna Andriyas	1	1	1	1	1	1	1	1	1	1	10	100	T
15	Maulana Arya F.	1	1	1	1	0	1	1	0	1	1	8	80	T
16	Moch. Indra	1	1	1	1	1	1	1	0	1	0	8	80	T
17	Mohammad Wahyu A.	1	1	1	1	1	1	1	1	1	1	10	100	T
18	Monica Ayu Meylinda	1	0	0	1	0	1	0	1	1	1	6	60	TT
19	Muchamad Dedi Irawan	1	0	1	1	1	0	1	1	1	1	8	80	T
20	Muhammad Adi	0	0	1	1	1	1	1	1	1	1	8	80	T
21	Muhammad Alfian M.	1	0	1	1	1	1	1	1	1	1	9	90	T
22	Muhammad Iqbal	1	1	1	1	1	1	1	1	1	1	10	100	T
23	Muhammad Priyo Tri	1	0	1	0	1	1	1	1	1	1	8	80	T
24	Muhammad Rizki Rizal	1	1	1	0	1	0	1	1	1	1	8	80	T
25	Muhammad Zamaludin	1	1	1	1	1	1	1	1	1	1	10	100	T
26	Mukhammad Wildan	1	1	1	1	1	0	1	0	1	1	8	80	T
27	Nurul Azizah	1	1	1	1	1	1	1	0	1	1	9	90	T
28	Pindo Syakur	1	1	1	1	1	0	1	0	1	1	8	80	T
29	Syaicku Bahrul	1	1	1	1	1	1	1	1	1	1	10	100	T



	Alam													
30	Triangga Arya Sanjaya	1	1	1	1	1	0	1	0	1	1	8	80	T
31	Vernanda Aunur Nur	1	1	1	1	1	1	1	1	1	1	10	100	T
32	Yuda Malik Ibrahim	1	1	1	1	1	1	1	0	1	0	8	80	T
33	Tegar Bagus	1	0	0	1	0	1	0	1	1	1	6	60	TT
34	Ummu Salamah	0	1	0	1	0	1	1	1	1	1	7	80	T
35	Vensky Della Saputri	1	1	1	0	1	1	1	1	1	1	9	90	T
36	Vivi Widya Saharani	1	0	0	1	0	1	0	1	1	1	6	60	TT
Number of Incomplete Students (Tt)													3	
Number of Completed Students (T)													33	
Average Learning Outcomes													86	
Completeness Presentation													91.66%	

Based on the data in Table 7, it can be seen that classical completeness has been fulfilled, which is 91.66%. As for the average score of 86, there were only 3 students who did not complete and the highest score was 100.

Based on the results obtained during the second cycle, the results of the second cycle reflection can be presented as follows: 1) The quality of learning in the second cycle shows that it is of very good quality, namely by getting an average score of RPP implementation of 3.82 (very good). These results show that there is consistency in the quality of learning. Student activity in the second cycle shows that students are in the very active category, which is 95.56%, with the highest percentage in the aspect of working in groups at 40% and the lowest percentage in the aspect of irrelevant behavior at 4.44%. These results also indicate the consistency of student activities in the category of student-centered learning. 2) In the aspect of scientific attitude, it also shows an increase, namely to 3.37 (good) and all categories get a minimum score of good (3.0). 3) The learning outcomes also showed consistent and positive results, namely in the second cycle of learning completeness, 91.66% of students were able to complete learning. Based on these results, it can be concluded that the research was stopped in the second cycle because all indicators have been achieved.

Based on the research results, a summary of the research results can be made as shown in Table 10 below.

Table 8 Recapitulation of research results

Aspect	Cycle 1	Category	Cycle 2	Category
Average Implementation of RPP	3.27	Well	3.82	Very good
Percentage of RPP Implementation	100%	Very good	100%	Very good
Student Activities	84.78%	Active	95.56%	Active

If the data is made a diagram it will look like Figure 1 below:



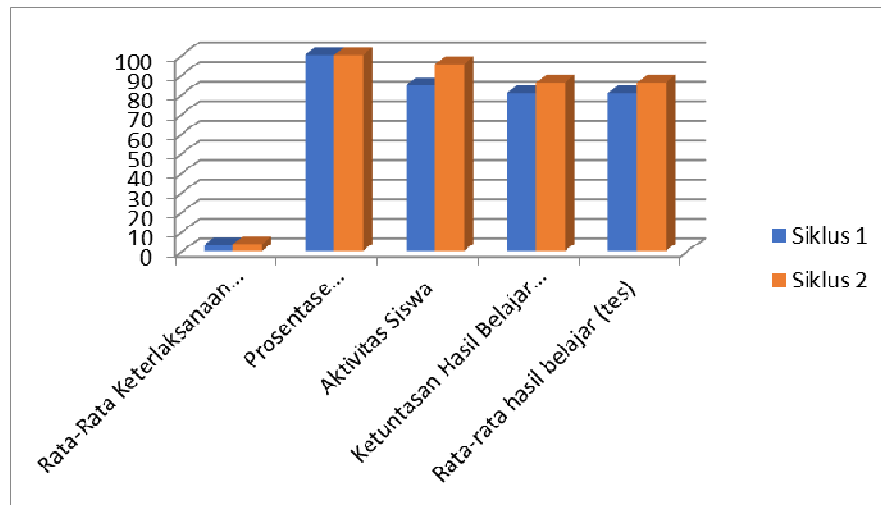


Figure 1 recapitulation of the comparison of the first and second cycles

Based on these data, it can be seen that the success of the research has been seen in the first cycle and strengthened in the second cycle. This success is caused by several things, including the availability of adequate tools so that researchers can easily apply double loop problem solving learning. The role of the observer who is actively involved in learning so that mistakes made by researchers can be corrected at the next meeting. Students are actively involved in learning, this is because the model used is interesting and the devices for students are adequate.

These results also strengthen Lee's opinion which states that the double loop problem solving learning model has several benefits, namely developing student attitudes and skills in solving problems, as well as in making decisions objectively and independently. Develop students' thinking abilities, the assumption that thinking skills will be born if knowledge increases. Through inquiry or double loop problem solving, the thinking ability is processed in situations or circumstances that are truly internalized, interested by students and in a variety of alternatives. Fostering the development of an attitude of feeling (wanting to know more) and an objective way of thinking – independent, crisis – analysis both individually and in groups.

Another advantage of the double loop problem solving learning model is educating students to think systematically. Train students to design an invention. Think and act creatively. Stimulate the development of students' thinking progress to solve the problems at hand. Able to find various ways out of a difficulty encountered. Learn to analyze a problem from various aspects.

The results of this study also strengthen several previous studies, including research by Tamsik Udin, Nurul Hikmah (2014), Kd Arya. Dwi Hendrawan et al (2013), Andika, Rahayu, Chumy Zahroul F (2013) which states that student learning activities and student learning outcomes after applying the double loop problem solving method have increased from learning activities in the pre-cycle. Based on the results of the study, the proposed research hypothesis is proven, including the application of the double loop problem solving learning model in the matrix material will improve the quality of learning. The application of the double loop problem solving learning model in the matrix material can improve student learning outcomes. The application of the double loop problem solving learning model in the matrix material can increase student activity.

#### 4. Conclusions

Based on the results of research and discussion, it can be concluded that the application of the double loop problem solving learning model can improve student learning outcomes. This can be seen from the increase in mastery learning outcomes from the first cycle to 86.11% then increased in the second cycle to 91.66%. In addition, the application of the double loop problem solving learning model in class XI MM 2 SMK Negeri 1 Dlanggu semester 1 for the 2019/2020 academic year in



Mathematics with the main matrix material can increase student activity, implementation of lesson plans and student scientific behavior. And the average student learning outcomes also increased rapidly from the first cycle of 81.12 increased to 86 in the second cycle. Suggestions that can be given based on the results of research, discussion and drawing conclusions are for subjects in the learning process to use a double loop problem solving learning model. So that the success of learning can be improved.

### References

- [1] Andika, Rahayu, Chumy Zahroul F. 2013. Penerapan Metode Double loop problem solving Untuk Meningkatkan Aktivitas dan Hasil Belajar Siswa Kelas IV dalam Pembelajaran IPS Pokok Bahasan Masalah Sosial di Lingkungan Setempat di SDN Binakal Bondowoso. Jurusan Ilmu Pendidikan, Fakultas Keguruan dan Ilmu Pendidikan, Universitas Jember (UNEJ)
- [2] Asrori, Mohammad. 2007. Psikologi Pembelajaran. Bandung: CV Wacana Prima
- [3] Dimiyati. 1993. Strategi Belajar Mengajar. Jakarta: Dep. P & K
- [4] Kd Arya. Dwi Hendrawan, Ni Kt Suarni, I Wyn. Sudiana. 2013. Pengaruh Metode Double loop problem solving Terhadap Hasil Belajar Matematika Kelas V SD di Gugus VII Kecamatan Tejakula Kabupaten Buleleng. Jurusan PGSD, FIP Universitas Pendidikan Ganesha Singaraja, Indonesia.
- [5] Purnama, Johan. 2001. Strategi Belajar Mengajar. Bandung : CV. Maulana.
- [6] S. Margono. 2004. Metodologi Penelitian Pendidikan. Jakarta: Rineka Cipta
- [7] Sugiono. 2007. Metodologi Penelitian Pendidikan Pendekatan Kuantitatif, Kualitatif dan R&D. Bandung : Alfabeta
- [8] Suryabrata, Sumadi. 1995. Metodologi Penelitian. Jakarta: PT. Raja Grafindo.
- [9] Suryobroto. 2002. Proses Belajar Mengajar di Sekolah. Jakarta: Rineka
- [10] Syah, Muhibbin. 1995. Psikologi Pendidikan. Bandung: PT. Remaja Rosdakarya.
- [11] Syairozi, M. (2015). Pengaruh Faktor Eksternal (Inflasi, Bunga) Dan Faktor Internal (Bagi Hasil, Jumlah Bank) Terhadap Deposito Mudharabah Pada Perbankan Syariah Di Indonesia (Doctoral dissertation, Universitas Brawijaya).
- [12] Syairozi, M. I. (2011). Analisis peranan sektor pertanian terhadap produk domestik regional bruto (PDRB) di kabupaten Malang (periode 2000-2008) (Doctoral dissertation, Universitas Negeri Malang).
- [13] TIM penyusun Kamus. 1990. Kamus Besar Bahasa Indonesia. Jakarta: Balai Pustaka.
- [14] TIM SBM UNS. 2000. Strategi Belajar Mengajar. Surakarta: Depdiknas Surakarta.
- [15] T Udin, N Hikmah. 2014. Pengaruh Penerapan Metode Double loop problem solving Terhadap Hasil Belajar Siswa Mata Pelajaran Matematika Pokok Bahasan Pecahan Pada Siswa Kelas IV SD Negeri Legok 1 Kabupaten Indramayu. Al Ibtida: Jurnal Pendidikan Guru MI, 2014 - syekh Nurjati.ac.id.

