IMPROVING MATHEMATICS PROBLEM SOLVING ABILITY THROUGH THE APPLICATION OF THE DOUBLE LOOP PROBLEM SOLVING (DLPS) LEARNING MODEL WITH GUIDED DISCOVERY METHOD BASED ON RUBIK'S CUBE MEDIA ON BUILDING CUBE ROOM STUDENTS OF UNGARAN 4 STATE SCHOOL

(Classroom Action Research Studies On Implementation Of Computational Thinking In Education And Problem Solving Ability)

PENINGKATAN KEMAMPUAN PEMECAHAN MASALAH MATEMATIS MELALUI PENERAPAN MODEL PEMBELAJARAN DOUBLE LOOP PROBLEM SOLVING (DLPS) DENGAN METODE PENEMUAN TERBIMBING BERBASIS MEDIA RUBIK'S CUBE PADA MATERI BANGUN RUANG KUBUS SISWA SMP NEGERI 4 UNGARAN

(Studi Penelitian Tidakan Kelas Tentang Implementasi Berpikir Komputasi Dalam Pendidikan Dan Kemampuan Pemecahan Masalah)

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Abstract

The purpose of this study was to determine the increase in mathematical problem solving abilities using the DPLS learning model with the Guided Discovery method based on Rubik's Cube media on the cube space building material for SMP N 4 Ungaran students.

This study uses classroom action research (CAR), with 2 cycles consisting of 4 stages of planning, implementation, observation and reflection. The population in this study was class VIII SMP Negeri 4 Ungaran for the academic year 2021/2022, class VIII-B obtained and became the research sample through a sampling technique, namely observation consisting of 34 students. Data collection techniques used observation sheets, post test tests, questionnaire sheets, documentation, and field notes. The analysis of the instrument trial used validity, rehabilitation, level of difficulty, and differentiating power.

The results of this study showed an increase in each cycle, in the first cycle the students who achieved the success indicator value 75 (T) were 25 students or 73.53% with an average value of 77.15. Meanwhile, the increase in the second cycle as many as 30 students reached the indicator or 88.24%, with an average value of 86.24, and the results of the student response questionnaire showed a percentage result of 81%, which means they strongly agree/like. The conclusion of the research: that the application of the DPLS learning model with the guided discovery method based on the rubric's cube media can improve the mathematical problem solving ability of class VIII B students of SMP N 4 Ungaran, on the material of building a cube space.

Keywords: *Models DPLS, Guided Discovery, Rubric`S Cube, Mathematical Problem Solving Ability, Building Cube Space*

Abstrak

Tujuan penelitian ini adalah untuk mengetahui peningkatan kemampuan pemecahan masalah matematis dengan menggunakan model pembelajaran DPLS dengan metode Guided Discovery berbasis media Rubik's Cube pada materi bangunan ruang kubus pada siswa SMP N 4 Ungaran.

Penelitian ini menggunakan penelitian tindakan kelas (PTK), dengan 2 siklus yang terdiri dari 4 tahap perencanaan, pelaksanaan, observasi dan refleksi. Populasi dalam penelitian ini adalah siswa kelas VIII SMP Negeri 4 Ungaran tahun pelajaran 2021/2022, kelas VIII-B yang diperoleh dan menjadi sampel penelitian melalui teknik pengambilan sampel yaitu terdiri dari 34 siswa. Teknik pengumpulan data menggunakan lembar observasi, post test, lembar angket, dokumentasi, dan catatan lapangan. Analisis uji coba instrumen menggunakan validitas, rehabilitasi, tingkat kesukaran, dan daya pembeda.

Hasil penelitian ini menunjukkan adanya peningkatan pada setiap siklusnya, pada siklus I siswa yang mencapai nilai indikator keberhasilan 75 (T) sebanyak 25 siswa atau 73,53% dengan nilai rata-rata 77,15. Sedangkan peningkatan pada siklus II sebanyak 30 siswa mencapai indikator atau 88,24%, dengan nilai rata-rata 86,24, dan hasil angket respon siswa menunjukkan hasil persentase sebesar 81% yang berarti sangat setuju/suka. . Kesimpulan penelitian: bahwa penerapan model pembelajaran DPLS dengan metode penemuan terbimbing berbasis media rubrik kubus dapat meningkatkan kemampuan pemecahan masalah matematis siswa kelas VIII B SMP N 4 Ungaran, pada materi membangun kubus ruang angkasa.

Kata kunci: *Model DPLS, Penemuan Terbimbing, Rubrik Kubus, Kemampuan Pemecahan Masalah Matematika, Membangun Ruang Kubus*

1. Introduction

Problems in the field of education are many things that are faced in life. (Compiler, 2003) The ability to formulate teaching and learning strategies is very important in the dynamics of a teaching and learning activity to achieve its goals. Learning can be easily understood by students, of course, the right strategy is needed so that the goals are achieved. Teaching for a teacher is not just conveying knowledge to students, but a teacher needs to have a level of understanding and skills in managing the class. Such as preparing suitable materials, media, and methods that can be accepted by all students. Facts in the field are often found by a teacher delivering material using the lecture method and according to students it is a very boring thing. Without creativity that can foster the spirit of learning in students.

Based on direct observations with the Mathematics subject teacher, namely Mr. Joko Santosa, BA at SMP Negeri 4 Ungaran, the learning outcomes of class VIII B students for the 2021/2022 academic year can be seen in the mid-semester assessment (PTS), especially on the material on Number and Coordinate Patterns. Cartesian in 3 classes, from class VIII B there were 26 students (70.29%) of 34 students who scored below the KKM (Minimum Completeness Criteria), with an average score of 54.9 and had to take remedial action. The Minimum Completeness Criteria (KKM) set by the school is 70. Judging from these results, there are still many students who have low learning outcomes and problem solving abilities. When viewed in terms of the content of learning devices that are often made by teachers, they tend to only contain material summaries and applied practice questions and learning is only teacher-centered. Thus, this tendency makes students less trained to be able to build their own knowledge. This results in weak problem-solving abilities in students in solving math problems.

In this study, the researcher chose the "Guided Discovery" method or what is often known as guided discovery. Guided discovery learning is a learning process in which

students play an active role in gaining learning experiences and discovering the principles of activities carried out by students themselves. This guided discovery method will be combined with a double loop problem solving approach, using a double loop problem solving approach combined with a guided discovery method can encourage students to improve their ability to solve mathematical problems. The application of DLPS learning with this guided method allows students to be trained to be able to have the skills to manage their thoughts, so they are able to carry out the problem solving process by finding the main (cause) of the problem. (Shoimin, 2014)

The Double Loop Problem Solving (DLPS) learning model is a type of mathematical problem solving approach that emphasizes the main solution to the problem. Students are given a problem and asked to find a solution to the problem, it will indirectly improve the student's mathematical problem solving ability. Based on Rusman's opinion (2013: 230) which states that contextual mathematics learning will hone students' reasoning/problem solving skills, it is necessary to have concrete media that can be seen and indirectly help the process, so that later it will help the effectiveness of the Double Loop learning model. Problem Solving (DLPS) in improving students' mathematical problem solving abilities.

Rubik's cube (3 x 3) is a mechanical puzzle game that was invented in 1974. (Revelation, 2013) To solve the puzzle, of course, requires mathematical solving skills. In addition, the Rubik's cube in the form of a cube is very suitable for learning media to build space. To build a block space, it can be obtained from two Rubik's cubes combined. Therefore, the Rubik's cube 3 x 3 can be used as a learning medium to help students' mathematical solving process. The role of the Rubik's cube media as a problem given to students to be identified.

In connection with this, the researchers tried to apply an action using a double loop problem solving learning mode combined with a guided discovery method based on the rubric's cube media to deal with existing problems in the hope of increasing mathematical problem solving skills using the Double Loop Problem Solving learning model with Guided Discovery Method based on Rubik's Cube Media on the material of building a cube for students of SMP Negeri 4 Ungaran.

2. Method

The type of research used in this research is classroom action research. Classroom action research is research conducted by teachers in the classroom or at the school where they teach, with an emphasis on improving or improving practices and processes in learning. The classroom action research method can be interpreted as a research method carried out in the classroom by using an action to improve the quality of the teaching and learning process in order to obtain better results than before. The purpose of CAR is to improve the quality of learning practices in schools, the relevance of education, the quality of educational outcomes, and the efficiency of education management. (Sanjaya, 2010) The subjects of this study were class VIII B SMP N 4 Ungaran with a total of 34 students with a composition of 18 males and 16 females. In this learning, researchers use media that will be identified by students. The research steps consist of 2 cycles where each cycle consists of planning, implementing, observing, and reflecting

The research data collection technique will be carried out in several ways, namely, Observation, used to collect data about teacher and student activities during the teaching and learning process (PBM) and the implementation of the DLPS learning model that has

been prepared previously. Tests, tests are used to determine learning outcomes in the problem solving aspects of students during the learning process to determine student achievement. Documentation is an instrument for recording all events that occur in connection with the actions taken by the teacher. According to Sugiyono (2016: 142), he argues that the questionnaire is a data collection technique that is carried out by giving a set of questions or written statements to respondents to answer. The questionnaire used in this study is a questionnaire with a Likert scale, students respond to statements with five alternative answers, namely Strongly Agree (SS), Agree (S), Neutral (N), Disagree (TS), and Strongly Disagree. Agree (STS) (Sugiyono, 2015). Field notes are used to obtain data about the condition of students when paying attention to learning Mathematics in the Cube Space Build Material.

The data obtained in this study are data from observations and tests. The data obtained were then analyzed, the analytical techniques used were reducing data, presenting data, and drawing conclusions. The data from the observation of the implementation of learning were analyzed descriptively qualitatively to provide an overview of the implementation of learning, while the data from the end of the cycle test were analyzed quantitatively. In each test, there are aspects of problem solving that are assessed by scoring.

3. **Result and Discussion**

After doing research and analyzing the data obtained from two cycles which were carried out on April 15-25 2022, the results of the research using the double loop problem solving learning model with the guided discovery method based on the rubric's cube media, from cycle I to cycle II increased. as expected.

The following are the results of the comparison of mathematical problem solving abilities and learning outcomes for class VIII-B students of SMP N 4 Ungaran with the material for building a cube space through a double loop problem solving learning model with the guided discovery method based on the rubric's cube media..

Table 1. Results of Recapitulation of Learning
Outcomes Percycle

Cycle	Score	Criteria	Amount	Percentage
I	86-100	Very High	20	58,82%
	75-85	High	5	14,71%
	60-74	More Than Enough	4	11,76%
	45-59	Enuogh	5	14,71%
	30-44	Almost Enough	0	0%
	15-29	Not Enough	0	0%
	0-14	Very Less	0	0%
II	86-100	Very High	24	70,53%
	75-85	High	6	17,65%
	60-74	More Than Enough	1	2,94%
	45-59	Enuogh	3	8,82%
	30-44	Almost Enough	0	0%
	15-29	Not Enough	0	0%
	0-14	Very Less	0	0%

The results of table 1. Show a significant increase in each cycle. In Cycle I the percentage of students' mathematical problem solving abilities with criteria 75 (T) 73.53% (25 students) with the percentage of students having very high criteria 58,82 % (20 students) and High 14.71% (5 participants students), while in the second cycle the mathematical problem solving ability of students increased to 30 students with a percentage of 88.24% with a percentage of students with very high criteria of 70.59% (24 students) and 17.65% high (6 students).). The comparison of the percentage increase in mathematical problem solving abilities obtained by class VIII B students can be seen in table 1.1 and the average increase in the results of students' mathematical problem solving abilities can be seen in Figure 1.
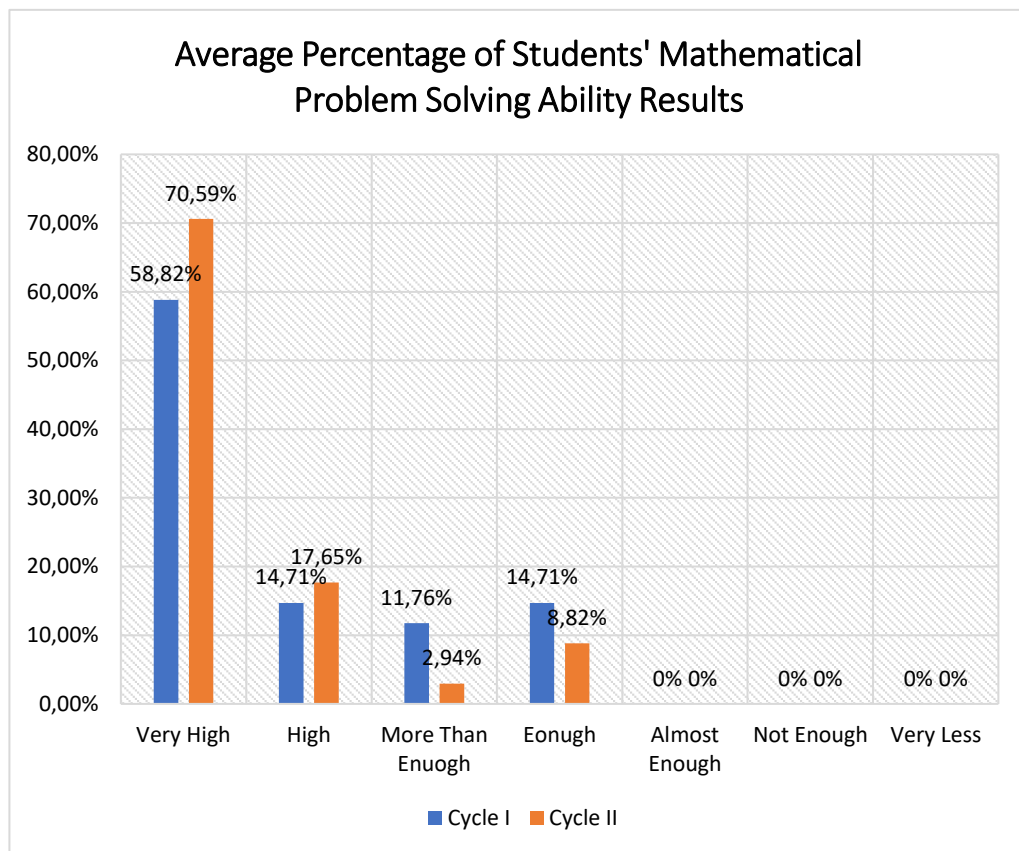

Figure 1. Recapitulation of the Results of Students' Problem Solving Ability

While the percentage of completeness of students in the first cycle only reached 73.53% with students who completed above the KKM there were 25 students and 9 students who did not complete with an average score of 77.15, while in the second cycle students who completed increased to 30 students with a percentage of 88.24% where students who completed above the KKM there were 30 students and 4 students who did not complete with an average score of 86.24, Comparison of the percentage of completeness obtained by class VIII B students can be seen in table 2. and the increase in completeness of learning outcomes between cycles can be seen in Figure 2.

Table 2. Results of Recapitulation of Learning
Outcomes Per-cycle

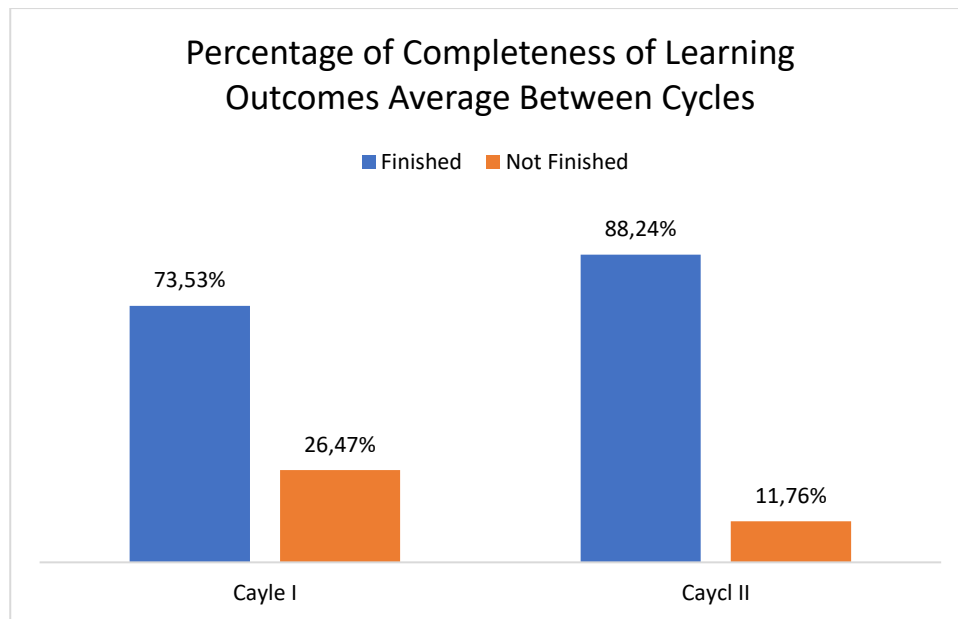| Cycle	Average	Category	Amount	Percentage
I	77,15	Finished	25	73,53%
		Not Finished	9	26,47%
II	86,24	Finished	20	88,24%
		Not Finished	4	11,76%

(primary data source)

Figure 2. Percentage of Complete Learning Outcomes of Each Cycle

Based on the data above, it can be said that the use of the double loop problem solving learning model with the guided discovery method based on the rubric's cube media worked well, because the percentage had exceeded the target set by the author. The results of the research that the author did with the title "Implementation of the Double Loop Problem Solving (DLPS) Learning Model with Guided Discovery Methods Based on Rubik's Cube Media on Students' Cube Space Building Materials at SMP Negeri 4 Ungaran", can be said to be relevant and in accordance with research conducted by Rahayu . (2014) showed a significant increase in student learning achievement both from mathematical problem solving abilities and learning outcomes exceeding KKM = 70 and more than 80% of students achieving KKM, namely 93.75%. Through the application of double loop problem solving (DPLS) with the PMRI approach with character content, it can improve the problem solving ability of class X trigonometry material and can also reduce the problem of completeness of learning outcomes in class. This is said to be relevant as well as the research conducted by Lucky Heryanti Jufri (2015) which showed that level 3 mathematical literacy skills were increased by using the Double Loop Problem Solving method rather than using the conventional method. This is also supported and can be said to be relevant according to research that has been conducted by Oktavia Irma Pratama (2018) which concluded that DPLS-based learning provides good things for increasing the mathematical problem solving abilities of class VII students in each cycle.

This is also supported by the thesis research conducted by Dessy Rahmawati (2018) which shows an increase in the mathematical problem solving ability of Mts students. Negeri 3 Medan every cycle and he concluded that by using the double loop problem solving learning model combined with the guided discovery method, this can be used as another alternative tool for teachers in carrying out the learning process in the classroom. This is also strongly supported by a journal belonging to Lola Mandasari (2021) from IAIN Takengon about the application of double loop problem solving learning to improve students' mathematical problem solving abilities at SMP Negeri 34 Takengon which concludes that using the DPLS learning model can improve mathematical problem solving abilities. Takengon 34 Junior High School students.

Conclusion

Looking at the results achieved in this study, the author can conclude that the application of double loop problem solving with the rubric's cube media-based method is an alternative that is proven to be applicable in class VIII B SMP Negeri 4 Ungaran in an effort to improve students' mathematical problem solving abilities. learn on the material of building a cube space.

Based on the data from the research above, it can also be seen that there is not only an increase in students' mathematical problem solving abilities, but the mastery of learning outcomes obtained in each cycle also increases in the cube space material. Many students originally had relatively low completeness and the average was still below the KKM 70, now after the learning process is carried out, students use the double loop problem solving (DPLS)N learning model with the guided discovery method based on the rubric's cube media. proven not only to improve students' mathematical problem solving abilities, but also student learning outcomes also increase, and the learning process in the classroom becomes more effective.

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