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Improving student learning outcomes on SPLDV material using the Problem Based Learning model in class IX H SMPN 6 Surabaya

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Based learning model, Learning Outcomes Mathematic, critical thinking ability

Abstract
The problem based learning model is expected to be effective in enabling students to find solutions and solve their own problems, thereby increasing conceptual understanding of SPLDV material. The aim of this research is to find out how much influence the problem based learning model has on SPLDV material which can improve student learning outcomes at SMPN 6 Surabaya. This research uses the PBL method. The design of this research is a single case study, namely an experimental design by providing treatment to a small group and a large group. The results of data processing using the influence of the PBL learning model on the learning outcomes of conflict resources and social integration at SMPN 6 Surabaya. The result is the use of a problem-based learning model that involves sources of conflict which will improve student learning outcomes at SMPN 6 Surabaya. The use of the PBL learning model for learning outcomes related to SPLDV material at SMPN 6 Surabaya is classified as good, this can be seen from the average pre-cycle score carried out by individuals, namely 85.18, the average LKPD score is 1 learning outcome for small group students consisting of 2 participants. students is 85.90 and the average score for LKPD 2 student learning outcomes for a large group of 6 students is 99.09. In the collaborative classroom action research carried out it can be declared successful because there is an average increase in pre-cycle, cycle 1 and cycle 2 in learning outcomes.

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INTRODUCTION

Education has become very important for humans to create a superior and qualified next generation to face today's global competition (Darling-Hammond, 2015). Education is a very important component in human life because through it humans can grow and develop as very independent individuals. The progress of a nation in all fields is largely determined by its level of education (Farenga & Ness, 2015). Education as a means to prepare students to become tough, brave, innovative, independent and creative professionals. In this case the government has an important record that must do many things to improve the quality of education in order to produce a superior, high-quality generation, and be able to adapt education to the times.

Innovative learning models for teachers to use today, innovative learning that will be able to bring learning changes for students, has become a mandatory item for teachers. Old learning has become obsolete because it is seen as only revolving around the oral method. Learners are very uncomfortable with oral methods. To teach learners according to their learning styles so that learning objectives can be achieved optimally, there is a learning model. in choosing the right learning model, you must pay attention to the condition of the

students, the nature of the teaching material, the available media-facilities, and the condition of the teacher himself (Dewantoro et al., 2021).

Teachers have a very influential role in learning, not just providing knowledge, but teachers are required to make learning take place more actively. The method or model used by the teacher certainly affects the activities of students, if the teacher uses a model that involves students to learn more diligently, on the contrary, if the teacher only explains it, students feel bored and bored during the lesson. The use of the right lesson model will affect students' interest in learning so that lessons are more active and learning outcomes can improve (Li et al., 2023). In addition, the role of the teacher as a facilitator for students is encouraged to be able to meet the needs of students in the learning process (Aji & Budiyanto, 2022).

Interactive multimedia is a medium that can be used to clarify the learning process, supported by learning media that attracts the interest and involvement of students in learning activities, thus creating a pleasant learning environment. Through the use of a computer or laptop, interactive multimedia in the learning process combines different elements such as text, graphics, audio, video, and animation to illustrate a concept. In this way, students can engage in learning through interesting animations, sounds and demonstrations. This approach allows learners to develop their abilities effectively according to their individual potential (Preim & Meuschke, 2022). Thus, the use of media plays an important role in learning and can arouse learners to be more motivated so that it can affect learners' cognition to develop their interest and desire to learn (Plass & Kaplan, 2016).

Problem Based Learning (PBL) is a learning model characterized by using real-life problems as something that students must learn to train and improve their thinking, problem-solving skills, and gain important concept knowledge (Khoiriyah & Husamah, 2018). In terms of learning, in this learning model, students directly practice what material is applied by the teacher. Project Based Learning is a learning model that uses problems as the first step in collecting and integrating new knowledge based on their experience in real activities. Project-based learning is designed to be used on complex problems that require learners to investigate and understand. Given that each learner has a different learning style, project-based learning provides opportunities for learners to explore content (material) using a variety of ways that are meaningful to them, and to experiment collaboratively. Using this Project Based Learning method encourages the growth of creativity, independence, responsibility, confidence, and critical and analytical thinking in learners. The application of this method of course adapts to the learning material and the level of development of students (Chu et al., 2021).

The problem-based learning model allows students to analyze, experiment, make benchmarks, and conclusions through the implementation of investigating the problem (Deslauriers et al., 2019). The problem-based learning model is considered effective because it allows learners to find solutions and solve their own problems so that students' understanding of the concepts of social conflict and integration material can be improved. The application of this model can change the mindset of students from low to high based on cognitive levels. That the highest level in the cognitive field after the existence of a learning process where students are able to solve problems (Nayak et al., 2024). The PBL learning model has several advantages, among others: a) students better understand the concepts taught because students find these concepts. b) actively involves students in solving problems and demands higher thinking skills of students. c) students' knowledge is embedded based on their experience, so that learning is more meaningful. d) students can feel the benefits of learning, because the problems they solve are directly related to real life.

This can increase students' motivation and interest in the material they learn. e) make students more independent and mature, able to aspire and accept other people's opinions, and instill positive social attitudes with other students. f) conditioning students in learning in class who interact with each other about learning with their friends, so that the achievement of students' learning completeness can be expected. g) can develop students' creativity abilities, both individually and in groups, because almost every step requires students' activeness (Sawyer, 2014).

Critical thinking skills are defined as thinking abilities that include behavioral tendencies and cognitive skills to solve problems, draw conclusions, consider various possibilities and make a decision on what to believe or do. Doing critical thinking activities will be very instrumental in building and developing thoughts to solve various problems by providing appropriate arguments. Further research also revealed that the use of the Problem Based Learning model was significantly able to improve students' learning outcomes and was able to improve students' communication skills (Qomariyah, 2019).

The learning model is a manipulable variable that allows each teacher to choose and use different learning models according to the characteristics of the learning model in the learning quality improvement program (Supovitz & Sirinides, 2018). The role of the learning model is as a guide for educators and teachers in carrying out learning, for learning designers and teachers in planning and implementing learning activities and learning activities to achieve learning objectives.

The purpose of this study was to determine the improvement of learning outcomes of students in class IX H SMP N 6 Surabaya in mathematics subjects, especially the material of the Two-Variable Linear Equation System (SPLDV), after participating in learning by using the Problem Based Learning (PBL) model. The expected benefits of this research include several aspects. For teachers, this research can be input and consideration in the teaching and learning process to improve student outcomes through the PBL model. For students, it is hoped that this research can improve learning outcomes, create an active learning atmosphere, and encourage student interaction and concentration, so that they dare to express their opinions. For schools, this research can be used as a reference in the teaching and learning process to improve the quality of learning. For researchers, this research will increase knowledge, experience, and insight in applying the PBL model. Finally, for other researchers, the results of this study can be used as a reference for those who want to conduct similar research using the Problem Based Learning model.

RESEARCH METHOD

The type of research conducted is the type of *Classroom Action Research*. In the design of classroom action research (PTK) applied by researchers refers to the action research model from reseachers, namely 2 cycles. each cycle includes planning, action, observation, and reflection.

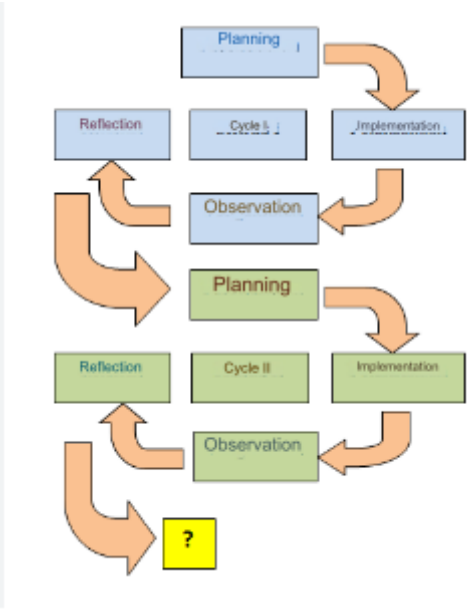

Figure 1 Arikunto's PTK Model

The target of this study were students of class IX H SMP N 6 Surabaya with a total of 33 students. Data collection was carried out twice a meeting in July 2024 with SPLDV material. The data taken in this PTK are: Data analysis was carried out during the data collection stage until the conclusion stage.

RESULTS AND DISCUSSION

In class action research there are stages in the Arikunto model cycle 1 and cycle 2. The success indicator is set at students who reach the KKM score of 80 in the knowledge aspect. Another indicator of the success of the research is that classical completeness is obtained up to 85% of the number of students. The data on learning outcomes obtained on the diagnostic test are as follows:

Table.1 learning outcome data on diagnostic tests

No.	Learner's name	Test D	LKPD 1	LKPD 2
1	Adilla Irsyad Alvaro	98	100	100
2	Ahlul Aisya Putri	80	80	100
3	Alharani Isnayah Okarin	80	80	100
4	Alvina Yesenia Chandra Putri	80	80	95
5	Aumtumzhanoom Zizi Dewipradnya	100	100	100
6	Aurea Isamira Natarina	85	85	100
7	Carissa Putri Azzahra	88	80	100
8	Carla Ghefirra Larasati	75	85	95
9	Cynthia Jaya Evelyn	100	100	100
10	Daffy Andhita Bintoro	95	100	100
11	Esmeralda Maiza Affandi	92	100	95
12	Ezra Birawa	95	90	100
13	Farel Emeraldy Pratama	80	85	100
14	Ivan Alif Pratama	90	90	100
15	Jihan Rania Azahra	70	75	95
16	Kafia Malikah Amirah	75	80	95
17	Kamelia Nuraini	75	85	100
18	Melissa Laila Sari	92	95	100
19	Moch. Viody Alfarizi	75	85	95
20	Muhammad Naufal Rahmadhika	90	100	100
21	Muhammad Prima Ataya Bintang	85	90	100

No.	Learner's name	Test D	LKPD 1	LKPD 2
22	Namira Sankrisza	95	100	100
23	Radithya Javas Nararya	85	85	100
24	Radya Aryadhyaksa Putra Hidayat	85	85	100
25	Ragazzo Zhafif Afrino Nalasakti	80	80	100
26	Raina Alicia Marthavıα	85	90	100
27	Regano Ardana Putra	95	100	100
28	Rr. Clarissa Kirani Nugraha	98	100	100
29	Rr. Syakirra Tsania Maheswari	70	75	100
30	Sekar Ardhanareswari	88	90	95
31	Shakila Rifantriny Kurniawan	85	95	100
32	Shella Putri Trisnawati	70	80	100
33	Zaida'an Ali Ashari	75	80	100
	Total	2811	2835	3265
	Average	85,18	85,90	99,09

Before the research took place, there were learning activities to find out the initial abilities of students who had learned about PLDV material and the differences between PLDV and SPLDV. This initial ability test is called a diagnostic test. In this study, the diagnostic test was in the pre-classroom activity. The data on learning outcomes obtained on the diagnostic test are as follows:

Table 2.Prasiklus

completeness	Frequency	Percentage
Completed	25 students	76%
Not complete	8 students	24%
Average		85,18

In the implementation of the pre-cycle, there were still many shortcomings in several aspects, therefore in the next stage the researchers held a reflection including the following: 1) Organizing time before the lesson, better preparing the material that will be delivered in the teaching process of the next cycle I stage so that time can be used effectively and efficiently (Nilson, 2016); 2) Provide instructions to students so that they can work together collaboratively; 3) Create a more conducive atmosphere so that students dare to express opinions, ask questions, and think critically; 4) Provide a better understanding of the assignments given to students and emphasize the time to collect assignments so as not to slow down the learning time; 5) Motivate students to be more active in asking questions, discussing, taking notes and listening during learning so that at the next meeting it gets better, such as if you actively ask questions will be given additional points (Doyle, 2023). Since this learning model is still new for students, it takes time for adjustment in following the learning process;

Based on the reflection of cycle I, improvements were made in cycle I with the aim of creating better conditions and then implementing cycle I, where the first meeting applied the Problem Based Learning (PBL) learning model to the knowledge aspect of LKPD 1 ability. The data findings obtained in cycle I are presented in table 2 as follows:

Table 3.Cycle I

completeness	Frequency	Percentage
Completed	31 learners	94 %
Not complete	2 learners	6 %
Average		85,90

In the implementation of the pre-cycle, there were still many shortcomings in several aspects, therefore in the next stage the researchers held a reflection including the following: 1) Organizing time before the lesson, better preparing the material that will be delivered in

the teaching process of the next cycle I stage so that time can be used effectively and efficiently; 2) Provide instructions to students so that they can work together collaboratively; 3) Create a more conducive atmosphere so that students dare to express opinions, ask questions, and think critically; 4) Provide a better understanding of the assignments given to students and emphasize the time to collect assignments so as not to slow down the learning time; 5) Motivate students to be more active in asking questions, discussing, taking notes and listening during learning so that at the next meeting it gets better, such as if you actively ask questions will be given additional points. Since this learning model is still new for students, it takes time for adjustment in following the learning process;

Based on the reflection of cycle 2, improvements were made in cycle I with the aim of creating better conditions and then implementing cycle I, where the first meeting applied the Problem Based Learning (PBL) learning model to the knowledge aspect of LKPD 1 ability. The data findings obtained in cycle I are presented in table 2 as follows:

Table 4. Cycle 2

completeness	Frequency	Percentage
Completed	33 students	100 %
Not complete	-	-
Average		99,09

Discussion

After applying the Problem Based Learning (PBL) learning model in class IX H SMP N 6 Surabaya, data on student learning outcomes were obtained by researchers as follows:

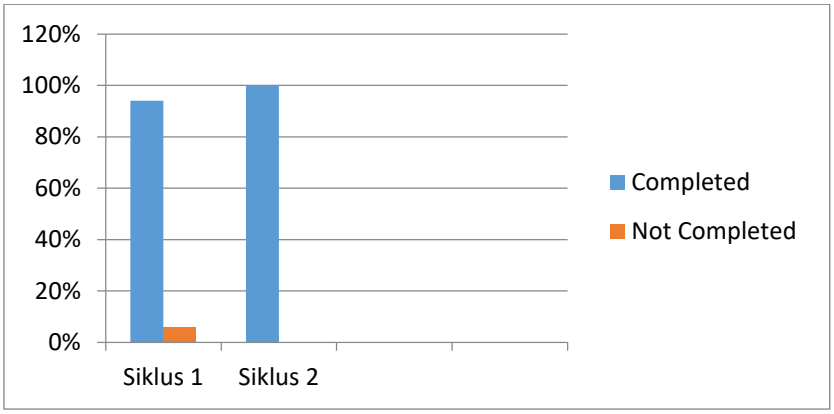

Table 5. Diagram of the completeness of all students in IX H

Based on the data on the learning outcomes of class IX H, it is not surprising that class IX is called a superior class that is enthusiastic about learning, critical in learning and an active class. Only in cycle 1 on LKPD 1 learning was less focused because the students did not pay attention to the work instructions on LKPD 1. And then it can be improved in cycle 2 on LKPD 2 which has 100% completeness because students have started to focus on learning. So that in this completeness has increased, so this research can be declared successful.

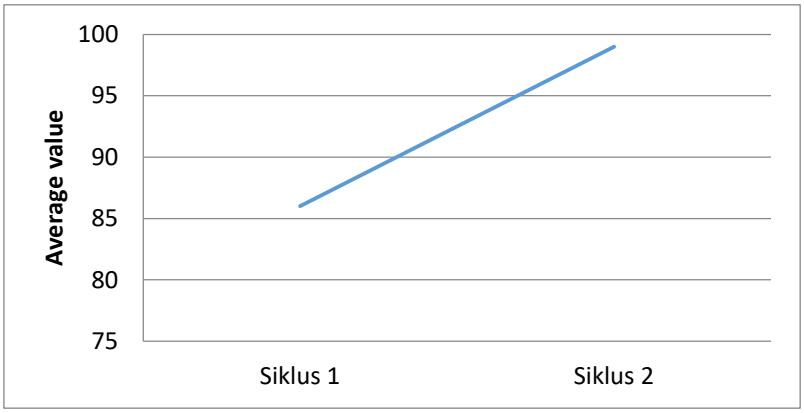

Table 6. Diagram of the average score of all students in IX H

Based on the data on the learning outcomes of class IXH, it has an average value that is not far from the completeness value that has increased. Only in cycle 1 on LKPD 1 learning was less focused because the students did not pay attention to the work instructions on LKPD 1 which had an average of all students of 85.90. And then it can be improved in cycle 2 on LKPD 2 which has an average value of 99.09 close to perfect numbers because students have started to focus on learning. So that in the average value of all students this has increased tremendously, so this research can be declared successful.

CONCLUSION

Based on the results of the action research that has been carried out, it can be concluded that the application of the Problem Based Learning (PBL) learning model can improve student learning outcomes in mathematics subjects, especially the material of the System of Linear Equations of Two Variables (SPLDV) in class IX SMP N 6 Surabaya. Related to this, there are several suggestions regarding the application of the PBL model. First, the PBL learning model is an effective alternative to improve student learning outcomes in mathematics subjects. Second, considering that this model requires a long time, good classroom management is very important; educators must be able to motivate students and create a supportive classroom atmosphere. Finally, in applying the PBL model, time should be allocated optimally, so that learners can be assisted in each stage of learning according to the specified time limit, which in turn will discipline them in completing the task.

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