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APPLICATION OF PROBLEM BASED LEARNING MODEL TO INCREASE ACTIVENESS AND LEARNING OUTCOMES IN JUNIOR HIGH SCHOOL STATISTICS LEARNING

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Abstrak: Pembelajaran pada siswa kelas VIII sering mengalami kesulitan untuk mengidentifikasi penyelesaian permasalahan nyata yang terkait dengan statistika seperti mean, median, dan modus. Selain itu siswa juga sering mengalami ketidaktelitian didalam melakukan perhitungan. Oleh karena itu, penelitian tindakan kelas dilakukan dengan tujuan untuk meningkatkan keaktifan dan hasil belajar melalui penggunaan model pembelajaran problem based learning. Subjek penelitian ini adalah siswa kelas VIII A SMP Negeri 1 Adimulyo yang berjumlah 32 siswa. Data keaktifan dikumpulkan dengan metode observasi, dan data hasil belajar dikumpulkan dengan metode tes. Data tes dianalisis berdasarkan kunci jawaban dan rubrik penilaian yang telah ditentukan. Data keaktifan dianalisis berdasarkan persentase siswa yang menunjukkan respon aktif seperti: dalam mengajukan pertanyaan guru, mengerjakan soal latihan, dan menjawab soal. Indikator keberhasilan hasil belajar ditentukan oleh 70% siswa mencapai kriteria ketuntasan minimal (KKM), dan keaktifan siswa sebesar 50%. Selama dua siklus penelitian ini, hasil belajar meningkat dari 21,87% menjadi 45,16% (pada siklus I) dan 74,19% pada akhir siklus II. Sedangkan keaktifan siswa meningkat dari 18,75% pada siklus 1 menjadi 40,85% pada akhir siklus 2. Walaupun keaktifan belum sesuai dengan yang diharapkan, peningkatan aktivitas siswa yang diperoleh memberikan harapan baru bagi peningkatan kualitas belajar mengajar di sekolah.

Kata kunci : *Model Pembelajaran Problem Based Learning, Keaktifan Siswa, Hasil Belajar, Statistika*

Abstract: Learning in class VIII students often have difficulty identifying solutions to real problems related to statistics such as mean, median, and mode. In addition, students also often experience inaccuracies in doing calculations. Therefore, classroom action research is carried out with the aim of increasing activeness and learning outcomes through the use of problem based learning learning models. The subjects of this study were students of class VIII A of SMP Negeri 1 Adimulyo, totaling 32 students. The activity data was collected by the observation method, and the learning outcome data was collected by the test method. The test data were analyzed based on the answer key and the predetermined scoring rubric. The activity data was analyzed based on the percentage of students who showed active responses such as: in asking the teacher's questions, doing practice questions, and answering questions. Indicators of the success of learning outcomes are determined by 70% of students achieving the minimum completeness criteria (KKM), and

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50% of student activeness. During these two research cycles, learning outcomes increased from 21.87% to 45.16% (in the first cycle) and 74.19% at the end of the second cycle. Meanwhile, student activity increased from 18.75% in cycle 1 to 40.85% at the end of cycle 2. Although activity was not as expected, the increase in student activity obtained gave new hope for improving the quality of teaching and learning in schools.
Keywords: *Learning Model Problem Based Learning, Student Activity, Learning Outcomes, Statistics.*

INTRODUCTION

Learning strategy is selected ways for convey Theory learning in environment learning certain. Next learning strategy the cover nature, scope and order activity learning that can give experience study to participant educate (Fincham et al., 2018; Meyers & Nulty, 2009). Activity must learn done by teachers and students so that the goals learning could achieved by effective and efficient. Then could said that learning strategy that is a set of materials and procedures learning used by together for cause results learn on students. The right learning strategy used is one of them that is learning active (Arifin et al., 2020; Fernandes et al., 2021).

Learning active influencing to enhancement results study has reported in a number of research. Bonwell and Eison (1991) studied a number of literature about learning active and conclude that learning active will repair attitude students and improve ability student in think and write (Alqasa & Afaneh, 2022; Bonwell & Eison, 1991). Bonwell and Eison state that study active could defined as method learning that involves student in the learning process. Study by active require student for To do activity meaningful learning and thinking about what are they do (Bakar & Ismail, 2020; Sivan et al., 2000).

Based on Interview with a math teacher who is a researcher do it at SMP Negeri 1 Adimulyo it is known that the learning process math used still teacher centered. Teacher as center moving learning his knowledge to student so that student Becomes not enough active in activity learning. This thing caused that learning direct no activate student in activity learning (Sperry et al., 2019). Beside that during the learning process seen many from student no pay attention to the teacher when explain material busy with activity alone like draw something not concerned with eye lesson math and sometimes there is students who are busy playing cell phones. During the learning process ongoing partially big student not enough show interest for follow lesson mathematics (Roberts et al., 2018). Student tend behave passive and easy very distracted his concentration on something else outside lesson. This thing showed with results study Mid-Semester Assessment (PTS) is not optimal, it is shown with the KKM score is 7 out of 32 students or around 21.87%.

Low results study students on the eyes lesson math probability indicated learning model in learning less math optimizing activity study student (Borman & Overman, 2004; Triana & Zubainur,

2019). because that needed learning model innovation To use increase activity study student through activity study by group. With study by group student could involved by active in the learning process. Besides that student could learn Theory lesson with discuss together friend for solve something problem. Need existence learning model innovation To use increase activity study student for achievement results learn more good from before. Innovation selected learning is change the learning model centered to the teacher, become a learning model student centered (Silalahi & Hutauruk, 2020). With the 2013 curriculum is expected that teachers can offer more learning models effective which can awaken attention student so that student Becomes active and motivated for study as well must balanced with teacher 's ability in master the learning model the (Simanjuntak et al., 2022). Appropriate learning model with 2013 curriculum is one of them is a Problem Based Learning (PBL) curriculum learning model (Brundiers & Wiek, 2013; Maskur et al., 2020).

Through this PBL model the teacher will presenting a problem isn't it in the form of lecture or exercises. Student must handle sheet work participant related students with problems presented by the teacher (Putri et al., 2022). So in Thing this student must active learn sheet work participant educate don't you ? taught by the teacher. Understand sheet work participant educate is condition for student or group student for could solve problem in aspect knowledge and aspects skills provided by the teacher (Utami et al., 2020).

Theory statistics chosen researcher because in learning During this student often difficulty for identify solution problem related real with statistics such as mean, median, and mode (Borovay et al., 2019). Besides that students often experience inaccuracy in the To do calculation. because of it's a teacher must capable apply the right learning model so that the goals learning that can train and improve results study students.

RESEARCH METHOD

Study action class this held at SMP Negeri 1 Adimulyo which is located at Jl. Sidomukti Adimulyo Sidamukti Kec. Adimulyo Kab. Kebumen Central Java. Subject in study this is whole student class VIII A SMP Negeri 1 Adimulyo year lesson 2021/2022 with amount 32 students. The object to be discussed in research this is activity and results study mathematics participant educate in learn statistics namely the mean, median, and mode. Study action class this has 4 stages consisting of of 2 cycles or more researchers plan depends implementation every stages designed with through stages : planning implementation action observation and reflection (Susanti et al., 2015). The methods and stages explained as Figure 1.

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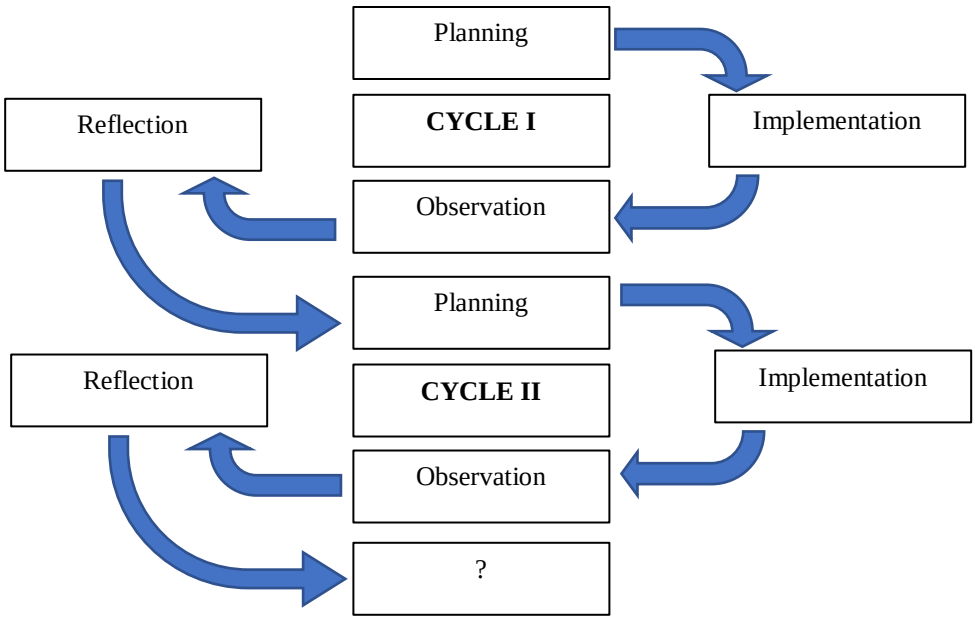

Figure 1. Stages Classroom Piercing Research

Problem Based Learning Model Learning (PBL) is considered necessary to be applied. Through this PBL model the teacher will present a problem, not in the form of lectures or exercises. Students must handle student worksheets related to the problems presented by the teacher. So in this case students must actively study student worksheets, not be taught by the teacher. Understanding student worksheets is a requirement for students or groups of students to be able to solve problems in the aspects of knowledge and skills provided by the teacher. From this description, the application of the Problem Based learning model Learning is expected to increase the activity and learning outcomes of class VIII A students of SMP Negeri 1 Adimulyo in the 2021/2022 academic year. The research framework diagram as shown in Figure 2.

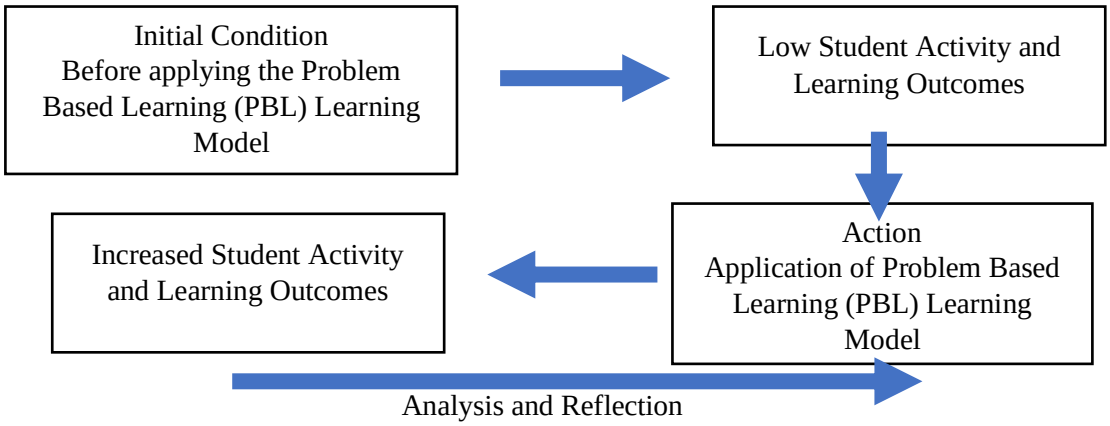

Figure 2. Research Framework Diagram

Observation sheet learning. This sheet will be filled out by the observer to assess whether the proposed action has been implemented in the learning process or not. The action in question is a Problem Based learning model Learning. The observation sheet is made by taking into account several things that are observed and listed in the grid as follows: Table 1 below.

Table 1Grid of Implementation of Problem Based Learning (PBL) Model Sheets

Learning Steps	Indicator
Introduction	Open lesson
Core	PBL syntax stage 1: Orientation Student On Problem
	Stage 2 PBL syntax : Organize student for study
	PBL syntax stage 3: Guide individual investigations and group
	PBL syntax stage 4: Develop and present results creation
	PBL syntax stage 5: Analyze and evaluate the solving process problem
Closing	Close lesson

Activity observation sheet. This observation sheet aims to be used by observers to record things related to activities according to indicators that occur during learning. The observation sheet is made by taking into account several things that are observed and listed in the grid as follows: Table 2 below.

Table 2. Activity Sheet Grid Student

Indicator	Observed aspects _
Student submit question	Student submit questions when the teacher explains and explains Theory or problem
	Student submit question at the moment discussion group
	Student submit question at the moment presentation
Student work practice question	Student work practice questions given by the teacher direct
	Student work practice the questions in the LKPD
Student answer question	Student answer question from the teacher without coercion
	Student answer question from the teacher when appointed direct
	Student answer question when discussion group

The test questions of knowledge and skills aspects of the first cycle The test was used to collect data about student learning outcomes in the first cycle. The first cycle test questions are made based on Table 3.

Table 3. Grid – Test Grid Cycle I

No.	Basic Competence	Indicator	realm Cognitive				Amount
			C1	C2	C3	C4	
1	Analyze data based on distribution of data, mean value median, mode, and	Calculate the mean (mean) of something single data set.	1	2, 3	4, 5	6, 8	7

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No.	Basic Competence	Indicator	realm Cognitive				Amount
			C1	C2	C3	C4	
	data distribution for take conclusion make decisions and make prediction						
2	Presenting and finishing related problems with distribution of data, mean value median, mode, and data distribution for take conclusion make decisions and make prediction	Complete related problems with the average of something a given single data set.				7, 9, 10	3
Amount			1	2	2	5	10

Question test aspect knowledge and skills in the second cycle The test was used to collect data on student learning outcomes in the second cycle. The second cycle test questions are made based on Table 4 below. Indicator of success for each cycle as Table 5.

Table 4. Grid – Test Grid Cycle II

No.	Basic Competence	Indicator	realm Cognitive				Amount
			C1	C2	C3	C4	
1	Analyze data based on distribution of data, mean value median, mode, and data distribution for take conclusion make decisions and make prediction	Calculate the mode and median of something single data set.	1	2, 3	4, 5	6, 8	7
2	Presenting and finishing related problems with distribution of data, mean value median, mode, and data distribution for take conclusion make decisions and make prediction	Complete related problems with the mode and median of something given single data set. _				7, 9, 10	3
Amount			1	2	2	5	10

Table 5. Indicator PTK success

Variable	Beginning	Cycle 1	Cycle 2
Activity	NA	$\geq 12{,}5\%$	$\geq 50\%$
Learning Outcomes	$< 25\%$	$\geq 37{,}5\%$	$\geq 70\%$

After obtaining the observation data on student activity in cycle I and cycle II, the next step is to calculate the amount of observational data on student activity for each indicator. After that calculate using percent. To find percent used formula as Equation 1.

$$\bar{P_a} = \frac{A_a}{N} \times 100\% \quad (1)$$

Information:

$\bar{P_a}$ = Percentage of student activity for each indicator

A_a = The number of active students for each indicator

N = Total number of students

After obtaining the observation data on the implementation of learning in cycle I and cycle II, the next step is to calculate the amount of observation data on the implementation of learning. After that calculate using percent. To find percent used formula as Equation 2.

$$\bar{P_r} = \frac{A_r}{N} \times 100\% \quad (2)$$

Information:

$\bar{P_r}$ = Percentage of learning implementation

A_r = Number of implementations of learning

N = The total number of aspects observed

After obtaining the test scores for student learning outcomes in cycle I and cycle II, the next step is to calculate the number of values that are above the KKM, which is 65 per cycle. After that calculate using percent. To find the percentage of students who have grades above the KKM namely with formula as Equation 3.

$$\bar{p} = \frac{A}{N} \times 100\% \quad (3)$$

Information:

$\bar{p}$ = Percentage of students whose scores are above the KKM

A = The number of students whose scores are above the KKM

N = Total number of students

RESULTS AND DISCUSSION

Implementation of learning with Problem Based learning model Learning (PBL) in research is in accordance with a design made based on initial and pre- cycle observations. In the first cycle, the implementation of learning with Problem Based learning model Learning (PBL) resulted in an increase in students' activeness and learning outcomes in mathematics. However, this increase still has some obstacles that occur. Student Worksheets that should be done in groups are done individually. More because there are students in a group who rely on LKPD work on their friends. So students do not want to take advantage of the opportunity to discuss to be able to understand the learning material. There are students who discuss outside the material while working on the LKPD. There are students playing cellphones without being monitored by the teacher.

The existence of this obstacle causes the achievement of indicators of research success but has not reached half of the number of students in one class, so the second cycle of action is a reflection of the first cycle so that the obstacles that occur can be overcome. The resolution of this obstacle is the result

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of the researcher's discussion with the supervising lecturer and the civil servant teacher. Here the role of the researcher as a teacher can be emphasized even more, especially during discussions. Teachers monitor students more and direct them to be active in discussions. Then during the lesson, the cellphones were collected at the teacher's desk. In the second cycle has showing implementation 100% learning as Table 6. Rating based on sheet observations on the first and second.

Table 6. Observation Results

Class Action	Observation Sheet 1	Observation Sheet 2	Average _
Cycle I	100%	92%	96%
Cycle II	100%	100%	100%

After the action in the first cycle by applying the Problem Based learning model Learning (PBL), the activity obtained is 18.75%. For indicators of students asking questions reached 18.75%, indicators of students asking practice questions 17.18%, and indicators of students answering questions 19.79%. The percentage of student activity from cycle I and each indicator reached the indicator of research success, namely 12.5%.

In learning activities after applying the Problem Based learning model Learning (PBL) in cycle II increased by 19.14%, from 18.75% to 37.89%. For indicators of students asking questions reached 35.47%, indicators of students asking practice questions 37.09%, and indicators of students answering questions 40.85%.

Based on the opinion of the teacher already experience difference enough significant compared to before so can give hope new for improvisation quality teaching and learning in school. It can also linked with increase percentage liveliness by 18.75% and 37.89% after the implementation of the Problem Based learning model is carried out Learning (PBL). As Figure 3 shows, the logarithmic trend of increasing of $y = 0.2872\ln(x) + 0.1718$ with score approach $R^2 = 1$.

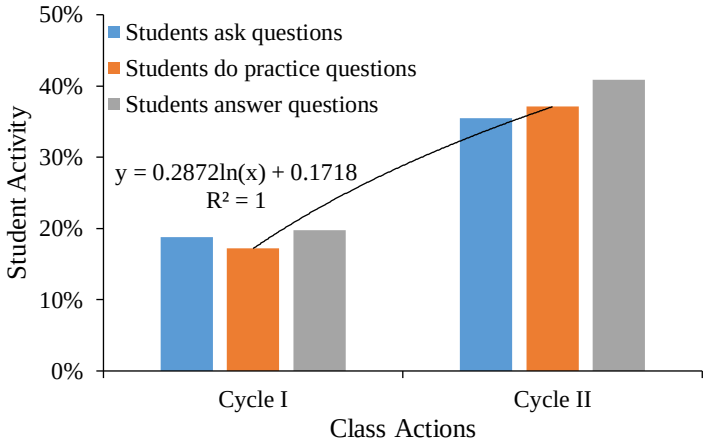

Figure 3. Student activity

In the early mathematics learning activities, namely before the Problem Based learning model was applied, Learning (PBL), the percentage of students who score above the KKM is 21,87%. From the results of pre-cycle activities, then learning is carried out by applying the Problem Based learning model Learning (PBL).

After the actions taken in the first cycle, the students' mathematics learning outcomes showed that the percentage of students' mathematics learning outcomes increased to 45,16%. The increase in student learning outcomes in mathematics has reached the established indicators of research success, namely 37,5%. Although there has been an increase and achieved indicators of research success on the percentage of students' mathematics learning outcomes, further action is needed to be carried out in cycle II by correcting deficiencies and overcoming obstacles that occur in cycle I.

After holding follow-up actions in cycle II with Problem Based learning model Learning (PBL), the percentage of students' mathematics learning outcomes that exceed the KKM is equal to 74,19%where the percentage increases when compared to pre-cycle and cycle I. The percentage of students increases by as much 29,03% as compared to cycle I and increases 52,32%when compared to pre-cycle, as shown in Figure 4. Logarithmic Actions class have score increase of $y = 0.4611\ln(x) + 0.1953$ with approach of $R^2 = 0.96$ Because the indicator of achievement of the cycle, namely the percentage of the number of students who get a score above the KKM increases in each cycle and the percentage of the number of students who get a score above the KKM has exceeded 70%, there is no need for further action.

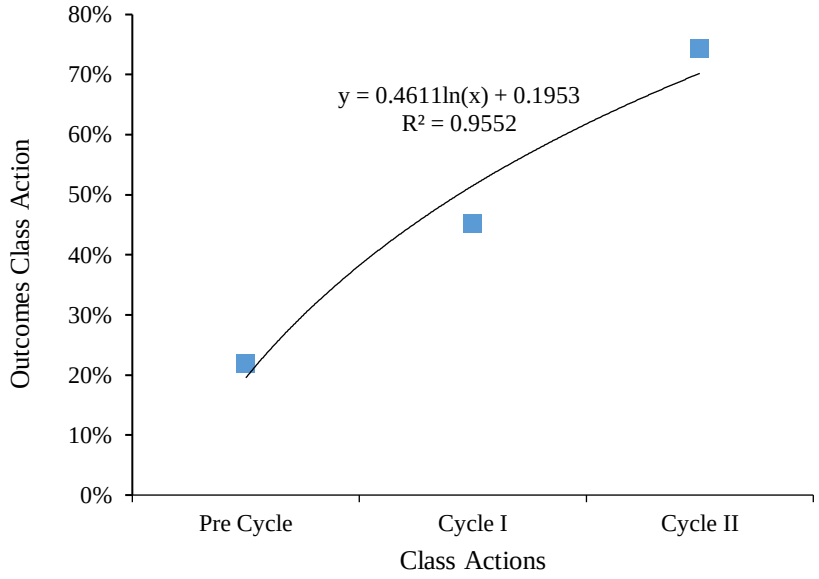

Figure 4. Learning Outcomes Student

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CONCLUSIONS AND SUGGESTIONS

Based on the results of the research that has been carried out, it can be concluded that the application of the Problem Based learning model Learning (PBL) statistical material in class VIII A of SMP Negeri 1 Adimulyo for the 2021/2022 academic year can be improve student activity and learning outcomes. In accordance with results Observation Class Action first and second achieved 100% implementation plan implementation learning in cycle II. Percentage enhancement liveliness students in cycle I and cycle II were 18.75% and 37.89% after conducted application of the Problem Based Learning (PBL) learning model. So that results study student could increase percentage enhancement results study by 29.03% in the first cycle and 52.32% in the second cycle. View from teacher 's opinion is very different with learning before so that could bring hope new for enhancement quality study teach at school.

Teacher should apply the Problem Based Learning (PBL) learning model as one of the alternative learning for increase activity and results study students. Learning this model need interesting problem so the teacher needs increase creativity for determine problem in life related daily with material to be learned and needed more time many so the teacher must allocate time with good for learning could held more optimal.

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