THE EFFECT OF PBL LEARNING MODEL ON THE FIFTH-GRADE STUDENTS' MATH ARITHMETICAL SKILLS AT MIS PERDAMEAN SIGAMBAL

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PENGARUH MODEL PEMBELAJARAAN PBL (*PROBLEM-BASED LEARNING*) TERHADAP KETERAMPILAN BERHITUNG MATEMATIKA SISWA KELAS V MIS PERDAMEAN SIGAMBAL

ARTICLE HISTORY	ABSTRACT
	Abstract: This paper discusses the effect of the PBL (Problem-Based Learning) learning model on students' math arithmetical skills in integer material in class V of MIS Perdamean Sigambal, Rantauprapat, North Sumatra Province in the academic year 2020/2021. The research uses quantitative research (Quasi Experiment) with the research sample determined by total sampling technique. The population of the research was 30 students, which consists of 15 students in class V-A as the control class and 15 students in class V-B as the experimental class. The results indicate that students' arithmetic skills using the PBL learning model were in the very good category with an average score of 87.2. The hypothesis results that have been carried out indicate t_{count} 2.658 > t_{table}, 1.701 at a confidence level of 0.05. Thus, there is a significant effect of applying the PBL (Problem-Based Learning) learning model on students' arithmetical skills in class V of MIS Perdamean Sigambal Rantauprapat and it provides information to teachers in applying the PBL (Problem-Based Learning) learning model to improve students' thinking skills. *Keywords: PBL learning model, students' arithmetical skills, integers* **Abstrak:** Artikel ini membahas pengaruh model pembelajaran PBL (Problem Based Learning) terhadap keterampilan berhitung matematika siswa pada materi bilangan bulat kelas V MIS Perdamean Sigambal, Rantauprapat, Provinsi Sumatera Utara tahun pembelajaran 2020/2021. Penelitian menggunakan jenis penelitian kuantitaif (Kuasai Eksperimen) dengan sampel penelitian ditentukan dengan teknik total sampling. Populasi penelitian adalah 30 siswa yang terdiri dari 15 orang siswa kelas V-A sebagai kelas kontrol dan 15 orang siswa kelas V-B sebagai kelas eksperimen. Hasil penelitian menunjukkan bahwa keterampilan berhitung siswa dengan menggunakan model pembelajaran PBL termasuk kategori sangat baik dengan rata-rata 87.2. Hasil hipotesis yang telah dilakukan dengan hasil yang diperoleh hasil thitung 2.658 > ttabel 1.701 pada taraf kepercayaan 0.05. Maka, terdapat pengaruh yang signifikan penggunaan model pembelajaran PBL (Problem Based Learning) terhadap kemampuan berhitung siswa di kelas V MIS Perdamean Sigambal, Rantauprapat dan memberikan informasi kepada guru dalam penggunaan model pembelajaran PBL (Problem Based Learning) untuk meningkatkan keterampilan berpikir siswa.* **Kata Kunci:** *model pembelajaran PBL, keterampilan berhitung siswa, bilangan bulat*

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INTRODUCTION

Changes and development of the 2013 curriculum were driven by several international studies on the ability of Indonesian students in the international arena. Based on the TIMSS (Trends in International Mathematics and Science Study) results, only 5% of Indonesian students can answer high-category questions and Indonesia's PISA results are ranked 64th out of 65 countries. The achievement of Indonesian students is still at the level of basic abilities that have not yet reached the level of higher order thinking skills. Indonesia ranks 35th out of 49 countries (Tarigan et al. 2019; Wahyuni et al. 2022). The results of this study are still relatively low when compared to other countries such as Kosovo, the Philippines, Lebanon, Morocco. Changes and development of the curriculum carried out are expected to improve students' thinking skills and achievements (Munaji & Setiawahyu, 2020).

Another problem that occurs in Indonesia is education. The world of education has several problems it faces, one of these problems arises from the weakness of the learning process (Ningsih et al. 2022). The learning process of students is less encouraged and motivated to develop students' thinking skills and numeracy skills (Sari et al. 2021). The learning process in the classroom, students are directed to the ability to memorize, the child's brain is forced to remember the material and add information without being required to understand the information it remembers (Tarigan et al. 2019).

Problems can also be seen from the incompleteness of student learning outcomes. This incompleteness is due to the fact that in the teaching and learning process, teachers are more active than students so that students are not able to play an active role in the teaching and learning process in class. (Murphy et al. 2021; Serin, 2018). The second problem is the lack of variety of teachers in teaching. The teacher always provides learning with the lecture method so that the atmosphere in the class becomes saturated, so that students' understanding decreases (Tarigan et al. 2021). Furthermore, the lack of facilities and infrastructure in schools is also a problem (Santika et al. 2021). This presentation is in line with the statement of Elfina et al. (2022) and Tarigan et al. (2016) revealed that complete facilities and infrastructure in schools will support the smooth running of the teaching and learning process.

Based on the results of observations at the MIS Perdamean Sigambal school, Rantauprapat, Indonesia that several problems were found in the implementation of learning in the classroom, the problem was that students seemed unfocused and lacked interest in learning mathematics, students' readiness to participate in the learning process was still low, understanding of concepts in mathematics with other concepts are very low and students have difficulty understanding the concept of the material. In addition, it was found that students' problem-solving abilities in learning mathematics were not satisfactory. This can be seen in the results of students' daily tests with a percentage of only 54% of students getting a score of 50 or more. Meanwhile, the KKM Mathematics score in class V was 60. This indicated that the students' mastery in learning was not optimal, and students' problem-solving abilities in answering math story questions were still below average. Based on the explanation of these problems, the solution to overcome them is that teaching staff must have a way or system so that countermeasures in the

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teaching and learning process can be handled properly so that students are able to be motivated and motivated in their activeness in expressing their opinions about the material that has been presented. Therefore, the use of learning models is very important in the teaching and learning process so that students are able to understand the intent and purpose of the material presented, such as in the use of PBL (*Problem Based Learning*) learning models to improve students' numeracy skills.

The advantages of this PBL (*Problem Based Learning*) learning model are to support activeness, critical thinking, analysis and sensitivity of students to an existing problem (Fitria et al. 2019). Learning model Problem Based Learning or problem-based learning is a learning model that uses real-world problems as a context for students to learn about critical thinking and problem-solving skills, as well as to acquire essential knowledge and concepts from the subject matter (Aslam et al. 2021; Munawaroh et al. 2022; Nurzaman, 2017). The stages in applying the PBL learning model are orienting students to problems, organizing students to conduct research, assisting independent and group investigations, developing and presenting work, analyzing and evaluating the problem-solving process (Arends, 2009).

This research is important to do to provide information to teachers in using the PBL (*Problem Based Learning*) learning model to improve students' thinking skills. This study also aims to determine students' numeracy skills after using the PBL (*Problem Based Learning*) learning model in Class V MIS Perdamean Sigambal, Rantauprapat.

THEORETICAL STUDIES
Definition of PBL (*Problem Based Learning*) Learning Model

PBL (*Problem Based Learning*) is a learning model that refers to the pillars of universal education, namely a learner must be able to learn to understand (learning to know), students are able to carry out (learning to do), learn to be themselves (learning to be) (Bidokht & Assareh, 2011). PBL is also interpreted as an approach to the learning process with practical problems, namely by providing problems and context with the real world (Brady et al. 2015; Darling-Hammond et al. 2020). What makes Problem Based Learning interesting is that educators involve their students directly in learning. The teacher or educator provides various problems (Problems) which later these problems must be analyzed by students, then students diagnose these problems, formulate alternatives/strategies that must be applied to solve problems, and the final step is to evaluate these problems (Syamsidah & Suryani, 2018).

From this explanation it can be concluded that PBL (*Problem Based Learning*) is an approach that will provide new knowledge for students to solve the problems faced by them. With this approach, it can help teachers to create a pleasant learning atmosphere. Because then students will have a more real (realistic) learning experience.

Characteristics of the PBL (*Problem Based Learning*) Learning Model

The PBL (*Problem Based Learning*) Learning Model has several characteristics that distinguish it from other learning models, namely: first, the teacher's assessment of students is based on the way students solve problems in learning (Ceker & Ozdamli, 2016). The point is that the value given by the teacher depends on students who do not just listen and record and then memorize the subject matter, but are seen from the activeness of students in thinking, communicating, searching and processing data and then concluding it (Syamsidah & Suryani, 2018). Second, apply various scientific disciplines and then evaluate the success of these disciplines (Ceker & Ozdamli, 2016). Third, PBL can be used alone or with other methods

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(Ceker & Ozdamli, 2016). Fourth, learning begins by providing students with floating problems related to real life and the problems chosen are in accordance with the learning objectives. Then from these problems students look for solutions with authentic investigations (Wulandari & Surjono, 2013). Fifth, the varied knowledge and information obtained by students does not only come from one source and must be accounted for by presenting the results of solving these problems (Wulandari & Surjono, 2013). Sixth, the teacher only acts as a tutor and facilitator (Wulandari & Surjono, 2013).

Strengths and Weaknesses of the PBL (*Problem Based Learning*) Learning Model

There are several advantages of the PBL Problem Based Learning) learning model, namely (Rakhmawati, 2021a): 1) by implementing PBL in educational institutions (schools), enabling students to foster initiative in work, motivating internally to be more enthusiastic about learning, improving students' critical thinking skills and being able to improve interpersonal relationships in work groups; 2) with PBL students become more independent individuals; 3) make learning much more meaningful, meaning that by learning students find solutions to a problem, students will apply the knowledge they have or students will try to find out the knowledge needed to solve the problem; 4) finding solutions to the problems given to students helps students develop their new knowledge and students will feel responsible for the learning they are doing and will encourage students to carry out their own evaluations both related to their learning outcomes and those related to the process learn.

In a learning model, both the PBL model and other learning models, apart from having advantages, it also has disadvantages. For this reason, the following are the disadvantages of the PBL learning model according to Mischiatti et al. (2019) which

includes: 1) requires a structure and training that is long enough to achieve effective teaching, 2) more theory than practice, 3) in schools that still apply traditional learning models it will be difficult to replace their learning model with PBL due to lack of updates and improvements teachers as well as there are misunderstandings and concerns of educators who reject the new reality that the PBL learning model is actually much more effective. The statement from Mischiatti et al. (2019) slightly different from the opinion of Rakhmawati (2021), According to him, the shortcomings of this PBL learning model are: 1) it will be difficult if students do not have confidence in themselves that they are able to solve the problems they face, 2) there must be books that serve as guides and guidelines in learning activities, 3) not all subjects numeracy lessons can apply this learning model.

PBL (*Problem Based Learning*) Learning Model Syntax

The syntax of the PBL learning model means problem-based learning steps which include student-oriented problems, organizing students so they want to learn, guiding the course of individual and group investigations, developing and presenting results, and also conducting analysis and evaluation of the problem solving process (Muayyadatiddieni et al. 2015).

The syntax of the Problem Based Learning learning model starts from the preliminary phase, namely making initial observations where the teacher's activities include; delivering learning objectives to students, helping students form groups, connecting subsequent learning material with previous material, and raising problems related to the topic of discussion and then linking it to the lives of students. In the preliminary phase of student activities, namely; listening to explanations given by educators, forming heterogeneous groups, involving themselves in apperception activities, and analyzing

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problems given using experience in life. The next phase is the problem formulation phase, the teacher's activities guide students in compiling problem formulations and provide an explanation of how to find solutions to problems to students. The activities of students in this phase are compiling the formulation of the problem, then listening and recording the problems presented by the educator and listening to how to find solutions presented by the educator. Then, the phase that is carried out after the problem formulation phase is the phase of formulating alternative strategies. The point is that educators guide students who submit hypotheses or temporary conjectures based on the problems compiled and students write hypotheses or temporary conjectures. The next phase, namely the data collection phase, is intended by educators to direct and guide students to carry out experiments based on the problems prepared, discuss as discovery activities, ask students to write down the solutions to their problems on a piece of paper and the task of students here is to conduct experiments based on the problem then write it down. sheet of paper. The most important phase is the discussion phase which is carried out after the data collection phase, in this phase the educator is in charge of guiding students in activities of unifying opinions and providing information/strengthening, corrections to students if needed and the task of students is to be active in discussing and asking questions if something is not understood. The last phase is the conclusion and evaluation phase which is intended for educators to ask several students to convey conclusions from the results of discussions that have been carried out and students are required to convey their conclusions (Syamsidah & Suryani, 2018).

Student Numeracy Skills

Skills are often used in various fields of science, but basically skills have the same meaning but different purposes depending on the point of view of the person using them.

Likewise the notion of math skills. Skills are taken from the word skilled (Skill Full) which means skill in carrying out and completing tasks competently, quickly and precisely. Based on this, skills can be interpreted as the ability to do something through learning in the form of action quickly, effectively to achieve certain results (Musabik et al. 2021).

According to the Big Indonesian Dictionary, counting begins with the basic word "count" which means counting which consists of counting, multiplying, etc. So it can be concluded that numeracy skills are one of the sciences related to efforts to train students' intelligence, especially in working on problems that require calculation. Skills can be acquired through memorizing activities, but are obtained through continuous activities. Likewise with numeracy skills in mathematics lessons, students can have numeracy skills if students learn or practice repeatedly so that students are proficient in counting (Aisyah, 2022).

Mathematics is one of the subjects taught at the Elementary School/Madrasah Ibtidaiyah level units to develop students' skilled skills in rational thinking. This is as contained in the National Education Unit Agency (BSNP), namely: Mathematics subjects are given to elementary school/Madrasah Ibtidaiyah students which aim to equip these students to have the ability to think critically and creatively and be innovative (Bahri et al. 2016). According to Yantoro. et al. (2020), learning mathematics is a learning process that many students find difficult because of its abstract nature. This is in stark contrast because most students are used to thinking concretely. Mathematics is an important basic science and greatly influences one's life. Therefore, understanding mathematics must be taught from an early age. The quality of learning can be improved by improving the quality of learning in elementary schools, because three basic skills are taught at the elementary school level,

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namely the ability to read, write and count. Arithmetic is one of the math skills that every child has, such as sorting numbers or counting.

In accordance with Permendikbud No. 21 of 2016 concerning Content Standards for Elementary and Secondary Education, one of the mathematical abilities that must be present in learning basic mathematics is "understanding addition, subtraction, multiplication and division and solving problems by comparing with calculation results". Learning mathematics is always synonymous with counting. Counting is not only used in mathematics, but it is also used in physics, chemistry, economics and other sciences. The ability to count is very important and useful in everyday life. Counting should be taught to students from an early age. starting from counting addition, subtraction, division, multiplication and so on (Yantoro. et al., 2020).

So, students' numeracy skills are abilities possessed by each student in mathematics, activities carried out in students' arithmetic by sorting numbers or counting and regarding numbers to develop skills that are very necessary in students' daily lives. The ability to count is the basis for developing mathematical skills for students' readiness to attend basic education.

METHODS

This type of research uses quantitative research (*Quasi Experiment*) with the research sample determined by total sampling technique. The x variable in this study is the PBL (Problem Based Learning) learning model and the y variable is students' numeracy skills. This research was carried out at MIS Perdamean Sigambal, Rantauprapat, North Sumatra Province and was carried out on April 11-13 June 2022 at the Perdamean Sigambal Private Madrasah Ibtidaiyah, Rantauprapat. The population in this study were all students of class V (five) Madrasah MIS Perdamean

Sigambal for the 2020/2021 academic year consisting of class V-A and class V-B with a total of 30 students. Class V-A as the control class and class V-B as the experimental class. The research instrument was a learning achievement test and was analyzed using the t test.

Data Collection Technique

Data collection is an effort that must be made to obtain various information in research (Harefa et al., 2022). Data collection techniques used to collect data in this study are documentation method, namely data obtained from schools or teachers regarding student outcomes in the form of grades in mathematics. For completeness of the data using the documentary method, especially the value of mathematics learning outcomes for Class V-A and Class V-B MIS Perdamean Sigambal, questionnaire/question method is data collection which is done by giving written questions to respondents. The questionnaire made in this study is a list of questions related to math problems which are used as a kind of pretest.

Descriptive Data Analysis Techniques

Descriptive analysis was used to determine students' numeracy skills after using the PBL (Problem Based Learning) learning model in Class V MIS Perdamean Sigambal, Rantauprapat, based on the frequency distribution of respondents' responses to questions in the questionnaire.

Test Requirements Analysis
Normality test

The normality test is a test used to determine whether the independent and dependent variables in a regression have a normal or near-normal data distribution.

Homogeneity Test

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Homogeneity test is a test that is carried out to find at least two sets of test information from a population that have something similar or a homogeneous change. The reason for determining the choice in the homogeneity test is the importance value (Sig) is more than 0.05, the delivery of information is homogeneous and vice versa if the large value (Sig) is below 0.05 the information is not homogeneous.

t test

The t-test aims to determine the influence of the PBL (Problem Based Learning) learning model (X) on students' numeracy skills (Y). The criteria are as follows:
1. If the research significance number is > 0.05, the hypothesis is accepted, namely: the PBL (*Problem Based Learning*) learning model on the numeracy skills of

class V (five) MIS Perdamean Sigambal in learning.

If the search significant figure is <; The 0.05 hypothesis is rejected, which means: there is no PBL (*Problem Based Learning*) learning model for the numeracy skills of fifth grade students of MIS Perdamean Sigambal in learning.

RESULTS AND DISCUSSION

In class V, there are 30 students. The researcher first uses the initial action or Pretest before starting learning to determine student abilities. The results obtained can be seen from the pretest average value of 67.07 with a standard deviation of 7.66. Furthermore, the posttest value is 87.2 with a standard deviation of 4.12. These results can be seen in Figures 1 and 2.

Figure 1. Histogram of Pretest Values
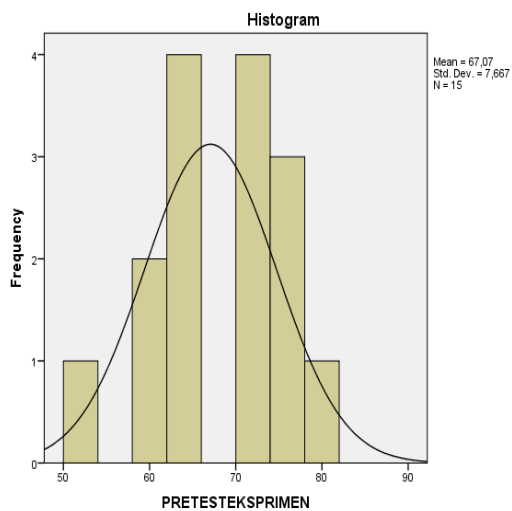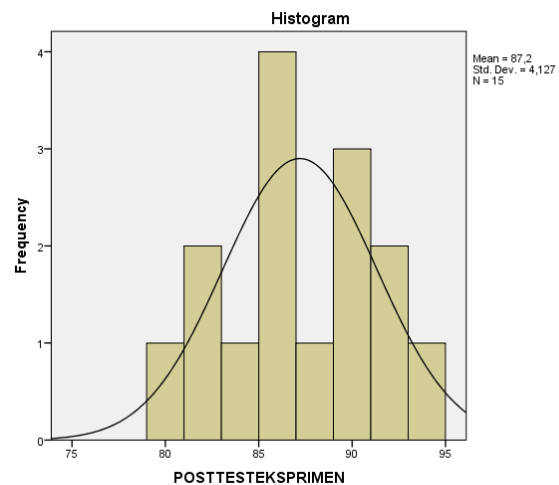

Figure 2. Histogram of Posttest Values

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Normality test

The normality test was carried out to find out whether the data from the Posttest numeracy skills of class V were normally distributed or not. The normality test is used to determine whether the study is normally distributed or not. After calculating the SPSS test for normality, namely by using the Kolmogorov-Smirnov test, it is known that the significant value is > 0.05.

Experimental Pretest Normality Test

Table 1. Pretest Experimental Normality Test

Test of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Pretest Eksprimen	,182	15	,193	,946	15	,467

Table 1 shows the results of the pretest normality test in the experimental class is normal, seen from the significant value (sig) is 0.193 which is greater than 0.05.

Experimental Posttest Normality Test

Table 2. Posttest Experimental Normality Test

Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	Df	Sig.	Statistic	Df	Sig.
Posttest Eksprimen	,151	15	,200[*]	,959	15	,668

Table 2 shows the results of the posttest normality test in the experimental class which is normal in terms of the significant value (sig) which is 0.200 which is greater than 0.05.

Homogeneity Test

Homogeneity test is a test that is carried out to find at least two sets of test information from a population that have something similar or a homogeneous change. The reason for determining the choice in the homogeneity test is the importance value (Sig) is more than 0.05, the delivery of information is homogeneous and vice versa if the large value (Sig) is below 0.05 the information is not homogeneous.

Table 3. Homogeneity Test Results
Test of Homogeneity of Variances

Keterampilan Berhitung Matematika

Levene Statistic	df1	df2	Sig.
,251	1	28	,620

Table 3 shows that the significant value (Sig) is 0.620 greater than 0.05, so this data is homogeneous.

Hypothesis testing

The hypothesis test used in this study is the t test, where the t test is obtained by comparing t_{count} with t_{table}.

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Tabel 4. Hypothesis testing
Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	76,768	6,154		12,475	,000
	X	,208	,078	,593	2,658	,020

a. Dependent Variable: Y

Table 4 shows that the test results obtained tcount = 2.658 while ttable = 1.701 (seen from table t with df = (n1 + n2) - 2 and a very large 5%) so that it can be seen from the value of $t_{count} > t_{table}$ which is 2.658 > 1.701, which means there is an effect of the PBL (Problem Based Learning) learning model on students' mathematical numeracy skills on integer material at MIS Perdamean Sigambal, Rantauprapat.

DISCUSSION

The test results stated that, Ho was rejected and Ha was accepted, so it was concluded that there was a significant effect of using the PBL (*Problem Based Learning*) learning model on students' math skills in Class V MIS Perdamean Sigambal, Rantauprapat. Data on students' numeracy skills after using the PBL (Problem Based Learning) learning model experienced an increase in students' numeracy skills. The results of data analysis obtained that the pretest average value was 67.07 with a standard deviation of 7.66. Furthermore, the posttest value is 87.2 with a standard deviation of 4.12. For the results of the normality test at the pretest and posttest with a significant level of 0.05 and the results of the pretest normality test with the number of students (N) 15 in the experimental class is normal, seen from the significant value (sig) is 0.193 which is greater than 0.05 while the test results posttest normality in the experimental class is normal seen from the significant value (sig) is 0.200 which is greater than 0.05. The homogeneity test data shows that the significant value (Sig) is 0.620 greater than 0.05, so this data is homogeneous.

Based on the results of the calculations that have been obtained, it can be seen that in this study the alternative hypothesis (Ha) is accepted while simultaneously rejecting the null hypothesis (Ho), which means that it can be stated that there is a significant effect of using the PBL (Problem Based Learning) learning model on students' mathematical numeracy skills, with the results of calculating tcount > ttable, namely 2.658 > 1.701. This proves that the selection of a learning model really needs to be considered, because a subject matter that is taught with the right learning method is expected to achieve optimal learning objectives. This exposure is in line with the results of the study Tarigan et al. (2019) reveal the use of appropriate learning models can make it easier for students to understand the lesson so as to enable students to achieve good learning outcomes. This was also stated by Nurrita, (2018) that in order to bring students to experiences that are more real and meaningful to students, appropriate learning methods/models are needed.

The results of this study are also in line with the research conducted Sianturi et al. (2018) revealed that the mathematical critical thinking skills of students who took part in learning with the *Problem Based Learning* (PBL) model were higher than those of students who took part in conventional learning. This shows that the *Problem Based Learning* (PBL) model influences students' mathematical critical thinking skills. Other research Putri & Roichan, (2021) also revealed that there was an influence of the Problem

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Based Learning learning model on the mathematical problem solving abilities of class XI students of SMAN 15 Surabaya. Furthermore Musabik et al. (2021) revealed that the application of PBL accompanied by the use of the Algebra Box as a learning medium has helped students to further explore their abilities in solving mathematical problems. Students are also able to analyze and evaluate the problems given using the algebra box.

CONCLUSIONS AND RECOMMENDATIONS

As for the conclusion from the problems that have been disclosed previously that the provision of a PBL (*Problem Based Learning*) learning model has a significant influence on students' numeracy abilities. This can be seen from the hypothesis testing that has been carried out with the results obtained that tcount > ttable is 2.658 > 1.701 at a confidence level of 0.05, so there is a significant influence using the PBL (*Problem Based Learning*) learning model on students' numeracy skills in class V MIS MIS Peace of Sigambal, Rantauprapat. These results are consistent with the advantages of the model that this PBL (Problem Based Learning) learning model can support activeness, critical thinking, analysis and sensitivity of students to a problem that is around them. Exposure to this answer is the aim of the research.

As for the recommendations from this study, teachers and prospective teachers, especially in the field of Elementary School Education who use the PBL learning model, can be used as a learning model in class to improve students' numeracy skills in learning, for other researchers who want to research the influence of learning models. PBL should be used in this model for material that has a broad range of material so that results can be achieved and the application of the PBL learning model can be achieved. In addition, the author admits that there are many

shortcomings in this research, so it needs to be completed or perfected at a later research stage.

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