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# THE EFFECT OF PROBLEM BASED LEARNING MODEL AND ACHIEVEMENT MOTIVATION ON MATHEMATICS LEARNING OUTCOMES

**Lilik Sujiantini Ermawati[1], Atiqoh[2], Yoso Wiyarno[3]**

[1,2,3]Educational Technology, Postgraduate Program, Universitas PGRI Adi Buana Surabaya

Email: lilik@gmal.com[1], atiqoh@unipasby.ac.id[2], yoso.wiyarno@gmail.com[3]

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**ABSTRACT**

The purpose of this research is (1) to find out there are differences in learning outcomes between students using the PBL model and conventional learning, (2) to find out if there are differences in student learning outcomes who have different motivations in students (3) to find out if there are differences in student learning outcomes. the interaction between the Problem Based Learning model and achievement motivation on learning outcomes. This study used a 2X2 factorial quasi-experimental design. Data collection methods commonly used in a study are: tests, interviews, questionnaires, and observations. The data analysis technique in quantitative research uses statistics, in this case the two-way Analysis of Variance (ANOVA) technique. Based on the research, the following results were obtained (1) There are differences in the effect of the Problem Based Learning (PBL) Learning Model with Conventional learning on students' mathematics learning outcomes, (2) There are differences in the mathematics learning outcomes of students who have high achievement motivation and students who have achievement motivation. low. and (3) There is an interaction between the learning model and achievement motivation on mathematics learning outcomes. Learning mathematics by using the Problem Based Learning (PBL) Learning Model, students who have a high level of achievement motivation have better mathematics learning outcomes than students who have a low level of achievement motivation. Based on the results of the study, it was concluded that using the Problem Based Learning (PBL) Learning Model and achievement motivation could improve students' mathematics learning outcomes at SDN Sidomulyo Bangsal Mojokerto. The implication of this research is that the Problem Based Learning (PBL) Learning Model can be used as a way to improve students' mathematics learning outcomes.



## 1. Introduction

Formal education is increasingly needed. This is due to the fact that the family environment is not able to introduce children into the world of science which is growing rapidly, however, the problems that occur in the world of education today are very complex in terms of relevance, quality, quantity and others. In terms of quality, for example, many consider that the quality of our education is very low so efforts are needed to improve it (Abror, 2021; Ermayani, 2021; Yanti et al., 2021).

In accordance with the Law of the Republic of Indonesia No. 20 of 2003 concerning the National Education System, the position of a teacher as an educator is a professional position. reflects that Indonesian education aims to develop the potential of students to become human beings who believe and fear God Almighty, creative, independent and become democratic citizens who are responsible and carry out one of the human rights, namely the right to education. On that basis, Indonesia implements the principles of democratic education both horizontally (everyone has the right to education) and vertically (everyone has the right to the highest education according to ability) (Dzurrahmi et al., 2021; Hadiyanto et al., 2021; Ivan, 2021).

Teachers are the key and at the same time the spearhead of educational attainment and renewal, therefore teachers are in the middle of regulating, guiding, directing, educating to achieve educational goals.



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The low quality of learning cannot be separated from the ability of teachers to carry out classroom learning (Aisiyah, 2021; Hadiyanto et al., 2021; Hasanah et al., 2021).

But in reality the learning process carried out by the teacher is still not running optimally, especially in mathematics. Often what happens in schools, learning mathematics is only oriented to mastery of the material as evidenced by learning outcomes in certain competencies. The teacher assumes that the task of teaching is to transfer information, knowledge and books, the task of students is to receive, remember and memorize information according to what is said. And this is also done by the teacher every day so that students feel bored in receiving learning and finally students are lazy in learning. And rarely do teachers equip students with problem solving in long-term life (M et al., 2021; Nursita, 2021; Rosyada et al., 2021).

While the material in mathematics is an abstract concept. So if in the process of learning mathematics, the teacher only uses the lecture method to convey abstract mathematical concepts that make it difficult for students to understand the material. This is because students are still thinking concretely. As a result, mathematics material has become one of the subjects that are considered difficult because the achievement of student learning outcomes is still lacking (Alifia & Pradipta, 2021; Aritonang & Safitri, 2021; Wahyu Wijayanti, 2021).

Therefore, the role of the teacher is highly demanded to be able to change the educational vehicle to be better, innovative, creative and fun in the learning process. Teachers are also not the only source of learning, but as facilitators, changing, directing to form a better and advanced national character (Arini, 2021; Khusna et al., 2021; Puspaningtyas & Ulfa, 2021).

Solving educational problems with the current conditions in the field, the government has carried out various reforms, including by conducting training, training and improving teacher competence, procurement of books and learning tools, etc. Therefore, teachers are expected to be able to improve the quality of education by choosing and using learning models according to student characteristics, basic competencies, learning objectives to be achieved and the material to be taught (Abror, 2021; Ivan, 2021; Munawwir & Nur Hanip, 2021) .

One of the learning models that can be developed to place students at the center of learning is the application of the Problem Based Learning (PBL) model. The Problem Based Learning model is one of the appropriate learning models to achieve the objectives of learning mathematics, namely being able to solve problems creatively (Abdalla et al., 2021; Fradila et al., 2021; Indah & Nuraeni, 2021).

In addition, the Problem Based Learning model is a learning concept that helps teachers relate the material they teach to real-world situations, and encourages students to make connections between their knowledge and its application in their lives as family and community members (Et al., 2021; Kuo et al. ., 2021; Syamina et al., 2021). With this concept, learning outcomes are expected to be more meaningful for students. The learning process takes place naturally in the form of student work and experience activities, not transfer of knowledge from teacher to student. A learning strategy is far more important than a result.

Achievement motivation is a physiological and psychological condition found in students that encourages them to carry out certain activities in order to achieve a certain goal (Alifia & Pradipta, 2021; Fitriati et al., 2021; Nurwahidah et al., 2021). In addition, achievement motivation is the most important thing in a teaching and learning process, because achievement motivation is the encouragement or driving force of individuals in achieving success and in student behavior will be directed in behaving in accordance with abilities in the development of knowledge and skills, and achievement motivation in view as one of the most important factors in determining whether or not educational goals are achieved, especially if the individual concerned does have abilities that are not so encouraging, then without motivation it is difficult to expect good learning outcomes (Nurwanti, 2021; Susana et al. ., 2021; Wijayanti et al., 2021).

## 2. Methods

This research is an experimental research, namely the research aims to determine the differences in learning outcomes from the influence of the Problem Based Learning model, and student achievement motivation on the learning outcomes of fourth grade students in the field of mathematics. The study was designed using two groups of students, the first group using the Problem Based Learning model, the second group using conventional learning.

Data collection techniques using observation and tests (pretest and posttest). The test is a set of tools that contains tasks that must be done or a number of questions that must be answered by students to measure the level of understanding and mastery of the required material coverage and in accordance with certain learning objectives. Basically, the test is one of the measuring tools that is often used in learning assessment.



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In this study, the data obtained from the experimental results were analyzed using a two-way analysis of variance (ANOVA) and calculations using the SPSS statistic Version 25.00.

## 3. Result and Discusion

### 3.1 Results

Based on the results of this descriptive calculation, it can be explained that there are differences in student learning outcomes in science subjects between students who are taught using the Problem Based Learning learning model and those taught using conventional learning in students with high achievement motivation and students with low achievement motivation even to see the difference. is significant or not significant evidence is needed by statistical calculations.

With regard to the analysis of variance of the 2 factors carried out, it can be seen in the following table:

**Table 1.** Results of Two-way ANOVA Hypothesis Testing

**Tests of Between-Subjects Effects**

Dependent Variable: HASIL BELAJAR MATEMATIKA

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|
| Corrected Model | 4282.634[a] | 3 | 1427.545 | 58.542 | .000 |
| Intercept | 524969.802 | 1 | 524969.802 | 21528.345 | .000 |
| METODE | 3970.928 | 1 | 3970.928 | 162.843 | .000 |
| MOTIVASI | 129.667 | 1 | 129.667 | 5.317 | .023 |
| METODE * MOTIVASI | 103.971 | 1 | 103.971 | 4.264 | .041 |
| Error | 2828.666 | 116 | 24.385 | | |
| Total | 567718.000 | 120 | | | |
| Corrected Total | 7111.300 | 119 | | | |

a. R Squared = .602 (Adjusted R Squared = .592)

Source: Primary data processed

Based on table 1, it can be seen that: (a) In the learning model, the value of sig = 0.000 with a significance level of = 0.05 and the value of sig <0.05, thus H0A is rejected. This means that there is an effect of learning outcomes between students who study with Problem Based Learning (PBL) learning models and conventional learning in mathematics subjects, (b) On student achievement motivation, the value of sig = 0.023 with a significance level of = 0.05 and sig < 0.05 thus H0A is rejected. This means that there is an effect of learning outcomes between students who have high achievement motivation and low achievement motivation, and (c) In student learning interactions, the value of sig = 0.041 with a significance level of = 0.05 and sig <0.05, thus H0A is rejected. . This means that at the significance level = 0.05 there is an interaction of learning models (Problem Based Learning (PBL) and Conventional learning and motivation on mathematics learning outcomes.

There is a significant result that there is an interaction between the application of the Problem Based Learning (PBL) learning model and conventional learning and achievement motivation on mathematics learning outcomes is also strengthened by Figure 1. as follows:

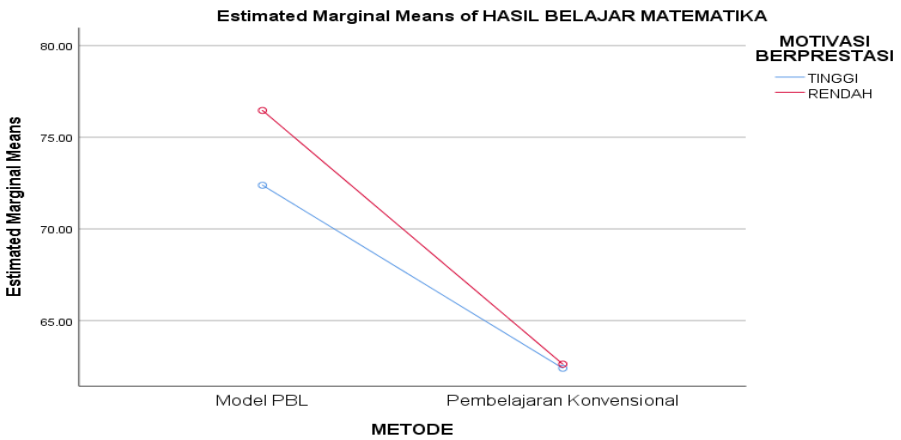


**Figure 1.** Interaction Results of Mathematics Learning Outcomes
Source: Primary data processed



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Figure 1. shows that there is a meeting line or intersection of data on mathematics learning outcomes between low and high achievement motivation in the control (conventional) and experimental (PBL) groups.

**3.2 Discussion**

**a. The Effect of Using Problem Based Learning (PBL) and Conventional Learning models on Learning Outcomes**

From the results of the two-way analysis of variance, for the learning model, the value of sig = 0.000 is obtained with a significance level of = 0.05 and the value of sig <0.05, thus H0A is rejected. so that the Ho test decision is rejected, which means that there is an influence or there is a significant difference in the average of the learning model factors on the learning outcomes of mathematics.

By looking at the table in Chapter IV, it can be seen that for students in the Problem Based Learning (PBL) learning model group has an average learning outcome of 74 and for students in the Conventional learning group has an average learning outcome of 62. Therefore, it can be concluded that the provision of Problem Based Learning (PBL) learning models will produce better learning outcomes than conventional learning.

The Problem Based Learning (PBL) learning model helps students find meaning in their lessons by connecting academic material in the context of their daily lives (Firdaus et al., 2021; Putri & Taqiudin, 2021; Yulia Sari, 2021). They make important relationships that produce meaning by carrying out self-regulated learning, working collaboratively, thinking critically and creatively, dealing with others, achieving high standards, and participating in authentic assessment tasks (Waluyo, Wardani and Prastetyo, 2019; Suswati, 2021; Yennita and Zukmadini, 2021).

As described by Elaine B, Johnson, PHD (2002). . . an educational process that aims as to help students see meaning in the academic material, they are studying by connecting academic subjects with the context of their daily lives, that is, with context of their personal, social, and cultural circumstances. To achieve this aim, the system encompassed the following eight components: making meaningful connections, doing significant work, self-regulated learning, collaborating, critical and creative thinking, nurturing the individual, reaching high standards, using authentic assessment.

**b. The Level of Student Achievement Motivation on Mathematics Learning Outcomes.**

The results of the two-way analysis of variance, for the source of the level of achievement motivation, obtained a value of sig = 0.023 with a significance level of = 0.05 and sig <0.05, thus H0A is rejected. So that the Ho test decision is rejected which means that there is an influence or there is a significant difference in the average level of achievement motivation on mathematics learning outcomes, so it is concluded that students who have a high level of achievement motivation will produce better learning outcomes than students who have a high achievement motivation level. have a low level of achievement motivation.

Achievement motivation is the psychological driving force of a student to be able to carry out learning activities and add skills and experiences as described (Andriani et al., n.d.; Gunawan et al., 2019; Tigowati et al., 2017) Need for achievement as desire or overcome obstacles , to exercise power, to strive to do something difficulties well ang as quickly as possible. (Achievement motivation is closely related to the individual's desire to overcome obstacles, train strength, do something difficult well, quickly, with satisfactory results). Thus achievement motivation can be interpreted as a driving force in students that will lead to and provide direction for learning activities towards the development of the whole human person (Riyadi, 2020; Mardani, Atmadja, 2021; Siti Nurjanah, 2021). This is in accordance with the opinion of Utami, Margunayasa and Kusmariyatni, (2019); Fitriani, Haryanto and Atmojo, (2020) who explained that achievement motivation is a psychological mover from a person to be able to carry out learning activities and add skills, experience. Motivation encourages and directs interest in learning to achieve goals as explained by (Kurniawan & Wuryandani, 2017; Susanti et al., 2021) that motivation is a series of efforts to provide certain conditions, so that someone is willing and wants to do something which in this case study.

**c. Interaction Between Problem Based Learning (PBL) Model and Students' Achievement Motivation Levels on Mathematics Learning Outcomes.**

The results of the two-way analysis of variance on student learning interactions, the value of sig = 0.041 with a significance level of = 0.05 and sig <0.05, thus H0A is rejected. This means that there is an interaction between the factors of the learning model and the level of student achievement motivation on mathematics learning outcomes. so it is concluded that students who apply the Problem Based Learning (PBL) Learning Model and have a high level of achievement motivation will produce better learning outcomes than students who have a low level of achievement motivation.

Students who have high achievement motivation will have a significant influence in improving mathematics learning outcomes, as explained by (Firdaus et al., 2021; Putri & Taqiudin, 2021; Yulia Sari,



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2021): (1) motivation increases individual energy and activity levels ; (2) motivation shows individuals towards certain goals, the effect is to make people choose and find the results they want; (3) motivation to generate certain activities and persistence in these activities, including that people will start something on their own, keep doing even though they are faced with difficulties and start again after being interrupted for a while; (4) motivation affects learning strategies and individual cognitive work processes, including that people will pay attention to something, learn and practice it, and try to learn it in a meaningful style. It also includes that they will ask for help when they encounter difficulties).

## 4. Conclusion

Based on the results of data analysis and discussion of research results, it can be concluded that: (a) There is a difference in the effect of Problem Based Learning (PBL) and Conventional Learning on students' mathematics learning outcomes. Learning mathematics using the Problem Based Learning (PBL) learning model produces better student mathematics learning outcomes than conventional learning, (b) There are differences in the mathematics learning outcomes of students who have high achievement motivation and students who have low achievement motivation. Students who have a high level of achievement motivation produce better mathematics learning achievement compared to students who have a low level of achievement motivation, and (c) There is an interaction between the learning model and achievement motivation on mathematics learning outcomes. Learning mathematics by using the Problem Based Learning (PBL) Learning Model, students who have a high level of achievement motivation have better mathematics learning outcomes than students who have a low level of achievement motivation. Learning mathematics using Problem Based Learning (PBL) Learning Model, students who have a high level of achievement motivation have better mathematics learning outcomes than students who have a low level of learning motivation.

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