The Effect of Problem-Based Learning Model on Learning Motivation and Its Impact on Students' Learning Achievement

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A R T I C L E I N F O

A B S T R A C T

To evaluate the effectiveness of the problem-based learning (PBL) model on learning motivation and its impact on the academic achievement of PTM FT UNM students, a study will be conducted. This research will use a quantitative approach with path analysis. Path analysis is a statistical method that provides a quantitative interpretation for multiple variables within an analysis model. It tests the influence between independent and dependent variables by analyzing both direct and indirect effects among the variables. Regression correlation analysis will be employed to determine the percentage contribution of the independent variable to the dependent variable. The data processing results indicate that the PBL model and learning motivation together affect learning achievement by 13.8%, while the remaining 86.2% is influenced by other factors. Specifically, the PBL model accounts for 7.00% of the effect on achievement, with 93.00% attributed to other unexamined factors. Additionally, the PBL model impacts motivation by 28.65%, with the remaining 71.35% influenced by other factors not studied

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INTRODUCTION

Constructivist learning in classroom teaching and learning activities involves shifting the learning paradigm from a teacher-centered approach to a student-centered approach (Tsai et al., 2023; Wu & Schunn, 2023). In other words, when teaching in class, teachers should create a learning environment that actively engages students, encourages them to learn, and provides opportunities for them to construct the concepts they are learning. Instead of having students passively receive, record, and memorize material from the teacher, the focus should shift to sharing knowledge, engaging in inquiry, and actively discovering knowledge, which enhances their understanding rather than just their memory (Khushk et al., 2022; Kilag et al., 2023). To achieve this goal, teachers can use a variety of innovative approaches, strategies, models, and methods to create a dynamic and engaging learning environment (Almulla, 2020; Macapobre et al., 2023).

To support this, educational experts have developed an educational system that pays more attention to the student aspect, one of which is learning using the PBL (Problem Based Learning) method (Chung et al., 2016; Karwasz, 2023; Yusop, 2023). Problem-based learning (PBL) is an innovative educational model designed to create active learning conditions for students. By focusing on real-world problems and encouraging critical thinking, PBL engages students in the learning process and promotes deeper understanding through hands-on, practical experiences. This approach not only enhances students' problem-solving skills but also fosters collaboration, self-directed learning, and the ability to apply knowledge in various contexts (Asprilla & Sukaswanto, 2017; Nurtanto et al., 2019). Problem-based learning (PBL) is an educational model where students engage in solving a problem by following the stages of the scientific method. This approach helps students acquire knowledge relevant to the problem while simultaneously developing their problem-solving skills (Indrawan et al., 2020; Nov et al., 2012).

PBL encourages students to become independent learners who are skilled, capable of managing their own learning process, and motivated to complete their studies (Arizkah et al., 2018; Romadin, 2021; Vebrianto, 2018). PBL is an innovative learning method that places problems at the center of the learning process, serving as the initial step in gathering and integrating new knowledge, it emphasizes active learning through inquiry, collaboration, and reflection, empowering students to construct their own understanding and apply it in practical contexts (Komari et al., 2019; Nurtanto et al., 2018). From this description, it can be concluded that Problem Base Learning is a learning method that involves students to be skilled in solving problems both individually and through group discussions so that students are encouraged to learn independently, express ideas, and be able to work together in groups. PBL is to assist students in developing investigative skills (Kennedy et al., 2015; Norhariati, 2013). In this case, it can improve learning outcomes and student learning motivation (Sada et al., 2015). From the teaching characteristics of the PBL method, it can be concluded that the PBL learning model involves presenting problems for students to investigate and formulate conclusions, resulting in collaborative problem-solving work within groups.

Motivation to learn is something that grows within students which has an impact on the amount of curiosity about what they want to learn (Liu et al., 2016; Luo et al., 2019). Motivation can be grown by itself which makes the urge to make a change on the basis of a stimulus from within oneself, there is also motivation through environmental factors where to hang out and from the family environment. In this case, good motivation and discipline can improve learning achievement, this is related to the existence of factors that affect student learning achievement, one of which is internal factors (Kasim et al., 2016; Tsai et al., 2023)

Motivation and learning are two things that are interconnected (Ngundiati & Fitrayati, 2020; Yoto & Widiyanti, 2017), therefore in the learning process motivation is needed (Hadyastiti et al., 2020), because motivation is the driving force(Suchyadi et al., 2019). Motivation has several important in learning, namely 1) as a driving force that releases energy that is useful for encouraging students to do, 2) determining the direction of action / goals to be achieved in the learning process, 3) selecting actions, what to do and what not to do in order to achieve goals (Suchyadi et al., 2019; Ying et al., 2021). Based on the above opinion, learning motivation can be understood as something that arises in a person both indirectly and directly that stimulates the work of the human brain so that it affects the behavior of a person so that the person is moved to make changes to achieve maximum results.

Learning attainment is defined as the mastery of knowledge or skills developed by subjects, typically demonstrated by test results or instructor grades (Schneider et al., 2022; Sorour et al., 2021; Wang et al., 2023). Learning accomplishment is the best outcome a person may obtain through their learning efforts. If someone doesn't take their work seriously or puts up constant effort, they won't be able to learn or accomplish anything. Getting an achievement is actually more difficult than just turning your hand. To get it, though, will require a great deal of effort and the facing of numerous challenges. One can attain a goal with perseverance, optimism, and determination. Learning achievement is a collection of phrases that contain the two terms "achievement" and "learning," each of which has a distinct meaning due to their relationship(Azizah & Widjajanti, 2019; Komala & Wailanduw, 2021; Schut et al., 2020).

Learning success is the highest level of effort attained by an individual following their learning endeavors (Giffin et al., 2018; Romadin, 2023; Suswanto & Adhikari, 2024). Tests that are sometimes referred to as "learning achievement tests" can be used to measure learning achievement. When considering the learning accomplishment exam from its point of view, it reveals a person's level of learning success. This explanation leads one to the conclusion that learning achievement is proof of success attained via learning endeavors satisfying cognitive, effective, and psychomotor components, followed by an evaluation conducted in compliance with each agency's protocols.

RESULTS AND DISCUSSION

The study used a quantitative approach. The quantitative approach was used to reveal the influence between the scientific approach and what teachers do and the ability of marking on student competence. This study was conducted to determine how much influence and contribution of exogenous variables on endogenous variables. The exogenous variable in this study is the implementation of online learning (X). The endogenous variable in this study is learning independence (Z) while the intervening variable or connecting variable is learning interest (Y). The relationship between exogenous and endogenous variables.
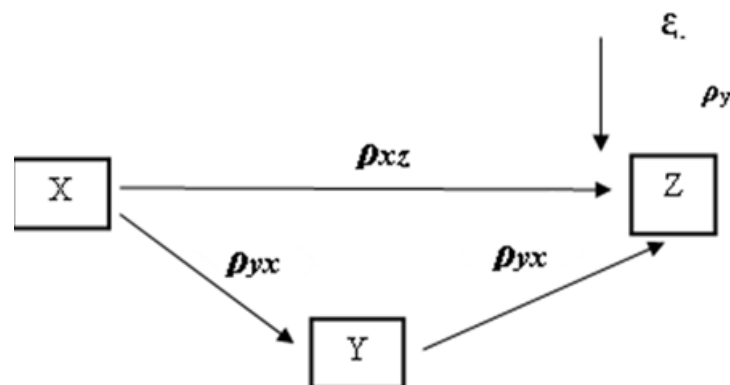

Figure 1. Path Diagram

The population used in this study were 90 PTM FT UNM students.

$$n\frac{N}{N.d^2+1} = \frac{90}{(90).(0,05^2)+1} = \frac{90}{1,22} = 73,9 = 74$$

The sampling technique was carried out randomly, the sample was obtained through the results of the calculations carried out using the formula above, obtained a sample of 74 PTM FT UNM students.

The results of the study were analyzed using quantitative descriptive techniques and path analysis. This quantitative descriptive analysis is used to describe the data obtained from the research process. Data in the form of numbers will be processed and presented the results of descriptive statistical calculations in the form of frequency tables and percentages of research results. Path analysis is a statistical analysis method that allows in giving an interpretation or quantitative interpretation for a number of variables in the analysis model. The analysis of direct and indirect effects between several variables is used to examine the relationship between the independent and dependent variables. Researchers will analyze data at a significance level of 5% using the SPSS 25 program to determine the relative contribution of the independent and dependent variables.

RESULTS
Frequency Distribution of Problem Base Learning Model

Table 1. Criteria for Classification of Problem Base Learning Model Variable Score

No	Kategori	Interval	Frekuensi	Persentase
1	Tidak Setuju	< 40	0	0.00
2	Kurang Setuju	41 - 66	1	1.35
3	Setuju	67 - 92	48	64.86
4	Sangat Setuju	> 93	27	33.78
	Total		74	100.00

When compared with the classification criteria in Table 1, in general, PTM students perceive the Problem Base Learning Model to be in the agree category. A total of 0.00% of students perceived the Problem Base Learning Model to be in the disagree category, 1.35% in the disagree category, the agree category, 64.86% in the strongly agree category 33.78%.

Frequency Distribution of Learning Motivation

Table 2. Criteria for Classification of Learning Motivation Variable Score

No	Kategori	Interval	Frekuensi	Persentase
1	Rendah	< 50	0	0.00
2	Sedang	51 - 67	2	2.70
3	Tinggi	68 - 84	26	35.14
4	Sangat Tinggi	> 85	46	62.16
	Total		74	100.00

When compared with the classification criteria in table 2, in general, PTM students perceive Learning Motivation to be in a very high category. A total of 0.00% of students perceived Learning Motivation to be in the low category, 2.70% in the medium category, 35.14% in the high category, and in the very high category 62.16%.

Frequency Distribution of Learning Achievement

Table 3. Criteria for Classification of Learning Achievement Variable Score

No	Kategori	Interval	Frekuensi	Persentase
1	Rendah	< 25	0	0.00
2	Sedang	26 - 50	0	0.00
3	Tinggi	50 - 75	20	27.03
4	Sangat Tinggi	> 75	54	72.97
	Total		74	100.00

When compared with the classification criteria in Table 3, in general, PTM students perceive Learning Achievement to be in the Very high category. A total of 0.00% of students have Learning Achievement in the low category, 00.00% in

the medium category, and 27.03% in the high category and 72.97% in the very high category.

Testing with Path Analysis

To find out the Problem Base Learning Model and learning motivation on learning achievement, it can be seen in the following summary model table, especially the R square value.

Table 4. Model Summary

				Std. Error of the	R Square	Change Statistics			
Model	R	R Square	Adjusted R Square	Estimate	Change	F Change	df1	df2	Sig. F Change
1	.372a	.138	.114	9.066	.138	5.704	2	71	.005

a. Predictors: (Constant), Motivasi Belajar, PBL
b. Dependent Variable: Prestasi Belajar

Based on the model summary table above, it is known that the amount of R square (R2) is 0.138. This figure means that the effect of the Problem Base Learning Model and learning motivation on learning achievement simultaneously is 13.8%. Meanwhile, the remaining 86.2% is influenced by other factors. Furthermore, to test the significance level of the constant, it can be seen in the following ANOVA table.

Table 5. ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	937.587	2	468.793	5.704	.005b
2 Residual	5835.548	71	82.191		
3 Total	6773.135	73			

a. Dependent Variable: Prestasi Belajar
b. Predictors: (Constant), Motivasi Belajar, PBL

ANOVA table findings for the significance test indicate a Sig. value of 0.005. 0.05 >= Sig value is indicated by this value. 0.005, indicating that the regression coefficient is significant and thus H0 is rejected and H1 is accepted. This leads to the conclusion that learning achievement is influenced by both learning motivation and the Problem Base Learning Model.

The following summary model table can be used to determine the specific contribution of problem-based learning to learning motivation. Additionally, the ANOVA table below shows the constant to assess its significant level.

Table 6. Uji Coefficientsa

	Model	Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	t	Sig.
1	(Constant)	98.780	11.149		8.860	.000
2	PBL	.267	.132	.263	2.016	.048

3	Motivasi Belajar	-.440	.131	.439	3.368	.001

a. Dependent Variable: Prestasi Belajar

At the 0.05 significant level, the table value can be shown, with df = number of samples - number of variables = 74 - 3 = 71. As a result, 1.667 is the ttable value at df = 71. In the meantime, 3.036 is the tcount value found in the coefficients table. As a result, H0 is rejected and Ha is approved. It may be inferred that the Problem Base Learning learning model has an individual effect on learning motivation since tcount> ttable (2.016> 1.667).

The coefficient table indicates that the learning model for Problem Base Learning has a significance value of 0.048. The Sig. value is less than the α value (0.048 <0.05) when compared to α = 0.05. As a result, it is determined that it has a considerable influence because H0 is refused and H1 is accepted.

At the 0.05 significant level, the ttable value is seen, with df = number of samples - number of variables = 74 - 3 = 71. As a result, 1.665 is the ttable value at df = 71. In the meantime, 1.867 is the tcount value found in the coefficients table. As a result, H0 is rejected while Ha is accepted, indicating that learning motivation has an individual effect on learning accomplishment. tcount> ttable (3.368> 1.665).

It is known that learning motivation has a Sig. value of 0.000 based on the coefficient table. The Sig. value is less than the α value (0.001 <0.05) when compared to α = 0.00. As a result, it is determined that it has a considerable influence because H0 is refused and H1 is accepted.
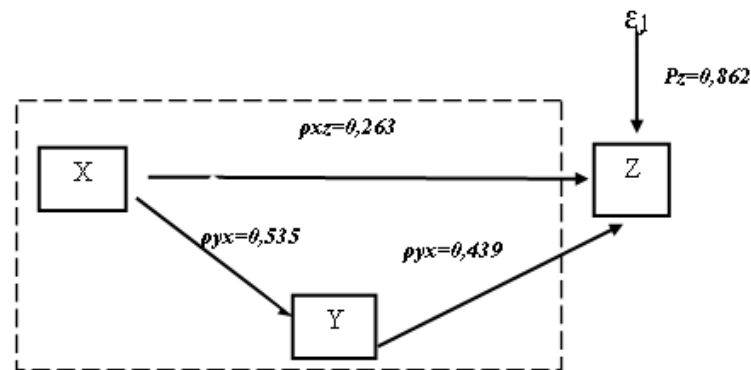

Figure 2. Path Diagram of Empirical Causal Relationship X Through Y to Z Srutural Model

Tabel 7. Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
1 (Constant)	39.512	8.919		4.430	.000
2 PBL	.542	.101	.535	5.373	.000

a. Dependent Variable: Motivasi Belajar

At the 0.05 significant level, the table value can be shown, with df = number of samples - number of variables = 74 - 3 = 71. As a result, 1.667 is the ttable value at df = 71. In the meantime, 1.867 is the tcount value found in the coefficients table. This indicates that tcount> ttable (4.430> 1.667), which shows that the Problem Base Learning Model has an individual effect on learning motivation, leading to the rejection of H0 and the acceptance of Ha. An individual's interest in learning is influenced by online learning.

It is known that learning motivation has a Sig. value of 0.000 based on the coefficient table. The Sig. value is less than the α value (0.000 <0.05) when compared to α = 0.05. This indicates that H0 is disproved and H1 is confirmed, leading to the conclusion that it has a major impact.

Table 8. Summary of Decomposition of Path Coefficients, Direct and Indirect Effects of Online Learning (X), and Learning Interest (Y) on Learning independence (Z).

Variable effect	Residual causal		$\varepsilon 1$ and $\varepsilon 2$	Total
	Indirect			
	Direct beta	Through Y		
X to Z	0,263			0,263
		0,263 + (0,535 x 0,439)		0,497
X through Y to Z	0,138		0,862	1,00
X to Y	0,535			0,535

DISCUSSION

Table 8 provides a comprehensive analysis of the R square (R^2) value, which is reported as 0.138. This R^2 value signifies that 13.8% of the variation in learning achievement can be attributed to the combined influence of the Problem-Based Learning (PBL) model and learning motivation. In other words, these two factors together account for 13.8% of the changes in learning achievement observed in the study, while the remaining 86.2% is influenced by other factors that were not included in the analysis.

The beta value, which represents the correlation coefficient, is given as 0.263 for the relationship between learning achievement (Z) and the use of the PBL model (X). This beta value indicates that there is a positive correlation between the PBL model and learning achievement. Specifically, the PBL model contributes to 7.00% of the changes in learning achievement, with the calculation based on the square of the beta value (0.263^2). The remaining 93.00% of the variation in learning achievement is influenced by other factors not evaluated in this study.

Furthermore, the beta value for the correlation between learning motivation (Y) and the application of the PBL model (X) is reported as 0.535. This suggests a strong positive correlation, indicating that the PBL model significantly impacts learning motivation. The effect of the PBL model on learning motivation is calculated to be 28.65% (0.535^2), meaning that the PBL model accounts for 28.65% of the changes in learning motivation. The remaining 71.35% of the variation in learning motivation is due to other factors not examined in this research.

In summary, the data presented in Table 8 highlights the significant role of the PBL model and learning motivation in influencing learning achievement. However, it also underscores that a large portion of the variance in both learning achievement and motivation is due to other unexplored factors. This insight suggests the need for further research to identify and understand these additional factors that contribute to students' academic success and motivational levels.

CONCLUSION

The following are the study's conclusions based on the discussion's findings:
1. The Problem Base Learning learning model and learning motivation simultaneously affect the learning achievement of PTM FT UNM students.
2. Problem Base Learning learning model has a significant effect on the learning motivation of PTM FT UNM students.
3. Problem Base Learning learning model has a significant effect on the achievement of PTM FT UNM students.

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