

THE EFFECT OF PROBLEM BASED LEARNING MODEL ON CRITICAL THINKING ABILITY AND LEARNING OUTCOMES IN PLUIT RAYA SMK STUDENTS

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Abstract

This study aims to determine the effect of the problem-based learning model on critical thinking skills and student learning outcomes at SMK Pluit Raya. This research was conducted using a questionnaire research method with a sample of 161 students and the sampling technique was proportional random sampling. The data were analyzed using a simple linear regression technique to test the validity and reliability. From the results of the research conducted, it shows that problem based learning has a positive and significant effect on critical thinking skills and learning outcomes. Thus, teachers are expected to be able to apply problem-based learning models on an ongoing basis to improve critical thinking skills and student learning outcomes.

Abstrak

Penelitian ini bertujuan untuk mengetahui pengaruh dari model pembelajaran problem based learning terhadap kemampuan berpikir kritis dan hasil belajar siswa SMK Pluit Raya. Penelitian ini dilakukan dengan metode penelitian angket dengan sampel sebanyak 161 siswa dan teknik pengambilan sampel proportional random sampling. Data dianalisis menggunakan teknik regresi linier sederhana untuk menguji validitas dan reliabilitas. Dari hasil penelitian yang dilakukan menunjukkan bahwa problem based learning berpengaruh positif dan signifikan terhadap kemampuan berpikir kritis dan hasil belajar. Dengan demikian, guru diharapkan dapat menerapkan model pembelajaran problem based learning secara berkesinambungan untuk meningkatkan kemampuan berpikir kritis dan hasil belajar siswa.

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INTRODUCTION

The current education system focuses on creative, critical thinking, problem solving, and decision making which are the main components in developing the education system in Indonesia. The educational process is carried out to evaluate, accredit, and certify in order to monitor educational developments. The quality of learning is complex and dynamic, it can be seen from various perceptions and perspectives across time lines. The success of education depends on how the learning process can take place effectively. The problem-based learning model is a student-centered learning model and is considered suitable for the current education system.

The importance of students' critical thinking skills in the learning process greatly affects the cognitive, affective and psychomotor development of students in attitudes, making decisions, and ways of solving problems both individually and in groups. Thinking skills possessed by each individual become the initial capital in living life. Thinking skills are certainly obtained through training and teaching, one of which is through educational institutions that are believed to be able to develop human thinking abilities. Humans who have good thinking skills will analyze, conclude, and solve the problems they face.

A learning is said to be successful if a teacher can understand the students well because by understanding the students so that the teacher can adapt and implement it in the way of teaching. If teachers can understand their students well, the learning success rate will be higher, because more or less teachers are mediators of student success. The learning outcomes achieved by each student are certainly different. There are several things that affect student learning outcomes. Among them are internal factors and external factors. Internal factors are all factors that come from within students such as physical aspects and psychological aspects. While external factors are factors that come from outside the students, such as the family environment, school environment, and community environment.

Thus, from the results of these thoughts the researcher is interested in conducting a study entitled "The Influence of Learning Models on Critical Thinking Ability and Learning Outcomes in Pluit Raya Vocational High School Students".

RESEARCH THEORITICAL

Learning outcomes

Learning outcomes are patterns of actions, values, understandings, attitudes, appreciation and skills (Sari, Rina Permata, & Ahmad, 2020). Learning outcomes are a description of students' abilities in fulfilling a stage of achieving learning experiences in one basic competency (Nurdyansyah & Fariyatul, 2016).

Learning outcomes are abilities or skills possessed by students after participating in teaching and learning activities. The learning outcomes are in the form of action patterns, life values, understandings, and applied attitudes.

Learning outcomes are when someone has learned there will be a change in behavior in that person, for example from not knowing to knowing, and from not understanding to understanding (Kustawan, 2013). Learning outcomes are the basis for measuring and reporting student academic achievement, and are key in developing further more effective learning designs that have alignment between what students will learn and how they will be assessed (Ricardo & Intansari, 2017).

Learning outcomes are the final form of a learning interaction that is carried out

repeatedly and is reflected in how students experience changes in behavior. The factors that influence learning outcomes according to Sugihartono (Nugraha, 2018) are as follows:

1. Internal Factor

Internal factors are factors that exist within individuals who are learning include: physical and psychological.

2. External Factors

External factors are factors that exist outside the individual. These factors include: family, school, and community.

Critical Thinking Ability

Critical thinking is a directed and clear process that is used in mental activities such as solving problems, making decisions, persuading, analyzing assumptions, and conducting scientific research (Isnaeni, Nurul, & Binti, 2016). Critical thinking means a person's ability to make judgments, analyze and assess an argument or fact (Ningsih, Puji, Arif, & Sentot, 2018).

Critical thinking is a logical thinking that is directed and related to the use of reason. Learn to think critically using mental processes, such as paying attention, categorizing, selecting, and judging or deciding.

(Husnah & Miftahul, 2017) suggests that critical thinking is an activity or process of analyzing, explaining, developing or selecting ideas, including categorizing, comparing, contrasting, testing arguments and assumptions, completing and evaluating conclusions of induction and deduction, determining priorities and make choices. Meanwhile (Mundilarto & Helmiyanto, 2017) said that, critical thinking is the art of analyzing and evaluating thinking with a view to improving It.

Then (Nugraha, 2018) defines critical thinking as a habit to be able to open oneself to analyze information and evaluate the information obtained to find a solution to a problem.

Based on some of the theories above, it can be synthesized that critical thinking is the ability of everyone to analyze information and evaluate the information obtained to find a solution to a problem.

Problem Based Learning

(Nurdyansyah & Fariyatul, 2016) states that problem-based learning is a set of teaching models that use problems as a focus to develop problem-solving skills, materials, and self-regulation. Problem-based learning is the most significant innovation in education. Then problem-based learning is the use of various kinds of intelligence needed to confront real-world challenges, the ability to face everything new and existing complexities (Nurdyansyah & Fariyatul, 2016).

Based on the above theory, it can be concluded that problem based learning is learning that uses problems as material for students to learn and is used to stimulate students' thinking skills.

(Husnah & Miftahul, 2017) states that, problem based learning is a student-centered learning approach that allows students to work together in small groups to find solutions to situations or problems.

Hypothesis

H1: There is a positive and significant effect between Problem Based Learning on Critical Thinking Ability.

H2: There is a positive and significant effect between Problem Based Learning on Learning Outcomes.

H3 : There is a positive and significant effect between Problem Based Learning on Critical Thinking Ability and Learning Outcomes.

METHODELOGY

The population in this study were Pluit Raya Vocational School students for the 2020/2021 academic year consisting of accounting and office administration majors for class XI and XII, totaling 310 students. The sampling technique used is proportional random sampling or proportional random technique, that is, each individual in the population is selected by drawing lots from absences. In this study, the determination of the sample refers to the table of Isaac and Michael with an error rate of 5%., obtained a sample of 161 students.

The data used in the research variables of problem based learning and critical thinking skills are primary data, namely data obtained directly from sources/respondents (Darmawan, 2013). Then the learning outcome variable is secondary data, namely data obtained from documents/publications/research reports from offices/agencies and other supporting data sources (Darmawan, 2013). The data analysis technique used is simple linear regression analysis using SPSS version 25.

DISCUSSION AND RESULT

Normality test

Table 1. Normality Test of Learning Outcomes

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		161
Normal Parameters ^{a,b}	Mean	,0000000
	Std. Deviation	6,99104289
Most Extreme Differences	Absolute	,062
	Positive	,062
	Negative	-,032
Test Statistic		,062
Asymp. Sig. (2-tailed)		,200 ^{c,d}
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		
d. This is a lower bound of the true significance.		

Source: Data processed by researchers

Judging from the test results in the table above, it can be seen that the value of asymp.Sig. (2-tailed) in the Unstandardized Residual column of 0.200 > 0.05, which means the level of significance and residual is greater than 0.05. So the data used in this study is Problem Based Learning and learning outcomes have a normal distribution.

Table 2. Normality Test of Critical Thinking Ability

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		161
Normal Parameters ^{a,b}	Mean	,0000000
	Std. Deviation	6,39662058
Most Extreme Differences	Absolute	,067
	Positive	,067
	Negative	-,039
Test Statistic		,067
Asymp. Sig. (2-tailed)		,074 ^c
a. Test distribution is Normal.		
b. Calculated from data.		
c. Lilliefors Significance Correction.		

Source: Data processed by researchers

Based on the test results above, it can be seen that the value of asymp.Sig. (2-tailed) in the Unstandardized Residual column is 0.74 > 0.05, which means the significance level in the data is greater than 0.05. So it can be concluded that the data used in this study, namely problem based learning and critical thinking skills have a normal distribution.

Linearity Test

Table 3. Linearity Test of X against Y2

ANOVA Table							
			Sum of Squares	df	Mean Square	F	Sig.
Y2 * X	Between Groups	(Combined)	7695,915	37	207,998	4,486	,000
		Linearity	5578,834	1	5578,834	120,325	,000
		Deviation from Linearity	2117,081	36	58,808	1,268	,171
	Within Groups		5702,868	123	46,365		
	Total		13398,783	160			

Source: Data processed by researchers

Based on the ANOVA table above, it can be seen that the Significance value (Sig.) contained in the Linearity 0.000 row is smaller than 0.05 and the Sig value. obtained from the line Deviation from Linearity is 0.171 which is greater than 0.05. So it can be concluded that between the independent variable problem based learning and the dependent variable learning outcomes there is a significant linear influence or the data used passes the linearity test.

Table 4. Linearity Test of X against Y1

ANOVA Table							
			Sum of Squares	df	Mean Square	F	Sig.
Y1 * X	Between Groups	(Combined)	7021,306	37	189,765	4,618	,000
		Linearity	5529,307	1	5529,307	134,549	,000
		Deviation from Linearity	1491,999	36	41,444	1,009	,468
	Within Groups		5054,682	123	41,095		
	Total		12075,988	160			

Source: Data processed by researchers

Based on the ANOVA table above, it can be seen that the significance value (Sig.) contained in the Linearity 0.000 row is smaller than 0.05 and the Sig value. obtained from the line Deviation from Linearity is 0.468 which is greater than 0.05. So it can be concluded that between the independent variable problem based learning and the dependent variable critical thinking ability there is a significant linear influence or the data used passes the linearity test.

So it can be concluded that between problem based learning (X) and learning outcomes (Y2) as well as problem based learning and critical thinking skills (Y1) in this study have a linear relationship and meet the linear requirements test.

Multicollinearity Test

Table 5. Multicollinearity Test of Learning Outcomes

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	Collinearity Statistics	
		B	Std. Error	Beta	Tolerance	VIF
1	(Constant)	40,275	3,779			
	Hasil Belajar	,606	,057	,645	1,000	1,000

a. Dependent Variable: Hasil Belajar

Source: Data processed by researchers

Seen in the table above, looking at the Tolerance column, the value is 1,000 and the VIF value is 1,000. So it can be concluded that in this regression model there is no multicollinearity problem.

Table 6. Multicollinearity Test of Critical Thinking Ability

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	Collinearity Statistics	
		B	Std. Error	Beta	Tolerance	VIF
1	(Constant)	47,254	3,457			
	Kemampuan Berpikir Kritis	,604	,052	,677	1,000	1,000

a. Dependent Variable: Kemampuan Berpikir Kritis

Source: Data processed by researchers

From the table above, it can be seen that all variables have a Tolerance value > 0.1 and a VIF value < 10, so it can be concluded that there is no multicollinearity in this regression model.

Heteroscedasticity Test

Table 7. Test of Heteroscedasticity of Learning Outcomes

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5,626	2,331		2,414	
	Hasil Belajar	-,002	,035	-,005	-,061	,952

a. Dependent Variable: Hasil Belajar

Source: Data processed by researchers

From the results of the Glejser heteroscedasticity test contained in the table above, it shows that the data used has met the classical assumption of heteroscedasticity. The conclusion is that the regression model in this study does not have heteroscedasticity problems.

Table 8. Critical Thinking Ability Heteroscedasticity Test

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	5,815	2,096		2,774	
	Kemampuan Berpikir Kritis	-,011	,032	-,028	-,359	,720

a. Dependent Variable: Kemampuan Berpikir Kritis

Source: Data processed by researchers

From the results of the glejser test contained in the table above, it shows that the value of Sig. > 0.05 so it can be concluded that the data used has met the classical assumption of heteroscedasticity.

Simple Linear Regression Test

Table 9. Simple Linear Regression Test for Learning Outcomes

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	40,275	3,779		10,659	,000
	Hasil Belajar	,606	,057	,645	10,650	,000

a. Dependent Variable: Hasil Belajar

Source: Data processed by researchers

Based on the results of simple linear regression analysis in the table, a simple linear regression model can be made as follows: $Y_2 = 40.275 + 0.606X$

Table 10. Simple Linear Regression Test for Critical Thinking Ability

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	47,254	3,457		13,668	,000
	Kemampuan Berpikir Kritis	,604	,052	,677	11,588	,000

a. Dependent Variable: Kemampuan Berpikir Kritis

Source: Data processed by researchers

Based on the results of simple linear regression analysis in the table above, a simple linear regression model can be made as follows: $Y_1 = 47.254 + 0.604X$

F Uji test

Table 11. F-Test Learning Outcomes

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5578,834	1	5578,834	113,432	,000 ^b
	Residual	7819,949	159	49,182		
	Total	13398,783	160			

a. Dependent Variable: Hasil Belajar
b. Predictors: (Constant), Problem Based Learning

Source: Data processed by researchers

From the table above, it can be seen that Fcount is 113,432 while Ftable is at a significance level of 5% or 0.05. With df1 (number of variables-1) or (3-1) = 2 and df2 = nk-1 or df2 = 161-2-1 = 158. Then the Ftable value obtained is 3.05, which means Fcount > Ftable, which is 113,432 > 3.05. It can be concluded that problem based learning can affect learning outcomes.

Table 12. F Test of Critical Thinking Ability

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	5529,307	1	5529,307	134,291	,000 ^b
	Residual	6546,681	159	41,174		
	Total	12075,988	160			

a. Dependent Variable: Kemampuan Berpikir Kritis
b. Predictors: (Constant), Problem Based Learning

Source: Data processed by researchers

From the table above, it can be seen that Fcount is 134,291 while Ftable is at a significance level of 5% or 0.05. With df1 (number of variables-1) or (3-1) = 2 and df2 = nk-1 or df2 = 161-2-1 = 158. Then the Ftable value obtained is 3.05, which means Fcount > Ftable, which is 134,291 > 3.05. It can be concluded that problem based learning can affect critical thinking skills.

T test

Table 13. t-test Learning Outcomes

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	40,275	3,779		10,659	,000
	Problem Based Learning	,606	,057	,645	10,650	,000

a. Dependent Variable: Hasil Belajar

Source: Data processed by researchers

From the table of t-test results above, it can be seen that the t-value for problem-based learning is 10.650. Furthermore, this value will be compared with the value of df = (N-2) = (161-2) = 159 at a significance level of 5% or 0.05 so that the ttable value is 1.654. Because the value of tcount is greater than ttable and the significant value for problem based learning is 0.000 less than 0.05 (0.000 < 0.05) with a positive beta of 0.606, so H0 is rejected and H2 is accepted. In other words, the problem based learning variable has a positive effect on the learning outcome variable.

Table 14. Critical Thinking Ability t-test

Coefficients ^a						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	47,254	3,457		13,668	,000
	Problem Based Learning	,604	,052	,677	11,588	,000

a. Dependent Variable: Kemampuan Berpikir Kritis

Source: Data processed by researchers

From the results of the t-test above, it can be seen that the t-value for the independent variable problem based learning is 11.588. Furthermore, this value will be compared with the value of df = (N-2) = (161-2) = 159 at a significance value of 0.05 so that a ttable value of 1.654 is obtained. Because the value of tcount is greater than ttable and the significant value for problem based learning is 0.000 less than 0.05 (0.000 < 0.05) with a positive beta of 0.604, so H0 is rejected and H1 is accepted. In other words, the problem based learning variable has a positive effect on the critical thinking ability variable.

Coefficient of Determination (R²)

Table 15. Coefficient of Determination of Learning Outcomes

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,645 ^a	,416	,413	7,013
a. Predictors: (Constant), <i>Problem Based Learning</i>				
b. Dependent Variable: Hasil Belajar				

Source: Data processed by researchers

The results of the coefficient of determination in the Model Summary table show the R Square value of 0.416 or 41.6%, meaning that the dependent variable (Y₂) is explained by the independent variable by 41.6% and 58.4% is explained by other independent variables that are not used in this study.

Table 16. Coefficient of Determination of Critical Thinking Ability

Model Summary ^b				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	,677 ^a	,458	,454	6,417
a. Predictors: (Constant), <i>Problem Based Learning</i>				
b. Dependent Variable: Kemampuan Berpikir Kritis				

Source: Data processed by researchers

The results of the coefficient of determination in the Model Summary table show the R Square value of 0.458 or 45.8%, meaning that the dependent variable of critical thinking ability can be explained by the independent variable of problem based learning of 45.8%.

DISCUSSION

Problem Based Learning on Critical Thinking Ability

Based on the results of the simple linear regression test calculation $Y_1 = 47.254 + 0.604X$ there is a positive relationship between problem based learning and critical thinking skills. The constant obtained is 47.254, if there is no problem based learning variable that influences it, the results of this study predict the value of critical thinking ability of 47.254. This means that there is an increase in problem based learning and students' critical thinking skills. The regression coefficient value of the X variable is 0.604, meaning that if problem based learning increases by one, the critical thinking ability will increase by 0.604.

F test with a value ($F_{count} > F_{table}$) $134,291 > 3,05$. So it can be said that problem based learning has a positive and significant effect on critical thinking skills.

The results of the t-test problem based learning with critical thinking skills $t_{count} 11,588 > t_{table} 1,654$. It can be concluded that problem based learning has a positive and significant effect on critical thinking skills, so the hypothesis (H₁) is accepted. The analysis test of the coefficient of determination (R²) is obtained from the R square value of problem based learning on critical thinking skills, which is 0.458 or 45%, meaning that the critical thinking ability variable can be explained by problem based learning.

Problem Based Learning on Learning Outcomes

The results of the simple linear regression test calculation $Y_2 = 40.275 + 0.606X$ there is a positive relationship between problem based learning and learning outcomes. The constant obtained is 40.275, meaning that if there is no problem based learning variable that affects it, the results of this study predict the value of learning outcomes of 40.275. That is, there is an increase in problem based learning and student learning outcomes. The regression coefficient value of the X

variable is 0.606, meaning that if problem based learning increases by one, learning outcomes will increase by 0.606.

The results of the F test with a value ($F_{count} > F_{table}$) $113,432 > 3,05$. So it can be said that problem based learning has a significant effect on student learning outcomes.

Then, the results of the t-test problem based learning with learning outcomes $10,650 > 1,654$. So it can be concluded that problem based learning has a positive and significant influence on learning outcomes, so hypothesis H2 is accepted.

The results of R² problem based learning on learning outcomes are 0.416 or 41%, meaning that the learning outcomes variable can be explained by problem based learning while 14% is explained by other variables not included in this study.

Problem Based Learning on Critical Thinking Ability and Learning Outcomes

From the results of the t test, it can be concluded that problem based learning has a partial influence on critical thinking skills and learning outcomes. This means that problem based learning also jointly affects critical thinking skills and learning outcomes. So that the hypothesis H3 is accepted.

CONCLUSION AND SUGGESTION

CONCLUSION

1. There is a positive and significant effect between problem based learning and critical thinking skills of $t_{count} 11,588 > t_{table} 1,654$.

2. There is a positive and significant effect between problem based learning and learning outcomes of $t_{count} 10,650 > t_{table} 1,654$.

3. There is a positive and significant effect between problem based learning on critical thinking skills and learning outcomes, $t_{count} 11,588 > t_{table} 1,654$ and $t_{count} 10,650 > t_{table} 1,654$. Problem based learning partially affects each Y, which means that problem based learning also affects critical thinking skills and learning outcomes.

SUGGESTION

1. Using other indicators in further research so that it is more adapted to existing conditions, is more updated, and has a wider scope.

2. Educators are expected to provide a pleasant learning atmosphere. Where students can express their opinions without feeling afraid of being wrong, learning that stimulates students to provide creative ideas they have, learning based on problems in everyday life so that students are more sensitive to the surrounding environment and skilled in solving problems.

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