



The Influence of The Problem-Based Learning (PBL) Model on The Level of Reasoning Ability

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Abstract: The reasoning ability of students at senior high school of 7 Ambon, especially reasoning is still low, so there are still teachers who pay less attention to the reasoning abilities of students. This results in students tending to work on questions fixated on previously given examples without evaluating analysis, synthesis, generalization, connection, and proof. The purpose of this study was to determine the effect of the PBL learning model on the level of reasoning ability of class X students at Senior High School of 7 Ambon on the material of the Indonesian lesson. The approach used in this study is a quantitative approach with the type of research used being quasi-experimental. The sample in this study amounted to 50 people consisting of 25 people in class X1 and 25 people in class X2. Data collection techniques used are observation, tests, questionnaires, and documentation. The data analysis technique used is T-test analysis. Based on the results of the study, it can be concluded that the application of the PBL model affects the level of students' reasoning abilities in the Indonesian lessons subject matter of Indonesian lesson in class X at senior high school of 7 Ambon. It can be seen from the average posttest score of students in the experimental class (X-1) senior high school of 7 Ambon is 72.6, while the average posttest score for students in the control class (X-2) senior high school of 7 Ambon is 60.80. This difference indicates that the level of students' reasoning ability between the experimental class and the control class has a significant difference. This is evidenced by the results of statistical data analysis "T-test" which is obtained by the value of $t_{count} (4,132) > t_{table} (1,711)$. This proves that the hypothesis is accepted, the application of the Problem Based Learning (PBL) learning model affects the level of students' reasoning abilities in Indonesian subjects in class X SMAN 7 Ambon.

Keywords: PBL, reasoning ability, Indonesian lesson

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INTRODUCTION

Education is one of the basic needed of every human being and an obligation to form a society that has the understanding and ability to carry out the functions of life that are the same as their nature and can develop a life for the better from time to time so that it is more complex, especially in the development of science, and technology (Benesova & Tupa, 2017; Durkheim, 2013). This requires humans to always be able to keep up with developments and be able to survive by being able to solve all the problems they face (Dhawan, 2020; Caradonna, 2014). To gain knowledge, insight and increase dignity in life. Humans have the right to get a proper education according to their development.

This education is obtained through the process of primary, secondary, and tertiary education. The knowledge gained through education will be very useful for the life to come when everyone can utilize and optimize the education they have received so far (Cozolino, 2013). Humans must understand that the education they have received so far is not just a mere formality. But more than that, education will greatly determine the life of the nation and state which is nurtured from the basic level (Sharp, 2014; Tanner, 2013). Because life is growth, education means helping human inner growth without being limited by age.

Indonesian lessons in schools serve to increase the sharpness of students' reasoning in solving problems. In addition, Indonesian lessons also have an important role in various other disciplines as well as in the development of science and technology. Therefore Indonesian lessons are a very important science in human life. Language is a means of communication through conversation with words. Indonesian is the national language for the Indonesian people. Language is a means of communication for the Indonesian people. A language that unites communication from various ethnic groups in Indonesia. The language is very important to be studied more deeply for the Indonesian people, especially the younger generation of the nation's successors. Indonesian lessons learning activities are teacher-student, student-student, and student-teacher interactions to clarify thoughts and understanding of an Indonesian language idea given through logical, creative, and systematics being studied so that learning achievement can increase.

PBL is the interaction between stimulus and response, which is the relationship between two directions of learning and the environment (Pohan et al, 2020; Yuniara & Surya, 2017). So, PBL 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 knowledge and concepts that are essential to the subject matter. PBL is designed primarily to help students develop thinking skills, problem-solving skills, and intellectual skills (Aslan, 2021). This learning model can also develop students' reasoning abilities through problem-solving so that students are actively involved in the process and the acquisition of problem-solving results. PBL implies that in learning students are faced with a problem, which is then expected through problem-solving students learn more basic thinking skills. In PBL, the teacher only acts as a facilitator who guides and directs students in the learning process. Students must be more active to explore and solve the problems given so that students' reasoning power can at honed during the problem-solving process.

Based on the results of observations made by researchers with several students and Indonesian language teachers, especially class X at senior high school of 7 Ambon, it is known that many students think that the subjects of the Indonesian lessons given at school are very difficult to understand and boring. rows and rows, especially in solving a problem related to these questions, this has resulted in many students being less interested in the Indonesian language. The active teacher dominates the class while passive students (come, sit, watch, practice, and forget) only receive the finished material from the concept given by the teacher. As a result, students are less trained in compiling a problem presented and finding a concept in solving Indonesian language solutions.

The reasoning ability of students at senior high school of 7 Ambon, especially reasoning is still low, so there are still teachers who pay less attention to the reasoning abilities of students. This results in students tending to work on questions fixated on previously given examples without evaluating analysis, synthesis, generalization, connection, and proof. The function of Indonesian lessons subjects is as a tool, mindset, and knowledge or knowledge (Scheiner et al., 2019). The three functions of the Indonesian language should be used as a reference in learning school Indonesian language. Learning the Indonesian language for students is also the formation of a mindset in understanding an understanding and in reasoning a relationship between those meanings. Indonesian language reasoning abilities will develop if students have an active role in learning, with active learning students will be able to reason and gain experience and knowledge so that they can be more responsive to the problems around them.

Learning that can improve learning activities and provide opportunities for students to express Indonesian language ideas or ideas optimally so that students become more active (Chang, 2019). With Indonesian language reasoning abilities, of course, there are various ways to achieve this ability, one of which is through problem-based learning which is one of the innovative learning models that can provide active learning conditions for students (Faqiroh, 2020). PBL that emphasizes Indonesia language representation is an alternative to increase student activity and creativity in learning Indonesian language and is a solution to encourage students' reasoning abilities at senior high school of 7 Ambon, especially reasoning is still low, so there are still teachers who pay less attention to the reasoning abilities of students. This results in students tending to work on questions fixated on previously given examples without evaluating analysis, synthesis, generalization, connection, and proof. The function of Indonesian lessons subjects is as a tool, mindset, and knowledge (Boaler, 2022). The three functions of the Indonesian language should be used as a reference in learning school Indonesian lessons. Learning Indonesian lessons for students is also the formation of a mindset in understanding an understanding and in reasoning a relationship between those meanings (Siregar, 2021). Indonesia language reasoning abilities will develop if students have an active role in learning, with active learning students will be able to reason and gain experience and knowledge so that they can be more responsive to the problems around them.

This is in line with Lave (2021) who states that one of the tendencies that cause students to fail to master well the subjects in Indonesian lessons is that students do not understand and use good reasoning in solving the problems given. Recognizing the situation that has been described, developing and improving students' Indonesian language reasoning abilities need to receive important attention in learning the Indonesian language. Improving reasoning ability requires a learning model that can accommodate students' thinking processes, reasoning processes, and students critical attitudes. Therefore, it is necessary to make efforts to improve Indonesian language learning in schools to train students' reasoning abilities. Therefore, this research objective to knowing the effect of the PBL learning model on the level of reasoning ability of class X students at SMAN 7 Ambon on Indonesian language material.

METHODS

This research is quasi-experimental by conducting experiments in the classroom that has been provided as it is, by not changing the classroom situation and learning schedule (Lee et al., 2017). The approach in this study is a descriptive quantitative approach which is one type of research activity whose specifications are systematic, well-planned, and structured from the beginning to the making of the research design, both about

research objectives, research subjects, research objects, data samples, data sources, as well as the methodology. This study uses a type of research design with a pretest-posttest control group design method. Krebt (2017) states "That there are two groups selected randomly, then previously given a pretest to determine the initial state between the experimental group and the control group". Furthermore, after knowing the results of the pretest of the two groups, the experimental class was given treatment (X), while the control class was not given treatment (X).

After being given treatment or treatment in one of the sample groups (experimental group) followed by giving a posttest to both classes or both groups of samples used. The effect of treatment is symbolized by (O2-O1) -(O4-O3) and then to see the effect of treatment based on its significance is to use parametric statistical tests or non-parametric statistical tests. If there is a significant difference between the experimental group and the control group, then the treatment given has a significant effect. The research was conducted at Senior High School 7 Ambon, the population used in this study were all grade X students of Senior High School 7 Ambon which consisted of 2 classes totaling 50 students with 26 male students and 24 female students. Data collection techniques using tests and questionnaires, data analysis techniques used are arithmetic average, normality, homogeneity, and hypothesis testing.

RESULT AND DISCUSSION

Comparison of Pretest Experiment Class and Control Class

Data from the results of students' initial test scores in the experimental class and control class can be presented in the table below:

Table 1. Comparison of Pretest Score Results

	Pretest Experimental	Pretest Control
Valid	25	25
Missing	0	0
Mean	51,400	51,000
Median	50,000	50,000
Mode	40,0 ^a	40,0
Std. Deviation	12,2066	12,5831
Minimum	30,0	30,0
Maximum	70,0	70,0
Sum	1285,0	1275,0

There is a difference in the level of students' reasoning in the experimental class and the control class, but the difference is not significant. In the experimental class, the average value obtained is 51.4 and the standard deviation is 12.2066, while in the control class the average value obtained is 51.0 and the standard deviation is 12.5831. Thus it is known that the level of reasoning of students in solving series and series questions in the experimental class obtained from the pretest results there is no significant difference from the control class.

Comparison of Posttest Results of Experiment Class and Control Class

Data from the results of the final test scores (posttest) of students in the experimental class and control class can be presented in the table below:

Table 2. Comparison of Posttest Score Results

	Posttest Experimental	Posttest Control
Valid	25	25
N Missing	0	0
Mean	72,600	60,800
Median	70,000	60,000
Mode	70,0	60,0
Std. Deviation	9,9079	11,1505
Minimum	50,0	40,0
Maximum	90,0	80,0
Sum	1815,0	1520,0

Based on the table above, it can be explained that there is a significant difference in the results of the level of students' reasoning ability in solving problems of Indonesian lesson in the experimental class and control class after the implementation of the PBL model and the application of the conventional model which is

significant. In the experimental class, the average value obtained is 72.6 and the standard deviation is 9.9079, while in the control class the average value obtained after the conventional application is 60.8 and the standard deviation is 11.1505. Thus it is known that the results of the level of students' reasoning ability in solving series and series questions in the experimental class obtained results from the posttest which were higher than the control class.

Statistic Test

To determine the effect of the two variables, namely variable X (application of PBL model) and variable Y (level of students' reasoning ability) T-test prerequisite analysis was used with a significance level of 5%. Researchers processed the data in this study using the application SPSS for windows version 20.00. The results of the normality test, homogeneity test, and T-test can be seen as follows.

Prerequisite Test (Normality and Homogeneity)

Before testing whether there is a difference between the learning interest of the experimental class and the control class, the learning outcomes data need to be tested through a requirements analysis test. Test requirements analysis used is a statistical test that includes tests of normality and homogeneity. The normality test technique used is the Kolmogorov-Smirnov technique while the homogeneity test is carried out using the Levene Statistic technique. Both of these requirements analysis tests were carried out with the help of the SPSS 20.0 program. The following are the results of the normality test of the data obtained from the SPSS output.

Table 3. Normality Test Results with the Kolmogorov-Smirnov technique

		Posttest Experiment	Posttest Control
N		25	25
Normal Parameters ^{a,b}	Mean	72,600	60,800
	Std. Deviation	9,9079	11,1505
Most Extreme Differences	Absolute	,237	,169
	Positive	,164	,169
	Negative	-,237	-,111
Kolmogorov-Smirnov Z		1,183	,843
Asymp. Sig. (2-tailed)		,122	,476

a. Test distribution is Normal

b. Calculated from data.

Based on the results of the normality test that has been obtained, it is known that the normality test value for the control class is 0.476 and the experimental class is 0.122, and these values are greater than 0.05 ($0.476 > 0.05$ and $0.122 > 0.05$), then according to the basis for decision making in the Kolmogorov-Smirnov normality test, both data were declared to be normally distributed. After the data is declared normal, it is continued with the homogeneity test. This test was carried out to determine the similarity of the variances in each group of data. Based on the calculation of the homogeneity test that has been carried out, the results are shown in the following table.

Table 4. Homogeneity Test Results with Levene Statistics technique

Levene Statistic	df1	df2	Sig.
,482	1	48	,491

ANOVA					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1740,500	1	1740,500	15,645	,000
Within Groups	5340,000	48	111,250		
Total	7080,500	49			

Based on the results of the homogeneity test that has been obtained, it is known that the significance value of the homogeneity test for the control and experimental classes is $0.491 > 0.05$, so according to the basis for making decisions in the homogeneity test of Levene Statistics, the data is declared to have the same variance or homogeneous.

T-test

T-test analysis of the experimental class posttest and control class posttest aims to determine whether there is a significant difference in posttest scores in the experimental class and the control class. The conclusion

of the study was declared significant if $t_{\text{count}} > t_{\text{table}}$ at a significance level of 5% and p-value < 0.05 . The summary of the T-test on the posttest of the experimental class and the control class is shown in the following table.

Table 5. T-test Results of Posttest Experiment Class and Control class

	N	Correlation	Sig.
Pair 1 Postes Eksperimen & Postes Kontrol	25	,084	,689

	Mean	Std. Dev.	Paired Differences		Mean	t	df	Sig. (2-tailed)
			Std. Error Mean	5% Confidence Interval of the Difference				
				Lower Upper				
Postes Pair 1 Eksperimen - Postes Kontrol	11,800	14,2799	2,8560	11,6190	11,9810	4,132	24	,000

The posttest t-test is known that the average result of the level of reasoning ability of students in the experimental class is 72.6 and the average level of reasoning ability of students in the control class is 60.80, so it can be concluded that the difference in the average results of the level of reasoning ability of students in the experimental class and the control class is 72.6. From the table, it is known that the t_{count} is 4.132. The t_{table} obtained from df 24 at a significance level of 5% is 1.711. So the value of $t_{\text{count}} > t_{\text{table}}$ ($4.132 > 1.711$) it can be concluded that there is a significant difference in the level of students' reasoning ability scores in the experimental class.

Student Response Questionnaire Results

This student questionnaire the researchers distributed after the researchers applied the PBL learning model. The results of the questionnaire were used to determine students' learning responses to Indonesian lessons subjects, especially in the material of Indonesian lessons through the application of the PBL learning model. This student response questionnaire is a closed questionnaire, where respondents or students provide answers by choosing one of the alternative answers that have been provided. The alternative answer is:

- a. SS: Strongly Agree
- b. S: Agree
- c. TS: Do Not Agree
- d. STS: Strongly Disagree

As for the results of filling out the student questionnaire, the percentage scores are categorized as follows:

Table 6. Students questionnaire

Statement Number	SS		S		TS		STS	
	f	%	f	%	f	%	f	%
1.	8	32%	9	36%	5	20%	3	12%
2.	7	28%	10	40%	5	20%	3	12%
3.	2	8%	3	12%	1	4%	10	40%
4.	5	20%	14	56%	3	12%	3	12%
5.	4	16%	4	16%	8	32%	9	36%
6.	2	8%	3	12%	1	4%	9	36%
7.	10	40%	8	32%	4	16%	3	12%
8.	8	32%	9	36%	5	20%	3	12%
9.	9	36%	13	52%	2	8%	1	4%
10.	3	12%	3	12%	8	32%	11	44%
11.	9	36%	12	48%	2	8%	2	8%
12.	8	32%	12	48%	3	12%	2	8%
13.	10	40%	8	32%	4	16%	3	12%
14.	8	32%	13	52%	1	4%	3	12%
15.	7	28%	10	40%	5	20%	3	12%
16.	4	16%	4	16%	8	32%	9	36%

Statement Number	SS		S		TS		STS	
	f	%	f	%	f	%	f	%
17.	10	40%	12	48%	1	4%	2	8%
18.	11	44%	13	52%	1	4%	-	-
19.	7	28%	10	40%	5	20%	3	12%
20.	9	36%	13	52%	2	8%	1	4%
21.	7	28%	14	56%	2	8%	2	8%
22.	9	36%	14	56%	2	8%	-	-
23.	10	40%	8	32%	4	16%	3	12%
24.	9	36%	13	52%	2	8%	1	4%
25.	7	28%	10	40%	5	20%	3	12%
Total	183	732%	242	968%	1	432%	92	368%
Average %	29,28%		38,72%		17,28%		14,72%	

Based on the results of the questionnaire calculation, it is known that the average percentage of the highest student answers is in the agree answer choice (S) which is 38.72%, then the strongly agree (SS) answer is 29.28%, for the disagree answer (TS) there is 17.28% and the answer strongly disagree (STS) there is 14.72%. Based on the results of the table above, it can be concluded that the student's response to the PBL model on the level of reasoning ability in the Indonesian lesson material is in agreement with the percentage of student answers of 38.72%.

In this study, the researchers chose the PBL model to see the effect of the model on the Indonesia language reasoning abilities of the students of senior high school of 7 Ambon, because as stated by [Akcaay \(2017\)](#) whereby using PBL students are allowed to apply the knowledge they have in the real world so that students are expected to develop their reasoning abilities. From the data from research conducted by researchers, at the time of the pre-test, the average score of students' Indonesian language reasoning abilities in the control class was better than the experimental class. During the pre-test, there were still a lot of student errors in both the experimental class and the control class, even many students did not know the purpose of the given problem. This is because students are not used to getting questions in the form of problems that require a high level of reasoning. After the pre-test was carried out, the control class was given treatment using a PBL model whose learning was carried out by the researcher. Meanwhile, in the control class, learning continues to use the conventional model and is carried out by the subject teacher in question, the material provided by the researcher and the teacher concerned is line and series material. Using the PBL model in the experimental class, students feel confused and find it difficult to solve problems given by researchers because they are not used to getting questions before being explained by the teacher. This student difficulty can be overcome by researchers with a learning step where researchers help students to obtain the data used and help students choose the possibility of solving the problem as also expressed by [Fessakis et al. \(2013\)](#) so that students can overcome the difficulties they face.

Through the PBL model, students are accustomed to actively asking and asking for guidance from researchers and the problems given by researchers can be understood by students and students can work on them quickly, students' reasoning looks more improved than the first and second meetings. Even so, there are still students who make mistakes when calculating, due to students being less careful in counting, and there are some students who do not understand the conversion of units of measure. From this third meeting, it can be concluded that students are much more active and their reasoning abilities have increased. A post-test was given to the experimental class and control class to know the student's Indonesian language reasoning ability after the learning process as a benchmark to determine the effect of the PBL model in improving students' reasoning abilities. After doing the post-test and checking the results, the researcher found that the answers of the experimental class students looked better in reasoning about the purpose of the questions, and working on the questions was more systematic and orderly, although some students made mistakes in the writing process, in general, the students seemed to be able to understand the purpose of the given problem. So that the average reasoning ability of students in the experimental class increases. In the teaching and learning process using the PBL model, it requires activity, and high student curiosity, but there are some students whose curiosity is low, so these students are less interested in learning, PBL will cause problems for students who do not have a high interest in learning ([LaForce et al., 2017](#)). In connection with this, researchers can handle it well because researchers already know this. In this case, the researcher gives problems around which are related to the material being taught so that students can be more interested in the material being studied.

The obstacles faced by researchers in this study were the number of students who had low curiosity,

then some students were noisy when learning was carried out, and also students who were initially confused when given a problem which for them the question was very difficult for them to work on. To overcome this, the teacher gives an intensive approach to students who have low curiosity and guides students who start to feel confused, so that the class situation remains orderly and conducive.

CONCLUSION

The application of PBL affects the level of students' reasoning abilities in Indonesian subjects in class X SMAN 7 Ambon. It can be seen from the average posttest score of students in the experimental class (X-1) of SMAN 7 Ambon is 72.6, while the average posttest score of students in the control class (X-2) of SMAN 7 Ambon is 60.80. This difference indicates that the level of students' reasoning ability between the experimental class and the control class has a significant difference. This is evidenced by the results of statistical data analysis "T-Test" which is obtained by the value of $t_{\text{count}} (4,132) > t_{\text{table}} (1,711)$. This proves that the hypothesis is accepted.

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