



## Improving high school student learning outcomes: Using problem-based learning model

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### ABSTRACT

Student learning outcomes are an indicator of the success of teaching and learning activities carried out. This research aims to determine the improvement in student learning outcomes in economics courses by implementing the problem-based learning model a quantitative research method with a quasi-experimental approach. The population of this research was 205 students in class XI social at SMAN 7 Tasikmalaya, and the sample used was 136 students using a purposive sampling technique consisting of two experimental classes and two control classes. The experimental class uses the Problem-Based Learning learning model, while the control class uses the conventional learning model. Students in each class are given a pretest, and then learning is carried out according to a predetermined model, and then a posttest is carried out. The questions used are 25 multiple-choice questions, and then the results or grades obtained by students are analyzed further. The results of this study show that there are differences between before and after treatment in the experimental class and control class. This research concludes that the implications of implementing a problem-based learning model as an alternative to conventional models can be used in an effort to improve student learning outcomes in economics courses.



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## INTRODUCTION

Education is something that is done to gain insight, knowledge and skills. Law Number 20 of 2003 concerning the National Education System states that education is a conscious and planned effort to create a learning atmosphere and learning process so that students actively develop their potential to have religious spiritual strength, self-control, personality, intelligence, noble morals, and skills needed by society, nation and state. Rusman (2017) that learning is interaction between teachers and students, both direct interaction such as face-to-face activities and indirectly, namely by using various learning media. The learning carried out directs students through the learning process to obtain learning goals, and the final results of the process are in accordance with what is expected, namely learning outcomes (Suparjo, 2021). Teachers play a very important role in the learning process in order to get the expected results. Fatchurahmawati et al. (2019) teachers are also required to be able to improve student learning outcomes in the learning process.

Minister of Education and Culture Regulation No. 22 of 2016 concerning basic and secondary education standards, states that the criteria for implementing learning in basic education units and secondary basic education units are to achieve graduate competency, where the main point in this case is active learning carried out by teachers and students at school. However, due to the Covid pandemic in 2020 which changed the learning system to online, in 2022 learning will be carried out in transition from online back to face-to-face learning. When these conditions were implemented, limited face-to-face learning gradually began to be carried out to improve the quality of learning so that the results were more optimal and measurable. However, when the online to offline transition was made as a result of these learning adjustments, it turned out that this had a significant impact on reducing student learning outcomes at school.

Based on pre-research observations in class apart from that, a direct survey of students regarding economics subjects showed that as many as 61.5% of students were not interested in economics lessons because, according to students, they considered them less enjoyable, and 76.9% of students did not understand employment material comprehensively. Different learning models are needed to help improve students' understanding and achieve optimal learning outcomes. Apart from direct interviews, the low student learning outcomes in economics lessons are also reflected in the final exam scores, as follows :

**Table 1. Average Final Exam Score in Social Class**

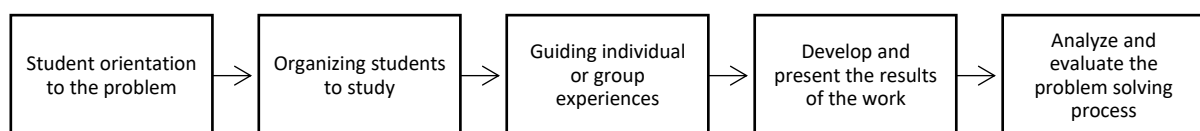
Class	Average Final Semester Exam Score
Social 1	31
Social 2	32
Social 3	36
Social 4	33
Social 5	35
Social 6	35

Source : Final Exam Score Data for Economics course at SMAN 7 Tasikmalaya

Table 1 shows that the average final exam score for the Economics course, from a cognitive aspect, is still very low. Tan (2021) stated that one of the factors affecting the decline in student learning outcomes is external factors, namely the social environment and non-social environment. The social environment highlighted in this case is the teacher which is seen from the limited teaching methods and presentation of learning materials (use of media) used by the teacher as well as the non-social environment which is highlighted from the limited time used for student learning. Limitations in the learning process are one of the factors causing low student learning outcomes in economics courses.

Pre-research results show that the learning method used in economics subjects is still conventional, namely the lecture method. The conventional model used is monotonous, causing boredom in Learning. This approach has several disadvantages are students tend to be passive recipients of information rather than active participants in the learning process, focus on memorization reduces opportunities for students to develop problem solving and critical thinking skills, and the material taught is often not linked to a real world context, so students have difficulty seeing the practical benefits of what they are learning. In fact, good quality education is not only seen from how much students memorize facts, but also from their ability to think critically, solve problems, and apply knowledge in real situations. However, challenges in the conventional education system often make students passive and only focus on memorization. To overcome this, innovation is needed in learning methods, one of which is the Problem-Based Learning (PBL) model.

The curriculum used at SMAN 7 Tasikmalaya is the 2013 curriculum. The learning process with the 2013 Curriculum uses a scientific approach. The learning model that refers to the 2013 Curriculum is based on constructivism. Dolmans et al. (2016) one of the learning models that refers to the constructivist learning model is the problem-based learning model or Problem-Based Learning (PBL). Adiga & Sachidananda (2015) explains that the stages of PBL are :



**Figure 1 : The Stages of Problem-Based Learning**

Figure 1 shows that the learning process uses real problems, the learning is cooperative, and has the development of inquiry skills to solve problems. PBL has benefits for students so they are better able to face problems in everyday life and strengthen relationships with teachers and other students. Tan (2021) that PBL is a pedagogical approach that allows students to learn while actively engaging in a given open-ended problem. Students are given the opportunity to solve problems in a collaborative

situation. In contrast to traditional learning which is teacher-centered and focuses more on memorization, problem-based learning is student-centered. In this method, students are directly involved in the problem solving process, thereby forming independent learning habits through practice and reflection (Ukoh, 2012; Yew & Goh, 2016).

However, PBL requires more time and money, and there are not many teachers who can bring students to solve problems and its implementation is difficult to monitor. Even though many have conducted research regarding the application of the problem-based learning model, there are differences in what researchers will do, including the methods used. also, in this research, the researchers used Employment material in the economics subject for class XI social. Hermuttaqien et al. (2023) the Problem-Based Learning learning model is carried out by providing examples of real-life problems that exist in it which are carried out in an effort to improve student learning outcomes. Based on existing problems regarding low student learning outcomes, many students' scores in economics subjects in class are still below the KKM. Problem-based Learning on employment material is carried out in an effort to improve learning outcomes. It is hoped that this research can contribute to the development of learning methods in schools. Brooks et al. (2014) understanding the benefits and challenges of implementing PBL, educators can be more effective in designing curricula that improve academic learning outcomes and prepare students to face challenges in the real world. Problem Based Learning offers an innovative approach that can overcome weaknesses in the conventional education system. By placing students at the center of learning and linking material to real situations, PBL can improve learning outcomes while developing skills that are essential for students' futures. This research will further explore how PBL can be implemented effectively at the high school level to achieve these goals

## RESEARCH METHODS

The quantitative research method uses experiments, namely the quasi-experimental nonequivalent control group design type. This research was conducted at SMAN 7 Tasikmalaya in class XI social with a population of 205 students. However, this research used a purposive sampling technique due to researcher limitations. So, the research sample was 136 students consisting of 4 classes, namely two experimental classes and two control classes. The experimental classes are XI social 1 and XI social 2, and the control class is XI social 3 and XI social 4. This research consisted of two class groups, namely the experimental class and the control class, all classes were given a pre-test first, then after that they were given treatment, namely the experimental class with the Problem-Based Learning model and the control class with the conventional learning model, then a post-test was carried out. Briefly, the research design that will be used is as follows:

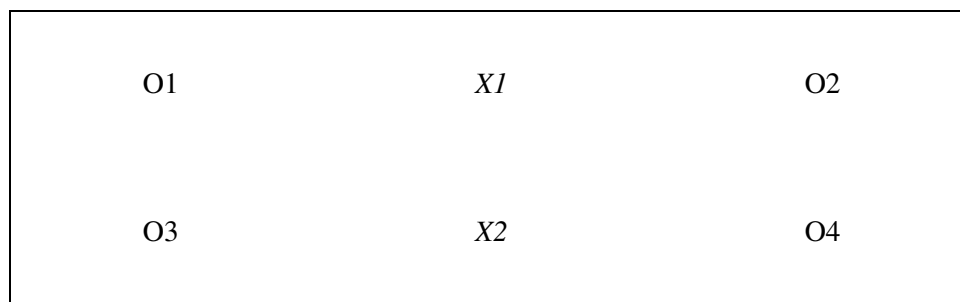


Figure 2. Reserach Desgin

Information :

O1: pre-test in the experimental class

O3: pre-test in the control class

X 1: Treatment in the experimental class using the PBL model

X2: Treatment in the control class without using the PBL model

O2: post-test in the experimental class

O4: post-test in the control class

The data collection technique uses multiple choice questions totaling 25 questions on employment material, with a Cronbach's Alpha reliability value of 0.729. Next, the data was analyzed using descriptive statistics and inferential statistics.

## RESULTS AND DISCUSSION

### Data Processing Results

The results of data processing with the help of SPSS 24 show the results of student learning outcomes tests in the experimental class using the Problem Based Learning model with 25 questions. The scores obtained by students in the experimental class and control class calculating the average pre-test, post-test and n-gain are:

**Table 2. Average score results**

Class	Stundent Total	Average score		
		Pre-test	Post-test	N-Gain
Experimental	68	35,65	83,59	0,751
Control	68	42,12	80,71	0,659

Source : Primary Data (2023)

Table 2 shows that there was an increase in the average score from pre-test to post-test with a difference of 47.94 point in experimental class as well as the normalized average gain in the experimental class in the high category because the results obtained from the calculation process were  $0.751 > 0.70$ . And increase in the average score from pre-test to post-test with a difference of 38.59 points, as well as the normalized average gain in the experimental class in the low category because the results obtained from the calculation process were  $0.659 > 0.70$ .

The data obtained were subjected to prerequisite analysis tests in the form of normality tests and homogeneity tests. The normality test aims to find out whether the pre-test and post-test results in the experimental class and control class are normally distributed or not. The existing results show that the data obtained in this study is normally distributed and significant, as shown by the Kolmogorov-Smirnov normality test with a significance value  $> 0.05$  which is more detailed in table 3 below:

**Table 3. Normality Test Results**

Class Type	Test Type	Mean	SD	Sig
Experimental	<i>Pre-test</i>	35,65	13,68	0,200
	<i>Post-test</i>	83,59	11,38	0,179
Control	<i>Pre-test</i>	42,12	15,35	0,200
	<i>Post-test</i>	80,71	9,25	0,200

Source : Primary Data (2023)

Homogeneity test is carried out to determine the level of homogeneity of the existing data. The test criteria are if the significance is  $> 0.05$  then the data is homogeneous and if the significance is  $< 0.05$  then the data is not homogeneous. The results of the homogeneity test in the experimental class and control class are as follows:

**Table 4. Homogeneity Test Results**

Test Type	Levene Statistik	df 1	df 2	Sig.
<i>Pre-test</i>	1,954	1	134	0,164
<i>Post-test</i>	3,851	1	134	0,052

Source : Primary Data (2023)

Table 4. shows that the significance value in the Levene Statistics homogeneity test is  $> 0.05$  so that the existing data is homegene, both for pre-test data and post-test data.

## Hypothesis Test Results

**H 1: There are differences in student learning outcomes who use the Problem Based Learning model before and after treatment in the experimental class.**

The data shows an increase in pre-test and post-test results in the experimental class from 35.65 to 83.59. These data show that there are differences in student learning outcomes who use the Problem Based Learning model in Economics courses.

**Table 5. Experimental Class Hypothesis Test Results**

<i>Paired Sample Test</i>					
Test Varian	N	Mean	T	Df	Sig (2-tailed)
Pre-test	68	35,65	29,719	67	0,000
Post-test	68	83,59			

Source : Primary Data (2023)

Table 5. shows an increase in scores from the pre-test to the post-test so that the use of the Problem Based Learning model can improve student learning outcomes. This is supported by the data shown by the significance data, namely  $0.000 < 0.005$ , so  $H_0$  is rejected and  $H_a$  is accepted. This means that there are differences in student learning outcomes in experimental classes that use the Problem Based Learning model before and after treatment.

**H 2: There is a difference in the increase in student learning outcomes in the control class which uses conventional learning models before and after treatment**

The data shows an increase in pre-test and post-test results in the experimental class from 42,12 to 80,71. These data show that there are differences in student learning outcomes on control class in economic courses.

**Table 6. Control Class Hypothesis Test Results**

<i>Paired Sample Test</i>					
Test Varian	N	Mean	T	Df	Sig (2-tailed)
Pre-test	68	42,12	22,341	67	0,000
Post-test	68	80,71			

Source : Primary Data (2023)

Table 6. shows that there is an increase in the average pre-test score of 42.12 to the post-test score of 80.71. This increase shows that the use of conventional models can improve student learning outcomes. This is supported by the data shown by the significance data  $0.000 < 0.05$ , so  $H_0$  is rejected and  $H_a$  is accepted. This means that there are differences in student learning outcomes in the control class before and after treatment.

**H 3 : There is a difference in improving student learning outcomes in the experimental class which uses the Problem Based Learning model and students in the control class which uses the conventional learning model after treatment.**

The N-gain for the experimental class which uses the Problem Based Learning model and the control class which uses the conventional learning model shows that the N-gain of the experimental class reaches 0.751 which means that the normalized gain value is high ( $g > 0.70$ ), while for the N-gain the control class reached 0.659 which means that the normalized gain value is moderate ( $g < 0.70$ ). The data from this image shows that learning using the Problem Based Learning model can improve student learning outcomes in Economics courses.

**Table 7. Experimental Class and Control Class Hypothesis Test Results**

Test Type	N	Mean	T	Sig (2-tailed)
N-Gain : Experimental Class	68	0,751	3,177	0,002
N-Gain : Control Class	68	0,659		

Source : Primary Data (2023)

Table 7. shows that the t value is 3.177 with a significance value (Sig) of  $0.002 < 0.05$ , so  $H_0$  is rejected and  $H_a$  is accepted. This means that there is a difference in the increase in student learning outcomes in the experimental class which uses the Problem Based Learning model and students who use the conventional learning model after treatment.

## Discussion

### Experimental class student learning outcomes : Problem Based Learning

Based on research results, there are differences in student learning outcomes who use the Problem Based Learning learning model before and after treatment in the experimental class. The average increase in pre-test scores and post-test scores was from 35.65 to 83.59. The results of the hypothesis test stated that  $H_a$  was accepted, meaning that there were differences in the learning outcomes of students who used the Problem Based Learning learning model before and after treatment in the experimental class. In practice, before treatment is carried out by researchers, teachers teach using conventional learning models. H. Sartika et al. (2018) the most visible situation of the conventional learning model is that students easily feel bored and have difficulty absorbing the material when listening to lessons delivered by the teacher because in its implementation, the conventional learning process is only teacher-centered learning. Yuliani & Rahman (2022) teacher-centered learning which is one-way in the learning process, is monotonous so that students often feel bored during the learning process. To reduce this feeling of boredom, a model is needed that is able to overcome deficiencies in the learning process.

The Problem Based Learning learning model is believed to be able to anticipate situations like this, Surtikawati et al. (2022) through the Problem-Based Learning learning model the learning process will be more realistic and able to create an educational method that emphasizes the real world, and is able to create high-level thinking skills, as well as improve group and communication skills through problem-based learning. This is also proven from the results of tests carried out where students can improve their learning outcomes. On the other hand, in the application of conventional learning models, generally learning only focuses on the teacher explaining in front of the class with little participation from students in the class. Apart from that, the conventional learning model does not stimulate students to look for facts related to the material, because in the conventional learning model, students are only positioned as recipients of information and are not actively involved in reconstructing their understanding. However, on the other hand, economics lessons are lessons that are closely related to social life or everyday life that students often do and encounter.

The Problem Based Learning learning model is more effective in improving learning outcomes because the Problem Based Learning learning model is a learning process based on real problems found in everyday life. In line with Caesariani (2018) Problem-Based Learning (PBL) is a learning model or approach, in which students are faced with a problem from the start, with the aim of compiling their own knowledge. With this, students will find it easier to understand and establish the knowledge provided by the teacher. The Problem Based Learning learning model is one of the right ways to renew the use of conventional learning models in the classroom where this learning model can foster collaboration with other students. Apart from that, the connection with real problems will help students process the lesson material and also build good cooperation as a group.

This is shown by the average post-test score achieved by the experimental class, which reached 83.59, which means that the increase in learning outcomes achieved by the experimental class after implementing the Problem Based Learning learning model was relatively high, namely with an N-Gain of 0.751 ( $g > 0.751$ ). The results obtained through this test show that the Problem Based Learning model can improve student learning outcomes. This is in line with the results of previous research (Darta, 2020) after carrying out actions using the Problem Based Learning (PBL) model, there was an increase in students' ability to work on questions. The reserach Yuliani & Rahman (2022) the application of the problem based learning model to improve student learning outcomes with research results showing an increase in the average value of learning outcomes. Anggraini et al. (2020) improving cognitive learning outcomes through problem based learning in class Increased completeness of cognitive learning outcomes by 85% and has met the success indicator, namely 80%. Nasution (2018) the Problem Based Learning learning model can increase learning outcomes by 44.05%, and Sari et al.

(2019) there is an increase in student learning outcomes by 14.29% in application of the Problem Based Learning Model.

### **Control class student learning outcomes : Convesnional Learning Model**

Based on research results, there are differences in the learning outcomes of students who use conventional learning models before and after treatment in the control class. The average increase in pre-test scores and post-test scores was from 42.12 to 80.71. The pre-test is carried out at the first meeting before the learning process using the conventional learning model begins. Then, at the next meeting, the learning process was carried out using a conventional learning model. The conventional learning model here means the learning model that is usually or mostly used by teachers in schools. The conventional model that is usually used is the lecture method accompanied by explanations and distribution of tasks and exercises. Where the learning process is more teacher-centred. Zahrawati (2020) hat the conventional model which uses the lecture method makes students passive recipients and this has the effect that most students do not pay attention to the material taught by the teacher. This makes the learning process less effective.

Jafar & Pre (2021) using inappropriate teaching methods will result in a less than optimal impact on student learning outcomes. Pratama (2019), in the learning process that uses the lecture method and does not use interesting learning media, students become bored, bored and tend to be busy with themselves. After implementing the conventional learning model for several meetings, at the last meeting a post-test was carried out to measure the increase in student learning outcomes in improving learning outcomes in the Economics subject. Even though the learning process between the experimental class and the control class was different, the learning outcomes for control class students also increased, although the increase was not significant. This is in line with previous research conducted by Jafar (2021: 198), research results show that there is no significant difference in learning outcomes between student learning outcomes before implementing the conventional learning model and after implementing the conventional learning model using the lecture method (Moust et al., 2019).

The average post-test value achieved was 80.71, with the average N-Gain value in the control class being 0.659 ( $g < 0.70$ ) having a medium normalized gain value. This is proven by the results of the third hypothesis test which states that  $H_a$  is accepted, meaning that there are differences in the learning outcomes of students who use conventional learning models before and after treatment in the control class. Devita & Budiyanto (2022) the conventional model has a positive effect on students even though the results obtained are not very significant. Latief (2016) the application of conventional models does not have a significant influence compared to contextual learning models. Tan (2021) comparison of models using the Problem Based Learning learning model with conventional models has significant differences where the conventional model has lower improvements than the Problem Based Learning model.

### **Student Learning Results in the Experimental Class and Control Class**

Based on research results the average gain in the experimental group using the Problem Based Learning learning model was 0.751. The average gain in the experimental class was higher than the average gain in the control class which only reached 0.659. This indicates that the Problem Based Learning learning model tends to be more effective than conventional learning models in improving student learning outcomes in Economics subjects. Supriatna (2020) there was an increase in learning outcomes, teacher and student activities, teacher abilities in managing learning, and good student responses to the application of the problem based learning (PBL) learning model. The Problem Based Learning learning model is more effective in improving student learning outcomes because this learning model aims to make students able to think to solve a problem, where in solving a problem of course they have to look for the right solutions to find a way out of the problem. To find a solution, of course there needs to be new ideas that require students to be able to think. Nafiah (2014) stated, the Problem Based Learning model trains students to think critically to solve problems. Through this model, students are able to train themselves in identifying, analyzing, solving by thinking critically and then drawing conclusions. These activities ultimately have an impact on improving student learning outcomes.

This condition is in contrast to the learning process in the control class which uses conventional learning models. In the control class, learning is more centered on the teacher as a source of information, while in the experimental class, each student is actively involved in learning activities. Through the stages in the Problem Based Learning learning model, students become more active because they are required to find solutions to solve existing problems. Hotimah (2020) the Problem Based Learning model is a way of learning by exposing students to a problem/problem to be solved or completed conceptually in learning. The influence of the Problem Based Learning learning model on improving learning outcomes can be seen from the gain scores of the two classes, or from the pre-test and post-test scores of the two classes. If you look at the gain value, it is very clear that the gain in the experimental class is higher than the control class. Meanwhile, if you look at the pre-test and post-test scores for both classes, the effect is very visible, but after being given treatment, the post-test scores in the experimental class are greater than the post-test scores in the control class. This gives a very clear indication that the use of the Problem Based Learning learning model has significantly had a real influence in improving student learning outcomes. Iasha (2018) research results show that the application of the Problem Based Learning model with a scientific approach brings improvements to learning. Surtikawati et al. (2022) the results of her research show that Problem Based Learning is able to bring about improved learning outcomes. Nofziarni et al. (2019) the Problem Based Learning (PBL) model influences learning outcomes with the final conclusion in learning improving learning outcomes with an average score for the experimental class of 82.30.

The conditions that occurred in the experimental class, as explained, did not occur in the control class. In the control class the learning process focuses more on the principle of teacher-centered learning. So that learning is more teacher-centered. Such conditions result in a less conducive classroom atmosphere because students feel bored with the situation that is occurring and this is compounded by students not being actively involved. Ukoh (2012) the habit of students who tend to receive information from their teachers causes the information obtained by students to be limited to what the teacher conveys. Students do not understand the subject matter themselves and take the essence of the material. This has an impact on students' low understanding which causes students. On the other hand, students' lack of activity in the process of searching for information has made students bored in learning which causes them not to focus on getting the knowledge provided by the teacher so that the resulting learning outcomes are not satisfactory enough. In the control class after the post-test was carried out, the increase in students' learning outcomes was still considered low. This can be seen from the post-test scores for the control class which are lower than the experimental class. Conventional learning that is often carried out by teachers is unable to improve student learning outcomes.

This is due to the limited role of students in the learning process. Moreover, in learning Economics, students should not only get material by just listening and then taking notes, but students should get learning experiences that involve students directly. Sartika (2021) many things show that the teacher's role is very important in increasing interest, curiosity, motivation and anything that is considered to improve student learning outcomes during the learning process. Especially the teacher's ability to apply learning models. Situations like this also affect students' conditions, students become comfortable with the conventional learning process provided even though the results do not have a significant effect. This condition occurred in the experimental class when the treatment was given for the first time, many students were still confused with the Problem Based Learning model, although in the end students were slowly able to follow the learning flow with the Problem Based Learning learning model, even in this learning model they could significantly improve student learning outcomes.

## **CONCLUSION**

Students who learn through PBL show a deeper understanding of the subject matter compared to students who use conventional learning methods. The research conducted concluded three points, namely: There are differences in student learning outcomes in experimental classes that use the Problem Based Learning learning model; There are differences in student learning outcomes in the control class which uses conventional learning models; There is a difference in the increase in student learning outcomes in the experimental class which uses the Problem Based Learning learning model and students in the control class which uses the conventional learning model.



This is reflected in higher test and assignment scores. In the PBL model, the teacher's role changes from instructor to facilitator. Teachers support and guide students in the learning process, help them find resources, and provide constructive feedback. This role is critical to the success of PBL implementation. This research can be a reference for teachers in implementing more varied learning models in the classroom, such as using the problem based learning model because based on the research that has been conducted it is able to improve student learning outcomes through problem solving. Apart from that, this learning model is able to familiarize students with being actively involved in learning because student involvement in learning activities is very important in order to support the success of the learning process at school. However, the research carried out is very limited so that future researchers can add varied learning media and cover a wider range of students, not just high school and economics school students.

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