

The Effect of Problem Based Instruction (PBI) Learning Model on Students' Learning Outcomes

Rika Yulia Fitri and Nurdin Bukit

Physics Departement, Faculty of Mathematics and Natural Science
State University of Medan

ABSTRACT

The purpose of this research to know the effect of Problem Based Instruction (PBI) learning model on students' learning outcomes consist of cognitive, affective and psychomotor. The research method was quasi experimental. The population is all students of class X SMA Negeri 2 Kisaran. The results obtained from the observation sheet of affective and psychomotor were good catagory. The testing criterion was accept H_0 if $-0,161 < t' < 0,161$ and refuse H_a in other condition. Here, H_0 was refused because t' is 2.536 and H_a was accepted. So can be concluded that there was the effect of Problem Based Instruction (PBI) learning model on students' outcomes in electrical dynamic topic for class x SMA Negeri 2 Kisaran.

Keywords: problem based instruction; cognitive; affective; psychomotor; student's learning outcomes.

Introduction

Physics study still become a lesson which difficult for most students to obtain good learning outcomes in class. Results of data obtained during Field Training Program in SMAN 2 Kisaran, show that the students average value of X grade for physics class is 69. The students average value are below of standard passing score, even based on the assessment carried out in school, students must master at least basic competence in classical and individual type above or equal to 80.

The low of student's learning outcomes is caused by various factors, one of them is because students are less interested in physics, most students in X grade claimed that they followed lessons of physics only as an obligation. Although there are some students who are able to understand formulas

in physics, but it is still difficult for them to implement these formulas in daily life, so they think that physics is not needed to solve various problems in daily life. Students only write, listen and do the the work in learning proses.

Teacher who teach are usually using conventional model, where students in the compulsory to understand formulas without explaining to students of physics concepts contained there in and its relationship with other subject matter taught in classroom. In addition, the use of media and experiment in learning is also minimal. So students become passive and the teacher more active in the class then the students or called teacher center.

According to the *Human Development Report 2003* (Manalu, E.L:2011) version UNDP, the rank of HDI (*Human Development Index*)

or the quality of human resources in Indonesia is in the rank of 112, than Filipina is in the rank of 85, Thailand in the rank of 74, Malaysia in the rank of 58, Brunei in the rank of 31, South Korea in the rank of 30 and Singapore was ranked 28. Given this reality means that there must be addressed within the Indonesian human resource. One affects of the low human resource factor is education. The education system in Indonesia is considered not capable of producing human resources ready to compete with universe. So there should be reforms in education.

If the facts above considered to be related to the teaching-learning process in schools that had been impressed monotonous. In addition, the learning process that occurs not maximize the potential of students in physical or psychological. During this time the students think that learning is boring. Especially for a physics because physics famous with numbers and formulas. Teaching in schools usually discuss the theory from the handbook, then given some formulas and problems. By using this kind of teaching, the students feel bored and lazy to learn. In addition, the work that attempt by the government to increase the educational quality are: changing the curriculum, improving the educational facilities, using models, increasing the quality and quantity of textbooks and preparing the professional educators.

PBI is a learning model that presents problem to students before they construct their knowledge. The problem presented is problem which always experienced by students in their daily live. Through PBI students trained construct their own knowledge, develop problem solving

skills, accustomed in using media, and used to enhance interaction among students of students, so students become independent, more confident and have a great motivation in learning physics. Meanwhile, Ibrahim reveals that the PBI, teachers try to encourage students to have intrinsic motivation (Rusmiyati & Yulianto, 2009:75).

Problem Based Instruction Learning Model

Problem Based Instruction according to Dewey (1938) learning is the interaction between the stimulus to response, a two-way relationship between learning and the environment. Environmental feedback to students in the form of aid and the problems, while the nervous system is functioning brain that help interpret effectively so that the face can be investigated, assessed, analyzed, and be solved properly. Thus, PBI dominates student centered learning from the teacher centered.

Syntax of problem based instruction learning model show in Table 1.1 about the phase and teacher activity in the learning process.

Table 1.1 Syntax of Problem Based Instruction Learning Model

Learning Phases	Teacher Activity
Phase 1 Orientation of students to the problem	Teacher explains the purpose of learning, describes the logistics required, motivating students engage in problem solving activities selected.
Phase 2 Organizing students to learn	Teachers helping the students to learn and organize the tasks related to the problem.
Phase 3 Group investigation	Teachers encourage students to collect appropriate information, carry out experiments, to get an explanation and problem solving.
Phase 4 Develop and presents the work	Teacher help the students in planning and preparing the appropriate work such as reports, videos, and models, which help them to share tasks with friends.
Phase 5 Analyze and evaluate process solution problem	Teachers help students to reflect on or evaluation of their investigation and the processes they use.

The research conducted at SMA Negeri 2 Kisaran in second semester at class X on academic year 2012/2013, located on Jln. Lasitarda. Population are all students of class X consist of 6 classes. Sampling

technique in this research use cluster random sampling. This technique provide the same chance for every part of population to be selected into sample. Randomly selected sample and obtained two classes that used as experiment and control class. From the result of random selection, so X3 class consist of 31 students choosed as experiment class and X1 class consist of 31 students as control class.

This study was designed to use "design two group pretest-postest" involving two classes designated as experimental class and control class as a Table 1.2.

Table 1.2 The Design of Experiment

Group	Initial Test	Treatment	Final test
Experiment class	T ₁	X ₁	T ₂
Control Class	T ₁	X ₂	T ₂

Note :

T₁= Pretest

T₂= Postest

X₁=Teaching with problem based instruction model

X₂=Teaching with conventional learning

Data from the normality test show the both of samples were normal distribution using Liliefors test. The homogeneity test to know the sample get from the homogeneous population and the both of class were homogeneous.

Hypothesis test using t test with the formula:

$$t = \frac{\bar{x}_1 - \bar{x}_2}{S \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

With standard deviation of the combined two class.

$$S^2 = \frac{(n_1 - 1)S_1^2 + (n_2 - 1)S_2^2}{n_1 + n_2 - 2}$$

Where:

- t = t price calculation
- \bar{X}_1 = Average experimental student's grade
- \bar{X}_2 = Average control student's grade
- s = Standard deviation of the combined two class
- S^2 = Variance of the combined two class
- n_1 = Number of samples of an experimental class
- n_2 = Number of samples of an control class

Where $t_{1-1/2 \alpha}$ obtained from the t distribution list by $dk = (n_1 + n_2 - 2)$ and opportunities $(1-1/2 \alpha)$. For the price of other t, H_0 is rejected.

Result and Discussion

The data obtained in this research is the score of students learning outcomes in electrical dynamic material semester II class X SMA Negeri 2 Kisaran. Before giving treatment to students, the first is giving pretest to know the initial ability of student without influenced by learning model that will used, where the total of student in X3 as experiment class is 31 students and X1 as control class is 31 students.

Data of pretest students show in the Figure 1.1.

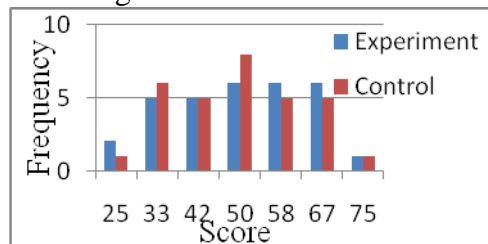


Figure 1.1 Data of Pretest

Data of posttest student show in the Figure 1.2.

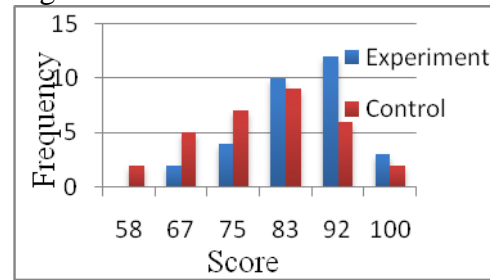


Figure 1.2 Data of Posttest

The affective and psychomotor learning outcomes show the average of the students was good category.

Normality test conducted to know if the sample is normally distributed or not. The testing of data normality using Liliefors test, obtained that the pretest score in concept mastery and critical thinking skill has the normal data or $L_{count} < L_{table}$ at significant level is 0.05, $N_1 = 31$ and $N_2 = 31$. The result of normality test for pretest as experiment was $L_{count}=0.1107$ and control class was $L_{count}=0.1292$. $L_{table}=0.1591$ to both of classes. Because $L_{count} < L_{table}$ show the normal distribution.

Homogeneity testing using F-test to know whether the sample group comes from a homogeneous population or not. Based on the calculations, indicating that pretest data of both class is homogen. For more information, the calculation of the homogeneity test for students learning outcomes listed in $F_{count}=1.14$ and $F_{table}=1.84$. Because $F_{count} < F_{table}$ show the homogeneous sample.

The testing criteria is accept H_0 if t_{count} between $-0,161$ and $0,161$, and rejected H_0 if t has the other score. From the calculation result of students learning outcomes in Table 4.5 obtained $t_{count} = 2.536$, so H_0 is

rejected and H_a is accepted or in other word said that there are significant effect between problem based instruction learning model and konvensional learning to increase the students learning outcomes.

Based on pretest and statistic test, it is known that the effect of students' learning outcomes in electrical dynamic topic using problem based instruction learning model. Based on statistic test of electrical dynamic topic, as whole shows that the average of posttest score between experiment and control class is different. Student who used problem based instruction learning model has a better ability for concept mastery than students who used konvensional learning. The differences is possible because problem based instruction learning model giving a chance for students to learn freely and independence, learn how to make a prediction, sharing or discussion and cooperate in group, and express the opinion. Group learning in classroom teach student to interact socially and it is a important factor that allows the increasing of students learning outcomes. The result of hypothesis test, obtained the conclusion that there was effect of problem based instruction learning model on students' learning outcomes in electrical dynamic topic.

The observation results shown that the steps applied by teacher is accordance with problem based instruction learning steps. Teachers implement the learning accordance with the plan that had been developed. The teachers is active in giving motivation to the students in make predictions and express opinions or ideas. Teachers provide guidance to the students who

have difficulties in practical activities, and answer student questions. From the first meeting to the next activity, the role of teachers is diminishing, where teachers function is more as a facilitator to guide and motivate students so that the learning is student-centered. As a facilitator, the teacher plays a role in providing services to facilitate students in learning activities.

Conclusion

Based on the research result, data analysis, and discussion so can be concluded that : (1) There is effect of problem based instruction learning model on students' learning outcomes in electrical dynamic topic for class X SMA Negeri 2 Kisaran Academic Year 2012/2013. (2) Result of affective domain in experiment class showed that attitudes of students affect to students' learning outcomes, in first meeting is 66 and the second meeting is 76 with good category. (3) Result of psychomotor domain in experiment class showed in first meeting get the average 74 with good category. In second meeting get the average 84 with very good category.

Suggestion

Based on research result and discussion before, researcher give suggestions as follows : (1) Table and seating arrangement of students have to suitable by the characteristics of learning model that used. The position of tables is not impeding mobility of teacher when guiding students groups. Every group consist of five or six students. (2) Reasechers must be understand of problem based instruction learning model and prepare all of facilities that used specially in time

management. (3) For researcher who wants to investigate further more about Problem Based Instruction (PBI) learning model should pay more attention to the weaknesses of this learning model to obtain better results. (4) For the next reseacer should be make the good indicator to observe psychomotor domain. (5) For the next reacher should be observe both of class, there are consist of experiment and control class.

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