

# *The Effect of Model Problem Based Learning of Learning Outcomes Student Course on Animal Ecology Based on Learning Styles*

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**Abstract** – This study aimed to determine the effect of learning model of problem based learning the learning outcomes of students in the subject of animal ecology in terms of learning styles.

The research is a quasi-experimental research, with a simple factorial design 3 x 2. The population in this study was all students who take courses in animal ecology in the academic year 2016/2017. Samples of this study using two groups of samples, the experimental class students are taught by a model student pbl and control classes taught by conventional models. This research instrument using learning style questionnaire and tests. The data analysis technique consists of a description of the data, the test requirements analysis, and hypothesis testing.

The results showed that the learning outcomes of students who attend the learning model pbl higher than conventional models, the learning outcomes of students who have learning styles of visual, auditory, and kinesthetic modeled pbl higher than conventional models, and there is no interaction between learning models and styles learning to student results.

**Keywords** – Guided Inquiry; Student Learning Style (Visual, Auditory, Kinesthetic); Student Outcome (Cognitive).

## I. INTRODUCTION

Education is an important component for the growth and survival of a nation. According to the Law of the Republic of Indonesia No. 20 In 2003, education is a conscious and deliberate effort to create an atmosphere of learning and learning so that students are actively developing the potential for him to have the strength of religious, self-control, personality, intelligence, and skills needed for themselves and society.

Learning biology is one area of knowledge learned in college education unit. Biology is the study that contains the facts, concepts, theories, and principles. One branch of biological science learned in college is animal ecology. Animal Ecology examines the relationship between the animal to the environment, including humans. The fact that we often encounter today is a good environmental quality diminishing the quality of water, soil, or air. One reason is

due to the irresponsible man. Through animal ecology courses, students are expected to be able to face and solve problems encountered in the future.

Based on interviews with one of the professors who teach animal ecology in mind that the test results are still lower mid-semester, students in the academic year 2016/2017. A science class had a mean of 69.42 and a high school science class b has an average 74.22. In addition he said, pembeajaran process tends to run in one direction and is merely providing information. Students are categorized rarely get to experience learning through learning by doing.

Lecturer acts as a facilitator, mediator, and counselors (Sardiman, 2004). Lecturer plays an important role in designing and designing lesson plans in order to create a learning environment that is able to enhance the activity of students. Through the implementation of the latest curriculum, one learning model that can generate liveliness

student is problem based learning shortened by PBL. Based on research conducted by Hidema (2015) revealed that student activity can be enhanced using PBL models. This model can stimulate students to discover and construct their own real problems given so as to push for creativity in finding new concepts or ideas.

This model also provides an opportunity to students to reason and think critically and creatively. The concept gained more meaning to his understanding increased. In addition, this model also can improve communication skills, especially the ability to express opinions.

Another factor affecting the outcome of learning is learning style (Fajriati, 2015). Learning style combination of absorbing, organize, and process information. Each student has his own way of absorbing information (Prashing, 2007). Recognizing students' learning styles can determine the most effective way of learning. Learning styles can be divided into three, namely visual, auditory, and kinesthetic (DePotter, 2012). Based on the research that has been done by Fajriati (2015) explains that learning styles to improve learning outcomes of students in biology class XI SMAN 7 Padang.

Based on the above problems, it has carried out research with the title "The Effect of Learning Model Problem Based Learning Against Student Learning Outcomes On Animal Ecology Courses Seen From Learning Styles".

## II. REVIEW OF LITERATURE

### 2.1 Problem Based Learning

PBL model or a problem-based learning instructional model designed to solve the problems presented. According Arends (2008: 41), PBL is an instructional model that serves a variety of problematic situations authentic and meaningful to the students, which can serve as a springboard for investigation and inquiry. PBL helps students to develop critical thinking skills and problem solving skills.

Warsono and Hariyanto (2012: 150) states that the syntax of PBL are as follows.

#### a. Orientation of students to the problems,

Teacher explains the purpose of learning outlining the need for logistics (materials and equipment) required for solving the problem, motivate learners to engage in problem-solving activities that have been learners with the teachers, as well as handpicked by learners.

#### b. Defining the problem and organize students to learn.

Teachers' help learners define and organize the tasks learners in learning to solve an issue, determine the theme, schedules, tasks, and others.

#### c. Forge independent investigation and investigation group

Teachers motivate learners to make a hypothesis, collect information, and relevant to the task of solving the problem, conducting experiments to obtain information and problem solving.

#### d. Develop and present the work.

Teacher helps learners in planning and preparing the work of various tasks with friends in the group and others, and then learners present the work as evidence of problem solving.

#### e. Reflection and ratings

Teacher guide learners to reflect understand the strengths and weaknesses of their report, noting in memory of grains or important concepts related to troubleshooting, analyze and assess the processes and outcomes of the investigation of the problem. Furthermore, teachers prepare for further investigation related to the results of problem solving.

### 2.2 Conventional Method

According to Hawadi (2012: 53) conventional method is a method that has existed since the existence of education, so this method is more often used in every learning and known as traditional methods, correspondingly, Lecture method is a method that may be said as a traditional method. Because, since the first method has been used as a traditional tool. Because, since the first method has been used as a means of oral communication between teachers and students in interaction

### 2.3 Student Learning Style

According to Deporter & Hernacki in his book Quantum Learning (2002), in general human learning styles are divided into three major groups, namely visual learning styles, auditory learning styles and kinesthetic learning styles:

#### 2.3.1 Visual Learning Style

According to Deporter & Hernacki (2002), in general the human learning style is divided into three major groups, namely visual learning style, auditory learning style and kinesthetic learning style. People with visual learning styles

like to follow illustrations, read instructions, and observe pictures, review events directly, and so on. This is very influential on the selection of methods and learning media that dominantly activate the senses of sight (eye). Visual learning style is the style of learning by looking so that the eye is very important role. Visual learning style is done by someone to get information such as seeing pictures, diagrams, maps, posters, graphs, and so on. Can also view text data such as text and letters. A visual type will quickly learn the materials presented in writing, charts, graphics, and images. Anyway it is easy to learn the lesson material that can be seen with the sighting tool. Conversely, it is difficult to learn when faced with the form of sound, or movement. From some understanding above can be inferred that people who use visual learning style to obtain information by utilizing the means of the sense of the eye. People with visual learning styles like to follow illustrations, read instructions, and observe pictures, review events directly, and so on.

**2.3.2 Auditory Learning Styles**

Auditory learning style is learning style by listening. People with this learning style, more dominant in using the sense of hearing to do learning activities. In other words, it is easy to learn, easy to capture stimulus or stimulation when through the sense of hearing (ear). People with auditory learning styles have power in their ability to hear.

**2.3.4 Kinesthetic learning style**

Kinesthetic learning style is the learning style by moving, working, and touching. The point is learning by prioritizing the sense of taste and physical movements. Students with this learning style are easier to grasp when they move, feel, or take action. For example, he only understands the subtle meaning when his sense of taste has felt a subtle object.

**2.4 Cognitive competence**

Cognitive competence is a competency that includes mental activity (brain). According to Bloom, all efforts concerning brain activity are included in cognitive competence. The cognitive domain is a domain that includes mental activity. Cognitive competence reflects the scientific concepts that students must achieve through teaching and learning. Knowledge (cognitive) is the mastery of students to a material, meaning that students are able to absorb the meaning of the material being studied. According Arikunto (2013), mastery is not just remembering what ever learned but also involves various mental activities so that is dynamic.

**III. METHODS**

The research is a quasi-experimental research. This method was chosen because it is not possible to perform total control (Setyosari, 2010). This study uses two classes, experimental and control classes. Experimental class is a class that taught using PBL learning model while in grade control using conventional learning models.

The study population was the entire class taking courses in animal ecology odd semester in the academic year 2017/2018. The population consisted of three classes. The sample consisted of two classes are taken by purposive sampling, which is based on particular characteristics with mempertimbang-kan average value is almost the same class taught by the same faculty as well. Measures of sampling are as follows:

- a. Querying class taking courses in animal ecology 2017/2018 school year.
- b. Define two classes taught by an instructor samples the same in order to obtain two classes, namely class A and Science B of the three classes taking courses in animal ecology.
- c. Determining the experimental class and control class in the lottery so that the selected class is a class science experiment A and Sciences class B as a control.

**IV. RESULTS AND DISCUSSION**

**1. Data Description**

The data obtained in this study a student learning outcomes in the cognitive domain. Data learning outcomes in this study was obtained through the final test in the form of a written test in the form of questions given to students describing the experimental class and control class at the end of the meeting. Data student results are presented in Table 1.

Table 1. Description of Student Learning Outcomes

Class	N	$\bar{X}$	$X_{max}$	$X_{min}$	Standard Deviation
Experiment	25	88.72	96	86	3.04
Control	25	78.86	88	72	5.12

Based on the analysis of data the above in mind that the average student learning outcomes in experimental class is higher than the control class. Maximum and minimum values obtained experimental class students also higher than the control class. The standard deviation of the control class to spread more diffuse than the experimental class.

2. Testing Requirements Analysis

a. Normality Test

Normality test is conducted on the learning outcomes of students in the experimental class and control class. Normality test is done by using test *Lilliefors* with *Microsoft Excel*. Data considered normal if the value of  $L_{count} < L_{tables}$ . Results of normality test experimental class and control class can be seen in Table 2.

Table 2. Experiment Class Data Normality Test and control classes.

Class	N	$L_{count}$	$L_{Table}$	Conclusion
Experiments	25	0.031	0.173	Normal
Control	25	0.082	0.173	Normal

Based on that data, it is known that the data results of student learning in the experimental class and control class overall normal distribution for the value of  $L_{count} < L_{tables}$ .

b. Homogeneity testing

Homogeneity test is done to see ability variance kesamaan students in the experimental class and control class. Homogeneity test data using test *Levene* with *Microsoft Excel*. Data considered homogeneous if the value of  $F_{arithmetic} < F_{table}$ . Results of homogeneity test experimental and control class data can be seen in Table 3.

Table 3. Test Data Homogeneity experimental class and control class

Class	$F_{count}$	$F_{table}$	Conclusion
$B_1$ and $B_2$	0,030	0.50	Homogeneous

According to the table above, note that the value of  $F_{arithmetic} < F_{table}$ . In conclusion the data experimental class and control class has a homogeneous variance.

3. Hypothesis

The purpose of this hypothesis is to determine whether the results of student learning in experimental class are higher than the control class. The formulation of the hypothesis is as follows.

$H_0$  : student learning outcomes in the class experimental equal or lower than the control class.

$H_1$  : The results of student learning in class experimental is higher than control class.

With the following test criteria.

If the value of  $t_{count} > t_{table}$ , then  $H_0$  is rejected  
 if the value of  $t_{count} < t_{table}$ , then  $H_0$  accepted

Hypothesis test calculation summary is presented in Table 4.

Table 4. Results of the calculations first hypothesis

Statistics	Student Learning Outcomes	
	Experiment Class	Control Class
Sample	25	25
Average	88.43	78.53
Variance	7.32	24.44
df	46	
t	8,60	
$t_{table}$	2.01	
Conclusion	in contrast significantly	

Based on test results first hypothesis is known that the value of  $t > t_{table}$  means that  $H_0$  is rejected, the conclusion shows that the experimental class student results higher than the results of student learning in the classroom control. So the experimental class students are taught by PBL models have better learning outcomes than students of the control class taught by conventional models.

V. DISCUSSION

Based on the statistical analysis of hypothesis testing showed that the average student learning outcomes are taught using PBL models higher than the results of student learning taught using conventional models. This happens because the PBL learning model can respond to the development of students in each set of learning, so that students understand what they already know and what they need to learn. Lecturers can stimulate students to learn well and enables students to solve problems that are around them.

Defining the problem in steps of PBL, lecturer acts as a facilitator and motivator scenario convey to students so that all group members to express their opinions, ideas, and responses to the scenario freely so it is possible to appear a wide range of alternative opinion (Desi, 2013). Based on the fact the field using PBL models made for students *self-learning* who can clarify the issues that are being investigated. Sources referred to in the form of articles written that are stored in the library, web page, or a scientific journal. Stage of the investigation has two main objectives: 1) that the students search for information and develop an understanding relevant to the issues discussed in class, and 2) the information is collected for one purpose that is presented to the class and such information must be relevant and understandable.

PBL learning model makes the students more active and enthusiasm in participating in the learning process. This is because the model of PBL includes a process that involves an investigation which enables them to interpret and explain real-world phenomena and to build understanding of the phenomena that occur around them. Through this process, students can learn with the best performance and create a fun learning environment.

When the implementation of PBL learning model, students do a group discussion on the issues presented in the Student Discussion Sheets and find solutions to these problems and give each other feedback. Students are also free to communicate their opinions because they are given the opportunity to present the results of their group discussions.

Learning activities in groups will make students realize that he has advantages and disadvantages, so that students who have excess will help colleagues who have flaws. Students who have a deficiency will learn from peers who have excess without any sense of inferiority (Djamarah, 2006). Furthermore, Nora (2012) explains that the students will begin to identify the problems on the discussion sheet, find the concept of the problem, and to prepare for the group's work presented to the class.

Learning to use the model PBL intended that each student can learn the best ways and discover new knowledge by linking the material being studied with the problems that occur around. While the conventional model puts students as passive recipients of information. Delivery of content is done through lectures, assignments, and debriefing activities. Unlike the experimental class, debriefing conducted in the control class is answering questions about the material being discussed. The purpose of this is to check the student's understanding of the material that has just delivered.

The conventional model is a learning-oriented faculty, in which almost all the learning activities are controlled by the lecturer. Student the opportunity to contribute to the knowledge, skills and attitudes as a result of learning is very limited (Zahara, 2001). This was seen at the time of the study, the students taught by conventional pembelajaran models tend to be passive. Lecturers explain the material followed by a presentation from a predetermined group to present learning materials and followed by discussions. Students lacked the initiative to communicate with her to discuss matters relating to the material being discussed.

The results obtained showed that the learning outcomes by using a model of PBL higher than the result of learning by

using conventional models. In accordance with that proposed by Dimiyati (2006) that the learning outcomes are the result of an interaction act of learning and teaching from the lecturer acts ends with the evaluation of learning outcomes, in terms of student learning outcomes is the end of the base and summit of the learning process. Learning can stimulate each other motivated students to understand the material that has been presented so that students will be able to answer any concerns that are presented, allowing embedded for students to demonstrate a greater ability and made him to be the best. Aziz (2007) found PBL learning model is more directional than the conventional learning models.

Based on the research and opinions of experts, the implementation of PBL learning model can improve student results in animal ecology courses. The average student results after application of PBL teaching model as a whole is higher than the results of student learning taught by conventional learning models. The results support the research conducted by Pathase (2015) found that students beajar results using PBL models are higher than learning model of *discovery* learning.

## VI. CONCLUSION

The conclusion is based on the results of the research are student learning outcomes that follow PBL learning model is higher than the students who attend the learning with conventional models.

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