

The Problem Based Learning Model To Improve The Students' Critical Thinking Ability

Agus Salim¹, Jamaluddin², Harry Soepriyanto³

¹Master Program in Science Education University of Mataram, Indonesia

²Faculty of Teacher Training and Education University of Mataram, Indonesia

Corresponding Author: Agus Salim

Abstract: *The critical thinking ability is one of the high-level thinking ability that must need to have by the students in solving the problems of learning in daily life. The aimed of this study is to determine the effectiveness of problem in based learning model particularly in improving the critical thinking of the student's ability. This study included quasi experiments with pretest-posttest control group design. Respondents of this study were 123 students that divided into two classes, experimental class and control class. To analysis the data, this study utilized the N-Gain test. The results showed that the improvement of the experimental class is much higher than the control class. Therefore, based on the result of the research, it can be concluded that the problem of based learning model was an effective way in improving the critical thinking of the student's ability in the setting of teaching learning process.*

Keyword: *Critical thinking ability, problem learning based model, improve, effective.*

Date of Submission: 03-03-2018

Date of acceptance: 19-03-2018

I. Introduction

The advancement of science and technology in the present day continues to grow along with the increasing needs of human beings. The development of knowledge and technology provides such great benefits but on the one hand makes the problems of life increasingly complex. The development of science and technology in today's demands the ability of high-level thinking, so that human resources must be able to be independent and have problem-solving skills. Natural science especially biology is one of the subjects that study about living things and components of life. Biology is also a science that has a great influence in the life and sustainability of nature. Science and technology are closely related to biology, among others: food industry, health, medicine, agriculture, and environmental management. Given the importance of biological roles, ideally biology teachers should be able to prepare biological learning that can encourage students to address future issues and demands.

The teachers of science especially on Biology teacher should be able to condition learning which invites students to think how to find the suitable concept in doing learning. However, the results of observations at the state of junior high school one of Masbagek, that the use of speech, answer and question, and assignment methods are more often to use in learning of the natural science, as well as learning models that are still conventional, so that learning still appears as a teacher centered, consequently the students less motivated in learning and they have not found yet about the interesting things from the subject matter on the natural science of Biology. Thus, the participation of students in the learning activities in the class becomes low, because they do not only have the opportunity to formulate their own ideas but they also do not trained to courage to express their opinions to others. So this thing has an impact on the low ability of student's critical thinking.

The ability of critical thinking and mastery of the concept of natural science in students can be built with a model of learning that implements multi-directional communication both between students and students with teachers, such learning model is student centered. Learning model that applies student centered one of them is Problem Based Learning. The problem-based learning model is a lesson that is delivered by way of presenting a problem, asking questions, facilitating an investigation, and opening a dialogue. [8] argued that the problem-based learning model presents a discussion of the problem before learning the concepts needed for completion. Some research results suggest that the problem-based learning model influences and can improve learning outcomes, among others: [5] which states that the problem-based learning model has a positive impact in the learning process so as to improve learning outcomes. [2] stated that the implementation of problem based learning positively and significantly influence the critical thinking skills.

Application of PBL (Problem Based Learning) learning model is very important by using contextual approach in order to help teachers hooking subject with real world situation and motivate students make the relationship between knowledge with its application in everyday life [4]. PBL learning is a learning process

based on a contextual problem-solving process that involves high-level thinking skills and more reveals the ability of the cognitive aspect. One of the high-level thinking skills is critical thinking skills, which can be developed primarily in problem-solving processes. The use of authentic contextual problems requires an authentic assessment whose purpose is to assess the learning process, one of which is to recognize the ability of critical thinking skills during the learning process. This is supported by the [4] statement that assessment is instrumental in determining the direction of learning and the quality of education. Facts that occur in the field most of the educators are more interested in using the assessment of paper and pencil tests because they assess quite practical in the sense of not needing energy, cost, and time that much. Conversely, if using the original assessment requires more energy, cost, and time, so educators do not want to use it. Thoughts and behaviors like this can hinder the achievement of quality learning and education. Given still rare use of the original assessment instrument the, particularly in assessing critical thinking skills, the author will try to use the instrument. The use of such instruments does not mean substituting an instrument for assessing critical thinking skills, but rather the use of an original appraisal instrument as a supporting researcher in addition to the test instrument description.

Based on the results of this study, it can be said that, the learning that has potential to improve the ability of critical thinking and mastery of the concept of the students is a model of learning PBL, because this learning model presents to students authentic problem situation and meaningful so that it can provide convenience to students to do your own investigation. Such learning is suitable for improving the ability to think critically to learners, because in the learning students are given problems related to the material being studied, then through that context students are given the opportunity to find concepts and solve problems. Based on the above background, need efforts be made to improve the learning process for students in State Junior High School one of Masbagek. This effort is expected to impact on improving the quality of students that is in the form of improved learning outcomes of students through the application of problem-based learning model

II. Method

The type of research is quasi experiment with the aim to test the effect of certain treatment on the variables under study and under controlled conditions. In this research, problem-based learning model is independent variable, and critical thinking ability is dependent variable. The study was conducted at the 1st junior high school Masbagik year 2017/2018. The study population is all students of class VII of State Junior High School 1 Masbagek amounted to 341 students from 4 classes, namely VII-2, VII-3, VII-4, and VII-5 State Junior High School 1 Masbagek Lesson 2017/2018. Class VII-2 and VII-3 as experimental groups that are taught by PBL learning model. Class VII-4 and class VII-5 as a control group that is taught by conventional learning model that is discussion The sampling technique using simple random sampling is used because population members are considered homogeneous [10]. consideration of the researcher in this case is students get the material based on the same curriculum, students it in the same grade level, the same source book, the age of students is relatively the same, and the placement of students in the class is not based on ranking.

Samples are divided into 2 classes, namely the experimental class amounted to 40 students and control classes as many as 40 students. This study used Pretest-Posttest nonequivalent control group design. The research design that will be used is 2 x 2 factorial design.

	MODEL PBL	PBL (y1)	NON PBL (y2)
A.A			
High(x1)		X1 Y1	X1 Y2
Low (x2)		X2 Y1	X2 Y2

Information:

- PBL : Learning using PBL model (Y1)
- NON PBL : Learning without using of a Non PBL model (Y2)
- X1 : High academic-enabled students
- X2 : Low academic-enabled learners

Based on the above design, the experimental procedure of this study can be described as follows:

	Pretest	treatment	Post-test
T1		X1Y1	T2
T3		X2Y1	T4
T5		X2Y1	T6
T7		X2Y2	T8

Ket:
T_{1,3,5,7} = Pretest

T_{2,4,6,8} = post-test
 X1Y1 = high academic-enabled students that PBL model
 X1Y2 = students with low academic ability that PBL model
 X2Y1 = students with high academic ability that non PBL model
 X2Y2 = academically-enabled students that non PBL model

This research uses pretest-posttest control group design. The experimental class is learning by using problem-based learning model, while the control class does the conventional learning. Data of critical thinking ability, obtained before and after treatment using critical thinking instrument in the form of essay as much as 8 problems. Critical thinking skills in question is the ability to think critically students on the material classification of living things. The preparation of the critical thinking skills instrument follows the critical thinking indicator that is formulating the problem, giving the argument, doing the deduction, doing the induction, doing the evaluation, making the decision and determining the action. The data were analyzed by using N-gain test which was done to find out how much improvement of critical thinking ability of students after being treated. The conclusions of data interpretation results are adjusted to the criteria as in Table 1.

Percentage	Category
N-gain > 70	High
70 > N-gain ≥ 30	Medium
N-gain < 30	Low

III. Result And Discussion

Data processing in this research using Software Statistical Product and Service Solution (SPSS) 16. The processed data is the result of the test of critical thinking ability. scores average score, initial test, and which is normalized gain in the experimental class and control class can be seen in Table 2. Table 2. Average Comparison of Second Class Critical Thinking Skills

Average value	Experiment Class (N = 40)	Control Class (N = 40)
Pretest	24.43	12.38
Posttest	59.20	33.78
<g>	46.01	24.42

Based on the average pretest, posttest, and gain pretest scores normalized in Table 2, it is known that the average pretest score of experimental class students is 24.43, while the average pretest score in the control class is 12.38. Furthermore, based on the average score of experimental class posttest score of 59.20, while the mean score of posttest of control class is 33.78. This shows that the critical thinking ability of students after learning in general has increased where students in the experimental class have better critical thinking ability compared to the students in the control class. Based on these data can be seen existence the improvement of students critical thinking before learning by using PBL model that is at the time of pretest and after learning using PBL model that is at the time of posttest.

Learning activities with PBL have several benefits, namely; 1) improving students' skills in solving problems, 2) easier to remember material 3) improving students understanding, 4) enhancing skills relevant to the world of practice, 5) building leadership and cooperation skills, and 6) proficiency learning and motivating students to develop higher-order thinking skills. [7]. From the data of the research, it can be seen that the model of Problem Based Learning has positive and significant impact on the mastery of the students concept, it is in accordance with the statement of [7] that the learning model of PBL can influence students learning outcomes because students gain knowledge not by remembering but with understand the material Comparison of achievement of mean score of pretest, posttest, and N-gain critical thinking ability of students between experimental class and control class is shown in Figure 1.

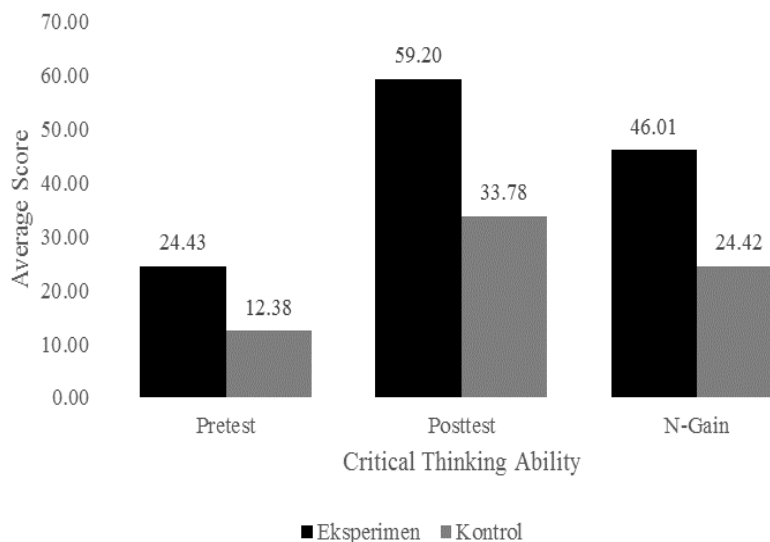


Figure 1. Comparison of Achievement of Average Scores of Second Class Critical Thinking Skills

The improvement of the critical thinking skills of the two classes was analyzed by obtaining the N-gain score presented in Table 2. Based on Table 2, the experimental class obtained a gain score of 46.01 in the medium category, while the control class obtained a gain score of 24.42 with low category. From the data obtained that the gain normalized critical thinking ability experimental class students much higher than the control class, or in other words the critical thinking ability of experimental class students better than the control class.

Learning result interval of students based on the average value can be classified into 5 criteria, that is very less, less, medium, good, very good. Determination of this criterion is obtained from the difference between the highest value with the lowest value and divided by 5 [9]. The interval value with the following criteria:

Table : Interval critical thinking ability

Value	Criteria
86,4 – 93	Very good
79,7 – 86,3	good
73 – 79,6	medium
66,3 – 72,9	less
≤ 66,2	very lass

The success of the enhancement of critical thinking ability is caused by the problem-based problem model used. Where the application of problem-based learning model provides some convenience to students in solving a problem through the assignment of group tasks. The giving of group assignment gives opportunity to students to do collaboration among group friend in solve the problem. This collaboration will bring up various answers each of the students, so that each learner can prepare a more appropriate answer for each issue. In addition, the provision of clues that have been presented in the learner's work sheet can facilitate the students in solving the issues raised, so that students more easily find the answer keys through the stimulus question arranged. The direction of this question is also a bridge of knowledge towards a more definite answer. Because learning is done together, students are fully involved in all learning processes including the process of finding answers to the problems. This result is in line with previous studies conducted by [6]; [7]; and [3] stating that the application of problem-based learning model significantly influence the critical thinking ability of students. So that the problem-based learning model proved better in improving the critical thinking skills of students compared with the class that do the learning conventionally.

Learning Problem Based Learning consists of stages of the learning process that can improve students' critical thinking skills, independence of learners, and work together in groups. This is in line with research from [1] which shows that the implementation of learning with Problem Based Learning model can improve the critical thinking ability which is characterized by the skill of formulating the problem, giving argument, induction, and provide a judgment. Students give positively respont to the application of PBL learning model.

Based on the results of research and some relevant research shows that the model of Problem Based

Learning in learning biology effect on the critical thinking ability of learners. One of the characteristics of This learning is in the form of discussion activities on heterogeneous groups to solve problems

IV. Conclusion

Based on the results of the study can be concluded that the critical thinking ability of students can be improved through the problem-based learning model. Although the problem-based learning model can increase the critical thinking ability of the students, however, the improvement is still relatively low due to the lack of time constraints in the treatment. Therefore, researchers suggest for further researchers to pay more attention to the timeliness that will be used in giving treatment.

Acknowledgements

This article paper can be accomplished with the help of lecturers, mentors and friends.

References

- [1]. Adnyana, G. P. (2008). Improving the Quality of Learning Activities, Critical Thinking Skills, and Understanding the Biology Concept of X-5 Class Senior High School 1 Banjar through the Application of Problem-Based Learning Model. Singaraja: Undiksha
- [2]. Anindyta, P., & Suwarjo, S. 2014. Effect of Problem Based Learning on Critical Thinking Skills and Self-Regulation of Grade V Students. *Prima Journal of Edukasia*, 2 (2), 209-222
- [3]. Ariyanto. 2015. The Influence of Problem Based Learning Learning on Critical Thinking Ability of Grade X Students of Senior High School 6 Surakarta in the academic year 2012/2013. *Journal of Education*, 7 (1), 40-51.
- [4]. Apriyan.I. et al. 2017, Application of PBL Model for Improving Skills Critical thinking in terms of Student's Student Ability, *Guangga*, vol 9, no 1.Hlm.41-54
- [5]. Klegeris, A., & Hurren, H. 2011. Impact of Problem-Based Learning in a Large Classroom Setting: Student Perception and Problem-Solving Skills. *Advances in Physiology Education*, 35 (4), 408-415.
- [6]. Muslim, I., Halim, A., & Safitri, R. 2017. Application of PBL Learning Model to Improve Mastery of Concepts and Skills of Student Critical Thinking on Hooke Elasticity and Law Concept in State Senior High School of Hope Persada. *Journal of Indonesian Science Education*, 3 (2), 35-50.
- [7]. Nadiya, I., & Nadiya, I. 2017. Influence of Problem Based Learning Learning Model (PBL) on Mastery of Student Concept on Nerve System Material. *lib. uinsgd. air conditioning. id*, (1), 1-9.
- [8]. Sani, R. A. 2014. *Scientific Learning for Curriculum Implementation 2013*.
- [9]. Sugiyono. 2009. *Statistics for Research*. Bandung: Alfabeta.
- [10]. Sugiyono, 2014. *Qualitative and R & D Qualitative Research Methods* Bandung: Alfabeta

Agus Salim. "The Problem Based Learning Model To Improve The Students' Critical Thinking Ability." *IOSR Journal of Research & Method in Education (IOSR-JRME)* , vol. 08, no. 02, 2018, pp. 36-40.