

## **The Improvement of Critical Thinking Skill And Concept Mastery Through Problem Based Learning Using The Strategy Of Mind-Map On Ecosystem Lesson**

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**Abstract:** This research aims to improve the concept mastery and critical thinking skill of students on the lesson of ecosystem. The method used in this research was quasi-experimental with Pre-post test only design. This research was conducted at Islamic Senior High School (*Madrasah Aliyah*) in Karawang District. There were total 40 objects in both control and experimental class. The instruments used are essay, multiple choices test, questionnaire, and observation. The result of this research shows that the using of Problem-Based Learning model with Mind-Map strategy has an average score of 80 in concept mastery and 75 in critical thinking skill. The research shows that the N-gain of critical thinking skill in experimental class was 68 (middle criteria), meanwhile the N-gain of concept mastery was 78 (high criteria) and the respond in this class was more enthusiastic. The students' activity in the class after being observed was improved since the students could understand the lesson more properly. This shows that Problem-Based Learning with Ming Map strategy can improve critical thinking skill and concept mastery.

**Key words:** Problem Based Learning, mind map, concept mastery, critical thinking skill.

### **INTRODUCTION**

The education in Indonesia nowadays is developing the new curriculum, namely 2013 curriculum (*K-13*). Based on the rule of Minister of Education and Culture of Republic Indonesia No 5 of 2014 for the level of Senior High School. The curriculum of 2013 is a perfected curriculum of the previous curriculum. This curriculum suits to be used in science subject because this curriculum concerns the learning activity on the students (Student Center), therefore the students become more independent on finding the concepts of the lesson.

Concept mastery is a result of students' learning. The students is expected to be able to master the concepts in every lesson. The reality of the field of the research shows that not all students fully understand the concepts being studied on the subject of Biology. Biology lesson is not only to be read, but also to be

comprehended at the first place, thus the students can fully understand the concepts being taught.

The result of the interview conducted at MA Nihayatul Amal shows that the concepts mastery in biology subject is still under standard of minimum completeness (*KKM*). The *KKM* of Biology subject is 75. The average of total students of each class is 40 students and the percentage of the students passing the standard score was only 20%, meanwhile the remaining 80% are those who couldn't fully understand the ecosystem lesson. This shows that students who still couldn't comprehend the lesson was still far from the percentage of 100%. This fact brought us to the conclusion that interesting teaching model must be applied in the Teaching-Learning process to rise the concepts mastery of the learning.

In addition, the students' critical thinking skill is still low because the teaching-learning process was still teachers centered. Critical thinking skill of the students was still under standard in every lesson. This causes the students not to be able to think deeper in solving problem. The students still think that learning can only be done by listening to teacher's explanation. In the learning process, there were still many students being not active. They were not confident to give opinions and having no enticement to study. Therefore, it is a must to give it an effort to overcome the low concepts mastery and critical thinking skill. Problem-Based Learning model with Mind Map can be applied as an alternative way.

One of the best learning models to be used to give positive stimulus to student in order to enhance critical thinking skill and concept mastery is Problem-Based Learning.

According to Buzan (2013 : 4), Mind Map is the easiest way to absorb information to the brain and to take it out. Mind map can literally arrange our thoughts.

Mind map is a learning model that works by recording the theme given, so that students can find the sub-theme by making the branches from it. This is so influential on the improvement of students' skill in terms of creativity and deep thought.

The use of this learning model completes one to another. The result of students' discussion using problem-based learning model can be outlined with mind map technique, therefore the students can be more interested and understand the concept. As for the researchers' delineation, problem-based learning model is proper to be used in teaching-learning process.

According to Keziah (2010), in her research about problem-based learning, the students' motivation for studying was more improved than that using lecture method.

Meanwhile, according to Kusumaningtias (2013) in her research about problem-based learning, there is the difference between the average scores of students' metacognitive skill being taught using PBL with NHT and the one using conventional learning.

The lesson which will be researched is ecosystem. Ecosystem is a biological community of interacting organism and their physical environment. This lesson suits best for the research. At school, students only knew that ecosystem relates to daily life. But, the students couldn't understand the concepts of ecosystem itself.

## METHOD

The method used in this research was quasi-experimental with pre-post test only design. This design used one group of experimental. The experimental group used problem-based learning model with mind map strategy, meanwhile the control group used discussion.

The sample taken for this research was from two classes; The control and experimental class were from class X of *MA Nihayatul Amal Rawamerta* consists of 40 students of each class. The analysis technique used was Normality Test of *Lilliefors* and Homogeneity Test (F) of Fisher Test.

## RESULT AND DISCUSSION

### Result of the Research

#### 1. Concept Mastery

##### Normality Test

Normality Test aims to examine the data. The test used in processing the data was *Lilliefors*. The normality of the concept mastery can be seen in Table 1.

Table 1. The normality test of the concept mastery Recapitulation

Data	$L_{count}$	$L_{table}$ $\alpha = 0.05$	Explanation
Pre-test of concept mastery in control class	0.133	0.140	Normal
Post-test of concept mastery in control class	0.115	0.140	Normal
Pre-test of concept mastery in experimental class	0.109	0.140	Normal
Post-test of concept mastery in experimental class	0.127	0.140	Normal

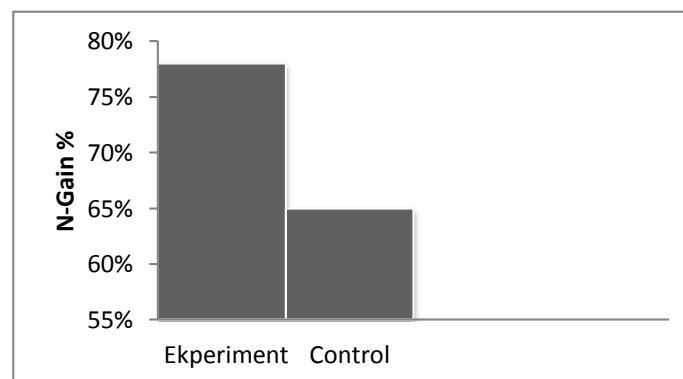
### Homogeneity Test

The calculation of homogeneity test used in this research was fisher test. The data is called homogen if  $F_{count} < F_{table}$ . The  $F_{count}$  of the pre-test was 1,515 and the  $F_{table}$  was 1,704. It shows that the data of pre-test was homogen. Meanwhile, in post-test, the  $F_{count}$  was 1,56 and it was categorized as homogen as well.

### Hypothesis Test

The data being researched was distributed as normal and homogen, so independent test was conducted then for experimental and control class. The result pre-test shows the  $t_{table}$  was 1,665 and  $t_{count}$  was 1,173. It can be clearly seen that  $t_{count} < t_{table}$ . it can be said that  $H_0$  is accepted so that there were no difference between pre and post test. In the post test, the value of  $t_{count}$  was 6,385. The  $t_{count} > t_{table}$ , so  $H_0$  was refused and it shows that there is a difference between experimental and control class.

### N-Gain



Picture 1. Graphic of the average score of N-Gain of Concept Mastery

The result of the research shows that the concept mastery using PBL model with Mind Map strategy is higher that that using discussion learning. As for the difference can be seen on :

## 2. Critical Thinking Skill

### Normality Test

Normality test aims to examine the data. The normality of critical thinking skill can be seen at :

Table 2. The Recapitulation of Normality Test of Critical Thinking Skill

Data	$L_0$	$L_{count}$	Explanation
Pre-test of Critical Thinking Skill of control class	0,100	0,140	Normal
Post-test of Critical Thinking Skill of control class	0,134	0,140	Normal
Pre-test of Critical Thinking Skill of Experimental class	0,117	0,140	Normal
Post-test of Critical Thinking Skill of Experimental class	0,136	0,140	Normal

### Homogeneity Test

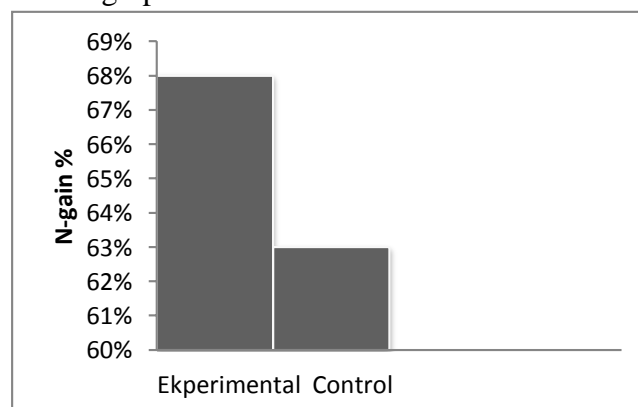
Homogeneity test aims to see the similarity of the data being researched. As for critical thinking skill, in pre-test, the value of  $F_{count}$  was 1,270 and the  $F_{table}$  was 1,704 so it's categorized as homogen. In the post-test, the  $F_{count}$  was 1,56 and it's homogen as well.

### Hypothesis Test

The data being researched was distributed as normal and homogen, so independent test of critical thinking skill was conducted then for experimental and control class. The result of pre-test shows the  $t_{table}$  was 1,665 and  $t_{count}$  was 0,296. It can be clearly seen that  $t_{count} < t_{table}$ . it can be said that  $H_0$  is accepted so that there were no difference between pre and post test. In the post test, the value of  $t_{count}$  was 2,032. The  $t_{count} > t_{table}$ , so  $H_0$  was refused and it shows that there is a difference between experimental and control class.

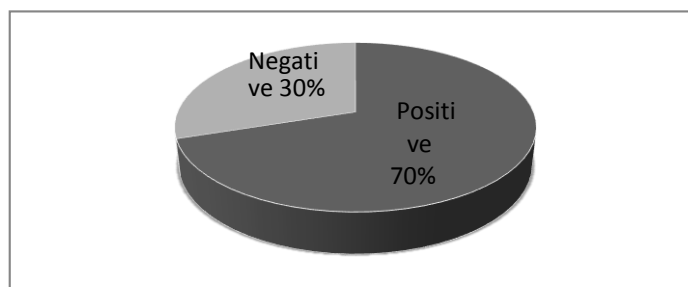
### N-Gain

The difference of critical thinking skill can be seen from the N-Gain. The data can be seen in the graphic below :



Picture 2. The average of N-Gain of critical thinking skill

### **Students' Respond**



Picture 3. Students' Respond toward Teaching-Learning Process

### **Students and Teacher Observation**

The observation was observed by 2 observers. The observation result towards students at the first meeting was 55%, the second meeting was 65% and the third meeting was 70%. Meanwhile, the observation toward teacher at the first meeting was 85%, the second meeting was 95% and the third meeting was 100%.

### **Discussion**

Learning process using Problem-Based Learning model with Mind Map causes different impacts in every lesson. In the first learning process, the students still seemed confused with the using of the model. But, as the time goes by, they can understand it a little more. The students could be more comprehensive since they were demanded to look for the solution of every problem given by the teacher. The result of the research shows that concept mastery using PBL model with mind map in the learning process more improved that that using discussion learning. The picture 1 of concept mastery shows the N-Gain of the experimental class was higher than the control class. Whereas, the picture 2 shows the average of N-Gain of critical thinking skill in experimental class has different result from the control class.

The result of this research is appropriate with Novitasari (2015) who stated that PBL model learning with Mind Map was proven effective as its learning result reached the percentage of 72,98% and it's categorized sufficient. It shows that the using of PBL model with Mind Map is proper to be used in learning process.

From this result, it can be seen that the using of PBL model with Mind Map can really help the learning process. This is because there are a lot of positive impacts appear as the learning process goes on. Those impacts include: the students happened to be more independent and confident to share their opinions. It impacted that students could improve their concept mastery. The research that supports the effectiveness of using this model on improving students' critical thinking skill is conducted by Eldy (2013). He stated on his research that the using

of PBL model can literally improve students' critical thinking skill from 30% up to 60%. The result of the research proves that PBL with Mind Map was effective to improve students' critical thinking skill. The students were no longer answer questions briefly . they could aslo argue to one another. The measurement of students' respond used *likert* scale. The success of learning process can be seen by filling questionnaires. The observers see that the students respond toward the using of PBL model with Mind Map strategy was quite significant and it could help the learning process. The percentage of positive respond was 70% and only 30% showed negative repond toward the learning process conducted.

## **CLOSING**

Based on the result above, it can be concluded that the students' concept mastery using PBL model with Mind Map Strategy is significantly improved. The using of PBL model with Mind Map strategy causes better impacts on students' concept mastery that that using discussion learning. The students' critical thinking skill was aslo significantly improved because of it. In addition, students respond towards the learning process using PBL model with Mind Map was also influential on improving comprehension in the learning process.

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