Application Of Problem Based Learning And Inquiry To Gain Creative Thinking And Mastery Of Concepts

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Abstract — This study aims at determining differences in the ability to think creatively and mastery of concepts of students based on assessment instruments that acquire problem-based learning and inquiry in SMP Negeri 23 Seluma. This research was conducted in February - March 2015. The method used in this study is a quasi-experimental design study is a Pre-Test Post-Test Control Group Design. The sample of the research was three classes of seventh grade, the determination of the experimental class and control class by random sampling technique. Research data collection used the assessment instrument in the form of test mastery of concepts and creative thinking, while data analysis techniques used in the study are using ANOVA (One Way ANOVA). The results show that there were significant differences in the application of problem-based learning, inquiry learning and conventional learning to mastery of concepts of biology on the topic of environment at SMPN 23 Seluma. Problem-based learning model is better than learning model Inquiry with the average ratio amounted to 0.833, on mastery of concepts. Inquiry learning model is better than the conventional learning model with the average ratio amounted to 1.833 on the student's ability to think creatively.

Keywords: Creative Thinking, Problem Based Learning, concept mastery, inquiry.

I. INTRODUCTION

In the process of teaching and learning, teachers have a duty to encourage, guide, and provide learning facilities for students to achieve the goal. Teachers have a responsibility to see everything that happens in the classroom to assist in the development of students. Submission of lesson is just one of many activities in learning as a dynamic process in all phases and processes of student progress, for it needs an effort to improve the quality of learning by changing the teacher's role as an information center to act as a facilitator, mediator, and a friend provide conditions conducive to the construction of knowledge and to improve scientific thinking (Slameto, 2006). The success of a lesson can also be measured by the ability to think and mastery of concept, therefore, the subject matter is clearly to be able to describe the relationship between concepts. A relationship concepts in the subject matter can be described in terms of formulas to solve the problem, charts, posters, pictures, charts, and other forms that can visualize the concept of the subject matter (Dahar, 2005). One of the capabilities that need to be developed to improve thinking skills is creative thinking that aims to develop or find an idea or the results of the original, aesthetic, constructive associated with the view, the concept, the emphasis is on aspects of thinking intuitive and rational, especially in using information and materials to show or explain it with the perspective of original thinkers, (Arnyana, 2006).

In learning innovation as a solution to help the problems in learning in which the student-centered learning is through problem-based learning and inquiry-based learning. This effort is expected to optimize the creative thinking and improve students' mastery of concepts. Other views of inquiry learning according Irwandi (2010), can involve students actively using the process of science and scientific skills and creative abilities as they find answers to the questions posed. Thus, in inquiry learning students are not only required to master the subject matter, but how they can use their potential, students will be able to develop the capacity to think when he can master the subject matter. Inquiry learning is a form of learning-oriented approach to the process. Say so, for students holding a very dominant role in the learning process (Amier, 2010).

In problem-based learning students can foster problem-solving skills, where students act as problem solvers and learning built in the process of thinking, teamwork, communication and exchanging information (Rusman, 2011). Eggen, (2012), explains that the problem based learning can provide
opportunities for students to explore to collect and analyze data to solve the problem, so that students are able to think critically, analytically, systematically and logically in finding alternative solutions masalah. memperoleh something new, manipulating skills and process skills, communication skills, creative skills, and attitudes. According Irwandi (2010), stated that the problem-based learning provides an opportunity to think of empowering learners in the activities of problem solving and decision making in the context of the real world of complex life. Problem-based learning, held by five steps of learning, namely: (1) orient students to the problem, (2) organize students for study, (3) assists independent and group investigation, (4) develop and present artifacts and exhibits), and (5) analyze and Evaluate the problem-solving process.

Biological concept on material management of this environment, studies on prevention and preservation of the environment from pollution, and is directly in student life, environmental issues and pollution need to be overcome, so that the existence of these problems is important for the students are given a problem-based learning and inquiry-second the study looked for a material that has a basic problem that must be solved with each strategy. Thus, learning that is used can improve their understanding of concepts and develop the ability to think creatively. According to (Jalaludin, 2009), the fact the field shows that many students who have difficulty studying biology. This learning difficulties due to the current lack of thinking skills and mastery of concepts of biology students shown by the low learning outcomes of students towards subjects biology.

Student learning outcomes were lower in the subjects of biology, the students of SMP Negeri 23 Seluma, in particular the class VII can be identified as follows: 1) The results of students' mastery of concepts not yet reached the expected target so it needs to be improved. 2) In general, students do not have the ability to develop or add creative ideas to the questions given by the teacher, the students' answer generally tends to focus on the content of the course material that needs to be fostered more creative thinking skills. Biology teachers still dominant conventional learning how to apply, except that the student's ability to absorb the lessons so diverse that retention of material from each of the students to be different. Learning methods are designed teacher has been less attention to it. Susanti (2012), in his research on the influence of problem-based learning and guided inquiry towards mastery of concepts shows that there is significant influence application of problem-based learning, inquiry learning guided and conventional learning to mastery of concepts of biology, and Arnyana (2006), in his research concluded that students who studied Kooperarif strategy with GI, PBL, and inquiry, has the ability to think creatively better than the group of students are are taught by DJ models.

II. METHOD

This research was conducted in February - March 2015. The method used in this study is a quasi-experimental design study is a Pre-Test Post-Test Control Group Design. The sample of the research was three classess of seventh grade, the determination of the experimental class and control class by random sampling technique. Research data collection used the assessment instrument in the form of test mastery of concepts and creative thinking, while data analysis techniques used in the study are using ANOVA (One Way ANOVA).

III. RESULT

Statistical description and preliminary analysis score pretest and posttest results mastery of concepts of biology and creative thinking abilities of students.

<table>
<thead>
<tr>
<th>Sources existence of differences</th>
<th>Number of Squares</th>
<th>Df</th>
<th>mean Squares</th>
<th>F</th>
<th>Sig.</th>
<th>H₀</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>4,422</td>
<td>2</td>
<td>2.211</td>
<td></td>
<td></td>
<td>Accept</td>
</tr>
<tr>
<td>Inter group</td>
<td>148,300</td>
<td>87</td>
<td>1.705</td>
<td>1.297</td>
<td>0.279</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>152,722</td>
<td>89</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

table 1. average scores anava pre-test mastery concept of biology

Seen from result of above, the significant value gained 0.279 greater than 0.05. Means mastery of concept of biology pretest results for the third class there was no difference. To determine the difference in mastery of concept of biology of students in the third class derived from the analysis post-test scores. The results of the analysis are shown in table 2 below:

BE-2
Sources existence of differences | Number of Squares | Df | mean Squares | F | Sig. | H0  
--- | --- | --- | --- | --- | --- | 
Between groups | 64.867 | 2 | 32.433 | | |  
Inter groups | 123.233 | 87 | 1.416 | 22.897 | .000 | Not accepted  
Total | 188.100 | 89 | | | | 

Table 2. Average scores ANOVA post-test mastery of concept of biology

Seen from result of above, the significant value gained 0.000 less than 0.05. Means mastery of concept of biology posttest results for the third class there is a difference. To know learning models that differ significantly in the mastery of concepts of biology, followed by LSD, the calculation results are presented in Table 3 as follows:

Class | Mean difference | Sig. | H0  
--- | --- | --- | ---  
PBL | | |  
Inkuri | .833 | .008 | Not accepted  
Konvensional | 2.067 | .000 | Not accepted  
Inkuri | | |  
PBL | -.833 | .008 | Not accepted  
Konvensional | 1.233 | .000 | Not accepted  
PBL | | |  
Inkuri | 1.233 | .000 | Not accepted  
Konvensional | -2.067 | .000 | Not accepted  

Table 3. Test scores LSD post-test mastery concept of biology

From Table 3, the results of post hoc test for mastery of concepts in PBL, Inquiry and conventional. If sig is smaller than 0.05 means that there is a difference. PBL models with inquiry obtained sig 0.008, between PBL models with conventional obtained sig 0.000, the inquiry with conventional models obtained 0.000. So from the third class student mastery of concepts is significantly different. It can be concluded based learning and inquiry learning problems differ significantly towards mastery of concepts of biology students.

Sources existence of differences | Number of Squares | Df | mean Squares | F | Sig. | H0  
--- | --- | --- | --- | --- | --- | 
Between groups | .822 | 2 | .411 | | |  
Inter groups | 183.233 | 87 | 2.106 | .195 | .823 | Accept  
Total | 184.056 | 89 | | | | 

Table 4. Path analysis pretest creative thinking

Seen from result of above, the significant value gained 0.823 greater than 0.05. Means creative thinking pretest results for the third class there was no difference. To determine the difference in creative thinking of students in the third class derived from the analysis post-test scores. The results of the analysis are shown in Table 5 below:

Sources existence of differences | Number of Squares | Df | mean Squares | F | Sig. | H0  
--- | --- | --- | --- | --- | --- | 
Between groups | 98.467 | 2 | 49.233 | 35.128 | .000 | Not accepted  
Inter groups | 121.933 | 87 | 1.402 | | |  
Total | 220.400 | 89 | | | | 

Table 5. Path analysis post-test creative thinking

Seen from result of above, the significant value gained 0.000 less than 0.05. Means creative thinking posttest results for the third class there is a difference, it is necessary to further tests to look at the differences in learning PBL, inquiry and conventional.
Table 6. Test scores lsd post test creative thinking

<table>
<thead>
<tr>
<th>Class</th>
<th>Mean difference</th>
<th>Sig.</th>
<th>H0</th>
</tr>
</thead>
<tbody>
<tr>
<td>PBL Inquiri</td>
<td>-1.833</td>
<td>.000</td>
<td>Not accepted</td>
</tr>
<tr>
<td>Konvensional</td>
<td>.633</td>
<td>.041</td>
<td>Not accepted</td>
</tr>
<tr>
<td>Inquiri PBL</td>
<td>1.833</td>
<td>.000</td>
<td>Not accepted</td>
</tr>
<tr>
<td>Konvensional</td>
<td>2.467</td>
<td>.000</td>
<td>Not accepted</td>
</tr>
<tr>
<td>PBL Inquiri</td>
<td>-2.467</td>
<td>.000</td>
<td>Not accepted</td>
</tr>
</tbody>
</table>

From Table 6, the results of post hoc test to post-test creative thinking on PBL, inquiri and conventional. If sig is smaller than 0.05 means that there are differences. PBL models with inquiry the values obtained sig 0.000, between PBL models with conventional obtained sig 0.041, between inquiry models with conventional obtained 0.000. So from the third class all have differences.

IV. DISCUSSION

From the analysis of further tests can be seen that the average ratio of PBL class with the inquiry more effective amounted to 0.833, PBL with conventional learning more effective amounted to 2.067 and conventional learning with models inquiri more effectively amounted to 1.233. So we can conclude that for the development of more effective mastery of concepts done using PBL because a value greater effectiveness than other learning models. Mastery of concepts of biology students in the class experiment better than the control class for environmental management material. From the research, there are significant differences between the three class of learning. Where the class-based problem their mean value is greater than the other class. based on the average value of this class are listed first PBL success rate with the largest average (16.73), the second order for the class of Inquiry (15.90) and the final sequence to conventional class (14.67). Having regard to the average value, then mastery of concepts in PBL class better than the class of inquiry, it is presumably because in the learning process of students are directly involved in learning, concept or theory of seeking support, conduct trials to draw conclusions. Besides the problems that the teacher has been designed according to indicators of mastery of concepts of biology and in accordance with problem-based learning, in addition students are also given the opportunity to display their answers in class discussions and other groups provide feedback on the answers to the problems.

It is this process which enables students to master the concept of learning well. This is in accordance with the opinion of Rusman (2011), stated that the in the model PBM, students can foster problem-solving skills, where students act as problem solvers and learning built thinking, teamwork, communication and exchanging information so as to achieve the purpose of learning diharaapkan. Also according to Abbas (2000), problem-based learning as an approach that prioritizes learning process can be used to train and develop the skills and abilities of science high levels, and improving learning achievement, in a problem-based learning students are required to solve problem independently or guided and also discuss with other students. Mastery of concepts of biology students in the experimental class is better than the control class. It is also consistent with the results of research Suryadi (2011), that the problem-based learning real impact on mastery of concepts so that student learning outcomes any better. In addition, according Susanti (2012), in his research on the influence of problem-based learning and the mastery of the concept of guided inquiry shows that there is significant influence application of problem-based learning, guided inquiry learning and conventional learning to mastery of concepts of biology.

In the ANOVA test path students’ ability to think creatively is found there were differences. From the analysis of further tests can be seen that the average comparisons PBL with conventional class learning more effective amounting to 0633, the inquiry with PBL learning more effective amounting to 1833 and with conventional learning models inquiri more effectively amounting to 2.467. So we can conclude that for the development of creative thinking is more effectively done by using the inquiry learning because the value of the more effectiveness of the learning model to another. Creative thinking abilities of students in biology class experiment better than the control class for environmental management materials. Based on the analysis that has been done, found that both the experimental class has an average value that is better than the conventional class. Where the inquiry learning classes with a higher average value (17.3) in enhancing the creative thinking of students, the second order for the class PBL (15.47) and the final sequence to conventional class (14.83). It is anticipated by the inquiry learning process where students from early learning has been involved directly participate actively thinking in learning where students follow the stages of learning the teacher.
It is this process that requires the student to think of new things, so as to make the students think creatively. In addition, students be motivated in discussion groups, create a sense of mutual respect and eager to solve the problem; the inquiry learning students are required for mutual tolerance and active in solving problems set by the teacher and more active force in delivering the results of discussions. This is in accordance with the opinion of Amier (2010), stated that the the inquiry learning students are not only required to master the subject matter, but how they can use another potential it has. Man who just learned the lesson is not necessarily able to develop the ability to think optimally. Instead, students will be able to develop the capacity to think when he can master the subject matter. In addition Sanjaya (2011), stated that the all activities undertaken students are directed to seek and find the answers themselves from something that is questionable, which is expected to cultivate an attitude of self belief and purpose of its use is to develop the ability to think in a systematic, logical and creative, or develop intellectual abilities as part of the mental process.

Inquiry learning also affects the creative thinking of students, seen from the difference in their mean when compared to conventional learning, it is consistent with research Arnyana (2006), research shows students who learn the strategies Kooperarif GI, PBL, and inquiry, has the ability to think creatively more compared with a group of students who are taught by DI models. According Sukmadinata (2004), creative thinking is a habit of thinking that is dug, turn on the imagination, intuition, cultivate the potential of new, open views that cause admiration, stimulate thoughts unpredictable. While Munandar (2004), defines the creative thinking is based on the ability of the data or information provided find many possible solutions to a problem where the emphasis is on quantity, efficiency and diversity of answers. The more possible answers that can be given to a problem the more creative a person. In other words, many answers can not be given solely to determine a person is creative or not, but also be seen from the quality and the quality of the answer. Aryana (2006), stated that the creative thinking is the use of basic thinking processes to develop or find an idea or the results of the original, aesthetic, constructive associated with the view, the concept, the emphasis is on aspects of thinking intuitive and rational, especially in using information and materials for show or explain to the original perspective thinker.

V. CONCLUSION

In learning innovation as a solution to help the problems in learning in which the student-centered learning is through problem-based learning and inquiry-based learning. This effort is expected to optimize the achievement of creative thinking and improve students’ mastery of concepts. The results show that there were significant differences in the application of problem-based learning, inquiry learning and conventional learning to mastery of concepts of biology on the topic of environment at SMPN 23 Seluma. Problem-based learning model is better than learning model Inquiry with the average ratio amounted to 0.833, on mastery of concepts. Inquiry learning model is better than the conventional learning model with the average ratio amounted to 1.833 on the student's ability to think creatively.

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REFERENCES