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EFFECTIVENESS OF DISCOVERY LEARNING MODEL TO INCREASE CRITICAL THINKING SKILLS

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Abstract

The purpose of this research is to know the effectiveness of learning model of Discovery Learning on improving students' critical thinking skill. The subjects of the study were the students who followed the lecture of problematic learning in SD which was divided into 2 classes, namely experiment and control class. Data collection uses integrated critical thinking skills tests with mastery of elementary school learning. Data analysis used mean difference test and normalized gain scores. The results showed a significant difference between students' critical thinking skills in the experimental class and control class. Improvement of critical thinking skill of experiment class student is higher than control class student. The highest increase occurred in the indicator ability to conclude by 56% in the experimental class and 43% in the control class. This suggests that the use of learning discovery learning model is effective in supporting the learning process, so that the mastery of concept and critical thinking skills is better.

Keywords: *Discovery Learning Learning Model, Critical Thinking Skills.*

INTRODUCTION

Learning in essence includes aspects of processes, products, and attitudes. However, if observed, learning in Indonesia tends to emphasize only the product aspect, where facts, laws, and theories get a dominant portion, while aspects of process and attitudes get less attention. This implies the still low learning outcomes at various levels of education. The low learning outcomes are also caused by the difficulty of understanding abstract concepts. Abstract concept in a concept that is difficult to visualize or display the process directly through real laboratory activities though. This then led to the emergence of new innovations in learning.

Learning activities emphasize more on direct delivery to improve competence so that students are able to think critically and systematically in understanding the concept, so that students gain a correct understanding. A correct understanding of the lesson is very influential on student learning outcomes. Science learning is still verbal, students seem passive and receive knowledge in accordance with what is given, teaching and learning process is still centered on lecturers. When the teacher gives the opportunity to ask or answer the students just silence because they are confused what to ask and answer. Lecturers more often use the teaching pattern by presenting the meteri and solving the problems.

The use of learning models can stimulate students' thoughts, feelings, interests, and interests in such a way that the learning process can take place. The researchers found that there are different ways in which students process information that is unique. Some are easier to process visual information, others are easier with audits, and others will understand easily or better if done with practice. Gunawan (2008) found that the increased mastery of student concepts that follow interactive multimedia learning is better than students who follow conventional learning. In addition to mastering the concept, the use of learning models is also expected to improve students' critical thinking skills.

Skill of thinking or ability to do the thinking process in relation to teaching and learning process is a learning result that is classified as hidden or ability difficult to observe. Wellington (Wahidin, 1996) states that training students' thinking skills is more relevant than simply transferring knowledge from the teacher to his students. Critical thinking skills include one of the

highest-order thinking skills. Essential thinking skills are essentially problem solving skills. According to Ennis (1996), critical thinking is the ability of reasoning and reflective thinking that is directed to decide the things that are convincing to do. Critical thinking is a sensible and reflective thinking that is focused on making decisions about what is done or is believed. It makes sense to think based on facts to make the best decisions. Reflective means seeking consciously and decisively the best possible solution.

Critical thinking as one of the higher-order thinking processes can be used in the formation of a student's IPA conceptual system so it is one of the high-level conceptual thinking processes (Liliasari, 2002). Critical thinking is an important aspect of modern education so that educators are interested in developing critical thinking for students. Critical thinking skills need to be developed within the students because through the critical thinking skills the student can more easily understand the concept, sensitive to the problems that occur so as to understand and solve problems and be able to apply the concepts in different situations. With good critical thinking skills can provide a good recommendation to perform an action. The essence of critical thinking is an attitude used to judge something (Ennis, 1996).

The development of critical thinking skills has long been noted as the primary goal of education. However, studies on students' thinking ability reveal that critical thinking skills do not develop without effort explicitly and deliberately implanted in their development (Zohar, 1994). A student will not be able to develop his critical thinking skills properly if not trained to think critically in the field of study he studies (Meyers, 1986).

METHODOLOGY

The research was conducted by using quasi experiment method (Quasi exsperimental research). This method is used because many of the research subjects that can not be controlled or controlled (Darmadi, 2011: 37). The purpose of quasi-experimental research is to find cause-and-effect relationships by giving certain treatments to two experimental groups that are specific treatment in the experimental group and without performing a particular treatment for the control group. The design of this study can be seen in the following table:

Table 1.1 Research Design Postest Only Control Group Design

Group	Treatment	Post Test
Experiment (R)	X	T_2
Control (R)	-	T_2

Information:

X : The treatment given to the experimental group is the use of the learning model of Discovery Learning

T2 : The final test given to the experimental group and the control group

R : Random assigment (random group selection)

The population in the study were all students of 4th Semester of PGSD Study Program of Universitas PGRI Madiun. The sampling technique using cluster random sampling taken from students of 4th semester of PGSD Study Program of Universitas PGRI Madiun consisting of 2 classes, that is class 4B as experiment class with 4D class as control. The independent variable in this research is the Discovery Learning model. The dependent variable is the student's critical thinking skill.

Data collection techniques used in this study using test methods and non-test methods. The test method is used to obtain science process skill data. Questions in the test can be either written or oral test. The tests used in the form of objective tests are multiple choice and essay. Non-test method using documentation, observation, interviewing is done by collecting data, taking notes and reviewing existing documents that have relation with research object (Riduwan, 2004). The data collected by this technique is student value data.

Instrument of student critical thinking skill assessment is essay test, which is used in the form of objective test. Problem test used before used to retrieve research data, tested in advance to know the quality of the question. The feasibility of the instrument used in this study is conducted test of feasibility tested with statistics include validity test, reliability test, differentiation test, difficulty index test.

The purpose of this study was to determine the level of significance of the effectiveness of learning using the learning model of Discovery Learning in the science concept course on students' critical thinking skills. The requirement of statistical data to be tested using paired t-test is the data distribution must be normal and homogeneous. The prerequisite test was performed before the equilibrium test with the t-test, the preliminary test using the Kolmogorv-Smirnov test used for the normality test whereas in the homogeneity test the Levene's test was used.

RESULT AND DISCUSSION

Critical thinking skills of the students are assessed from the initial test answers and the final test after following the lesson. Indicators of critical thinking skills assessed include: the ability to discover similarities and differences, the ability to give reasons, the ability to make conclusions, the ability to use acceptable principles. The result of a skill assessment is a score that is then searched for percentage. The average score of the initial test, the final test and the normalized gain of critical thinking skill in the experimental class and control class can be seen in table 1.

Table 1. Description of Student Critical Thinking Skills Score

	Experiment Class			Control Class		
	T_{early}	T_{end}	<g> %	T_{early}	T_{end}	<g> %
N (number of student)	32	32		32	32	
Average	36,5	68,1	50,9	37,1	59,5	36,5
Standard Deviation	11,3	13,3	15,5	9,8	11,8	13,1
Maximum	56	92	82	52	88	75
Minimum	12	40	25	12	40	13

Normality and homogeneity test results show the distribution of normal distributed data, the variance of both classes is also homogeneous. Parametric statistic test (t-test) was then performed. Result of t test show value t count equal to 3,96 and t table at level of trust 0,05 equal to 2,04. From these results it can be concluded that there is a significant difference between improving the critical thinking skills of the experimental class and the control class. The percentage improvement of critical thinking skills of the experimental class is greater than the control class. This suggests that learning by using the learning model of Discovery Learning can improve students' critical thinking skills. Percentage of average score achievement of initial test, final test and N-gain critical thinking skill between experiment class and control class is presented in figure 2.

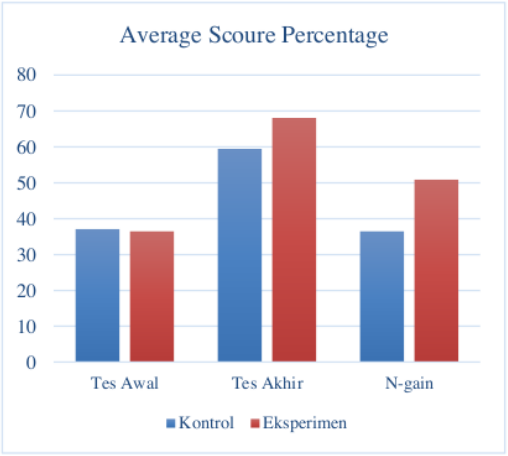

Figure 2. Average Scoring Achievement Initial test, Final test and N-gain Critical Thinking Skills.

There are four indicators of critical thinking skills used in this research, namely: ability to find similarities and differences (KBKr1), ability to give reason (KBKr2), ability to make conclusion (KBKr3), and ability to use acceptable principle (KBKr4). Each indicator is analyzed for achievement based on initial test score, final test, and normalized gain. The percentage improvement of students' critical thinking skills on each experimental class indicator and control class is presented in Figure 3.

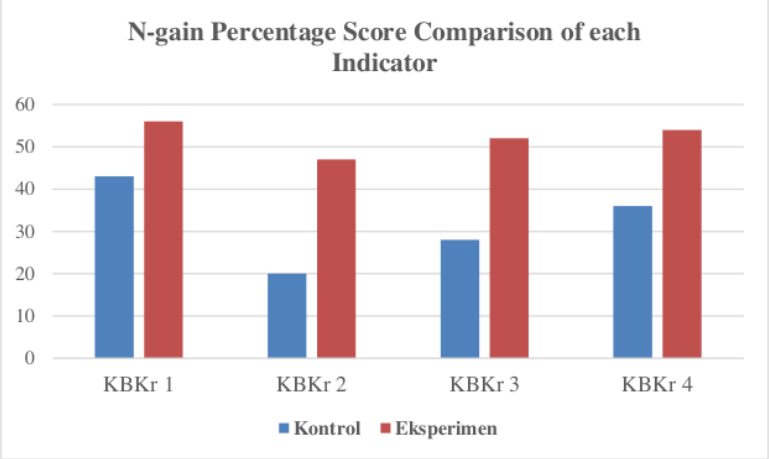

Figure 3. N-gain Percentage Score Comparison of Each Indicator of Second Class Critical Thinking Skills.

Based on the analysis on each indicator it can be seen that the highest increase in both classes occurred on the same indicator, that is the ability to make conclusions, with each gain of 56% in the experimental class and 43% in the control class, both of which are in the medium category. The highest increase in the indicators draws conclusions, is an implication of logical reasoning ability that also develops. Increasing the ability of logic inference and finding the next concept can be used by students to improve their ability in drawing a conclusion from a problem.

The lowest gain of N-gain in both classes also occurs in the same indicator, ie the ability to use acceptable principles. In the experimental class the increase was 47% (medium category), while for control class only 20% (low category). A substantial increase in this indicator indicates that students who are learning to use interactive multimedia are better able to use the principles

that exist in the concept of science. The lesson plans were developed involving students to gain experience, and conduct experiments that allowed them to discover the principles themselves.

The learning process by which students are directly involved in finding themselves a concept is expected to give better results. Some of the advantages that can be gained from learning this invention include: 1) the knowledge can last longer and more memorable than the knowledge learned in other ways; 2) Discovery learning results have a better transfer effect than other learning outcomes. In this case the concepts and principles that one has owned will be more easily applied in new situations. 3) discovery learning can improve students' reasoning and the ability to think freely (Dahar, 1996).

The substantial increase in the indicator's ability to use this principle is easy to understand because of the initial framework of thinking that is already present in every student. In learning there is a tendency for students to retain the frame of mind until they have a rational explanation or picture that will lead to the reinforcement of the frame of mind if it is correct, and a paradigm shift in a more appropriate direction if pre-existing frameworks are less precise (Gunawan, 2012).

CONCLUSION

The results showed that students' critical thinking skills taught by the Discovery Learning model are higher than those conventionally taught. Indicators of ability to make conclusions have increased greater than other indicators. This is due to, among other things, the characteristics of the Discovery Learning model of learning that gives students the opportunity to practice making estimates and independently trying to prove the truth of their estimates before giving conclusions from a data or problem.

SUGGESTION

Based on the results of research that has been done then the application of the model of Discovery Learning can serve as an alternative model in developing innovative and creative learning in achieving learning objectives. The highest and lowest increases in the two classes occurring on the same indicator, are interesting things that need to be explored further.

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