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A STUDY OF CRITICAL THINKING SKILLS IN JUNIOR HIGH SCHOOL

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ABSTRACT

This study aims to determine the critical thinking skills and the effect of problem-based learning (PBL) model through fishbowl of the critical thinking skills of students at seventh grade. This study is executed in November 2014 in SMPN 1 Wates, SMPN 1 Galur, and SMPN 2 Lendah in Kulon Progo Regency DIY. The study design used is One group pretest-posttest design. Research parameter is the students' critical thinking skills. Data analysis using paired sample t-test of the results with the N-gain for each school 0.406, 0.313, and 0.317, all of them in the medium category. The final conclusion, there is the effect of the use problem-based learning model through the fishbowl to improving student learning outcomes at seventh grade on the subject of Change Objects Around Us. However, the percentage achievement of critical thinking skills is less.

Key Word: PBL, fishbowl, critical thinking skills

INTRODUCTION

Indeed, K-13 is prepared so that the Indonesian people have the ability to live as individuals and citizens who believe, productive, creative, innovative, and affective based Permendikbud number 68 in 2013. With the improvement of the curriculum, there will be an increase in the quality of the learning process that is expected to have an impact on the result of learning. Learning is a process of interaction of students with teachers and learning resources in a learning environment. The learning process in the educational unit organized in an interactive, inspiring, fun, challenging, motivating learners to actively participate and provide enough space for innovation, creativity, and independence in accordance with their talents, interests, and physical and psychological development of learners. For every educational unit planning for learning, learning and assessment process of implementation of learning process to improve the efficiency and effectiveness of the achievement of competencies of graduates (Permendikbud No. 63 in 2013).

Improving the quality of the learning process and results suggests at the use of constructivist learning paradigm, especially in the classroom. This learning paradigm change means changing the focus of learning,

from learners are given out to the students to find out; from teacher-centered learning into a student-centered learning; from a textual approach to the process as reinforcement the use of the scientific approach (Permendikbud No. 65 in 2013). This means that teachers should encourage and give students the chance to participate actively construct the concepts learned through thinking skills.

Thinking skills are defined as a cognitive process that is broken down into concrete steps that are then used as a guide to think. One example is the thinking skills to draw conclusions (inferring), which is defined as the ability to connect various instructions (clue) and the facts or information with the knowledge that has been held to make a prediction of the final result inevitable. To teach thinking skills draw the conclusion that, first of all cognitive processes inferring must be broken down into steps as follows: (a) identify the questions or the focus of the conclusions to be made, (b) identify the facts are known, (c) identify knowledge relevant previously known, and (d) make predictions formulation of the final result.

There are three terms related to thinking skills, which is actually quite different; namely high-level

thinking, complex thinking, and critical thinking. High-level thinking is a cognitive operation that is much needed in the thinking processes that occur in the short-term memory. If it is associated with Bloom's taxonomy, includes of higher-order thinking, analysis, synthesis, and evaluation. Complex thinking is cognitive process that involves many stages or sections. Critical thinking is a kind of thinking that is convergent, which is heading to a point. Opponents of critical thinking is creative thinking, which is kind of divergent thinking, which is spread from a point.

Critical thinking is defined as a complex process that involves acceptance and mastery of data, data analysis, and evaluation of data taking into account the qualitative aspects as well as the selection or make decisions based on the results of the evaluation (Gerhard, 1971, in Redhana 2003: 14). Therefore, critical thinking material includes material that involves the analysis, synthesis, and evaluation of concepts (Gokhale 2002: <http://scholar.lib.vt.edu/enjournals/JTE>).

Essentially, the science in Junior High School are taught to provide students knowledge, understanding, and some ability to enter higher education and develop science and technology. To achieve these objectives, it would require active student participation in the learning process. With the active participation of students in the classroom is expected to give rise high-level thought processes, one of which critical thinking skills.

The learning method used is problem based learning (PBL) through a fishbowl. PBLs are student-centered, typically consisting of small groups, involving the use of higher cognitive functions to complete tasks which are directly meaningful to a student's education (Burley & Price, 2003, Trauth-Nare & Buck, 2011). Collaborative learning environments created by PBLs can elevate a student's intrinsic motivation to learn more about a particular topic or subject (Performance-based assessment, 2008) (Barron, Preston-Sabin, and Kennedy, 2013). Flynn (2008) emphasizes the ability of students to use critical-thinking skills to apply newly acquired knowledge into novel situations, providing insights into thought processes not demonstrated on traditional paper-and-pencil tests. PBLs provide students the opportunity to demonstrate knowledge attained during the course of the scenario and at the end during the final presentation.

PBL begins from authentic problems. Problem based learning model requires that students perform authentic investigation to find a solution to a real problem. They must analyze and define problems, collect and analyze information, to experiment and formulate

conclusions. In this model, students can grow problem-solving skills, acting as problem solvers and built the thinking process in learning, group work, communicate and inform each other. PBL can provide opportunities for students to explore to collect and analyze data to solve problems, so that students are able to think critically, analytically, systematically and logically in finding alternative solutions (Sanjaya 2008).

The fishbowl method is a creative teaching technique used to generate discussion and a sharing of ideas (Mary, 2010). An important ingredient in utilizing this method is to create an interesting prompt to engage student interest in the discussion. This format can be easily adapted to fit any topic. The fishbowl method provides students with an opportunity to explore a topic and to learn from the ideas suggested by other students. Students utilize critical thinking, articulation, debate, and active listening in this exercise. This method involves asking for a number of volunteers who will discuss a certain topic.

Learning activities through fishbowl is done in the group that the number of participants is not too large. Students are divided into two (2) groups of the group's inner circle and outer circle group. In the inner circle, students discuss an issue, program, and so on. In the outer circle, the students watch and listen to the discussions held by the members of the group's inner circle. If there are participants from the outer circle who wanted to speak in the discussion in a circle in the subject must be swapped places with students who were in the inner circle. This method makes each individual responsible for the problem, so expect the learning process is effective.

Critical Thinking Skills

Critical thinking skills are important aspects which need to be developed during the learning of science. Duschi (2008) states, learning science has focused on to know for to do. In recent years the focus has shifted from to do for know. Critical thinking skills are defined as an organized process that involves a mental process that involves therein problem solving, decision making, analyzing, and scientific inquiry activity (Ennis, 1993). Use critical thinking to analyze the basic arguments and bring insight to each of meanings and interpretations. This thinking patterns develop reasoning cohesive, logical, credible, concise and convincing (Ennis, 1993). People who have the critical thinking skills to be able to act normatively, ready to reason about something they see, hear or think and be able to solve the problems it faces (Redhana, 2003).

Santyasa (2004) states, the characteristics of people who have the competence to think critically is careful, like classifying, open, emotionally stable, to take immediate measures when the situation requires, like demand, appreciate the feelings and opinions of others.

Further stated that occur close relationship between remembering and understanding, between understanding and thinking. Students who have the critical thinking skills that will either show that he understands a subject matter well and remember it too well, and if one day use the student is able to use it well for the sake of learning and problem solving. Therefore, problem solving is one important indicator of critical thinking. This means that if someone has the critical thinking skills of the person certainly has the potential of being able to solve problems. Thus, critical thinking should always be trained and improved in schools so that students have the ability to problem solving.

Rosyid, et al (2015: 11) states, indicators of critical thinking skills include 1) identifying criteria to consider a possible answer, 2) identify conclusions, 3) the ability to give a reason, 4) hypothesize, 5) using the existing procedures, 6) apply concept, and 7) to consider alternatives. Ngazizah (2011) argued, critical thinking skills include 1) formulate a problem and hypothesize, analyze the problems that arise, 2) analyze the settlement of the problem, 3) make conclusions, and 4) make further explanation.

From the above opinion, can be formulated indicators of critical thinking skills, namely, to formulate the problem, hypothesize, specify the variables, using the existing procedures, analyze the data, conclude, shows the similarities and differences (argued), the ability to give a reason, to apply the concept, and choose the possibilities will be implemented (considering alternatives).

Occur close connection between remembering and understanding, understanding and thinking. Students who have the critical thinking skills show that he understands a subject matter well and remember it too well, and if one day use the student is able to use it well for the sake of learning and problem solving. Therefore, problem solving is one important indicator of critical thinking. In the classification of Bloom's Taxonomy, problem solving begins with the task of analysis, synthesis, and evaluation. Analysis tasks that students are asked to analyze a relationship or situation that complex on basic concepts. In the synthesis of the students can combine or reorganize the specific things in order to develop new situation. While the concept of evaluation to determine the extent to which students are able to apply

the knowledge and skills that have been held to assess something of cases filed by author matter (Arikunto 2002: 119-120).

Problem-solving skills is an ability that is demanded by working world in this time. Career Center Maine Department of Labor (2004) recommends some of the characteristics of individuals who desired the world of work include: 1) have confidence, 2) have the achievement motivation, 3) master the basic skills such as reading, writing, listening, speaking, and computer literacy (computer literacy), 4) mastering thinking skills such as problem solving, problem posing, decision making, analytical thinking, and creative thinking, and 5) mastering interpersonal skills such as the ability to work in teams and negotiate (McGregor, 2007).

Conditions in the Field

Conditions that exist at the moment it happens the opposite, packing learning of science, especially science to increase critical thinking skills have not been systematically addressed. Some constraints include learning in school is still teacher centered, not the student centered; and focus more on education in schools which are memorization or factual knowledge. Teachers less creative to create the conditions that lead students to be able to integrate construction experience their everyday lives outside of the classroom.

As a result, thinking skills, scientific work, and skills to problem solving in real life everyday among students is not developed, and does not develop in line with expectations. Though thinking skills is a skill that can be learned and taught, both at school and through independent study.

METHODS

This study is executed in November 2014 at seventh grade in SMPN 1 Wates, SMPN 1 Galur, and SMPN 2 Lendah in Kulon Progo Regency DIY. Each school is taken one seventh grade with a number of 32 students. Desain Research the used is One group pretest-posttest design. Research parameter is the students' critical thinking skills. This study design was One group pretest-posttest design with three steps, namely a test to measure the dependent variable before treatment (pre-test); provide treatment (experiments) to a subject (variable X); and give more tests to measure the dependent variable after treatment (post-test) (Fraenkel & Wallen, 2009, 265).

Based on this design, a set of subjects are treated in the form of a sample class model of problem-

based learning (PBL) through a fishbowl. Measurements were taken before and after the learning method was implemented. The influence of the use of learning methods is measured from the difference between the pretest and post-test with the following design:

Table 1. Design research

Pretest	Treatment (Independent Variable)	Post-test
T ₁	X	T ₂

Source: Fraenkel & Wallen (2009: 265).

Before being given treatment, group or class designated as research subjects were given a pretest, then given a post-test after being given treatment. It is intended to determine the stability and clarity of the state of the group. The steps in this study are as follows.

1. Perform pretest (T₁) at the beginning of the meeting to measure students' prior knowledge before learning treatment (X).
2. Perform post-test (T₂) after treatment (X) implemented.
3. Test for normality and homogeneity of pretest and post-test.
4. Comparing the results of pretest to post-test to see improvement from the treatment (X).
5. Calculate N-gain <g> with equation (Meltzer, 2002):

$$g = \frac{S_{pos} - S_{pre}}{S_{maks} - S_{pre}}$$

Description :

g = gain;

S_{pre} = pretest score

S_{pos} = posttest score

Table 3. Summary of data of normality test of pretest and post-test results

No	School	Asym.sig(2-tailed)		α	Decision	Description
		Pretest	Post-test			
1	SMPN 1 Wates	0,428	0,995	0,05	Accept H ₀	Normal
2	SMPN 1 Galur	0,234	0,566	0,05	Accept H ₀	Normal
3	SMPN 2 Lendah	0,717	0,899	0,05	Accept H ₀	Normal

Table 4. Summary of data of homogeneity test of pretest and post-test result

Sekolah	Levene Test	Sig.	α	Decision	Description
SMP N 1 Wates	3,689	0,059	0,05	Accept H ₀	Homogen
SMP N 1 Galur	2,064	0,158	0,05	Accept H ₀	Homogen
SMP N 2 Lendah	3,323	0,073	0,05	Accept H ₀	Homogen

$$S_{maks} = \text{ideal score}$$

Table 2 Criteria gain level

G	Keterangan
$g > 0,7$	high
$0,3 < g \leq 0,7$	medium
$g \leq 0,3$	low

6. Make conclusions.

RESULT AND EXPLANATION

This research data is pretest, posttest, and data of process of learning to see the students' critical thinking skills. After that, the test of normality and homogeneity of pretest and post-test for each school. Normality test is necessary to determine the distribution of the data. Normality of data known through regression equitable distribution of each value. The method used to test the normality of the data is the Kolmogorov-Smirnov method. From the table 3 it is known that all is normal.

Homogeneity testing used Levene Test. From the table 4 it is known that all the data is homogeneous. This means that the data derived from the homogeneous variant.

The next test is the t-test (paired sample T-test) with SPSS 11.5, to compare results of pretest to post-test. From the statistical calculation is obtained as table 5.

Table 5. Summary of comparison of pretest to post-test

No	Sekolah	n	t	Sig. (2-tailed)	Description.
1	SMP N 1 Wates	32	-9,698	0.000 < 0.05	different
2	SMP N 1 Galur	32	-15,496	0.000 < 0,05	different
3	SMP N 2 Lendah	32	-10,548	0.000 < 0,05	different

Table 6 Summary of Results of N-Gain

No	School	n	Results			<g>
			ideal score	Pre	Post	
1	SMP N 1 Wates	32	30	12,53	19,63	0,406
2	SMP N 1 Galur	32	30	13,81	18,88	0,313
3	SMP N 2 Lendah	32	30	12,38	17,94	0,317

From Table 5 shows that there are differences in the results of pretest to post-test for all three schools. This means that there are significant differences between the average pretest to post-test, SMPN 1 Wates average pretest 12.53 and post-test 19.63, SMPN 1 Galur average pretest 13.81 and post-test 18.88, and SMPN 2 Lendah average pretest 12.38 and post-test 17.94.

Next calculate the N-gain <g>. Table 6 is known that N-gain for each school is medium. This means that the learning process by PBL through a fishbowl can have an impact on improving learning outcomes. The improvement of learning outcomes (N-gain) in Table 6 shows that the increase in student

learning outcomes on the subject of material changes. Improved learning outcomes this occurs because the treated that is the process of learning by PBL through the fishbowl, students are more excited to follow the activities of learning. The learning models can attract the curiosity and the participation of the students because is dynamic and fun.

In order to see the learning process to know critical thinking skills of students can be seen in Table 7.

Table 7 Results of learning to see students' critical thinking skills in Junior High School at seventh grade in the first semester of school year 2014/215

No	School	Indicators of Critical Thinking Skills	Persentase (%)	Description
1	SMPN 1 Wates	Formulate a problem	40,63	Less
		Hypothesize	37,50	Less
		Determining variables	28,16	Less
		Using existing procedures	40,63	Less
		Analyzing data	31,25	Less
		Conclude	40,65	Less
		Show the similarities and differences (argued)	43,75	Less
		The ability to give a reason	34,36	Less
		Applying concept	21,88	Less
		Selecting the possibility to be implemented (considering alternatives)	31,25	Less
2	SMPN 1 Galur	Formulate a problem	28,13	Less
		Hypothesize	37,50	Less
		Determining variables	34,38	Less
		Using existing procedures	31,25	Less
		Analyzing data	40,63	Less

No	School	Indicators of Critical Thinking Skills	Persentase (%)	Description
		Conclude	40,63	Less
		Show the similarities and differences (argued)	31,25	Less
		The ability to give a reason	34,38	Less
		Applying concept	37,50	Less
		Selecting the possibility to be implemented (considering alternatives)	28,13	Less
3	SMPN 2 Lendah	Formulate a problem	21,88	Less
		Hypothesize	25,00	Less
		Determining variables	28,13	Less
		Using existing procedures	28,13	Less
		Analyzing data	18,75	Less
		Conclude	21,88	Less
		Show the similarities and differences (argued)	34,38	Less
		The ability to give a reason	21,88	Less
		Applying concept	31,25	Less
		Selecting the possibility to be implemented (considering alternatives)	25,00	Less

From the table 7 shows that the percentage of achievement of each indicator of critical thinking skills is less. Such conditions encourage the emergence of new ideas to improve the learning process in schools. This thinking leads to the need for the application of learning strategies that provide a great opportunity for students to practice and learn independently and optimally involve student participation in the learning process (Suryosubroto, 2010: 188).

CONCLUSION

Based on data analysis that has been done, it is known N-gain is the medium category and paired sample test results showed statistically significant differences. Thus concluded that there are significant use problem-based learning (PBL) through fishbowl to improving student learning outcomes at seventh grade on the subject of Change Objects Around Us. However, the percentage achievement of critical thinking skills in the less category.

2 Therefore, the science teacher suggested that problem-based learning (PBL) through fishbowl can be used as an alternative in learning activities, especially on the subject of Change Objects Around Us. They suggested to increase critical thinking skills so that students' critical thinking skills to be increased.

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