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Creative Thinking Ability on Mathematics of Junior High School in Palu Based on School Levels

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Abstract

Students' creative thinking skills on mathematics is an important component that must be owned by a student, so with this ability will help students in solving mathematical problems, as well as everyday problems. Problem-based learning combined with cognitive conflict strategy (PBLCC) can be implemented for this ability. PBLCC is based- learning problem, where the problems are the facts presented, situation that contrasts cognition structures students. In this situation there is conflict between the knowledge possessed by students who deliberately provided situation. The main problem in this study is how creative thinking ability of students mathematical VIII grade junior high school students based on School Levels. This research is experimental research. Population in this study is to VIII grade junior high school in the city of Palu. Instruments used in this study include mathematics tests, student's record, test mathematical ability to think creatively. The purpose of the research to be conducted are: Review and analyze the differences in mathematical creative thinking skills of students who received problem-based learning with cognitive conflict strategy (PBLCC) based on School Levels(high , medium, and low).

Key Words: Problem-Based Learning, Cognitive Conflict , Creative Thinking on Mathematics, Prior Knowledge

A. Background

From various studies, both international and national scale seems that the quality of education in Indonesia is still cause for concern. It can be seen from Human Development Index (HDI) published by UNDP. One indicator in determining the HDI is the quality of education in a country from the school level primary to secondary. Indonesia's HDI value of only 0.728 from the ideal one and Indonesia was ranked 107th out of 177 countries measured. Mirror of the mastery of mathematics junior high school students in Indonesia can be seen from The results of the report Trends in International Mathematics and Science Study (TIMSS) 1999, 2003, and 2007. From the results of TIMSS study showed that Indonesia still ranks than expected. In line with the TIMSS results, test results Programme for International Student Assessment (PISA) 2003 and 2006, coordinated by the Organization for Economic Co-operation and Development (OECD), indicating a similar result. Result TIMSS and PISA revealed that junior high students' mathematical ability Indonesia for non-routine problems and understanding the concept is still very weak, but relatively good in resolving questions of facts and procedures (Mullis et al, 2000, 2004, 2008). The average value of National Exams (UN) Mathematics high school students in the province Central Sulawesi nationally can be said is still low at 6.11 in school year

5.58 in 2006/2007 and 2007/2008 academic year. When viewed in terms of national rankings, Central Sulawesi province is ranked 30 in the academic year 2006/2007 and ranked 29 in the academic year 2007/2008 of 33 provinces in Indonesia. Low mathematics learning outcomes indicate something is wrong and not optimal in learning mathematics in school. This is in line with the results research conducted Sullivan (1992), IMSTEP-JICA (1999), Sutiarso (2000), Armanto (2002) and Dahlan (2004). Their results revealed that in learning mathematics in school students tend to passively, prioritize and drill mechanistic, centered on the teacher (teacher-oriented), chalk and talk. Teacher as one centers of learning in the classroom is still the view that learning is a knowledge transfer process (transfer of knowledge) from teachers to students. Problem solving is the heart of mathematics. So this becomes emphasis in mathematical ability to be possessed by a student. Like described in the Education Unit Level Curriculum (SBC), the standard of competence should be owned by a student is understanding the concepts, logical thinking ability, analytical, systematic, critical and creative problem solving and have the attitude that appreciate mathematics and its usefulness. This is in line with the standard capabilities mathematics that must be achieved according to the NCTM (2000): (1) mathematical reasoning (2) mathematical representations (3) mathematical communication (mathematical communication) (4) Mathematical connection (5) problem solving (mathematical problem solving). According to Piaget, cognitive development process which we have always interacted with its environment through a process of assimilation and accommodation. If assimilation and accommodation occurs freely and without conflict, then the cognitive structure is said in a state of balance (equilibrium) with its environment. However, if there conflict then the person is in a state of balance (disequilibrium). This occurs because the scheme entered does not match the structure (schema) cognitive possesses. When someone in a state of disequilibrium, he will respond this situation, and trying to remember, empowering concept that has to seeking a new equilibrium with its environment. Through metacognition, ask friends who are not experiencing conflict, or scaffolding that the teacher, students can out of conflict. Thus, cognitive conflict is a condition of initial or stimulus in the obtain a balance (equilibrium) new. Level of balance (equilibrium) new This higher level of balance (equilibrium) before.

B.Problem formulation

Based on the description set forth the background, then the problem studied in this study are
Are there differences in the ability to think creatively, students who receive problem-based learning with cognitive conflict strategy (PBLCC) and students who studied in conventional (KV) is reviewed as a whole and the school level (high, medium, and low)

C. Research Methods

Experimental design used is the posttest-only control group design design combined with 3 x 3 x2, ie PAM three groups of students (high, medium, and low), three school levels (high, medium, and low), and two models of learning (PBLCC and KV). Experimental design used in this study can be expressed as follows:

X O

O

In this experimental design, schools were randomly selected, then proceed random selection of classes. Experimental group were subjected to the learning conflict-based problems with a strategy of cognitive conflict (X) and control group received conventional learning without any special treatment. At the end of the subject The second group was given the same final test (O). The study population was the entire junior high school students in Central Sulawesi town of Palu. This study sample of 200 students (3 SMP), comprised of 102 students who acquire learning PBLCC (experimental class) and 98 students receiving KV learning (control class). To obtain the data used in this study comprised the test instrument of a set of questions to measure and determine the ability of early mathematics students, tests the ability to think critically and creatively mathematically, attitude scales and student report cards VII.

E. Data Analysis Techniques

Testing the hypothesis in this study using a test-t, ANAVA one lane, and ANAVA two lines are routed further test the software with the help of SPSS- 17 for Windows.

F. Research Results

Initial knowledge of mathematics (PAM) students is the knowledge students have before the learning process takes place. Initial knowledge of mathematics is Average of math ability test scores, grades mathematics students at semesters I and II in the junior class VII. To determine the sample equity research, conducted statistical analysis of test difference in the average score

of knowledge of early mathematics. Before the test average difference, first tested the normality and homogeneity of variance data, and obtained the conclusion that the samples come from populations distributed normal. From the analysis of data obtained that there is no significant difference between the PAM students who received problem-based learning strategies cognitive conflict and students who received conventional learning (KV) for each school level.

Distribution of creative mathematical thinking ability of students after obtaining PBLCC based learning school level can be seen in Table 1

Table 1. Distribution of Mathematical based Creative Thinking Ability School Level

School Level	***n***	Average	Standard Deviation
High	34	75,4412	12,20827
Medium	37	64,7297	12,41336
Low	31	65,1613	9,87285

Before the hypothesis is tested, it is necessary to see the homogeneity of the creative ability to think mathematically based on the school level by using the Levene test. The hypothesis was tested:

H0: $\sigma 12 = \sigma 22 = \sigma 32$

Ha: At least two different variance

Testing criteria: if the value of sig. greater than = 0.05, then the null hypothesis is accepted.

The results of the calculation of homogeneity of variance test of mathematical ability of creative thinking based on school level are presented in Table 2.

Table 2. Homogeneity of Variance Test Mathematical based Creative Thinking Ability Level Schools

Ability	**Statistik Levene (F)**	**dk 1**	**dk 2**	***Sig.***	**H_0**
Creative Thinking	1,376	2	99	0,257	Accept

Table 2 shows that the value of sig. mathematical ability to think creatively by school level greater than 0.05, this means that the null hypothesis is accepted. Thus, the variance data based on the mathematical ability to think creatively school level is homogeneous. After testing the

homogeneity of the data based on the ability to think creatively school level, then to see if there are differences in creative ability by school level mathematical test was performed in ANAVA. Testing criteria is if the value of sig. smaller than 0.05, the null hypothesis is rejected. The results of test calculations ANAVA mathematical ability to think creatively presented in Table 3

Table 3. Creative Thinking Ability Test ANAVA Mathematically based School Level

	Sum of Squares	**df**	Mean Square	**F**	***Sig.***
Interagency Group	2509,146	2	1254,573	9,276	0,000
Groups	13389,873	99	135,251		
Total	15899,020	101			

In Table 3 shows the value of sig. ability to think creatively mathematically based school level is smaller than 0.05. This means that the null hypothesis is rejected. So we can conclude that there are significant differences of creative mathematical thinking abilities of students receiving school-level learning based PBLCC. To look at the school level which is different then performed Scheffe test, the results can be seen in Table 4.

Table 4. Scheffe Mathematical based Creative Thinking Ability Level Schools

(I) Level Sekolah	**(J) Level Sekolah**	**Mean Difference (I-J)**	**Std. Error**	***Sig.***
High	Medium	10,71145*	2,76286	0,001
	Low	10,27989*	2,88807	0,003
Medium	High	-10,71145*	2,76286	0,001
	Low	-0,43156	2,83167	0,988
Low	High	-10,27989*	2,88807	0,003
	Medium	0,43156	2,83167	0,988

From Table 4 it can be concluded that the ability to think creatively mathematical differ

significantly according to school level, which is different for the high school level with school-level medium level high schools with low school level, while for the school level is the lower school levels did not differ significantly .

Conclusion

Ability to think creatively to obtain mathematical learning differ according PBLCC school level. The difference is critical thinking skills to high school level with school-level medium, and high school levels with a low school level, while for the school level is a low-level schools are no different. Creative mathematical thinking ability of students receiving PBLCC learning better than students who received learning KV.Kemampuan creative mathematical thinking of students who received PBLCC differ significantly according to school level, namely the high school level with school-level medium, the high school level with the lower school level, whereas for the school level is a low-level schools do not differ significant. Based on the school level, PBLCC suitable for the high school level.

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