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The Differences of Improving Junior High School Student's Creative Thinking Ability Through The Relating, Experiencing, Apllying, Cooperating, Transferring (REACT) Strategy and Conventional Learning Model

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ABSTRACT

This study aims to determine (1) the differences in the improvement of students' mathematical creative thinking skills by the relating, experiencing, applying, cooperating, transferring (REACT) strategies better significantly compared to conventional learning models, (2) the interaction between learning approaches and initial mathematcl ability in improving students' creative thinking skills, this type of research is quasi-experimental. This research was carried out at SMP Negeri 1 Medan. The population in this study were all eighth grade students by taking a sample of two classes. The instruments used consisted of PMA tests and tests (pretest and posttest) with indicators of students' creative thinking abilities. The instrument was declared to have fulfilled the requirements of content validity and a high reliability coefficient of 0.83 on the ability to think creatively. Data were analyzed by ANACOVA test and two-way ANOVA. Before using the ANACOVA and ANOVA two-way test, homogeneity in the study was first tested and normality in this study was 5% significance level. The results showed that: (1) there were differences in the improvement of creative thinking abilities of students who were given learning using REACT strategies better than using conventional learning. This can be seen from the results of covariance analysis (ANACOVA) for F count 69.53 greater than F table 4.00. The regression equation constant for REACT learning is 8,297 greater than conventional learning that is 6,192 (2) there is no interaction between the learning model with the students 'initial mathematical ability to increase students' creative thinking skills.

Keywords: Creative Thingking Ability, REACT Strategy.

BACKGROUND

In learning mathematics, this is not a simple matter. The activity and thought process will occured an individual is dealing with a situation or problem that is urgent and challenging and can trigger it to think in order to obtain a solution to the problems raised in the situation at

hand. Meanwhile, the teacher considers that it is enough to teach mathematical formulas and proceed with asking students to memorize them, so that later they can be used in solving problems. This assumption can directly reduce or even eliminate opportunities for students to practice thinking in mathematics learning. If in mathematics learning the role of students is really active both physically and mentally, it will have an impact on their memory about what is learned so that it lasts longer. A concept is easily understood and remembered by students if the concept is presented through appropriate, clear and interesting procedures and steps. Thus, students will avoid the burden of mind that is too heavy in learning a field of study.

Based on the description above, to anticipate the difficulty of students in communicating and thinking creatively, a form of learning that is not monotonous or not boring for students and teachers must be more creative to use a learning model when learning takes place, because the learning model provided by the teacher also has an important role for determine the success or failure of the desired learning. One model that can be applied is Relating, Experiencing, Apllying, Cooperating, Transfering (React) Strategy.

With learning through the REACT strategy, researchers expect to be able to make changes for students to be more creative and mathematically communicate well in finding solutions to any mathematical problems faced and also bring changes to the teacher in a better direction, which can use various models, approaches or Learning strategies so that learning is more meaningful, interesting and motivating for each student.

THEORETICAL FRAMEWORK

A more specific level of thinking is creative thinking. Creative thinking as the ability to see a variety of possible solutions to a problem, is a form of thought that is still lacking in attention in education (Guilford in Azhari, 2013). The ability to think creatively includes four criteria, including fluency, flexibility, authenticity in thinking and elaboration or details in developing ideas (Munandar in Azhari, 2013).

In addition Munandar (Azhari, 2013) said that fluency in thinking is the ability to produce many ideas and answer solutions and a relevant problem, the flow of smooth thinking. Flexibility in thinking is the ability to give answers / ideas that are uniform but different directions of thinking, able to change ways or approaches and can see problems from various points of view, authenticity (originality) is the ability to give birth to new, unique expressions and think of unusual ways, other than others, which most people give. Details (elaboration) in thinking is the ability to enrich, develop add an idea, detail details and expand an idea.

Purwosusilo (2014) mentions that learning with REACT strategies contains 5 (five) strategies which include relating, experiencing, applying, cooperating and transferring. Of the five main things provide a meaningful student learning experience and can help students develop thinking skills and help students in problem solving, learning various adult roles through their involvement in real experience, becoming autonomous and independent learners.

Thinking is the ability to analyze, make conjectures, draw conclusions based on inferences or logical considerations. Thinking skills like understanding and problem solving can be developed through learning with REACT strategies, why is that? Learning with REACT strategies has several advantages and one of them is deepening students' understanding. In addition to the REACT strategy students are trained to have the ability to link and apply. This ability is very useful when students solve problems, especially non-routine problems or complex problems. Thus the learning with REACT strategy is one alternative that can be

pursued in order to improve students' mathematical abilities, especially to increase their understanding and mathematical problem solving abilities (Purwosusilo, 2014).

Creative Thinking Ability

Creative thinking in mathematics can be viewed as an orientation or disposition of mathematical instruction, including the task of discovery and problem solving. These activities can bring students to develop more creative approaches to mathematics. According to Slameto (Azhari, 2013) that thinking, solving problems and producing something new is a complex activity and closely related to one another. A problem generally cannot be solved without thinking, and many problems require a new solution for people or groups. Instead, producing something (things, ideas) that are new to someone, creating something, that includes solving problems.

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Research Aim

The purpose of this study was to investigate:

1. Analyzing students' creative thinking abilities whose learning uses Relating, Experiencing, Apllying, Cooperating, Transacting (React) learning strategies are significantly better than students who learn using Conventional learning models.
2. Reviewing the extent of interaction between learning and the level of students 'initial mathematical abilities (high, medium, low) on students' creative thinking skills.

RESEARCH METHOD

This research was held at SMP Negeri 1 Medan. The research method used in this research is quasi-experimental research. Based on the conditions of a homogeneous population, sampling uses the Random Sampling technique. The population in this study were all eighth grade students of SMP Negeri 1 Medan. The sample in this study were all students from two classes of all eighth grade students who were randomly selected.

The independent variables in this study are learning with REACT Strategies and conventional learning models. The treatment variables in this study were learning with REACT Strategies and conventional learning models. While the control variables in this study are: students' initial ability, subject matter, length of time, atmosphere and class conditions, teachers who teach in both classes are the same.

The research design is as follows:

Tabel 1. Research Design

Class	Treatment		
Experiment 1	O_1	X_1	O_2
Experiment 2	O_1	X_2	O_2

Keterangan:

O_1: Pretest
O_2: Posttest
X_1: treatment by REACT Strategy
X_2: treatment by Convensional Learning

DATA ANALYSIS & RESULT

Description of Research Results

Initial mathematical ability test was given to determine the mean equality of experimental groups 1 and experimental group 2 and to classify students by initial mathematical ability test categories, namely high, medium and low. For this purpose, researchers use the questions that have been studied. The question consists of 10 multiple choice questions.

To get an overview of Initial ability of mathematic student's, the average and standard deviation are calculated, the results can be seen in the following table:

Tabel 4.7 . Description of Students' Mathematical Ability in Each Sample Class Based on the Value of the Initial Mathematical Ability Test

Class	Ideal Score	N	$x_{\min}$	x_{maks}	$\bar{x}$	SD
Exp 1	100	35	30	100	65,7	17,8
Exp 2		35	40	90	50,5	19,9
Sum/ Average	100	70	35	95	61,7	18,9

To determine the equivalence of Initial mathematic ability score in the research sample class, it is necessary to do an analysis test which includes: test the normality of data distribution and the mean difference test. And the results can be seen in the following table:

Tabel 4.8. Normality of Initial Mathematic Ability

Tests of Normality

		Kolmogorov-Smirnov[a]		
	Kelas	Statistic	Df	Sig.
IMA Score	Experiment1	.119	35	.200*
	Experiment2	.134	35	.113

a. Lilliefors Significance Correction

From the table above shows that the significance value of Kolmogorov Smirnov in experimental class 1 is 0.200 and experimental class 2 is 0.113. The significant values in both classes are greater than the significance level of 0.05, so the null hypothesis which states that data is normally distributed for experimental class 1 and experiment 2 can be accepted. In other words, the data for experimental group 1 and experiment 2 have data that are normally distributed.

Because the data in both groups (experiments 1 and 2) were normally distributed, then continued by testing the variance homogeneity. And the results can be seen in the following table:

Tabel 4.9. Homogenity of Initial Mathematic Ability

Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
1.729	1	68	.193

From the table above shows that the significance value of 0.193 is greater than the significance level of 0.05, so the null hypothesis which states there is no difference in variance between groups of data can be accepted. This shows that both experimental class 1 and experimental class data groups have homogeneous data variances.

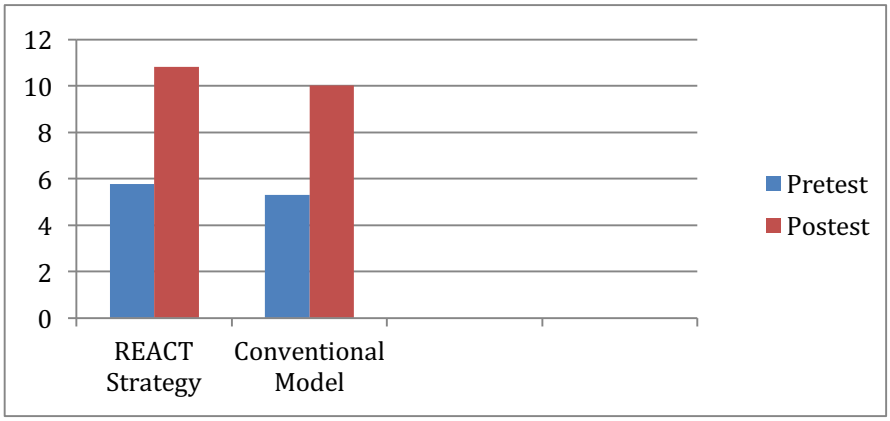
Selanjutnya data hasil *pretes* dan *postes* kemampuan berfikir kreatif siswa dapat dilihat pada tabel berikut :

Tabel 4.12 Pretest and Posttest Data from the Second Creative Thinking Ability Learning Group

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation	Variance
Pretest of Experiment1	35	2	12	5.77	2.438	5.946
Postest of Experiment1	35	5	16	10.83	2.443	5.970
Pretest of Experiment2	35	2	8	5.29	1.872	3.504
Postest of Experiment2	35	4	14	10.03	2.738	7.499
Valid N (listwise)	35					

The table above shows that the average score of the results for each experimental class 1 and experiment 2. Data from the pretest in the table he bag can be seen more clearly in the following picture:



Gambar 4.1. Score the average Pretest and Postest Creative Thinking Ability REACT Experimental Classes and Conventional Experiments

From table 4.12 and figure 4.1 it can be seen that the average pretest of students in experiment class 1 and experiment 2 is different. Before learning, the average creative thinking ability of students who received REACT learning was only 5.77, while the average value of creative thinking students who received conventional learning with an average of 5.29. After learning,

there was an increase in the average creative thinking ability of the two groups of students. Students who obtain REACT learning get an average creative thinking ability of 10.83, while students who obtain conventional learning get an average creative thinking ability of 10.03. Based on Figure 4.1, provides information on the average pretest score of students 'creative thinking skills in REACT learning and conventional learning, but based on the quality of post-test scores students' creative thinking ability in REACT learning and conventional learning has increased from the results of the pretest.

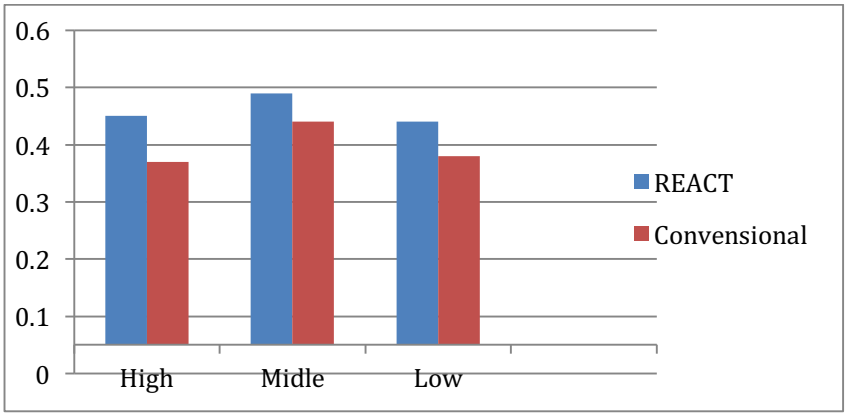
Gain normal (ternormalisasi) Kemampuan berfikir kreatif matematis siswa diperoleh dari selisih skor postes dikurang dengan pretes dibagi selisih skor maksimum (ideal) dikurang dengan skor pretes. Rerata gain yang merupakan gambaran peningkatan kemampuan berfikir kreatif siswa dengan pembelajaran REACT maupun dengan pembelajaran konvensional.

To see the increase in creative thinking students who obtain REACT learning with students who obtain conventional learning is to calculate the N-Gain of both classes. Descriptive statistics for the experimental group N-Gain scores 1 and experimental group 2 are presented in the lowest N-Gain category of initial mathematical ability, highest N-gain score, N-Gain () and standard N-Gain (SD) deviation, complete data is presented in the following 4.18 table:

Tabel 4.18 Data of Increasing Students' Creative Thinking Ability

Initial Mathematic Ability Categories	Statistics	Learning Models	
		REACT	Konvensional
High	N	6	4
	$\bar{x}$	0,45	0,37
	SD	0.275	0,127
Midle	N	24	21
	$\bar{x}$	0,49	0,44
	SD	0,245	0,237
Low	N	5	10
	$\bar{x}$	0,44	0,34
	SD	0.281	0,152

Figure 4.2 below can further clarify the improvement of students' creative thinking skills (N-Gain) based on two learning groups (REACT and Conventional) for each KAM category.



Gambar 4.2. N-Gain Average Diagram of Creative Thinking Ability Based on Initial Mathematic Ability Category

Based on Table 4.18 and Figure 4.2 it can be seen that the mean of N-Gain Creative Thinking both REACT and Conventional learning groups for high category students are 0.45 and 0.37 respectively with a standard deviation of 0.275 and 0.127. Whereas for the students the average category of N-Gain was 0.49 and 0.44 respectively with a standard deviation of 0.245 and 0.237. Furthermore, for students with low categories, the mean N-Gain was 0.44 and 0.34 with standard deviations 0.281 and 0.152.

Tabel 4.43 Covariance Analysis for Complete Design of Creative Thinking Ability (SPSS 16)

Tests of Between-Subjects Effects

Dependent Variabel:POS

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	189.736[a]	2	94.868	20.639	.000
Intercept	451.043	1	451.043	98.129	.000
PRETEST	325.404	1	325.404	9.240	.004
KELAS	103.101	1	103.101	22.431	.000
Error	263.429	67	4.62		
Total	5028.000	70			
Corrected Total	23883.10	69			

a. R Squared = .420 (Adjusted R Squared = .400)

For the mathematical creative thinking ability obtained a significant value of Pretest <0.05, it can be concluded that at a 95% confidence level, the posttest results are influenced by the students' pretest ability before being given REACT learning strategies. Therefore, errors can be corrected by the pretest as a covariate / range.

Regression models that have been obtained for previous creative thinking abilities, namely for experimental class 2 are YE2 = 6.182 + 0.728 XE2 and the experimental class 1, YE1 = 8,297 + 0,430 XE1. Furthermore, because both regressions for both groups are homogeneous and the linear regression line equation constant for experimental group 1 creative thinking ability is 8,297 greater than the equation of the experimental group 2 linear regression equation equation which is 6,182 then the geometric regression line for experimental class 1 is above the line experimental class regression 2.

The height of the regression line describes the student learning outcomes, that is, when X = 0, the regression equation for creative thinking ability of REACT learning class is obtained Y = 8,297 and the conventional learning class regression equation Y = 6,187. It means that it can be concluded that there are differences in the increase in the ability of creative mathematical thinking between students who are given REACT learning with conventional learning on the subject of relations and functions.

Next, to see the interaction between KAM and creative thinking skills, consider the following table:

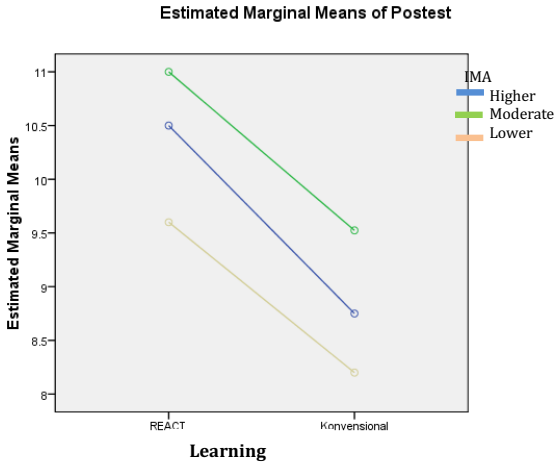
Tabel 4.61 ANOVA Test Results Based on Learning and Initial Mathematic Ability Categories on Increasing Creative Thinking Ability

Tests of Between-Subjects Effects

Dependent Variable:Postest

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	68.798[a]	5	13.760	2.245	.060
Intercept	4112.828	1	4112.828	670.989	.000
Pembelajaran	26.554	1	26.554	4.332	.041
KAM	19.926	2	9.963	1.625	.205
Pembelajaran * KAM	.190	2	.095	.015	.985
Error	392.288	64	6.130		
Total	7302.000	70			
Corrected Total	461.086	69			

Based on table 4.61 above, it can be seen that for learning factors and Initial Mathematic Ability (IMA), a significance value of 0.985 is obtained. Because the significant value is greater than the significance level of 0.05, reject Ha and accept H0, which means there is no interaction between learning and initial mathematic ability on students' creative thinking skills. This shows that there is no shared influence given by learning and initial mathematic ability. More specifically, the interaction between students 'learning and initial mathematical abilities on students' creative thinking skills in graphical interactions can be seen in the following figure 4.9:



Gambar 4.9. Interaction Between Learning and Initial Mathematic Ability Against Students' Creative Thinking Ability

From Figure 4.9 above, it can be seen that there is no interaction between learning and students 'initial mathematical abilities towards students' creative thinking skills. The average difference in creative thinking ability of students who get REACT learning is more influential in achieving creative thinking abilities because the average score obtained by students in REACT learning is higher than the average score obtained in conventional learning. So there is no

interaction between learning and the students 'initial mathematical abilities towards students' creative thinking skills.

CONCLUSION

Based on the data analysis that has been obtained, it can be drawn some conclusions from the results of this study as follows:

1. There is a difference in the improvement of students' creative thinking abilities whose learning uses Relating, Experiencing, Apllying, Cooperating, Transffering (React) learning strategies is significantly better than students who learn using Conventional learning models.
2. There is no interaction between learning and students 'initial level of mathematics ability (high, medium, low) on students' creative thinking skills. This means that the interaction between learning (REACT and conventional learning) with students' initial mathematical abilities (high, medium, and low) students do not give a significant effect together on the ability to think creatively. The difference in the increase in creative thinking abilities is caused by differences in learning used not because of the students' initial mathematical abilities.

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