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The Influence of Learning Models and Critical Thinking toward Study Result by Controlling Students Interest

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Abstract The purpose of this research is to determine the effect of Learning and Critical Thinking Model with of the students Learning Outcomes. research Controlling interest in learning was conducted at SMK 1 Bandar Lampung, Lampung Province in the academic year 2014/2015. The number of samples in this study 72 students of class XI, selected using random sampling. reseach or experiment using a 2 x 2 factorial. The population of this research is all class XI student of SMK 1 Bandar Lampung. This experiment took a teaching method and classification of schools as a factor treatment and mathematics learning outcomes as the dependent variable, and the interests of students as covariabel or covariate. The learning method conducted on students of SMK 1 Class XI and XI accountant 1 Accounting 2, and each taught by and inductive deductive method. The conclusion of this study that there is influence between the learning model CTL, critical thinking skills, the learning outcomes of students with a controlling interest of the students.

Keywords: *learning model. CTL learning, critical thinking, learning outcomes, student interest*

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1. Introduction

Curriculum 2013 is a refinement of the curriculum SBC 2006. According to Noah, the 2013 curriculum more emphasis on competency-based competency thinking attitude, skills and knowledge ([1]: 22).

The purpose of learning Mathematics at every level of education has been set up in 1994 as a curriculum guide for teachers in the classroom define strategies and instructional materials that will be given to their students. Therefore, the task of planning the teacher begins and ends with the assessment. Results of the assessment will be used as feedback for the next improvement of teaching. Success teaching is effective when there is efficacy in fulfilling their teaching in an effort to strike a balance between quality and quantity of teaching.

Based on the above, the position and role of the teacher is a very important factor in the success of students in learning, and create a conducive atmosphere, and fun students in the learning process.

The purpose of learning mathematics above suggests that the approach, method and strategy adopts a constructivist mathematics. Student-centered learning*(student centered learning*) which focus on understanding concepts, reasoning and thinking skills, problem solving, create mathematical models, mathematical communication, mathematical disposition, and creative activity.

In Vocational High School (SMK) in Mathematics taught five (5) hours of lessons a week with two meetings. This is in accordance with National Education Minister Regulation No. 22 ([2]: 20), in which is said that in the preparation of curriculum SMK / MAK divided into three groups, namely adaptive, normative and productive, groups adaptif consists of several subjects namely English, Mathematics, Science , IPS and KKPI. The group was adaptive and productive allocation of time subjects adapted to the needs of expertise and can be held within a block of time or other alternatives. When viewed from the background of the students in general they have identified Mathematics minimum of kindergarten (TK), as well as in terms of the educational background of the teachers in this school are graduates of S1 Mathematics there is even a graduate S2 although not education courses mathematics has got the discipline of teaching as indicated by the teacher certification. But in reality the result of learning mathematics is not fun. Subject seen in Table 1 the average school learning outcomes that researchers take the data on learning year 2011/2012 and 2012 / 2013.pada two schools.

Table 1. Average results of students studying Maths

Skills Program	2011/2012		
	CLASS		
	X	XI	XII
Accounting 1	5.48	3.73	3.59
Accounting 2	4.28	4.39	4.37
Skills Program	2012/2013		
	CLASS		
	X	XI	XII
accounting1	4.69	3.78	3.83
accounting2	5.5	4.59	4.13

Source: SMK 1 Bandar Lampung, 2013.

Based on the data that researchers take the average value of a class XI student of Mathematics at the school is very low, Math teachers at both schools are still often use the lecture method in conveying knowledge to students. Therefore, researchers interested in trying a new strategy in the learning of mathematics called the approach *Contextual Teaching and Learning* (CTL), which is a concept of learning that helps teachers link between the material taught with real-world situations students and compare it with the teacher who taught conventionally, to see empirically related to student learning outcomes. Meanwhile, in the study by using CTL approach has several indicators, among others, critical thinking skills, problem solving abilities and interests of students in learning which in this case seems to be very fundamental in order to improve learning outcomes, so it is necessary to study.

Based on the background of the problem, identify the problem, restrictions on the problem above, the general formulation of the problem is there are significant research model of learning and critical thinking on learning outcomes by controlling interest in student learning. In detail can be formulated as follows; (1) Is there a difference mathematics learning outcomes of students who have high critical thinking skills with students who have the ability to think critically low after controlling interest in mathematics learning ?; (2) Is there a difference Mathematics student learning outcomes that learned a learning model CTL and that learned to conventional models after controlling interest in mathematics learning ?; (3) Is there an interaction effect of critical thinking and learning model of the mathematics learning outcomes after controlling interest in mathematics learning?; (4) For students who have a high critical thinking ability, whether there are differences in learning outcomes of students who are taught mathematics learning model CTL with students taught by conventional learning models, after the controlling interest in mathematics learning? This research generally aims to investigate the influence of the learning model and the ability to think critically about the results of students' mathematics learning?

In this study, there are two things that are expected from the results of this study; (1) Purpose of Theoretical namely the results of this study are expected to enrich the science, special education technology related to the application of learning models and the results of this study can provide feedback to the teacher to select or determine the model of mathematics instruction in accordance with the material to be learned; (2) Practical Uses, for teachers of mathematics, the results of this study can be considered in designing learning, for students to develop skills at their disposal and foster will to study mathematics, and for researchers, the results of this study as a form of devotion in promoting education as well as provide information to teachers so that attention to the factors that can improve student learning outcomes in math.

1.1. Learning Outcomes

Winkel ([3]: 39) gives a definition that is more comprehensive study, namely, a process of not been able to afford direction. Learning is a mental activity / psychic that takes place in an active interaction with the environment that result in changes in the knowledge, understanding, skills and values and attitudes.

Dimyati and Muljiono, ([4]; 63) found In order to involve the students in the physical, mental-emotional, and intellectual learning activities, the teacher should design and implement learning activities by considering the characteristics of the students, and content.

Jujun give a statement, mathematics is a language that symbolizes the series of meanings and the statement we want to convey. symbol mathematical symbols are the new artificial has meaning after a meaning given to it.

Based on the above it can be concluded that the definition of learning outcomes is an assessment of students' learning ability specified in the form of numbers or learning values. Results said to be good if the number or value that gets categorized as good, as well as student learning is called ugly if the number or value obtained by the students included in the category of ugly.

1.2. Learning Model

Learning model according to Arend ([5]: 259) is covering the overall learning approach, comprehensive, and not a specific strategy or technique. The learning model has a few that are not owned strategies and specific methods. The attributes of a model is the presence of a coherent theoretical basis or a viewpoint on what Should be studied and how they learn, and it recommends a variety of behavioral models of teaching and class structure needed to realize a variety of different types of learning.

According to Joyce, Weill and Calhoum ([6]: 6) learning model is a model of learning can help students to acquire or obtain information, ideas, skills, ways of thinking and expressing ideas themselves. In addition they also teach how they teach.

This means that the learning model is a plan teachers in helping students to obtain information, ideas and skills, how to think and express ideas and then managed in a way so that the students want to learn.

1.3. Understanding Critical Thinking

Runch quoted According Jalaludin Rachmat ([12]:68-69.) Defines the organization's thinking is the manipulation or environmental elements by using symbol-emblem so no need to directly engage in activities that appear. RUNCH added that there are three kinds of realistic thinking, namely: deductive, inductive, and evaluative. Deductive reasoning is the conclusion of a general statement to the contrary is special. Thinks inductive starting from special things then take a common conclusion. Evaluate while thinking is critical thinking, judging good and bad, right or not right an idea.

Gunawan ([7]: 177-178) states that critical thinking is the ability to think at the level of the complex and use the analysis and evaluation process. Rahmat *(10March 2013)* suggests the critical thinking*(critical thinking)* is synonymous with the decision *(decision making)*, strategic planning *(strategic planning)*, the scientific process *(scientific process)*, and problem solving *(problem solving*).

Based on the description above can be concluded that critical thinking is the ability to think that has a top-level category tinggi. Oleh therefore to develop the critical

thinking skills necessary exercises are used to direct the students' critical thinking patterns.

While based on research conducted Rohendrayat ([13]; 1991) focuses on relationships critical thinking and interest in student learning affects students' mathematics learning outcomes. The experimental results show the critical thinking and interest in learning the high or low will relate to the learning outcomes obtained. This means also that the students 'critical thinking skills and interest in student learning can define and contribute significantly to the results of students' mathematics learning.

2. Research Methodology

The method used in this study is an experiment with the design of *treatment by level 2 x*2,Variables consist of a dependent variable, which is the result of studying mathematics and two independent variables namely learning as a model variable treatment and critical thinking skills as variable attributes. As for the students' learning interest as variable covariate. Variable learning model consists of consists of models *Contextual Teaching and Learning* (CTL) and variable conventional. while model of critical thinking skills are divided on critical thinking skills and an ability to think critically low.

Experimental design study are presented in the form of a constellation of research so as to give an idea to test the effectiveness of the treatment in experimental. next, research constellation can be shown in Table 2 below.

Table 2. Experimental design (Design *treatment by level 2 x 2)*

learning model (B)	The ability of Critical Thinking (A)	
	Height (A1)	Low (A2)
Model CTL (B1)	$(X, Y)_{11k}$ K = 1, 2, .. n_{11} $(A_1)(B1)$	$(X, Y)_{21K}$ K = 1, 2, .. n_{21} $(A_2)(B1)$
Conventional Model (B2)	$(X, Y)_{12k}$ K = 1, 2, .. n_{12} $(A_1)(B2)$	$(X, Y)_{22k}$ K = 1, 2 ,. n_{22} $(A_2)(B2)$

Description:
$_{(A-1)}$:The group of students who have the ability to think critically high
(A_2):The group of students who have the ability to think critically low
(B_1):Group of students by learning CTL
(B_2):The group of conventional learning sis wayang.

2.1. Data Collection Techniques

Collecting data using test instruments and non test. Pretest and posttest form shaped data interval as obtained from direct measurements and have intervals consistent. Based on any number of indicators that describe the KD, the obtained matters, both pretest and posttest in the form of multiple choice as well essay. Tingkat difficulty in preparing customized items the realm of learning outcomes contained in any indicator. Scoring done with a weighted scoring criteria according to the degree of difficulty of each item.

2.2. Data Analysis Techniques

Data analysis technique is done with the test for normality and homogeneity test. *Normality test is done* to determine whether the samples come from normal distributed population or not. Normality test is done using a parametric assessment of average and standard deviation, then to test for normality in nonparametric test was used Lilliefors.

To accept or reject the null hypothesis (H_o) then the value of L_o than the critical value of L is taken from the table list Lilliefors the real level $\bar{\alpha}$ selected. The criterion is reject the null hypothesis that the population is normally distributed if $L_0 \geq L_{tables}$. ([8]: 466-467)

Homogeneity Test study, For this there are three tests of homogeneity of variance were performed, namely: (1) Testing of the homogeneity of data result of learning mathematics in the two treatment groups, namely group A_1 and A_2.(2) Testing the homogeneity of the Mathematics learning outcomes data in the two treatment groups, namely the group B_1 and B_2.(3) Testing the homogeneity of the four groups of cells in experimental design, namely group A_1B_1 group A_2B_1,group A_1 B_2,and the group A_2 B2.

2.3. Analysis of Covariance (Anacova)

To test the research hypothesis proposed in this research is using analysis of covariance (Anacova) at a very significant level $\bar{\alpha}$ = 0.01 and / or $\bar{\alpha}$ = 0.05. Popham and Sirotnik James ([11] 1967: 212) explains that the analysis of covariance allows one to test the average difference between two or more groups while offsetting the difference early / first (H0) between groups with respect to the relevant variables thus improving the precision of the statistical test.

Meanwhile, according to Kadir ([9]: 238) that the core of the use Anacova is the use of linear regression models for the effects of uncontrolled variables commonly called variable to variable independent covariates.

For Anacova there is an assumption that must be met in addition to the assumptions of normality and homogeneity of variance, ie the regression linearity test performed by the test squares ([8]: 315), and the regression coefficient homogeneity test carried out by using F test (Sudjana [15], 1991; 315). Results are expected to show the interaction between learning method with the critical thinking skills of learners. If the test results show the interaction, the analysis continued with *Tukey's test* or *Scheffe's* test. ([10]: 432)

3. Results and Discussion

In this chapter presented two kinds of analysis, namely the statistical analysis of descriptive and inferential statistical analysis results. Math student learning outcomes data obtained from tests or question. Data interest in mathematics learning obtained from the results of questionnaires (questionnaire).

3.1. Results Analysis Data Description

Descriptive statistical analysis performed to present the result of students' mathematics learning derived from the treatment of learning methods and attributes of critical thinking and learning mathematics student interest scores obtained from the questionnaires.

Table 3. Summary of Scores Interest in Learning and Learning Outcomes Mathematics Students at All Group

AB		A_1		A_2		Total	
		x	Y	X	Y	x	Y
B1	N	10	10	10	10	20	20
	Mean	173.10	16.80	187.80	15.10	180, 45	15.95
	S	3.31	3.74	2.49	3.60	8.06	3.68
	Min	168		9183		9168	9
	Max	178	2222	192		192	22
B2	N	10	10	10	10	20	20
	Mean	186.90	15, 18		15.80	40	15.60
	S	2.56	2.76	1.55	2.15	5.58	2.41
	Min	181	11	173	13	173	11
	Max	190	18	179	19	190	19
Total	N	20	20 20		20	40	40
	Mean	182.30	16.10		15.45	180.00	15.78
	S	7.64	3.28	5.99	2.91	6.88	3.08
	Min	168		9173		9168	9
	Max	190	22	192	22	192	22

Notes:

X: Score interest in mathematics learning
Y: Score results of students' mathematics learning
A1: Group of students by learning CTL
A2: the group of students who were given conventional learning
B1: the group of students who have the ability to think high critical
B2: the group of students who have the ability to think critically low

3.2. Testing Requirements Analysis

1. Normality Test

Testing normality of the data in the study in i do against eight groups of data, namely (Y_{A1}) the results of students 'mathematics learning a given learning CTL, (Y_{A2}) the results of students' mathematics learning given conventional learning, (Y_{B1}) learning outcomes of students who have the ability to think critically high, (Y_{B2}) the results of students' mathematics learning which have the ability to think critically low, (Y_{A1B1}) the results of students' mathematics learning a given learning CTL have the ability to think critically high, (Y_{A2B1}) the results of students' mathematics learning given conventional learning that has the ability to think critically high, (Y_{A1B2}) mathematics learning outcomes of students who are given learning CTL have the ability to think critically low, (Y_{A2B2}) mathematics learning result given conventional learning that has the ability to think critically low. The hypothesis for normality test: test criteria is if $L_{count}<L_{table}$ with $\alpha = 0.05$, then$_{H0}$ accepted which means that the sample comes from a population of normal distribution.

Table 4. Summary of Results Calculation Data Normality Test Research

Group	Results Math	$L_{arithmetic}$	L_{table} ($\alpha = 0.05$)	Conclusion
1	Y_{A1}	0.1064	0.190	Normal
2	Y_{A2}	0.1096	0.190	Normal
3	Y_{B1}	0.0981	0.190	Normal
4	Y_{B2}	0.1190	0.190	Normal
5	Y_{A1B1}	0.0949	0.258	Normal
6	Y_{A2B1}	0.1120	0.258	Normal
7	Y_{A1B2}	0.1736	0.258	Normal
8	Y_{A2B2}	0.1443	0.258	Normal

Based on the results of the normality test calculations for all group values obtained $L_{count}<L_{table}$ at significant level $\alpha = 0.05$, so there is no reason for rejecting H_0.This indicates that the entire group of data in this study come from distributed population normal. Lilliefors results test calculation can be seen in the Table 4.

2. Homogeneity of Variance test

In this study using Bartlett test at level $\alpha = 0:05$. Homogeneity test is performed to determine whether the population variance is homogeneous or not. Bartlett homogeneity test using *Microsoft* Excel.

a. Test Homogeneity of Variance Student Groups Marked Learning CTL (A_1) and a group of students were given the Learning Conventional (A2)

Hypothesis test:

$H_{0:}$ $\sigma^2_{A1} = \sigma^2_{A2}$

$H_{1:}$ not H_0

Based on the calculation above found that $^2_{count} = 1.27$ smaller than$^2_{tables} = 3.03$, then$_{H0}$ is accepted. That is the result of students' mathematics learning of the two treatment groups have the same variance (homogeneous).

b. Test Homogeneity of Variance Group of Students Who Have Capability Critical Thinking High (B_1)and Group Employees Who Have Thinking Skills Critical Low (B2)

These hypotheses were tested:

$H_{0:}$ $\sigma^2_{B1} = \sigma^2_{B2}$

$H_{1:}$ not H_0

Based The above calculation results showed that $^2_{count}$ = 2,32 smaller than $^2_{tables} = 3.03$, then $H_{0\ is}$ rejected. This means that students' mathematics learning outcomes of both groups have the same variance attribute (homogeneous).

c. Variance Homogeneity Test Data Group YA1B1,Y_{A1B2}YA2B1,Y_{A2B2}

Hypotheses were tested:

$H_{0:}$ $\sigma^2Y_{A1B1} = \sigma^2Y_{A1B2} = \sigma^2Y_{A2B1} = \sigma^2Y_{A2B2}$

$H_{1:}$ not H_0

From the above calculation results showed that $^2_{count}$ = 3.59, less than $^2_{table}$ = 7,82, then H_0 accepted. That is the result of students' mathematics learning of the four groups of data have the same variance (homogeneous).

d. Variance Homogeneity Test Data Group XA1B1,X_{A1B2}XA2B1,X_{A2B2}

Hypotheses were tested:

$H_{0:}$ $\sigma^2X_{A1B1} = \sigma^2X_{A1B2} = \sigma^2X_{A2B1} = \sigma^2X_{A2B2}$

$H_{1:}$ not H_0

From the above calculation results showed that $^2_{count}$ = 4.76 is smaller than $^2_{table}$ = 7,82, then H_0 accepted. This means that interest in mathematics learning of the four groups of data have the same variance (homogeneous).

3. Testing Linearity Regression of Y on X

Testing linearity Y Regression on X done through SPSS as the Table 5.

Testing criteria is received H_0 when the probability value (sig.) *Deviation from Linearity* greater than the significance level (α) of 0.05. Hypotheses for linearity test:

H0: $Y = \beta_0 + \beta_1X$ (linear regression model)

H1: $\hat{Y} \neq \beta_0 + \beta_1X$ (not a linear regression model).

Based on the table above the value probability (sig.) *Deviation from Linearity* (0.325> 0.05), so the regression of Y on X is linear. With regresion equation model is: y = 14.76 + 0,01X.

Table 5. Linearity Test Results Regression of Y on X

			Sum of Squares	Df	Mean Square	F	Sig.
Y * X	Between Groups	193.92510.207		19	(Combined)		1.166,367,
		Linearity	058	1,		058,007,	936
		Deviation from Linearity	193.867	18	10.770	1,231,	325
	Within Groups		175.050	20	8.752		
	Total		368.975	39			

4. Alignment Test Line

Based on the model Anacova (3.1a) using univariate GLM procedure (design AB x ABX) through SPSS will present the results of testing the alignment of the linear regression line as follows.

Table 6. Summary of Results of Testing of alignment lines

Source	Type ll Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	127,917[a]	7	18,274	2,426	0,041
Intercept	57,039	1	57,039	7,572	0,010
A * B	2,162	3	0,721	0,096	0,962
X	75,162	1	75,162	9,978	0,003
A * B * X	1,961	3	0,654	0,087	0,967
Error	241,058	32	7,533		
Total	10323	40			
Corrected Total	368,972	39			

In this model to test the hypothesis as follows.

$H_{0:}$ $\beta_1 = \beta_2 = \beta_3 = \beta_4$

$H_{1:}$ Not H_0.

According to the Table 6 shows the calculation results F_{count} = 0.087. $F_{table\ (0,05,3:\ 32)}$ = 2.90, so that F_{count} is smaller than $F_{table,}$or a probability value (sig.) 0.967> 0.05. This means that H_0 is received. The fourth conclusion is parallel or fourth line is *slopes* not significantly differents that used analysis of covariance. In other words, the influence of the linear interest in learning (X) to the result of learning mathematics (Y) had no significant difference among the four groups of students formed by the methods of learning and critical thinking. Thereby supporting the implementation of the model of analysis of covariance (Anacova).

Analysis of the data by applying the GLM Univariate procedure as models 2.3.B above will directly present the results of the regression model analysis. From the results of data analysis obtained, obtained the regression equation:

Y = 79,14825,169 [A = 1] * [B = 1] 55.860 [A = 1] * [B = 2] 14.514 [A = 2] [B = 1] +, 537X + 0.163 [A = 1] * [B = 1] * X + 0.268 [A = 1] * [B = 2] * X + 0.042 [A = 2] [B = 1] X.

Based on the regression equation above, which shows the *intercepts* fourth parallel lines corresponding to the Y-axis as follows.

Table 7. Regression Equations Functions in Each Group of

No.	Group	Function Regression Equations
1	A_1B_1	$\hat{Y}_{11}$ = -104.32 + 0,70X_{11}
2	A_2B_1	$\hat{Y}_{21}$ = -93.66 + 0,58X_{21}
3	A_1B_2	$\hat{Y}_{12}$ = -135.01 + 0,81X_{12}
4	A_2B_2	$\hat{Y}_{22}$ = -79.15 + 0.54x_{22}

Table 8. Summary of Results Anacova with Test Results Mean Difference F About Math (Y) After a Controlling Interest in Learning (X)

Variance Sumber	Dk	JK_{yres}	RJK	F_{count}	F_{table}	
					α = 0.05	α = 0.01
Antar A	1	40.33	40.33	11.25**	4.12	7.42
Inter B	1	15.77	15.77	4.40 *	4.12	7.42
Interaction	1	120.06	120.06	33.50**	4.12	7.42
in D	35	125.45	3.58	-		
Total	38	261.28	6.88	-		

Note:

* =significant at α = 0.05

** =Very significant at α = 0.01

A =the learning model

B =Thinking critical

db = degrees of freedom

JK_{yres} =number of squared residuals

RJK =Average number of squares

3.3. Hypothesis Testing

Hypothesis testing is done by the engineering research analysis of covariance (Anacova), which aims to determine the effect of model of learning and critical thinking as well as the interaction effect on mathematics learning outcomes, after controlling for the influence of students' interest in learning mathematics. Results Anacova was then followed by t-test to determine the

difference in average mathematics learning outcomes established by the model of learning and critical thinking after controlling interest in student learning. With using Anacova table obtained results of the analysis as shown in the table.

Based on the analysis presented in the Table 8 can be explained as follows.

1. Differences Between Student Learning Outcomes Mathematics by CTL and Student Learning Learning Given Conventional Once Controlling Interest in Learning Mathematical

Statistical Hypotheses 1 as follows.

H0: $\mu_{res\ (A1)} < M_{res\ (A2)}$

H1: $\mu_{res}\ (A1) > \mu_{res\ (A2)}$

The results of the analysis of hypothesis testing 1 shows that $H_{0\ is}$ rejected by Test-F, rows A to F_{count} = 11.25 is greater than $F_{table\ (0.05;\ 1\ :\ 35)}$ = 4.12. Thus it can be concluded that there are differences in outcomes between the groups of students learn math by learning CTL with a group of students who were given conventional learning after controlling interest in learning mathematics.

To find out which group is higher can be seen from the mean value tare corrected both groups. In the group of students learning by CTL, the average mathematics learning outcomes corrected by 16.89 while a group of students who were given conventional learning at 14.66. The calculations show that mathematics learning outcomes between groups of students by learning CTL higher than the group of students who were given conventional learning after controlling interest in learning mathematics.

2. Differences Between Mathematics Learning Outcomes Students Have High Critical Thinking Skills and Students Who Have Low Critical Thinking Skills After Controlling Interest in Learning Mathematics

Statistical Hypothesis 2 as follows.

H0: $\mu_{res\ (B1)} < M_{res\ (B2)}$

H1: $\mu_{res}\ (B1) > \mu_{res\ (B2)}$

The results of the analysis of hypothesis testing 2 shows that $H_{0\ is}$ rejected by Test-F, row B with F_{count} = 4.40 is greater than $F_{table\ (0.05,\ 1,\ 35)}$ = 4.12. Thus it can be concluded that there are differences in mathematics learning outcomes between groups of students who have high critical thinking skills with a group of students who have the ability to think critically low after controlling interest in learning mathematics.

To find out which group is higher can be seen from the mean value tare corrected both groups. In the group of students who have the ability to think critically high, average mathematics learning outcomes corrected by 16.43 while the group of students who have the ability to think critically low 15.12. The calculations show that mathematics learning outcomes between groups of students who have high critical thinking skills better than the group of students who have the ability to think critically low after controlling interest in learning mathematics.

3. Effect of Interaction Between Learning Model and Critical Thinking Students Against Mathematics Learning Outcomes After Controlling Interest in Learning Mathematical

Statistical Hypotheses 3 as follows.

H0: Int. A x B = 0

H1: lnt. A x B ≠ 0.

The results of hypothesis testing analysis 3 showed that $H_{0\ is}$ rejected by Test statistic F, line interaction F_{count} = 33.50 is greater than $F_{table\ (0.05,\ 1,\ 35)}$ = 4.12. Thus it can be concluded that there are significant interaction between models of learning and critical thinking to students' mathematics learning outcomes after controlling interest in learning mathematics.

With tested these interactions, we then need to do a further test. A further test is intended to find out: (1) differences in learning outcomes by teaching mathematics and conventional CTL specifically for groups of students who have high critical thinking skills; (2) differences in mathematics learning outcomes by CTL and conventional learning specific to the group of students who have the ability to think critically low; (3) differences in mathematics learning outcomes that have the critical thinking skills of high and low specific to groups of students by learning CTL; (4) differences in mathematics learning outcomes that have the critical thinking skills of high and low specific to a group of students who were given conventional learning.

Table 9. Summary of Results Calculation Advanced Test After Controlling Interest in Learning Mathematics

No	comparison group	Dk	t	t_{table}	
				α = 0.05	α = 0.01
1	A_1B_1 with A_2B_1	35	13.86 **	1.69	2,44
2	A_1B_2 with A_2B_2	35	8,62 **	1,69	2,44
3	A_1B_1 with A_1B_2	35	12,79 **	1,69	2,44
4	A_2B_1 with A_2B_2	35	9,69 **	1,69	2,44

Description:

** =Very significant

A_1B_1 =Result learn student mathematics learning given CTL have the ability to think critically high after controlling interest in learning mathematics

A_2B_1 =Result mathematics learning students were given conventional learning that has the ability to think critically high after controlling interest in learning mathematics

A_1B_2 =Result mathematics learning a given learning CTL have the ability to think critically low after controlling interest in learning mathematics

A_2B_2 =Results of mathematics learning that given the conventional learning that has the ability to think kritis lower after controlling interest in learning mathematics

4. Mathematics Learning Outcomes Differences Between Student Groups Marked CTL and Conventional Learning Especially for the group Students Have High Critical Thinking Skills After Controlling Interest in Learning Mathematical

Statistical Hypothesis 4 as follows.

H0: $\mu_{res\ (A1B1)} < M_{res\ (A2B1)}$

H1: $\mu_{res}\ (A1B1) > \mu_{res\ (A2B1)}$

The results of the analysis of hypothesis testing 4 shows that $H_{0\ is}$ rejected based on the statistical t test, value.$_t$ = 13.86. The value is greater than $t_{table\ (0.05;\ 35)}$ = 1.69. Thus it can be concluded that for a group of students who have the ability to think critically high, there are differences in outcomes between the groups of students learn math by learning by CTL and conventional learning after controling interest in learning mathematics.

To find out which group is higher can be seen from the average value of corrected both groups. In the group of

students who have high critical thinking skills, learning outcomes of students by learning mathematics has an average CTL corrected by 22.30. While the results of the study group of students who were given conventional instructional corrected averaged 10.56. The calculations show that for a group of students who have high critical thinking skills, mathematics learning outcomes between groups of students by learning CTL higher than the group of students who were given conventional learning after controlling interest in learning mathematics.

5. Differences Between Mathematics Learning Outcomes Student Groups Marked CTL and Conventional Learning Special for Group Students Have Low Critical Thinking Skills After Controlling Interest in Learning Mathematical

Statistical Hypotheses 5 as follows.

H0: $\mu_{res\ (A1B2)} \geq M_{res\ (A2B2)}$

H1: $\mu_{res\ (A1B2)} < \mu_{res\ (A2B2)}$

The results of hypothesis testing analysis 5 shows that $H_{0\ is}$ rejected based on the statistical t test, value.$_t$ = 8.62 The value is greater than $t_{table\ (0.05;\ 35)}$ = 1.69. Thus it can be concluded that for a group of students who have the ability to think critically low, there are differences in outcomes between the groups of students learn math by learning by CTL and conventional learning after controlling interest in learning mathematics.

To find out which group is higher can be seen from the average value of corrected both groups. In the group of students who have the ability to think critically low, the result of students' mathematics learning by learning CTL having an average corrected 11.47. While the results of the study group of students who were given conventional corrected instructional averaged 18.77. The calculations show that for a group of students who have the ability to think critically low, the results between groups of students learn math by learning CTL lower than the group of students who were given conventional learning after controlling interest in learning mathematics.

6. Differences Between Mathematics Learning Outcomes Group Students Have High and Low Thinking Skills For Learning Student Groups Marked CTL Having Controlling Interest in Learning Mathematical

Statistical Hypotheses 6 as follows.

H0: $\mu_{res\ (A1B1)} < M_{res\ (A1B2)}$

H1: $\mu_{res}\ (A1B1) > \mu_{res\ (A1B2)}$.

The results of the analysis of hypothesis testing 6 shows that $H_{0\ is}$ rejected based on the statistical t test, value.$_t$ = 12.79. The value is greater than $t_{table\ (0.05;\ 35)}$ = 1.69. Thus it can be concluded that for a given group of students learning CTL, there are differences in mathematics learning outcomes between groups of students who have high critical thinking skills and who has the ability to think critically low after controlling interest in learning mathematics.

To find out which group is higher can be seen from the average value of corrected both groups. In the group of students who were given a CTL learning, mathematics learning outcomes of students who have the ability to think critically have an average height corrected by 22.30. While the results of the study group of students who have the ability to think critically low averaged 11.47 corrected. The calculations show that for a group of students who were given a CTL learning, mathematics learning outcomes between groups of students who have high critical thinking skills better than the group of students who have the ability to think critically low after controlling interest in learning mathematics.

7. Differences Between Mathematics Learning Outcomes Group Students Critical Thinking Skills Has High and Low For Learning Student Groups Marked Conventional Once Controlling Interest in Learning Mathematical

Statistical Hypotheses 7 as follows.

H0: $\mu_{res\ (A2B1)} \geq M_{res\ (A2B2)}$

H1: $\mu_{res\ (A2B1)} < \mu_{res\ (A2B2)}$

The results of the analysis of hypothesis testing 7 shows that $H_{0\ is}$ rejected based on the statistical t test, value.$_t$ = 9.69 The value is greater than $t_{table\ (0.05;\ 35)}$ = 1.69. Thus it can be concluded that for a group of students who were given conventional learning, there are differences in mathematics learning outcomes between groups of students who have high critical thinking skills and who has the ability to think critically low after controlling interest in learning mathematics.

To find out which group is higher can be seen from the average value of corrected both groups. In the group of students who were given conventional learning, mathematics learning outcomes of students who have the ability to think critically have an average height corrected by 10.56. While the results of the study group of students who have the ability to think critically low averaged 18.77 corrected. The calculations show that for a group of students who were given conventional learning, mathematics learning achievement between groups of students who have high critical thinking ability is lower than the group of students who have the ability to think critically low after controlling interest in learning mathematics.

4. Discussion

Based on the analysis of covariance of two lanes on the first line (Between A) found that F_{count} larger than F_{table} (F_{count} = 11.35> $F_{table\ (0.01)\ (1;\ 35)}$ = 7.42). It shows that the results of students' mathematics learning there are significant differences between the teaching given by CTL with conventional learning after controlling interest in mathematics learning. This difference is shown by the average value of students' mathematics learning outcomes corrected by learning CTL by 16.89 and mathematics learning outcomes of students who were given conventional learning at 14.66.

T-test results on the students who have the ability to think critically high, the value of$_t$ = 13.86 is greater than $t_{table\ (0.01,\ 35)}$ = 2.44. This means that there are differences in students' mathematics learning outcomes by CTL and learning by conventional teaching to groups of students who have the ability to think critically high. It can be concluded that the mathematics learning outcomes of students who have high critical thinking ability, the group of students who were given a lesson CTL higher than the group of students who were given conventional learning after controlling interest in learning mathematics (22.30> 10.56).

T-test results on the students who have the ability to think critically low, the value of$_t$ = 8.62 is greater than

$t_{table\ (0.01,\ 35)}$ = 2.44. This means that there are differences in students' mathematics learning outcomes by CTL and learning by conventional teaching to groups of students who have the ability to think critically low. It can be concluded that the mathematics learning outcomes of students who have the ability to think critically low, the group of students who were given a lesson CTL lower than a group of students who were given conventional learning after controlling interest in learning mathematics (11.47 <18.77).

T-test results on student learning by CTL, the value of$_t$ = 12.79 is greater than $t_{table\ (0.01,\ 35)}$ = 2.44. While the t-test results on the students who were given conventional learning, the value of$_t$ = 9.69 is greater than $t_{table\ (0.01,\ 35)}$ = 2.44. This means that there are differences in mathematics learning outcomes of students who have high critical thinking skills and who have a low critical thinking skills by learning *CTL* With conventional learning.

5. Conclusions and Implications

5.1. Conclusion

First, there is a significant interaction effect between critical thinking ability of students with learning model towards mathematics learning outcomes after controlling interest in mathematics learning.

Second, for a group of students who have the ability to think critically low, the result of students' mathematics learning taught learning model CTL lower than groups of students taught by conventional learning models.

Third, for a group that has a higher critical thinking skills, students' mathematics learning outcomes between groups of students taught by CTL higher learning models of groups of students taught by conventional models, after controlling for student interest.

Fourth, for groups of students who are taught by CTL learning model, students' mathematics learning outcomes between groups of students who have the ability to think critically low is lower than the group of students who have high critical thinking skills after controlling for initial ability of students.

Fifth, to groups of students taught by conventional learning model, students' mathematics learning outcomes between groups of students who have high critical thinking ability higher than the group of students who have the ability to think with critically low.

5.2. Implications

As a follow up of this study, presented some research implications as follows.

First, the mathematics learning outcomes group of students who have the ability to think critically low is lower than in the group of students who have high critical thinking skills, after controlling interest in mathematics learning ability. This has implications on the reliable hypotheses have been proposed, so that there is an effort to improve mathematics student learning outcomes. For improve mathematics learning outcomes, teachers may have students' critical thinking skills. However, from the research findings, the use of critical thinking skills of students in mathematics preferably on topics of mathematics which enable can be given through the learning model CTL, so that teachers can familiarize students to solve problems that related with the material being taught, so students are more accustomed to looking for answers matter through discussions in teaching and teachers can improve learning process as well as to improve students' mathematics learning outcomes overall.

Second, the results of this study indicate that the results of studying mathematics taught groups of students with learning model CTL higher in the group of students studying mathematics taught by conventional learning models, after controlling interest student. With in the study implies that this model needs more widely used and developed in a learning mathematics. with CTL applying the learning model they are already able students are stimulated to be recalled.

Third, based on the results of this study indicate that it turns critical thinking skills have a significant influence on learning outcomes of vocational high school students of eleventh grade. As the implications of these conclusions, the efforts to improve mathematics learning outcomes can be reached by improving students' critical thinking skills and learning model in math learning so as to improve the learning process and learning outcomes of mathematics. In addition jug expected to Vocational High School teachers, especially the class XI to be able to apply the learning model CTL with high critical thinking skills in mathematics learning in order to improve mathematics learning outcomes.

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