EFFECTIVENESS OF IT AS POST PROBLEM MODEL ON STUDENT CRITICAL THINKING ABILITY IN SMA GEOGRAPHY LESSONS

Zulkarnain [1] , Listumbinang Halengkara [2] ,Fania Dwi Silvi [3]

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Correspondent affliation :

1. Geography Education, Fakultas Keguruan dan Ilmu Pendidikan, University of Lmapung , Bandar Lampung, Indonesia;
2. Geography Education, Fakultas Keguruan dan Ilmu Pendidikan, University of Lmapung , Bandar Lampung, Indonesia
3. Geography Education, Fakultas Keguruan dan Ilmu Pendidikan, University of Lmapung , Bandar Lampung, Indonesia

Correspondent email:
zulkarnain.1960@fkip.unila.ac.id ; listumbinang.halengkara@fkip.unila.ac.id; faniadwi4024@gmail.com

ABSTRACT

This research aims to analyze (1) the differences of students critical thinking skills using problem posing models and conventional models, (2) the differences of students critical thinking skills before and after using problem posing models and conventional models, and (3) the effectiveness of the problem posing model towards students critical thinking skills of geography subject in XI Social Science class of SMAN 13 Bandar Lampung. This research uses quasi-experimental with cross design. The subjects of this research are students in XI Social Science class of SMAN 13 Bandar Lampung. Data collection techniques in this research use tests and documentation, while data analysis techniques that are used in this research are Two Way Variants (ANOVA), and Effect Size. The results indicate that there are differences in students' critical thinking skills after studying with problem posing models and conventional models. The differences are tested by two way variance analysis and the result of sig value is 0.009 <0 , 05 . The result also indicates that the problem posing model is more effective for improv students critical thinking skills of geography subjects in XI Social Science class of SMAN 13 Bandar Lampung.

Penelitian ini bertujuan untuk menganalisis (1) Perbedaan kemampuan berpikir kritis siswa menggunakan model problem posing dengan model konvensional, (2) Perbedaan kemampuan berpikir kritis siswa sebelum dan sesudah menggunakan model problem posing dengan model konvensional, dan (3) Efektivitas model problem posing terhadap kemampuan berpikir kritis siswa pada mata pelajaran geografi kelas XI IPS SMA Negeri 13 Bandar Lampung. Penelitian ini menggunakan eksperimen semu dengan desain cross. Subjek penelitian ini adalah siswa kelas XI IPS SMA Negeri 13 Bandar Lampung. Teknik pengumpulan data dalam penelitian menggunakan tes dan dokumentasi, sedangkan teknik analisis data yang digunakan dalam penelitian ini adalah Varian Dua Jalan (ANOVA), dan Effect Size. Hasil penelitian menunjukkan bahwa terdapat perbedaan kemampuan berpikir kritis siswa setelah belajar dengan model problem posing dan model konvensional. Perbedaan diuji dengan analisis varian dua jalan dan hasil nilai sig. adalah 0,009<0,05. Hasil penelitian juga menunjukkan bahwa model problem posing lebih efektif untuk meningkatkan kemampuan berpikir kritis siswa pada mata pelajaran geografi kelas XI IPS SMAN 13 Bandar Lampung.

Introduction

Knowledge of teaching methods or current teaching methodology problems is very important for teachers or prospective teachers. In connection with this Winarno Surakhmad (Suryosubroto, 2009: 140) ask - right that teaching methods are ways of implementation rather than the teaching process, or something about how technical study materials given to students at the school. Likewise in the field of teaching in schools. Educators (teachers) always try to choose the exact teaching method or approach, which is seen as

more effective than other methods so that the skills and knowledge provided by the teacher are truly owned by the student.

The right and good learning approach is able to provide an active learning process achievement so that good results will be achieved. In order to achieve these objectives a learning atmosphere is needed that is able to foster students' knowledge and skills as well as fun, so that it does not seem monotonous, boring, bored, or even unattractive. The importance of mastering the material and the learning strategy planner in accordance with the learning objectives for educators (teachers) in order to develop critical thinking skills for a student about how to interact with information to gain knowledge, develop communication skills, and find solutions to solve a problem.

In connection with the demands for improving the quality of intellectual human resources and critical thinking through education, it is necessary to increase the mastery of knowledge in various subjects at every level of education, one of them on the subject of geography. The learning process of geography should be able to equip students to think logically, analytically, systematically, synthetically, critically, creatively and be able to solve actual problems. One approach that allows students to learn optimally is the *problem posing* model . This is supported by the opinion of Suryosubroto (2009: 203) that the *problem posing* learning model is an approach to learning that can motivate students to think critically as well as dialogically, creatively, and interactively as outlined in the form of questions.

The superiority of the problem posing learning model compared to other learning models according to Thobroni and Mustofa (2012: 349) is in solving problems, where students can actively participate in learning activities, educating students to think systematically, students are not easily discouraged in facing difficulties , able to find various ways of the difficulties faced, able to bring its own satisfaction for students if the questions are made unable to be solved by other groups, students will be skilled at solving problems about the material being taught, students have the opportunity to show their abilities to other groups, students look for and find information or data to be processed into concepts, principles, theories, or conclusions, and students can also develop critical thinking skills. The weaknesses of the problem posing model from other learning models are, it requires considerable amount of time, cannot be used in the lower class, and not all students are skilled in asking questions (Thobroni and Mustofa, 2012: 349). Weaknesses of this problem posing learning model can be overcome by limiting students' time in formulating questions and answers in the learning process, providing additional hours of learning that do not burden students, and training students continuously to encourage themselves in asking questions so that it will increase confidence self.

Based on the results of pre-research conducted at SMA Negeri 13 Bandar Lampung, information is obtained that in the use of learning models that are not in accordance with the material that will be delivered by educators, most students have not fully participated actively in the learning process of Geography, student activities only listen and record what is said by the teacher. The answers given by students are only limited to memorizing the memory, without having a fundamental concept. Likewise, in asking questions and opinions, only a small proportion of students showed active questions and opinions. Most of the other students are still shy, afraid, and hesitant to ask their questions or opinions. This is known through the results of the Odd Semester Midterm (UTS) in the geography subjects of Class XI IPS at SMA Negeri 13 Bandar Lampung, showing that student grades are still not good enough in answering critical thinking questions. The low ability of students in critical thinking which only amounted to 26.19% of 42 students or as many as 11 students who were able to answer correctly on questions with levels of analytical thinking (C4).

One reason for the low ability of students' critical thinking is thought to be because during the learning process there are still many students who tend not to pay attention to the teacher during learning. In addition, when teachers ask questions about material that is not yet understood so students can ask the teacher directly but students tend to be quiet and say that they understand, and the selection of learning models that are not in accordance with the material presented and the use of learning models that have not led to improvement students' critical thinking skills.The application of the *problem posing* model will be applied to Social Sciences class XI Bandar Lampung 13 in order to improve students' critical thinking skills on the subject matter that will be delivered on Food Security, Industry, New and Renewable Energy . Basic Competence (KD) to be carried out is to analyze food security, industry, new and renewable energy. The purpose of this study was to analyze differences in students' critical thinking skills in social studies subjects in class XI IPS in SMA Negeri 13 Bandar Lampung using the problem posing model and using the lecture method. Analyzing the difference in the level of high critical thinking skills, and low students after being taught using the problem posing learning model with the lecture method. As well as analyzing whether the

problem posing learning model is effective in improving students' critical thinking skills in geography subjects in class XI IPS in SMA Negeri 13 Bandar Lampung.

Method

The method used in this research is quasi-experimental research method (*quasi experiment*). The research used is a *cross* system . This *cross* system of the two classes used as the research class both received the same treatment by conducting 2 *post-test* activities . The population in this study were all social studies class X SMA negeri 13 Bandar Lampung in the odd semester of the 2019/2020 school year of two classes XI IPS 1 and XI IPS 2,each class consisting of 21 students.Variables used in this research is the learning model *problem posing* (X_1) and methods Lecture (X_2) and Bound Variables (*Dependent*), namely the ability to think critically (Y). data collection techniques using tests that are used to measure students' critical thinking skills on geography material that has been studied namely Food Security, Industry, New and Renewable Energy; and d okumentasi who used to take the form of data written to the SMA Negeri 13 Bandar Lampung, such as the names of learners, school profiles, a list of learning outcomes of students, and other things needed in research.

The instrument requirements test consists of validity tests that are used to indicate the validity or validity of an instrument , the reliability test is used to produce reliable data , the difficulty level test, and the difference power analysis. The following are the results of the calculation of the instrument tests that have been carried out:

1. **Validity test**
   The results of the calculation of 15 test instrument test essay items that have been tested on 30 students indicate that there are 5 item test items that have valid criteria while those who have invalid criteria are 10 test questions.
2. **Reliability Test**
   The result of the calculation shows that the test has a reliability index of 0.4182. The coefficient of r table is 0.361, so the test is declared reliable and feasible to use to retrieve data.
3. **Difficulty Test**
   Difficulty test calculation results can be seen that of the 15 essay items, obtained 9 questions in the easy category, then 5 questions in the medium category, and 1 question in the difficult category.
4. **Difference Analysis**
   The results of the calculation of the analysis of different power are known that there are 2 questions in the very good category, 4 questions in the sufficient category, and 9 questions in the less category.

Data Analysis Requirement Techniques used are normality test, homogeneity test, and interaction test . Normality test using test *Liliefors* with the help of *Microsoft Excel* 2010. The test of homogeneity performed using Fisher test with the help of *Microsoft Excel* 2010. While the interaction test performed using *SPSS* 20 with a significant level of 5% or 0.05. The data analysis technique used to test the first and second hypotheses uses the Two Way Variance Analysis (ANOVA) test and the *Effect Size* Test . The two-way analysis of variance test was used to find out the significant level of difference between the two learning models in the category of critical thinking skills of students in class XI IPS subjects in SMA Negeri 13 Bandar Lampung. While the *Effect Size* test is used to find out how effective the *Problem Posing* learning model and lecture methods are on students' critical thinking skills.

This research was conducted at SMA Negeri 13 Bandar Lampung on October 11, 2019. The time of the learning process at SMA Negeri 13 Bandar Lampung on Monday to Friday the learning starts at 07.15 to 14.45 WIB and on Saturdays the learning starts at 07.15 to 12.00 WIB. The research was carried out every Monday, Tuesday and Thursday because the schedule of geography subjects in class XI IPS was on Monday, Tuesday and Thursday. On Monday the learning activities begin around 8.15- 9.45 West Indonesia Time and then resume on Tuesday at 14.00 - 15.30 West Indonesia Time for class XI IPS 2, while for class XI IPS 1 it is held on Monday at 10:00 - 11:30 West Indonesia Time, then resumed on Thursday at 7.15 - 8.45 West Indonesia Time during the first hour. Learning activities in each class carried out as many as 4 meetings with the division of each class get the same treatment with 2 meetings using the model problem posing and conventional methods. Having held two meetings, the next step is to give about post test 1 and the implementation of the post-test 2 held after the meeting of 3 and 4 have been executed.

Results And Discussion

Bandar Lampung 13 Public High School is one of the schools located in Jalan Harapan Karya Sinar Harapan District, Rajabasa Jaya District, Rajabasa, Bandar Lampung City. The boundaries of the Rajabasa Jaya Village are as follows:

a. East side is bordered by South Lampung.
b. The South is bordered by Ex . Tanjung Senang.
c. West side borders with Ex . Rajabasa Raya.
d. North side is bordered by South Lampung.

Based on its astronomical location, SMA Negeri 13 Bandar Lampung is located between 5o 20 '0 "and 5o 21' 30" South Latitude and 105o 14 '30 "and 105o 16' 00" East Longitude. To be more clear about the location of SMA Negeri 13 Bandar Lampung can be seen in Figure 1.. the following:

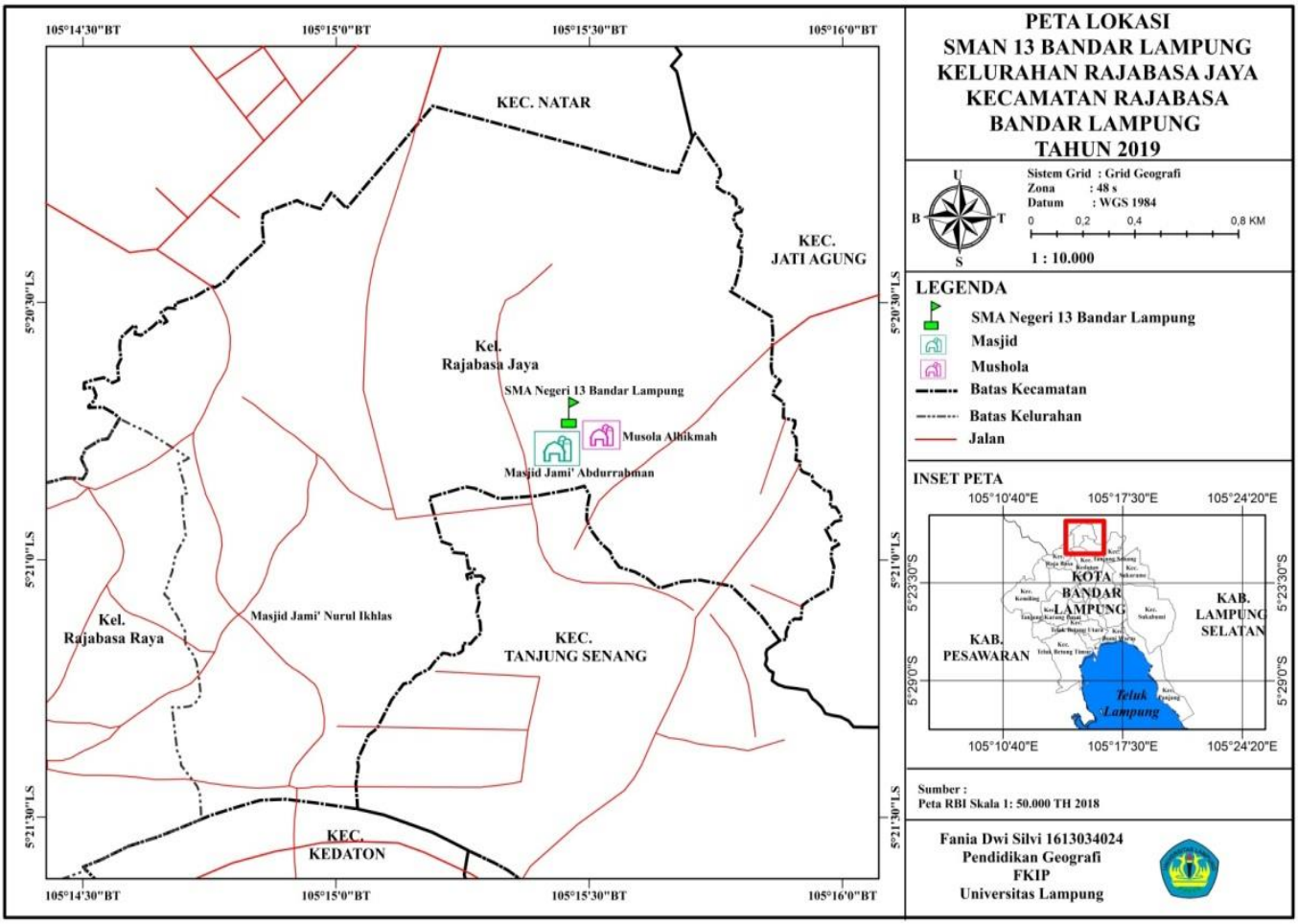


Figure 1 . Location Map of SMA Negeri 13 Bandar Lampung 2019

Prerequisites for data Analysis

Normality test

Normality test in this study used the Liliefors test (with a significant level α = 0 , 05). The following are results of normality tests using *Microsoft Excel* 2010:

Table 1 . Post 1 and Post 2 Normality Test Class XI IPS 1 and XI IPS 2

Statistics	Post Test 1		Post Test 2	
	Lecture method	Model *Posing Problem*	Model *Posing Problem*	Lecture method
N	21	21	21	21
	34.67	45	60.95	48.57
Elementary school	14,31	15.77	18.35	19.44
L_{count}	0.142	.119	.106	.116
L_{table}	.193	.193	.193	.193
Conclusion	Normal	Normal	Normal	Normal

Source: Results of Data Processing in 2019

Based on Table 1 . above it can be concluded that the large $L_{calculated}$ gives direction to the Post Test 1 and Post Test 2 data, both of which are normally distributed. Both data are said to be normally distributed because they both have a large $L_{count} < L_{table.}$

Homogeneity test is done after the data is known to have normal distribution. Homogeneity test conducted is *Fisher's* test in the significance level $\alpha = 0.05$. The following homogeneity test results using Microsoft Excel 2010:

Table 2 . Post 1 and Post 2 Homogeneity Test Class XI IPS 1 and XI IPS

Statistics	Post Test 1		Post Test 2	
	Lecture method	Model *Posing Problem*	Model *Posing Problem*	Lecture method
SD^2	249	204,83	201,43	311,19
F_{hitung}	1,21		0,65	
F_{tabel}	2,08		2,08	
Conclusion	Homogen		Homogen	Homogen

Source: Results of Data Processing in 2019

Post test 1 data results in class using the lecture method and problem posing model obtained F_{count} of 1.21 and post test 2 results obtained F_{count} of 0.65, while F_{table} of 2.08. So that the two data obtained $F_{count} < F_{table}$, obtain similarity, that is homogeneous.

Hypothesis Testing 1

The results of the analysis of hypothesis 1 testing are presented in Table 3 .

Table 3 . Hypothesis Testing Results 1

Tests of Between-Subjects Effects					
Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	13823,006 [a]	8	1727,876	73,965	.000
Intercept	113331.125	1	113331.125	4851,385	.000
KKBK	11431,978	4	2857,995	122,343	.000
MP	181,645	1	181,645	7,776	.009
KKBK * MP	209,668	3	69,889	2,992	.045
Error	770,899	33	23,361		
Total	143410,000	42			
Corrected Total	14593,905	41			
a. R Squared = .947 (Adjusted R Squared = .934)					

Source: Results of Data Processing with SPSS 2019

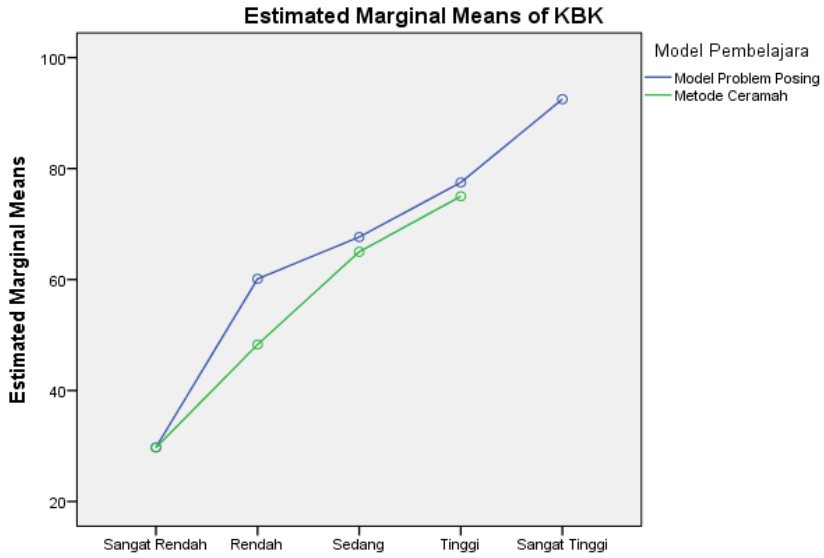
The hypothesis used is:

H_0 : There is no difference in the students' critical thinking skills in the subject of geography class XI IPS in SMAN 13 Bandar Lampung whose learning use you - right learning model *problem posing* with a lecture.

H_a : There is a difference in students' critical thinking skills in the subject of geography class XI IPS in SMA Negeri 13 Bandar Lampung whose learning uses the *problem posing* learning model with the lecture method.

Based on the Anova test results using SPSS version 20, the $_{calculated}$ F coefficient of 7.776 and F_{table} with the numerator dk 1 and the denominator 33 so that 4.14 is obtained so that the $F_{count} > F_{table}$ or 7.776> 4.14 and has a sig level. in the amount of 0.009 <0.05. So that H_0 is rejected and thank H_a meaningful adaperbedaan students' critical thinking skills in the subject of geography class XI IPS SMAN 13 Bandar Lampung whose learning using learning model *problem posing* with a lecture.

So that they can easily understand and see the difference between the distribution of the two models with critical thinking skills that have a relationship through Figure 2. *Estimated Marginal Means of* KBK as follows.



Based on Figure 2. above there are 2 lines namely the blue line showing the *problem posing* model and the green color showing the lecture method. Geographical values obtained by students after working on essay test questions are used as a benchmark in determining the level of critical thinking skills of students after treatment. The two lines in the picture intersect at very low critical thinking abilities which means that there is a significant interaction between the two.

b. Hypothesis Testing 2

The results of the analysis of hypothesis 2 testing are presented in Table 4 . Hypothesis 2 Testing Results with SPSS with the following display:

Table 4 . Hypothesis Testing Results 2

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	13823,006 [a]	8	1727,876	73,965	.000
Intercept	113331.125	1	113331.125	4851,385	.000
KKBK	11431,978	4	2857,995	122,343	.000
Error	770,899	33	23,361		
Total	143410,000	42			
Corrected Total	14593,905	41			

a. R Squared = .947 (Adjusted R Squared = .934)

Source: Results of Data Processing with SPSS 2019

The hypothesis used is:

1. H_0: There is no difference in the level of critical thinking skills of high and low student once taught use you - right model of *problem posing* with a lecture.
2. H_A: There are differences in the level of critical thinking skills of high and low student after use you taught - right model of *problem posing* with a lecture.

Based on the Anova test results using SPSS version 20, the $_{calculated}$ F coefficient of 122.334 and F_{table} with the numerator dk 4 and the denominator 33 so that 2.66 is obtained, thus $F_{count} > F_{table}$ or 122.334> 2.66 and has a level of sig. at 0,000 <0.05. So that H_0 is rejected and thank H_a.

The following is a Categorical Ability to Critical Thinking Data Diagram with very high, high, medium, low and very low categories can be seen in Figure 3. below.

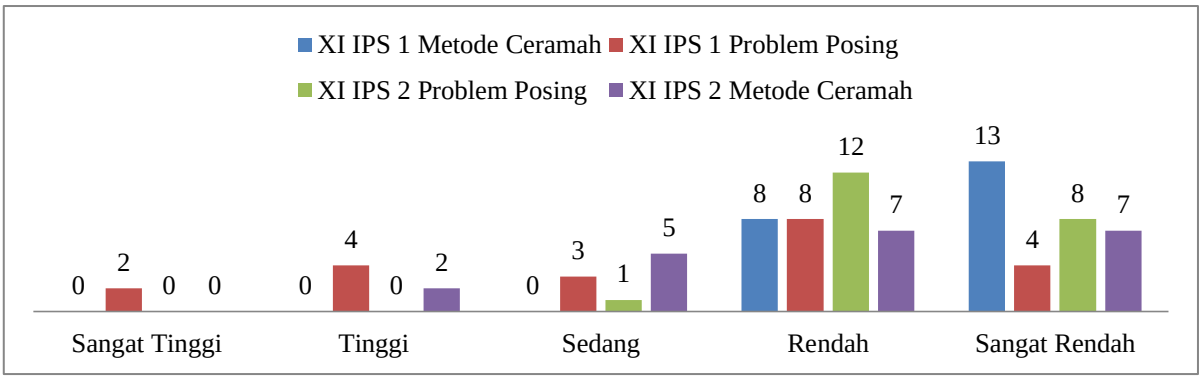


Figure 3. Category Critical Thinking Ability Class XI IPS student of SMAN 13 BDL TH 2019 .

c. Hypothesis Test 3

The results of the analysis of the *Effect Size* test to determine the effectiveness of the *problem posing* learning model on critical thinking skills. The results of the calculation of *Effect Size* Table 5 . as follows:

Table 5 . *Effect Size* Results

Class	Average Gain	Standard Deviation	*Effect Size*	Category
XI IPS 1	26,285	7,156	3.24	High
XI IPS 2	3,809	6,690		

Source: Data Processing Results Using *Excel* 2010 2019 .

The hypothesis used:

H_0: *Problem posing* learning model is not effective in improving students' critical thinking skills in class XI IPS subjects in SMA Negeri 13 Bandar Lampung.

H_a : The *problem posing* learning model is effective in enhancing students' critical thinking skills in class XI social science subjects SMA Negeri 13 Bandar Lampung.

Based on Table 5 . right that the effectiveness of the use of the learning model *Problem Posing* on the students' critical thinking skills, demonstrated the results of calculation of *Effect Size* with the value of 3.24 that the use of the model *problem posing* can be used in learning that can lead students to think critically.

There is a difference in students' critical thinking skills in the subjects of class XI IPS in SMA N 13 BDL whose learning uses the *problem posing* learning model with the lecture method

The results showed that there were differences in students' critical thinking skills in geography subjects using problem posing models with lecture methods with Fcount> Ftable or 7.776> 4.14. There were differences in the level of critical thinking of students in class XI IPS 1 and XI IPS 2 happened because of the learning model used. Class XI IPS 1 and XI IPS 2 both classes are given the same treatment.The difference in the increase in critical thinking skills is one of the causes, namely the learning model that educators use. This is in accordance with the opinion of Sujarwo (Suryosubroto, 2009: 188) problems or obstacles related to the learning process can be caused by learning components that include the ability of educators in teaching, those who are given learning material, the material being taught, the learning process (strategy, methods, teaching techniques), learning facilities and infrastructure, and the evaluation system applied.

Based on the results of the hypothesis test that has been presented in the above sub-results explained that the *problem posing* learning model is proven to be able to improve the ability to think critically higher than the lecture method. The *problem posing* learning model emphasizes the activeness of students in the learning process, while the teacher lecture method is more active in the learning process. One learning model that involves an active role in students is the *problem* posing model . The *problem posing* model according to Elaine (2009: 214) directs students to produce new ideas, be active in discussions, and be actively involved in the learning process.

Unlike the case with the lecture method, the increase in critical thinking skills that occur is not significant compared to the increase that occurs using the problem posing model. Weaknesses in the learning process of lecture methods need to be corrected so that they can have a positive impact on learning. Ag. Soeyono (Suryosubroto, 2009: 166) argues that to overcome the weaknesses contained in the lecture method, it is necessary to make improvements in the learning process such as making careful preparations before carrying out learning, providing stepping stones related to the lesson, the teacher tells the lesson material that by using assistive tools / props, giving questions that are investigative so that students will become more active in the learning process, as well as closing summaries, pictures and so on. So with careful preparation it is hoped that this lecture method can help students to think critically.

There are differences in the ability to think critically very high, high, medium, low, and very low students who are taught using the *problem posing* learning model with the lecture method.

Based on the results of the second hypothesis test that has been done shows that students who are taught with the problem posing model have reached a very high category of as many as 2 students. While the lecture method students' critical thinking skills only reach the high category. The difference in the achievement of these categories is caused by the use of learning models used by educators when teaching.

The *problem posing* learning model in the learning process places more emphasis on the efforts of students in finding new knowledge and experiences. So it is not surprising that the *problem posing* model is superior in improving students' critical thinking skills. This is in accordance with the opinion of Suryosubroto (2009: 204) explaining that in the *problem posing* model students are expected to not only be able to think critically, they also have felt dependent again on external reinforcement (*reward*), but rather on internal satisfaction due to successfully fulfilling their curiosity. This is also in accordance with Asterius 'research (2016) which explains that problem posing learning is better than direct instruction both for high ability and for low ability for students' critical thinking and mathematical communication skills. Then the results of research from Shelly Hardiyanti, et al (2012) which showed that the average learning outcomes of statics in the experimental class using the problem posing method was higher by 75.91 than the average control class using the lecture method by 70.20.

Unlike the case with the lecture method, critical thinking skills tend to have an insignificant increase due to the use of the lecture method must pay attention to the material and situation and conditions when teaching. In line with this Muhibbin (2002: 203) revealed that the lecture method is the most effective method in overcoming the scarcity of literature or references in accordance with the reach of purchasing power and understanding of students. So that the lecture method can be successful in enhancing critical thinking skills, then the use of the lecture method is not merely an educator delivering the material by lecture. An educator needs additional media and additional strategies for the lecture method to succeed.

Based on the description, the lecture method does not merely stand alone in a learning process, it needs additional strategies and tactics so that learning objectives can be achieved optimally. The learning process that leaves a memorable and enjoyable experience is needed so that students can be enthusiastic in participating in learning. The more experiences gained by students in the learning process will help students to be more interested in understanding and interpreting the material they are learning. Education today is not only focused on how much material has been received by students but how students make sense of the material that has been delivered.

The *problem posing* learning model is effective in increasing students' critical thinking skills in class XI IPS subjects in SMA Negeri 13 Bandar Lampung

The third hypothesis test results show that the problem posing model is effective in improving students' critical thinking skills. The results of the calculation of the effect size obtained a value of 3.24 with a high category which means that in the post 2 activity more significantly increased the value of the problem posing learning model compared with the lecture method. Sukadi (2016: 10) states that the learning process that does not achieve a predetermined target, can be said as ineffective learning. Determination of the effectiveness of a learning model in improving students' critical thinking skills is determined from the results of the *post test* scores that have been done by students. When viewed in terms of the value of the results of the *post test* activities that have been done, the results of the acquisition of values using the *problem posing* model increased higher than the lecture method. The use of *problem posing* models for new and renewable energy, industrial and food security materials in SMA Negeri 13 Bandar Lampung is more effective in improving critical thinking skills. However, this does not mean the lecture method is not good in the learning process but the results of a more significant increase occur in the problem posing model of the lecture method based on the strengths and weaknesses of each model used in the learning process.

Conclusion

There is a difference in students 'critical thinking skills using *problem posing* learning models with students' critical thinking skills using the lecture method. The average critical thinking ability of students who use *problem posing* learning models is higher than the average critical thinking ability of students who use the lecture method with an average value of 60.95 and 48.57. And there are differences in the level of critical thinking skills of high and low students after being taught using the *problem posing* model with the lecture method. The average critical thinking ability of students who use medel *problem posing* has the highest value of 95 and the lowest 25 while the lecture method of critical thinking ability of students has the highest value of 75 and the lowest 15. The model of *problem posing* learning is more effective in improving students' critical thinking skills on geography subjects compared to the lecture method.

Bibliography

Asterius Juano and Pardjono. 2016. The Effect of Learning Problem Posing Against Critical Thinking Ability and Mathematical Communication of Class V Elementary Students. *Prima Edukasia Journal* . Vol. 4 No. January 1 , pp. 46-53.

Deswani. (2009) . *Process keperawatan and berpikir critical* . Jakarta : Salemba Medika.

Elaine B. Jonson. (2009) . *Contextual teaching and learnings* . Bandung : Mizzan Learning Center.

Muhibbin S, yeah . (2002). *Psychology Education with pendekatan baru* . Bandung : PT Youth Rosdakarya.

Shelly Hardiyanti, Tuti Iriani, and Nira Nasution. (2012) . Differences in Statics Learning Outcomes Between Lecture Method and Problem Posing Method in Class XII Students of Wood Construction Engineering at State Vocational School 1 Jakarta. *Pensil Journal of Civil Engineering Department, FT UNJ* . ISSN: 2301-8437.

Sukadi. (2016) . *Master powerful guru masa depan* . Bandung : Kolbu.
Sumantri and Johar Permana. (2001) . *Strategy belajar mengajar* . Bandung : CV. Maulana
Suryosubroto. (2009) . *Process belajar mengajar School* . Jakarta : PT Rineka Cipta .
Thobroni & Mustofa, A. (2012) . *Learning and pembelajaran* . Ar-Ruzz Media, Yogyakarta.